

Estudo Técnico Preliminar 9/2024

1. Informações Básicas

Número do processo: 64.020.004960/2023-98

2. Descrição da necessidade

A presente licitação tem por finalidade a aquisição de materiais do PIT AvEx 2024 para o 4º BAvEx e o Dst AvEx. Tal necessidade surge em virtude da alta demanda que essas unidades aéreas possuem, em especial, com a operação Escudo Yanomami, Ágata Fronteira Norte, além de diversos acionamentos para apoio aos órgãos de segurança, socorro aéreo aos vilarejos indígenas, entre outros. A necessidade de uma disponibilidade permanente, aliada à diretriz de prover aeromobibilidade ao CMA, faz com que seja necessário ter sempre em condições os materiais necessários para voar, manter e operar em ambiente de selva.

3. Área requisitante

Área Requisitante	Responsável
Pelotão de Suprimento do 4º BAvEx	WELLINGTON LUCCAS FREITAS DE ALMEIDA KLEZEWSKY PIRES - 1º TEN

4. Descrição dos Requisitos da Contratação

A aquisição deve estar em consonância com os manuais técnicos de manutenção dos fabricantes das aeronaves para que seja evitado acidentes/incidentes aéreos ligados ao fator manutenção e operações. Para isso a contratante deve restringir algumas marcas/produtos da aquisição aos itens homologados pelos fabricantes.

A contratante deve indicar de maneira clara aos licitantes, por ocasião da confecção do Edital e seus anexos, sobre quais itens possuem indicação de marca de acordo com o fabricante das aeronaves, transcrevendo ou anexando cópia da documentação do fabricante no processo.

A contratada deverá providenciar o recolhimento e o adequado descarte dos frascos de aerossol originários da contratação, recolhendo-os ao sistema de coleta montado pelo respectivo fabricante, distribuidor, importador, comerciante ou revendedor, para fins de sua destinação final ambientalmente adequada.

Nos termos do artigo 33, inciso IV, da Lei nº 12.305/2010 – Política Nacional de Resíduos Sólidos e Resolução CONAMA nº 362, de 23/06/2005, a contratada deverá efetuar o recolhimento e o descarte adequado do óleo lubrificante usado ou contaminado originário da contratação, bem como de seus resíduos e embalagens, obedecendo aos seguintes procedimentos:

- recolher o óleo lubrificante usado ou contaminado, armazenando-o em recipientes adequados e resistentes a vazamentos e adotando as medidas necessárias para evitar que venha a ser misturado com produtos químicos, combustíveis, solventes, água e outras substâncias que inviabilizem sua reciclagem, conforme artigo 18, incisos I e II, da Resolução CONAMA nº 362, de 23/06/2005, e legislação correlata;
- providenciar a coleta do óleo lubrificante usado ou contaminado recolhido, através de empresa coletora devidamente autorizada e licenciada pelos órgãos competentes, ou entregá-lo diretamente a um revendedor de óleo lubrificante acabado no atacado ou no varejo, que tem obrigação de recebê-lo e recolhê-lo de forma segura, para fins de sua destinação final ambientalmente adequada, conforme artigo 18, inciso III e § 2º, da Resolução CONAMA nº 362, de 23/06/2005, e legislação correlata; e
- exclusivamente quando se tratar de óleo lubrificante usado ou contaminado não reciclável, dar-lhe a destinação final ambientalmente adequada, devidamente autorizada pelo órgão ambiental competente, conforme artigo 18, inciso VII, da Resolução CONAMA nº 362, de 23/06/2005, e legislação correlata.

Em atendimento à Instrução Normativa SLTI/MPOG nº 01, de 19 de janeiro de 2010, publicada no Diário Oficial da União de 20/01/2010, o fornecedor deverá atender aos seguintes critérios de sustentabilidade ambiental:

- que os bens devam ser preferencialmente, acondicionado em embalagem individual adequada, com o menor volume possível, que utilize materiais recicláveis, de forma a garantir a máxima proteção durante o transporte e o armazenamento;
- que os bens não contenham substâncias perigosas em concentração acima da recomendada na diretiva RoHS (Restriction of Certain Hazardous Substances), tais como mercúrio (Hg), chumbo (Pb), cromo hexavalente (Cr(VI), cádmio (Cd), bifenil-polibromados (PBBs);
- a comprovação do disposto neste item poderá ser feita mediante apresentação de certificação emitida por instituição pública oficial ou instituição credenciada, ou por qualquer outro meio de prova que ateste que o bem fornecido cumpre com as exigências do referido dispositivo; e
- selecionada a proposta, antes da emissão da nota de empenho, em caso de inexistência de certificação que ateste a adequação, o órgão poderá realizar diligências para verificar a adequação do produto às exigências de sustentabilidade ambiental aqui previstas, correndo as despesas por conta da licitante. Caso não se confirme a adequação do produto, a proposta selecionada será desclassificada.

Para que o presente serviço seja contratado e corretamente prestado, a Contratante e Contratada exerçam práticas de sustentabilidade previstas no Termo de Referência, conforme disposto e orientado no Guia Nacional de Licitações Sustentáveis – NESLIC da Advocacia-Geral da União de 2016.

Para os materiais destinados ao pelotão SAR (Busca e Salvamento), somente serão aceitos aqueles que possuam certificação europeia comprovada por meio de selo, laudo e/ou ateste do fabricante, principalmente aqueles destinados a atividades de rapel, escalada e segurança em geral.

Em caso de divergência entre o CATMAT e a descrição do item, prevalecerá o que estiver constante na descrição feita pelo Órgão solicitante.

Há necessidade de comprovação de ANVISA, AFE, Licença sanitária e CRF, ou equivalente, para itens deste certame que incidam na Lei nº 5.991, de 17 de dezembro de 1973.

O Item 01 deverá ser o EASTMAN 2197 em virtude do princípio da economicidade e padronização, visto que a frota AIRBUS do 4º BAvEx está equipada com esse produto referenciado e, em caso de troca da marca, haverá uma baixa de todas as aeronaves para manutenções referentes à troca de óleo, de modo a garantir a segurança de voo, pois diferentes marcas de óleos não podem ser misturadas. Essa marca tem sido utilizada em consonância com o manual do motor (MEM) em seu cartão 71-00-02-940-801-A01 página 6 (anexo), onde fica explícito que o referido produto é o mais indicado para utilização na aeronave (melhor desempenho, gerando economia aos cofres públicos). Não serão aceitos em nenhuma hipótese óleos que comprovadamente resultem em aumento de manutenções e/ou redução da disponibilidade entre manutenções das aeronaves.

O Item 02 deverá ser o ROYCO 500 em virtude do princípio da economicidade e padronização, visto que a frota SIKORSKY do 4º BAvEx está equipada com esse produto referenciado e, em caso de troca da marca, haverá uma baixa de todas as aeronaves para manutenções referentes à troca de óleo, de modo a garantir a segurança de voo (óleos não podem ser misturados em caso de diferença de marcas).

O item 03 deverá ser o AEROSHELL FLUID 31 em virtude do princípio da economicidade e padronização, visto que a frota AIRBUS e os EAS (equipamentos de apoio ao solo) do 4º BAvEx estão equipados com o produto referenciado e, em caso de troca da marca, haverá uma baixa de todas as aeronaves e EAS para manutenções referentes à troca do fluido hidráulico, de modo a garantir a segurança de voo (fluidos hidráulicos não podem ser misturados em caso de diferença de marcas).

O item 04 deverá ser o AEROSHELL FLUID 41 em virtude do princípio da economicidade e padronização, visto que a frota SIKORSKY do 4º BAvEx está equipada com o produto referenciado e, em caso de troca da marca, haverá uma baixa de todas as aeronaves para manutenções referentes à troca do fluido hidráulico, de modo a garantir a segurança de voo (fluidos hidráulicos não podem ser misturados em caso de diferença de marcas).

O Item 06 deverá ser o AEROGear 823 em virtude do princípio da economicidade e padronização, visto que a frota AIRBUS do 4º BAvEx está equipada com esse produto referenciado e, em caso de troca da marca, haverá uma baixa de todas as aeronaves para manutenções referentes à troca de óleo, de modo a garantir a segurança de voo, pois diferentes marcas de óleos não podem ser misturadas. Tal necessidade está prevista no manual AIRBUS referente às manutenções das CTP das aeronaves. O cartão 20-01-01-302 página 4 (anexo) do MTC, deixa evidente que o produto permitido para aplicação é o AEROGear 823, não havendo-se aqui escusas para aceitação de outro tipo de marca.

O Item 07 deverá ser o ROYCO 555 em virtude do princípio da economicidade e padronização, visto que a frota SIKORSKY do 4º BAvEx está equipada com esse produto referenciado e, em caso de troca da marca, haverá uma baixa de todas as aeronaves para manutenções referentes à troca de óleo, de modo a garantir a segurança de voo, pois diferentes marcas de óleos não podem ser misturadas. Ademais, haverá a manutenção de 500 horas, onde será demandado uma grande quantidade deste material, sendo necessário, para minimizar os custos, manter-se o produto de referência, já existente nas aeronaves.

O Item 08 deverá ser OBRIGATORIAMENTE da marca MOBIL JET OIL II. Tal necessidade está prevista no manual GOODRICH, no cartão 25-00-17-1 página 6007 (anexo) referente às manutenções dos guinchos elétricos das aeronaves. O item "CAUTION" deste manual deixa evidente que o único produto permitido para aplicação é o MOBIL JET OIL II, não havendo-se aqui escusas para aceitação de outro tipo de marca.

Os itens 19 a 37 (inclusive) serão aceitos apenas a marca LOCTITE com sua respectiva numeração. Tal demanda está prevista nos manuais da SIKORSKY e AIRBUS como não possuidores de equivalentes, no que tange à utilização desses referidos materiais na manutenção das aeronaves.

O Item 44 (ZOK 27) deverá ser ofertado na versão CONCENTRADO, conforme descrição. Não serão aceitas propostas do produto em sua versão diluída ou "READY FOR USE".

O Item 47 deverá ser OBRIGATORIAMENTE da marca WD-40. Tal necessidade está prevista no manual GOODRICH, cartão 25-00-17-1 página 9005 (anexo) referente às manutenções dos guinchos das aeronaves. O item "Lubricant" deste manual deixa evidente que o único produto permitido para aplicação é o WD-40, não havendo-se aqui escusas para aceitação de outro tipo de marca.

O Item 53, Gel limpador de mãos, deverá acompanhar o bico dosador na proposta e deverá realizar a limpeza sem necessidade do uso de água. Não serão aceitos produtos cujo bico dosador não esteja presente.

O item 55 deve atender aos modelos de aeronaves de asa rotativa (helicópteros) dos modelos HM-4 que, para fins de comparação, são H-225 M. Para fins de comparação, atualmente, temos em estoque o produto FUELSTAT RESINAE PLUS FHR8-2 (BOXES OF 8 TEST KITS).

Os itens 62, 63 e 64 (respirador semi-facial reutilizável, cartucho químico e filtro para particulados, respectivamente) devem ser compatíveis entre si, não sendo aceitos materiais divergentes. A não compatibilidade resultará em custos desnecessários à União.

O Item 98, protetor auricular, deverá acompanhar estojo para proteção do produto. Não serão aceitas propostas de protetores auriculares que não possuam o estojo de proteção individual.

O Item 99, vermiculita, necessita possuir granulação fina ou média para fins de melhor desempenho quando destinado às atividades aeronáuticas. Não serão aceitos outros tipos de granulações.

O Item 102, luva nitrílica, deverá possuir pó/talco em seu interior, de modo a facilitar o processo de colocação da mesma, reduzindo assim o número de luvas rasgadas durante a utilização.

O Item 104 (organizador de fila) foi solicitado de acordo com as necessidades do Batalhão sobre a segurança da manutenção. Esse material serve para isolamento das áreas com potenciais riscos de tombamento e /ou alijamento de materiais (troca da pá, motor, trem de pouso e etc). A proposta deverá conter cor, modelo, medidas e prazo de entrega do material após envio da arte (envio da arte de forma digital será obrigação da contratante no ato da remessa dos empenhos).

O Item 105 deve fornecer, no mínimo, proteção comprovada contra água, hexano, thinner, gasolina/querosene, óleos e tinta. Não serão aceitas propostas que não atendam a, no mínimo, TODAS as substâncias/produtos listados acima.

O Item 106 deverá ser de alumínio e possuir a escala para catálise de, no mínimo, 2:1, 5:1, 7:1, 8:1.

O Item 107 deverá ser feito de plástico resistente e redondo, para facilitar a mistura teste das tintas aeronáuticas. O produto solicitado é equivalente aos utilizados para "bolos de pote".

Os Itens 108, 109 e 110 deverão ser fornecidos no modelo HVLP.

O Item 111 deve possuir manômetro acoplado e com medida em, pelo menos, PSI e BAR. Deve ser compatível com as pistolas de pintura dos itens 108, 109 e 110.

O Item 113, saco de lixo 100 litros, deverá ser da cor laranja e seguir os padrões ABNT 9191 e NBR 7500. Deve conter a inscrição indicativa de Resíduo Tóxico ou contaminante de forma visível na parte externa de cada saco.

O Item 114 deverá seguir exatamente as dimensões mencionadas, em virtude da compatibilidade com a ferramenta existente no Batalhão.

O Item 115 deve ser do modelo "casca de ovo". Tal utilização se faz necessária para proteção de materiais extremamente sensíveis que são despachados pelo 4º BAvEx. Como exemplo, cita-se aqui o material aviônico. Um display da aeronave, por exemplo, tem seu custo estimado em pouco mais de R\$270.000,00.

Os Itens 116, 119, 120 e 121 deverão OBRIGATORIAMENTE possuir Certificação Europeia (CE) comprovada por selo, laudo ou atestado fornecido no ato da proposta.

O item 117 deverá permitir a escolha de tamanho e cor por parte do contratante no ato de remessa dos empenhos.

No Item 121 não será aceita toda e qualquer proposta cujo produto ofertado seja da marca/modelo "K2". Há relato de Prevenção (REL PREV) disponível no sistema gerenciado pelo CENIPA que constataram a má condição desta corda após seu emprego (REL PREV anexo).

O Item 122 deverá ser do modelo utilizado em OPERAÇÕES REAIS. Não serão aceitos torniquetes destinados para treinamentos. Além disso, o fornecedor deverá remeter junto à proposta dos materiais: ANVISA, AFE, Licença Sanitária e CRF (ou documento equivalente).

Nos itens 124 e 125 apenas serão aceitas propostas e pilhas do tipo ALCALINA. Pilhas que não sejam comprovadamente alcalinas serão descartadas do certame por não atender ao pedido. Pilhas alcalinas são as únicas que conseguem manter uma continuidade das operações OVN sem necessidade de troca constante da bateria para funcionamento dos óculos (melhoria na segurança de voo e economicidade).

O Item 126 deverá possuir , no mínimo, 6 rodízios giratórios , encosto para a cabeça e espaço destinado às ferramentas na parte lateral da esteira.

O Item 127 deverá permitir que o contratante escolha a cor desejada no ato da remessa dos empenhos.

No Item 128 apenas serão aceitos coadores destinados ao uso de tintas. Coadores comuns e /ou destinados para outras finalidades serão descartados da disputa.

O Item 132 deverá permitir a escolha da cor pelo contratante no ato da remessa de empenhos (inclusive com possibilidade de pedir duas ou mais cores diferentes dentre aquelas listadas na descrição). Não serão aceitas caixas térmicas sem dreno, sem abas laterais para transporte e/ou com litragem menor do que a solicitada.

O Item 133 deverá possuir limbo móvel, pontos fosforescentes (brilha no escuro) e cordão com escalímetro (servirá como curvímetro). Tal demanda se faz necessária em virtude da complexidade das operações em ambiente de selva fechada. O pelotão de Busca e Resgate estar equipado com esse tipo de material pode ser crucial para o sucesso de um resgate e/ou evacuação.

O Item 134 deve respeitar a capacidade mínima de carga do guincho (2 TON) e acompanhar corrente, gancho e alavanca.

O Item 137 deverá possuir reservatório de água, rodízios com trava, pedestal e base para maior alcance do aparelho.

O Item 141 deverá ser do tipo tático e com capacidade modular, isto é, acrescentar e/ou redistribuir os acessórios (porta torniquete, porta rádio e etc) por todo o colete. Será obrigatório que o colete forneça espaço para inserção de placas balísticas na parte da frente e na retaguarda.

O item 142 deverá permitir escolha da cor e tamanho no ato da remessa de empenhos pelo contratante.

O Item 143 deverá ser compatível com o torniquete do Item 122 e com módulos compatíveis com o colete do item 141.

O item 147 deverá ser necessariamente a chapa de alumínio com as dimensões e tratamentos descritos, em virtude da especificidade do reparo a ser feito na aeronave. Não serão aceitas propostas com variações de dimensões, ainda que mínimas. A placa possui aplicação na manutenção de helicópteros UH-60L (Black Hawk).

O item 149 deverá ser capaz de limpar uma área de 8000 m² ou mais. Além disso, o condutor deverá ter um assento para que possa conduzir a limpadora sentado ao volante. Rotação da escova: mínimo de 155 rpm; Capacidade da bateria: mínimo de 120 Ah ; Autonomia média: mínimo de 4 horas (aproximadamente) ; Tanque de água limpa: mínimo de 55L ; Pressão de contato com a escova: mínimo de 12 g/cm². Produto de referência: KARCHER BD 50/70 R PLUS.

O item 150 será empregado nas aeronaves de asa rotativa (helicópteros) dos modelos HM-1 que, para fins de comparação, são AS 365 K2. Atualmente, o 4º BAvEx usa a fonte auxiliar da empresa GUINAULT, modelo GB 60/20.

O item 158 faz alusão a "jogo de chaves". Essas chaves são aquelas responsáveis por fechar/lacrar a maleta (chave de fechadura).

O item 171 deverá possuir rodízio, dreno e ter as abas de suporte compatíveis com elevação pelo veículo coletor de resíduos. Ademais, as cores serão escolhidas pelo contratante no ato do empenho.

Os itens 173 e 174 deverão ser fechadura padrão ZipLock, em virtude da necessidade de acondicionar corretamente os suprimentos de aviação necessários.

5. Levantamento de Mercado

A pesquisa de mercado da presente contratação levou em conta duas possibilidades para atendimento das necessidades de manutenção das aeronaves do 4º BAvEx: compra de insumos para realizar a manutenção com seus próprios recursos humanos, ou a terceirização da manutenção por empresa privada.

Atualmente o Exército Brasileiro utiliza os 2 métodos combinados. Com unidades de Aviação espalhados por Taubaté-SP, Campo Grande-MS, Manaus-AM e Belém-PA, o Exército Brasileiro opta pela terceirização da manutenção apenas quando ela for muito complexa ou exaurir a capacidade de manutenção com seus próprios recursos humanos. É senso comum no mercado de Aviação que a manutenção terceirizada possui elevados custos, por isso as Forças Armadas tendem a evitá-la ao máximo.

A manutenção de aeronaves com recursos materiais e humanos próprios é ideal para pequenas e médias intervenções, pois diminui o custo da manutenção. O Exército Brasileiro forma militares especializados na manutenção de aeronaves (Mecânicos de Voo, Inspetores e Gerentes de Manutenção) e possui uma Unidade dedicada para a manutenção de aeronaves na cidade de Taubaté-SP (Batalhão de Manutenção e Suprimento de Aviação do Exército). Essa dedicação de parte da infraestrutura e de seus recursos humanos para a manutenção de aeronaves demonstra a preocupação de possuir expertise nessa atividade para evitar a dependência de empresas nacionais ou estrangeiras por ocasião de um conflito bélico.

As empresas brasileiras homologadas para manutenção dessas aeronaves se encontram na região Sudeste do país, tornando inviável a execução de pequenas e médias intervenções de modo terceirizado pelo fator logístico. Seria perdido quase toda a vida útil das aeronaves nos deslocamentos de Manaus até os centros de manutenção.

Ao analisar contratações similares de outros órgãos e entidades, ratificou-se a decisão da aquisição de insumos para manutenção das aeronaves, pois podemos encontrar contratações similares realizados pelas Unidades de Aviação localizadas nas cidades de Taubaté-SP e Campo Grande-MS.

Em relação ao número de empresas locais capazes de atender a aquisição, os orçamentos encontrados e o histórico de aquisições apontam que não há no Estado do Amazonas o número mínimo de 3 fornecedores locais para atender os itens.

6. Descrição da solução como um todo

Item	Material	CATMAT	Especificação	Unid	Qtd
			Óleo sintético para turbinas de aeronaves, recomendado pela Safran Helicopter Engines, com as seguintes características: pour point -57°C e flash point maior que 205°C Especificações: MIL-PRF-23699F Grade/Class HTS (US); DEFSTAN 91-101 Ind 3 Amdt 1 (UK)		

1	ÓLEO LUBRIFICANTE MINERAL	478945	NSN: 9150-01-439-0756 NATO CODE: O-154 Documentação Técnica: MTC 20.01.01.302 (página 7) – 2022.07.20 e MEM 71.00.02.940.801.A01 (página 6) – 2022.06.15 Embalagem: Lata 946ml (1 US Quart) Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Não serão aceitos óleos que comprovadamente resultem em mais manutenções e/ou na redução de disponibilidade das aeronaves. Produto de Referência: Eastman Turbo Oil 2197 (EASTMAN)	Und	200
			Óleo sintético para turbinas de aeronaves, com as seguintes características: ponto de fluidez -59°C e ponto de inflamação 264°C Especificações: MIL-PRF-23699F Grade STD (US); DEFSTAN 91-101 Ind 3 Amdt 1 (UK) NSN: 9150-00-985-7099 NATO CODE: O-156		

1	ÓLEO LUBRIFICANTE MINERAL	478945	Documentação Técnica: MTC 20.01.01.302 (página 7) - 2022.07.20 Embalagem: Lata 946ml (1 US Quart) Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Royco 500 (ANDEROL)	Und	250
1	FLUIDO HIDRÁULICO	478660	Fluido hidráulico sintético base hidrocarboneto de uso aeronáutico, com as seguintes características: ponto de fluidez inferior a -55°C e ponto de inflamação 237°C Especificações: MIL-H-83282D Amdt 1 (US) NATO CODE: H-537 Documentação Técnica: MTC 20.01.01.305 (página 02) - 2022.07.20 Embalagem: Lata 3,785L (1 USG) Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto.	Und	250

			Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: AeroShell Fluid 31 (SHELL)		
1	ÓLEO LUBRIFICANTE MINERAL	478944	Óleo mineral hidráulico para sistemas de transmissões hidráulicas de uso aeronáutico, com as seguintes características: ponto de fluidez inferior a -60°C e ponto de inflamação 104°C Especificações: MIL-PRF-5606H Amdt 3 Notice 1 (US); DEFSTAN 91-48 Ind 2 Grade OM 15 (UK) NATO CODE: H-515 Documentação Técnica: MTC 20.01.01.305 (página 01) - 2022.07.20 Embalagem: Lata 3,78L (1 gal) Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: AeroShell Fluid 41 (SHELL)	Emb 3,78 L	150

1	FLUIDO HIDRÁULICO	478660	Fluido hidráulico sintético de lubrificação de emergência resistente ao fogo, com as seguintes características: ponto de fluidez inferior a -50°C e ponto de inflamação 425°C Especificações: ECS2204-4516 Documentação Técnica: MTC 20.01.01.102 (página 09) - 2022.07.21 Embalagem: Galão 5L Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Hydrosafe 620 (AIRBUS)	Und	10
			Óleo de transmissão de uso aeronáutico, com as seguintes características: pour point -36°C e flash point 222°C Especificações: MIL-PRF-6086F Grade M (USA); DEFSTAN 91-112 GRADE M (UK) NATO CODE: O-155 Documentação Técnica: MTC 20.01.01.302 (página 04) - 2022.07.20 Embalagem: Lata 5L		

1	ÓLEO LUBRIFICANTE	478879	Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: TOTAL AEROGear 823 (TOTAL)	Lata	120
1	ÓLEO LUBRIFICANTE	478945	Óleo de transmissão de uso aeronáutico, com as seguintes características: pour point -57°C e flash point 260°C Especificações: DOD-PRF-85734; DEFSTAN 91-100 Ind 3 Amdt 1 NSN: 9150-01-209-2684 NATO CODE: O-160 Documentação Técnica: MTC 20.01.01.302 (página 08) - 2022.07.20 Embalagem: Lata 946ml (1 US Quart) Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das	Lata	300

			aeronaves da Aviação do Exército. Produto de Referência: Royco Turbine Oil 555 (ANDEROL)		
1.	ÓLEO LUBRIFICANTE	478945	Lubrificante de alto desempenho para turbinas a gás de aeronaves formulado com a combinação de um fluido de base sintética altamente estável com um pacote exclusivo de aditivos químicos, com as seguintes características: pour point -59°C e flash point 270°C Especificações: MIL-PRF-23699 G; DERD 2499; DEF STAN 91-101 Iss 3 Amdt 1; DCSEA 299/a NATO CODE: O-156 Documentação Técnica: MTC 20.01.01.302 (página 07) – 2022.07.20 e GOODRICH Component Maintenance Manual Part Number 42325-16/42325-19: 25-00-17-1 (página 6007 – Rev. 8) Embalagem: Lata 1L Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Mobil Jet Oil II (EXXON MOBIL)	Und	20

1 .	ÓLEO LUBRIFICANTE	467556	Lubrificante mineral para transmissões automáticas e direções hidráulicas ATF Tipo A / Sufixo A (Dextron II ou III). Embalagem: Frasco 500ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Óleo ATF TDX Dexron 3 (PETROBRAS)	Emb 500ml	48
1 .	ÁLCOOL PROPÍLICO	475010	Álcool isopropílico 99,8% para limpeza de componentes elétricos e eletrônicos. Características: concentração mínima de 99,6%; resíduo máximo após evaporação de 0,001%; concentração máxima de água 0,70% Especificações: AIR 3660/A, 2; TT-I-735A; TL6810-0002-20 L NATO CODE: S-737 Documentação Técnica: MTC 20.01.01.102 (página 14) - 2022.07.21 Embalagem: Garrafa 1L Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil.	Litro	60

			Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Álcool Isopropílico 99,8% (AEROQUALITY)		
1	ÉTER DE PETRÓLEO	352740	Solvente para limpeza. Bezina ou Éter de Petróleo. Especificações: DCSEA 653; DIN 51631 Type III Documentação Técnica: MTC 20.04.01.102 (página 04) - 2022.07.21 Embalagem: Garrafa 1L Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Benzina ou Éter de Petróleo (AEROQUALITY)	Litro	250
			Graxa de extrema pressão com dissulfeto de molibdênio.		

1	GRAXA	214602	Especificações: MIL-G-21164 D (US); DEFSTAN 91-57 Ind 2 (UK) NATO CODE: G-353 Documentação Técnica: MTC 20.01.01.301 (página 02) – 2022.07.21 Embalagem: Lata 1kg Prazo de Validade no Ato da entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Nyco Grease GN17 (NYCO)	Lata 1 Kg	10
1	GRAXA	214602	Graxa de extrema pressão tipo ester. Especificações: MIL-PRF-81322G (US) NATO CODE: G-361 Documentação Técnica: MTC 20.01.01.301 (página 01) – 2022.07.21 Embalagem: Lata 1kg Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil do produto. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos	Lata 1 Kg	10

			fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Nyco Grease GN07 (NYCO)		
1	GRAXA	214600	Graxa mineral Especificações: MIL-PRF-24139A (US); DEFSTAN 91-12 Ind 1 (UK) NATO CODE: G-382 Documentação Técnica: MTC 20.01.01.301 (página 02) – 2022.07.21 Embalagem: Lata 1kg Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil do produto. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto/marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Nyco Grease GN15 (NYCO)	Lata 1 Kg	10
			Graxa sintética para pneus. Especificações: SAE AMS-G 4343 (US) NATO CODE: G-392 Documentação Técnica: MTC 20.01.01.301 (página 03) – 2022.07.21 Embalagem: Bisnaga 150g (5.3oz) Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil.		

1	GRAXA	450932	Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Molycote 55 O'Ring (MOLYCOTE)	Und	4
1	GRAXA	214602	Graxa com hidrocarbonetos sintéticos. Especificações: MIL-PRF-81322G (US); DEF STAN 91-52 Ind 1 Amdt 2 (UK) NATO CODE: G-395 Documentação Técnica: MTC 20.01.01.301 (página 02) – 2022.07.21 Embalagem: Lata 1kg Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil do produto. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto/marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Nyco Grease GN22 (NYCO)	Und	10
			Composto graxa grafitada antiaderente. Especificações: AMS 2518D; MIL-T-5544C; AIR 4247/A Iss 2; DEF STAN 80-80 Iss 2 NATO CODE: S-720		

1	GRAXA	214600	Documentação Técnica: MTC 20.01.01.301 (página 03) – 2022.07.21 Embalagem: Lata 1kg Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Nyco grease GNGA47 (NYCO)	Und	10
1	ADESIVO USO GERAL	479019	Pasta antiaderente com molibdênio dissulfeto. Especificações: DEFSTAN 80.81/1 (UK) NATO CODE: S-722 Documentação Técnica: MTC 20-01-01-304 (página 3) – 2022.07.19 Embalagem: Lata 1kg Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Observação: o produto/marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência [Modelo (Fabricante)]: Molycote G-Rapid Plus (MOLYCOTE)	Und	15

1.	ADESIVO USO GERAL	486417	Adesivo de travamento à base de metacrilato, indicado para roscas pequenas, com tamanho máximo M12 e aplicações que requerem resistência baixa. Possui baixa viscosidade e torque de quebra de 8.5 Nm, o produto é indicado para fixadores que necessitam de desmontagem simples, com ferramentas manuais. Embalagem : Frasco 50g Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Loctite 221 (LOCTITE)	Und	6
1.	ADESIVO USO GERAL	486417	Adesivo trava roscas de baixa resistência, com as seguintes características: cor roxa, cura anaeróbica, tempo de fixação 20 minutos, para diâmetros de 0.05 até 0.15 mm e torque de quebra 6,0 N.m Especificações: ASN-A-4017; ASNA 4017 Documentação Técnica: MTC 20.02.06.409 (página 2) – 2022.07.19 Embalagem : Frasco 50g Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Loctite 222 (LOCTITE)	Und	6

1.	ADESIVO USO GERAL	486417	Adesivo trava roscas de média resistência para metais, com as seguintes características: cor azul claro, cura anaeróbica, fixação no aço em 5 minutos e torque de quebra em porcas de 5,6 N.m Especificações: ASNA-4018; ECS 6107-3403 Documentação Técnica: MTC 20.02.06.409 (página 2) – 2022.07.19 Embalagem : Frasco 50ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Loctite 242 (LOCTITE)	Und	6
1.	ADESIVO USO GERAL	486417	Adesivo trava-rosca de uso geral, de cor azul e de resistência média que veda e prende porcas e parafusos para evitar afrouxamento devido a choques e vibrações. Funciona em todos os metais, incluindo substratos passivos, como aço inoxidável, alumínio e superfícies revestidas. Ele é comprovadamente tolerante a pequenas contaminações devido a óleos industriais, por exemplo, óleos para motores, óleos para prevenção de corrosão e fluido de corte. Embalagem : Frasco 50ml	Und	2

			Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Loctite 243 (LOCTITE)		
1.	ADESIVO USO GERAL	486417	Adesivo de travamento tixotrópico, vermelho, de resistência média/alta, à base de metacrilato para uso em geral. Tempo de fixação no aço é de 15 min, no latão de 8 min e 180 min para aço inoxidável. Fluoresce na presença de luz UV de modo a proporcionar o monitoramento. Ideal para aplicações onde a migração do adesivo deve ser prevenida. Tolerância a uma leve contaminação por óleos industriais. Indicado para todos fixadores metálicos. Embalagem : Frasco 50ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Loctite 262 (LOCTITE)	Und	3
1.	ADESIVO USO GERAL	486417	Adesivo trava roscas de alta resistência para metais, com as seguintes características: cor verde, cura anaeróbica, tempo de fixação 10 minutos, e torque de quebra 33 N.m Especificações: ASNA 4019 Documentação Técnica: MTC 20.02.06.409 (página 2) – 2022.07.19 Embalagem : Frasco 50ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto /marca deverá estar	Und	10

			homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Loctite 270 (LOCTITE)		
1.	ADESIVO USO GERAL	486417	Adesivo de travamento vermelho, com baixa viscosidade, à base de metacrilato e com alta resistência. Possui tempo de fixação no aço de 10 min, no latão de 5 min e no aço inoxidável de 15 min. Pode tolerar leves contaminações por óleos industriais. Indicado para todos os tipos de fixadores metálicos. Torque de quebra em parafusos M10 de 26Nm. Floresce sob luz UV. Embalagem : Bisnaga 20ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Loctite 271 (LOCTITE)	Und	20
1.	ADESIVO USO GERAL	486417	Trava-roscas vermelho, de alta resistência, à base de dimetracrilato e viscosidade média. Possui um tempo de fixação em aço de 10 min, em latão 5 min e em aço inoxidável 15 min, é ideal para aplicações onde qualquer migração do adesivo deve ser prevenida. Pode tolerar ligeiras contaminações de óleos industriais. Indicado para todos os parafusos de metal. Tem um torque de quebra em parafusos M10 de 23 Nm. Embalagem: Frasco 250ml	Und	3

			Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Loctite 272 (LOCTITE)		
1.	ADESIVO USO GERAL	486417	Adesivo de travamento vermelho, com alta viscosidade, a base de metacrilato e alta resistência. Possui um tempo de fixação no aço de 30 min, 25 min em latão e 270 min em aço inoxidável, tornando-o ideal para aplicações onde a migração do adesivo deve ser prevenida. Pode tolerar leves contaminações por óleos industriais. Indicado para grandes roscas. Possui fluorescência que permite o monitoramento. Embalagem: Frasco 250ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Loctite 277 (LOCTITE)	Und	3
1.	ADESIVO USO GERAL	486417	Trava-roscas líquido de média/alta resistência, desenvolvido para o travamento e a vedação de fixadores rosqueados. Devido à sua baixa viscosidade e ação capilar, o produto passa entre as roscas engatadas e elimina a necessidade de desmontagem antes da aplicação. O produto cura quando confinado na ausência de ar entre superfícies metálicas bem ajustadas e evita afrouxamentos e vazamentos devidos a choques e vibrações. O produto também pode preencher porosidades em soldas,	Und	3

			peças fundidas e peças de metal em pó. Embalagem: Frasco 50g Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Loctite 290 (LOCTITE)		
1.	ADESIVO USO GERAL	486417	Adesivo acrílico, monocomponente, que oferece soluções em adesão estrutural para materiais como vidro, metal, cerâmicas e plásticos. Aplicações típicas incluem adesão do espelho retrovisor no vidro. Compensa a diferença de expansão térmica das peças. Para garantir uma cura rápida e confiável, ativador deve ser utilizado. Embalagem: Frasco 50g Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Loctite AA 319 (LOCTITE)	Und	3
1.	ADESIVO USO GERAL	486417	Adesivo instantâneo à base etil cianoacrilato, transparente e de alta viscosidade, para uso geral. indicado para metais, borrachas e plástico. Indicado também para poliolefinas em combinação com Primer LOCTITE® 770 ou LOCTITE® 7239. Tem um tempo de fixação de 20 a 40 segundos. Embalagem: Frasco 100g Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil.	Und	3

			Produto de Referência: Loctite 422 (LOCTITE)		
1 .	ADESIVO USO GERAL	486417	Adesivo instantâneo desenvolvido para a montagem de materiais difíceis de aderir, que exigem distribuição uniforme da tensão e alta resistência à tração e/ou cisalhamento. O produto fornece rápida adesão de uma ampla gama de materiais, incluindo metais, plásticos e elastômeros. A consistência do gel permite a aplicação sobre cabeça e vertical. É adequado para aderir materiais porosos, como madeira, papel, couro e tecido. Perfeito para todos os trabalhos de reparo rápido. Embalagem: Frasco 20g Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Loctite 454 (LOCTITE)	Und	4
1 .	ADESIVO USO GERAL	486417	Adesivo veda roscas acrílico de baixa resistência à base de éster dimetacrilato, com as seguintes características: cor marrom, cura anaeróbica e densidade à @ 25°C de 1,05 Especificações: SAP-Code 1306150 (Airbus Ref.); CMS N4988239567 Documentação Técnica: MTC 20.01.01.102 (página 66) – 2022.07.21 Embalagem : Frasco 50ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto /marca deverá estar	Und	2

			homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Loctite 566 (LOCTITE)		
1 .	ADESIVO USO GERAL	486417	Produto de fixação anaeróbico, verde, à base de éster dimetacrilado, apresenta baixa viscosidade e tempo de cura médio, indicado para uma folga diametral de no máximo 0.1 mm. É um produto de alta resistência para aplicações que requerem uma adesão permanente. O tempo de fixação no aço é de 25 min e a temperatura de trabalho vai de -55 até +150°C. A fluorescência permite o monitoramento da presença do produto. Embalagem : Frasco 50g Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Loctite 601 (LOCTITE)	Und	3
1 .	ADESIVO USO GERAL	486417	Adesivo composto de retenção de uso geral de alta resistência e cura rápida, com as seguintes características: cor verde e viscosidade à 25°C de 2000 mPa.s Especificações: ECS 6107-3287 Documentação Técnica: MTC 20.02.08.412 (página 2) – 2022.07.19 Embalagem : Frasco 50g	Und	3

			Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Produto de Referência: Loctite 638 (LOCTITE)		
1.	ADESIVO USO GERAL	486417	Produto de fixação anaeróbico, verde, à base de éster metacrilato, apresenta baixa viscosidade, ideal para peças que requerem um tempo de posicionamento maior. O tempo de fixação no aço é de 2h. Também utilizado em metais ativos, como latão. É um produto de alta resistência com boa resistência à temperatura. A folga entre os diâmetros pode ser de no máximo 0.1 mm e a temperatura de trabalho vai de -55 até +175° C. A fluorescência permite o monitoramento da presença de produto. Embalagem : Frasco 50g Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Loctite 640 (LOCTITE)	Und	3
			Composto de retenção de alta resistência desenvolvido para adesão de peças de encaixe cilíndricas, particularmente onde há folgas, sem a necessidade de reusinagem. O produto cura quando confinado na ausência de ar entre		

1.	ADESIVO USO GERAL	486417	superfícies metálicas bem ajustadas e evita afrouxamentos e vazamentos devidos a choques e vibrações. Apresenta excelentes características de cura de folga e também é adequado para reter calços. Embalagem : Bisnaga 50g Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Loctite 660 (LOCTITE)	Und	3
1.	ADESIVO USO GERAL	478950	Ativador à base de solvente para preparação de superfícies que oferece cura a baixa temperatura. Produto desenvolvido para promover a velocidade de cura dos adesivos e selantes anaeróbicos LOCTITE sem perda significativa da resistência da junta. Ele é especialmente recomendado para aplicações com metais passivos ou superfícies inertes e com grandes folgas. Oferece bom desempenho em baixas temperaturas de cura e é recomendado quando a temperatura de aplicação é inferior a 15°C. Embalagem : Frasco 128g Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Loctite 7649 (LOCTITE)	Und	4
			Agente anticorrosivo. Especificações: MIL-PRF-8116; ECS 7009 Documentação Técnica: MTC 20.01.01.102 (página 48) – 2022.07.21		

1	ANTICORRO-SIVO	235936	Embalagem : Frasco 160ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto; apresentação da documentação comprobatória da Normas Internacionais de Aprovação, emitida pela Empresa ou pelo Órgão Homologador. Produto de Referência [Modelo (Fabricante)]: CA1010-1160 (PPG AEROSPACE)	Und	16
1	SELANTE	601571	Composto selante. Especificações: MIL-S-38249 Type 1; ASNA 4187BF; ECS 6048-1086; LAC 40-776 Documentação Técnica: MTC 20.01.01.102 (página 54) – 2022.07.21 Embalagem : Frasco 6 oz. Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto/marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto; apresentação da documentação comprobatória da Normas Internacionais de	Und	30

			Aprovação, emitida pela Empresa ou pelo Órgão Homologador. Produto de Referência [Modelo (Fabricante)]: DAPCO 2100 (Solvay)		
1	SELANTE	601571	Composto selante inibidor de corrosão. Especificações: MIL S-81733 TYP-II-2 Documentação Técnica: MTC 20.01.01.102 (página 69) – 2022.07.21 Embalagem : Kit Parte A/B Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto; apresentação da documentação comprobatória da Normas Internacionais de Aprovação, emitida pela Empresa ou pelo Órgão Homologador. Produto de Referência [Modelo (Fabricante)]: PR 870 (PPG AEROSPACE)	Und	6
			Composto selante. Especificações: MIL-S8802 Documentação Técnica: MTC 20.01.01.102 (página 55) – 2022.07.21 Embalagem : Kit Parte A/B		

1	SELANTE	601571	Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto; apresentação da documentação comprobatória da Normas Internacionais de Aprovação, emitida pela Empresa ou pelo Órgão Homologador. Produto de Referência [Modelo (Fabricante)]: PR 1440B2-K25 (PPG AEROSPACE)	Und	25
1	SELANTE	478813	Composto selante. Especificações: AIMS 04-05-006; IPS04-05-006-02 Documentação Técnica: MTC 20.01.01.102 (página 56) – 2022.07.21 Embalagem : Kit Parte A/B Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto; apresentação	Und	8

			da documentação comprobatória da Normas Internacionais de Aprovação, emitida pela Empresa ou pelo Órgão Homologador. Produto de Referência [Modelo (Fabricante)]: PR 1773 B2 (PPG AEROSPACE)		
1	ANTICORROSIVO	479351	Produto de revestimento para proteção de metais comumente usados em estruturas de fuselagem e em componentes aeroespaciais da corrosão. Pode ser usado em todas as áreas da fuselagem em superfícies pintadas e não pintadas. Combina boas propriedades de penetração com excelentes características de inibição de corrosão. Especificações: MIL-PRF-16173 Rev. E Class 1 Grade 1 & 4; ECS 2287.10; AIMS 09-08-000; AIMS 09-08-002; ECS 2287.20 Documentação Técnica: MTC 20.01.01.102 (página 48) – 2022.07.21 Embalagem : Lata aerossol 400ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Obrigatório: porte da FISPQ no transporte e entrega junto	Und	3

			com o produto; apresentação da documentação comprobatória da Normas Internacionais de Aprovação, emitida pela Empresa ou pelo Órgão Homologador. Produto de Referência: ARDROX AV30 (Chemetall)		
1.	SOLUÇÃO LIMPEZA	317239	Fluido de limpeza e inibidor de corrosão concentrado, de uso aeronáutico, para compressores e turbinas, com as seguintes características: PH 7.2-7.5, densidade relativa 1.01, flash point >100°C, boiling point 100°C. Especificações: MIL-PRF-85704C Type 11 (US); DEFSTAN 79-18 (UK) Documentação Técnica: MEM 71-00-02-940-801-A01 (página 8) – 2022.06.15 Embalagem: Galão 25L (6,6 US Gallon) Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto; apresentação da documentação comprobatória da Normas Internacionais de Aprovação, emitida pela Empresa ou pelo Órgão Homologador.	Und	18

			Produto de Referência [Modelo (Fabricante)]: ZOK 27 (AIRWORTHY Ltd G.B.)		
1	GRAXA	127655	Lubrificante não oleoso com válvula “inverta”: limpa, lubrifica e protege mecanismos delicados; dissolve e remove graxas e óleos; ação desaguante em componentes eletroeletrônicos; inibe corrosão; forma película fina sem oleosidade. Pode ser utilizado em ferramentas elétricas, sistemas de ignição, porcas e parafusos, motores elétricos e cabos, micrômetros e paquímetros, equipamentos de escritório, fechaduras e dobradiças, desmoldante para moldes, conectores eletrônicos. Composição: hidrocarbonetos e aditivos (gás CO2). Especificação: MIL-C-23411A Embalagem: Aerossol 300ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência [Modelo (Fabricante)]: LPS 1 (ITW Chemical Products Ltda.)	Und	100
			Lubrificante industrial extra forte: penetra, remove e repele a umidade; forma película oleosa não secativa de longa duração; desengripa peças oxidadas e congeladas. Protege contra corrosão, peças ferrosas		

1	GRAXA	127655	estocadas, por mais de um ano; excelente para proteger ferramentas; não contém silicone ou solventes clorados; não condutivo; seguro sobre a maioria das superfícies. Pode ser aplicado em rolamentos e válvulas, cabos e correntes, bits, bedames e fixadores, máquinas e motores elétricos, peças metálicas, peças estocadas, equipamentos de produção, polias e roldanas, barramentos e guias. Composição: hidrocarbonetos e aditivos (gás CO2). Especificação: MIL-PRF-16173E GRAU 3 CLASSE 1 Embalagem: Aerossol 300ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência [Modelo (Fabricante)]: LPS 2 (ITW Chemical Products Ltda.)	Und	100
			Lubrificante e anticorrosivo multiuso com bico aplicador, que possa ser aplicado ao trem de aterragem e compartimento das rodas, geradores de emergência e outras partes da aeronave para se prevenir a formação de corrosão e se garantir o seu funcionamento. Prazo de validade do produto: 10 anos		

1	ANTICORROSIVO	479122	Características Físicas: Spray - Aerossol / Granel – Líquido / Cor: Âmbar Claro / Aroma: Agradável / Ponto Ignição: 47°C (Taça Fechada) / Peso Capilar: 0,004 g/cm³ / Grossura Capilar: 49,5 µm / Temperatura Funcionamento: -50°C a +150°C / Ponto Ebulição: 176°C a 760 mmHg / Ponto de Congelação / Ponto de Fluência: < -66°C / Rendimento: 15 – 26m²/litro / Força Dielétrica: 43.000 Volts / Solubilidade: Insolúvel em Água. Embalagem: Lata 300ml Prazo de validade no ato da entrega: mínimo de 80% da vida útil. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto; apresentação da documentação comprobatória da Normas Internacionais de Aprovação, emitida pela Empresa ou pelo Órgão Homologador. Produto : WD-40 Multiusos Aerossol (WD-40) Não serão aceitas outras marcas, em virtude da exclusividade deste item previsto pelo manual	Und	250
			Adesivo colagem - selante de silicone multiuso para uso aeronáutico. Referências: CMS N4988757730; SAP-Code 1306154 Documentação Técnica: MTC 20.01.01.102 (página 62) Embalagem: Bisnaga 300ml		

1 .	ADESIVO USO GERAL	478876	Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: O produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves. Referência (Marca): CAF730 (ELKEM SILICONES); RTV730 (RHODIA CHIMIE)	Und	4
1 .	SILICONE	478769	Silicone monocomponente de cura acética que vulcaniza à temperatura ambiente. Possui as seguintes características: 100% borracha de silicone, alta resistência mecânica, resiste a temperaturas de -60 °C a 204°C, resiste a intempéries e consistência pastosa, sem escorrer. Especificações: MIL-A-46106 TYP 1; DHS 173-143.20; ECS 6056-1036 Documentação Técnica: MTC 20.01.01.102 (página 57) Embalagem: bisnaga 300ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército.	Bisnaga	20

			Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Referência (Marca): RTV 732 Selante (DOWSIL)		
1	GRAXA	214602	Composto isolante elétrico para proteção de circuitos elétricos e eletrônicos contra corrosão. Especificação: SAE AS 8660 1 NATO CODE: S-736 Documentação Técnica: MTC 20.01.01.102 (página 2) – 2022.07.21 Embalagem: Tubo 150g (5.3 oz) Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: o produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves da Aviação do Exército. Obrigatório: porte da FISPQ no transporte e entrega junto com o produto. Referência (Marca): Nyco grease GN69 (NYCO) ou Molycote 4 (DUPONT)	Und	2
			Cola de contato versátil e de alto desempenho recomendada para unir materiais macios (couro, tecido) com materiais duros (madeira, compostos, metal). Especificação: DHS 171-141.20		

1.	ADESIVO USO GERAL	454016	Referências: SAP-Code 1232795; CMS N4966011420 Documentação Técnica: MTC 20.01.01.102 (página 56) Embalagem: Bisnaga 125ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: O produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves. Referência (Marca): Bostik 1400 (BOSTIK HOTLINE)	Bisnaga	4
1.	ADESIVO USO GERAL	454016	Cola estrutural de uso aeronáutico – componente A e B – com as seguintes características: flash point A 120°C / B >93°C, temperatura de serviço 82°C e tempo de cura 35min. (25°C). Especificação: DHS 171-200.40 Referências: SAP-Code 1170516; CMS N4966946512 Documentação Técnica: MTC 20.01.01.102 (página 48) Embalagem: Kit Partes A + B Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: O produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca)	Kit	20

			conforme manuais de manutenção e operação das aeronaves. Referência (Marca): Hysol EA 9309.3NA A+B (LOCTITE)		
1.	ADESIVO USO GERAL	478767	Gel limpador de mãos, uso profissional. Não deve possuir solventes de petróleo e derivados na composição. Seu uso não deve exigir água para funcionamento. Remoção de graxa, tinta, epóxis, colas e afins. Embalagem com bico dosador. Validade de pelo menos 80% no ato da entrega. Não serão aceitas embalagens com bico danificado e/ou com danos que comprometam a integridade do produto. Embalagem: Galão 4 kg (ou aproximado). Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produto de Referência: Fast Orange Loctite 394833 (LOCTITE)	Und	30
1.	MEDIDOR LABORATÓRIO	465621	Fluido para tratamento e prevenção de desenvolvimento microbiano em combustível de aviação. Especificação: MIL-S-53021A Documentação Técnica: MTC 20.01.01.102 (página 78 e 84) Embalagem: Frasco 1L. Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: O produto /marca deverá estar	Und	4

			homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves. Produtos de Referência: Kathon FP 1,5 (ROHM & HAAS Co.); Biobor JF (HAMMONDS)		
1	MEDIDOR LABORATÓRIO	465621	Kit teste de combustível para detecção de micro-organismos específicos que danificam o combustível aeronáutico. Teste com resultado dentro de 15 minutos e com especificação HR-2-011B. Embalagem: Kit Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Observação: O produto /marca deverá estar homologado pelos fabricantes (Eurocopter, Helibras, Turbomeca) conforme manuais de manutenção e operação das aeronaves. Produtos de Referência: FUELSTAT (Conidia Bioscience Ltd)	Und	40
1	ESPONJA LIMPEZA	225905	Folha abrasiva média de 134x240mm, grão 100/150; usada em construções, reformas e serviços gerais, substituindo a palha, lã de aço e folha de lixa grão fino, permitindo sua utilização por diversas vezes. É utilizada para acabamento com geometrias complexas e áreas de difícil acesso, condicionamento de peças na industrias automotiva e	Und	150

			aeronáutica antes de pintura ou repintura, limpeza de ferrugem e limpeza em geral. Embalagem: Unidade Produtos de Referência: Scotch Brite (3M)		
1	TINTA	326470	Tinta spray brilhante de uso geral de alta qualidade e durabilidade, secagem rápida, excelente acabamento, alta resistência a intempéries e ótima cobertura. Indicado para uso interno e externo em metais, madeira, gesso, papel, uso automotivo, vime, acrílico, alvenaria, geladeiras, bicicletas, móveis de aço, brinquedos, objetos artesanais, decoração em geral. Cor: Verde OTAN ou preto (a ser definido pelo contratante no ato de remessa de empenhos). Embalagem: Lata aerossol 400ml Prazo de Validade no Ato da Entrega: mínimo de 80% da vida útil. Produtos de Referência: Colorgin Uso Geral (Colorgin)	Lata 400 ml	20
1	SERINGA	439645	Seringa hipodérmica atóxica, apirogênica, estéril e sem agulha. Com bico liso e capacidade de 20ml. Embalagem: unidade Produtos de Referência: Descarpac, Rymco, ou outra de qualidade igual ou superior.	Und	100
			Pincel Antiestático tipo US-18 para limpeza completa e segura de equipamentos e componentes eletrônicos.		

1	PINCEL	390316	Sua função é remover partículas de sujeira de uma placa, garantindo sua proteção através da dissipação de cargas eletrostáticas. Possui tanto o cabo quanto as cerdas fabricados em polipropileno preto. Possui aproximadamente 15cm de comprimento total, 2cm de comprimentos das cerdas e 1,5cm de largura das cerdas. Peso: 14 g. Embalagem: unidade Produtos de Referência: Pincel Antiestático US-18	Und	50
1	PALITO	432383	Palito de madeira para sorvetes e picolés com ponta redonda. Comprimento mínimo: 10 cm Embalagem: pacote com 100 unidades Produtos de Referência: Theoto	Pacote 100 und	10
1	VASELINA	479064	Vaselina sólida industrial derivada do petróleo. Formulada com vaselina de alta pureza e aditivos, permite a lubrificação com elevada estabilidade mecânica, suportando altas temperaturas. Lubrifica e protege antenas elétricas, canaletas dos vidros de automóveis, fechaduras, pinos de capô, cadeados, correntes, portões de alumínio, sendo muito usada como desmoldante. Utilizada como desmoldante, lubrificante, em locais com temperatura até 60°C, protegendo as superfícies metálicas contra queimaduras de cimento. Também facilita a passagem de fios pelas tubulações, proteção e lubrificação de	Und	4

			instrumentos de medição. Temperatura máxima 60°C. Embalagem: Pote 450g Produtos de Referência: Vaselina sólida (VONDER)		
1.	MÁSCARA CONTRA GASES	301258	Respirador semi-facial reutilizável. Deve possuir tiras elásticas ajustáveis, suporte para cartuchos e filtros de ar removíveis. Tamanho , M ou G (a ser definido pelo contratante no momento da solicitação via empenho). Modelo de referência: Respirador Reutilizável Semifacial 3M 7503	Und	50
1.	FILTRO RESPIRADOR	341743	Cartucho químico compatível com a máscara contra gases do item anterior (item 70). Deve oferecer, no mínimo, proteção contra Vapores Orgânicos, Gases ácidos, Amônia, metilamina e Formaldeído. Características adicionais: suporte para filtro de ar de feltro. Modelo de referência: Cartucho de Vapor de Mercúrio/Vapor Orgânico /Gás Ácido 3M 6007	Und	400
1.	FILTRO RESPIRADOR	440398	Filtro para particulados. Deve oferecer, no mínimo, proteção contra poeira, névoa, fumos e vapores orgânicos. Compatível com o cartucho e máscara dos itens anteriores. Modelo de referência: Filtro para Particulados 3M 2097	Und	400
			Tubo termocontrátil de poliolefina reticulada; com diâmetro expandido de 1.0 mm; parede fina e baixa temperatura de contração;		

1	TUBO ISOLANTE	330313	para aplicações eletro-eletrônicas, isolamento de fios, cabos, conectores e componentes eletrônicos; cor preta; Embalagem: 1m	Metro	50
1	TUBO ISOLANTE	330313	Tubo termocontrátil de poliolefina reticulada; com diâmetro expandido de 2.0 mm; parede fina e baixa temperatura de contração; para aplicações eletro-eletrônicas, isolamento de fios, cabos, conectores e componentes eletrônicos; cor preta; Embalagem: 1m	Metro	50
1	TUBO ISOLANTE	330313	Tubo termocontrátil de poliolefina reticulada; com diâmetro expandido de 3.0 mm; parede fina e baixa temperatura de contração; para aplicações eletro-eletrônicas, isolamento de fios, cabos, conectores e componentes eletrônicos; cor preta; Embalagem: 1m	Metro	50
1	TUBO ISOLANTE	472577	Tubo termocontrátil de poliolefina reticulada; com diâmetro expandido de 4.0 mm; parede fina e baixa temperatura de contração; para aplicações eletro-eletrônicas, isolamento de fios, cabos, conectores e componentes eletrônicos; cor preta; Embalagem: 1m	Metro	50
1	TUBO ISOLANTE	424814	Tubo termocontrátil de poliolefina reticulada; com diâmetro expandido de 6.0 mm; parede fina e baixa temperatura de contração; para aplicações eletro-eletrônicas, isolamento de fios,	Metro	50

			cabos, conectores e componentes eletrônicos; cor preta; Embalagem: 1m		
1	TUBO ISOLANTE	330313	Tubo termocontrátil de poliolefina reticulada; com diâmetro expandido de 8.0 mm; parede fina e baixa temperatura de contração; para aplicações eletro-eletrônicas, isolamento de fios, cabos, conectores e componentes eletrônicos; cor preta; Embalagem: 1m	Metro	50
1	TUBO ISOLANTE	330313	Tubo termocontrátil de poliolefina reticulada; com diâmetro expandido de 10.0 mm; parede fina e baixa temperatura de contração; para aplicações eletro-eletrônicas, isolamento de fios, cabos, conectores e componentes eletrônicos; cor preta; Embalagem: 1m	Metro	50
1	TERMINAL ELÉTRICO	262396	Terminal tipo anel isolado, com bocal 3mm, para fios de bitola 0,25 – 1,60mm (22-16 AWG).	Und	200
1	TERMINAL ELÉTRICO	262396	Terminal tipo anel isolado, com bocal 4mm, para fios de bitola 0,25 – 1,60mm (22-16 AWG).	Und	200
1	TERMINAL ELÉTRICO	262396	Terminal tipo anel isolado, com bocal 5mm, para fios de bitola 0,25 – 1,60mm (22-16 AWG).	Und	200
1	TERMINAL ELÉTRICO	262396	Terminal tipo anel isolado, com bocal 6mm, para fios de bitola 0,25 – 1,60mm (22-16 AWG).	Und	200

1 .	TERMINAL ELÉTRICO	262396	Terminal tipo anel isolado, com bocal 8mm, para fios de bitola 0,25 – 1,60mm (22-16 AWG).	Und	200
1 .	TERMINAL ELÉTRICO	262396	Terminal tipo anel isolado, com bocal 10mm, para fios de bitola 0,25 – 1,60mm (22-16 AWG).	Und	200
1 .	TERMINAL ELÉTRICO	458560	Terminal tipo anel isolado, com bocal 4mm, para fios de bitola 1,30 – 2,60mm (16-14 AWG).	Und	200
1 .	TERMINAL ELÉTRICO	458560	Terminal tipo anel isolado, com bocal 5mm, para fios de bitola 1,30 – 2,60mm (16-14 AWG).	Und	200
1 .	TERMINAL ELÉTRICO	458560	Terminal tipo anel isolado, com bocal 6mm, para fios de bitola 1,30 – 2,60mm (16-14 AWG).	Und	200
1 .	TERMINAL ELÉTRICO	458560	Terminal tipo anel isolado, com bocal 8mm, para fios de bitola 1,30 – 2,60mm (16-14 AWG).	Und	200
1 .	ABRAÇADEIRA	310569	Abraçadeira de nylon, tamanho 100 x 2,5mm, cor preta.	Pct 100 und	10
1 .	ABRAÇADEIRA	310569	Abraçadeira de nylon, tamanho 140 x 3,6mm, cor preta.	Pct 100 und	10
1 .	SOLDA ESTANHO	370651	Estanho em fio 1mm para solda, carretel de 500g.	Rolo 500 g	5
1 .	FITA ISOLANTE ELÉTRICA	483487	Fita de auto fusão para baixa e média tensão, tamanho 19 mm x 10 m, temperatura	Und	5

			máxima de emergência de até 90°, resistência à tensão até 69kv.		
1.	LUVA EMENDA COMPRESSÃO	403104	Luva de emenda isolada, para fios de bitola 0,25 - 1,60 mm ² (22-16 AWG). Feita de cobre eletrolítico estanhado eletroliticamente e isolamento de PVC rígido com retardamento de chama. T. de trabalho -40°C à +90°C	Und	200
1.	LUVA EMENDA COMPRESSÃO	403104	Luva de emenda isolada, para fios de bitola 1,30 - 2,60 mm ² (16-14 AWG). Feita de cobre eletrolítico estanhado eletroliticamente e isolamento de PVC rígido com retardamento de chama. T. de trabalho -40°C à +90°C	Und	200
1.	LUVA EMENDA COMPRESSÃO	403104	Luva de emenda isolada, para fios de bitola 2,70 - 6,60 mm ² (12-10 AWG). Feita de cobre eletrolítico estanhado eletroliticamente e isolamento de PVC rígido com retardamento de chama. T. de trabalho -40°C à +90°C	Und	200
1.	LUVA EMENDA COMPRESSÃO	403104	Luva de emenda isolada, para fios de bitola 10mm ² (8 AWG). Feita de cobre eletrolítico estanhado eletroliticamente e isolamento de PVC rígido com retardamento de chama. T. de trabalho -40°C à +90°C	Und	200
1.	TERMINAL ELÉTRICO	397718	Terminal elétrico engate tipo fêmea isolado EF203, para fios de bitola 0,25 - 1,00mm ² (22-18 AWG). Feita de cobre eletrolítico estanhado eletroliticamente e isolamento de PVC rígido com retardamento de chama. T. de trabalho -40°C à +90°C	Und	200

1 .	TERMINAL ELÉTRICO	397718	Terminal elétrico engate tipo fêmea isolado EF4218, para fios de bitola 1,10 - 2,60mm ² (16-14 AWG). Feita de cobre eletrolítico estanhado eletroliticamente e isolamento de PVC rígido com retardamento de chama. T. de trabalho -40°C à +90°C	Und	200
1 .	TERMINAL ELÉTRICO	397719	Terminal elétrico engate tipo fêmea isolado EF4234, para fios de bitola 2,70 - 6,60mm ² (12-10 AWG). Feita de cobre eletrolítico estanhado eletroliticamente e isolamento de PVC rígido com retardamento de chama. T. de trabalho -40°C à +90°C	Und	200
1 .	TERMINAL ELÉTRICO	364748	Terminal elétrico engate tipo macho isolado EM4263, para fios de bitola 0,25 - 1,00 mm ² (22-18 AWG). Feita de cobre eletrolítico estanhado eletroliticamente e isolamento de PVC rígido com retardamento de chama. T. de trabalho -40°C à +90°C	Und	200
1 .	TERMINAL ELÉTRICO	364748	Terminal elétrico engate tipo macho isolado EM4278, para fios de bitola 1,30 - 2,60 mm ² (16-14 AWG). Feita de cobre eletrolítico estanhado eletroliticamente e isolamento de PVC rígido com retardamento de chama. T. de trabalho -40°C à +90°C	Und	200
1 .	TERMINAL ELÉTRICO	364748	Terminal elétrico engate tipo macho isolado EM4290, para fios de bitola 2,70 - 6,60 mm ² (12-10 AWG). Feita de cobre eletrolítico estanhado eletroliticamente e isolamento de PVC rígido com retardamento de chama. T. de trabalho -40°C à +90°C	Und	200

1	ORGANIZADOR CABOS	485191	Organizador de cabos em espiral com 12 mm de diâmetro, cor preta. Comprimento: 1,5m	Und	50
1	ORGANIZADOR CABOS	485191	Organizador de cabos em espiral com 20 mm de diâmetro, cor preta. Comprimento: 1,5m	Und	50
1	PROTETOR AURICULAR	337283	Protetor auricular com cordão; tamanho único com 3 flanges tipo cogumelo; macio e antialérgico; podem ser reutilizados e lavados com água e sabão neutro; fabricado em copolímero; atenuação: no mínimo 15dB. Adicionais: com estojo de proteção. Produto de referência: Protetor auricular 3M CA - 5745	Und	3000
1	VERMICULITA	217996	Vermiculita expandida granulação fina ou média. Embalagem: saco de 10kg Produto de referência (Fabricante): Vermiculita Expandida (Brasil Minérios).	Saco 100 L	100
1	ARAME	355417	Arame liso de aço inox com diâmetro de 0.8mm Embalagem: 1kg	KG	10
1	ARAME	355417	Arame liso de aço inox com diâmetro de 0.6mm Embalagem: 1kg	KG	10
1	LUVA BORRACHA	355686	Luva nitrílica multiuso de proteção; cor azul; tamanho G Embalagem: caixa com 100 unidades. Adicionais: com pó /talco	Caixa	20

			Produto de referência (Fabricante): Luva nitrílica (Descarpack)		
1	LUVA SEGURANÇA	440994	Luva de segurança multitalo, tricotada em fios de poliamida, recoberta de poliuretano na palma e dedos, punho tricotado com elástico, tamanho G. Embalagem: par de luvas. Produto de referência (Fabricante): Luva multitalo (Teknolovas).	Par	350
1	PEDESTAL	374519	Organizador de fila, tipo pedestal para isolamento de área com sistema de fita retrátil na parte superior. Comprimento mínimo da fita: 2 metros. Adicionais: corpo do pedestal em alumínio. Base redonda. Deverá possuir resistência à intempéries (proteção contra ferrugem). Fita na cor preta, zebra ou azul royal (tons semelhantes de azul poderão ser aceitos, a critério do contratante), a critério do contratante. Fita personalizada com logo da OM (arte será enviada no ato do empenho pelo contratante para o contratado).	Und	60
1	CREME HIDRATANTE	479909	Creme protetor de mãos , tipo: luva química. Deve fornecer proteção, no mínimo, contra: água, hexano, thinner, gasolina /querosene, óleos e tinta. Embalagem: 200 g Modelo de referência: Crema Protetor Luva	Bisnaga 200 g	50

			Química 3 em 1 Nutriex Grupo 3 200g		
1	RÉGUA COMUM	270870	Régua de alumínio para mistura de tintas, tipo: catálise universal. Modelo de referência: (7:1, 5:1, 2: 1, 8:1) Marca de referência: Sherwin Williams	Und	3
1	POTE ALIMENTOS	443403	Embalagem para mistura de tintas. Características adicionais: redondo. Resistente a tintas automotivas/ aeronáuticas. Capacidade mínima de 200 ml.	Emb 100 und	25
1	PISTOLA PINTURA	434484	Pistola para pintura automotiva, 0,8 mm HVLP	Und	2
1	PISTOLA PINTURA	434484	Pistola para pintura automotiva, 1,4 mm HVLP	Und	2
1	PISTOLA PINTURA	434484	Pistola para pintura automotiva, 1,8 mm HVLP	Und	2
			Regulador de pressão pneumático para pistola de pintura automotiva.		

1	REGULADOR DE PRESSÃO PNEUMÁTICO	479878	Fixação por pressão, com manômetro escalado em PSI ou BAR. Bitola ¼ Polegada	Und	3
1	SUPORTE PARA LIXAS	436388	Suporte manual para lixas, tamanho 245mm x 105mm	Und	5
1	SACO PLÁSTICO LIXO	430572	Saco de lixo 100 litros produzido dentro dos padrões da ABNT 9191 e NBR 7500, cor laranja. Para descarte de resíduos químicos. Embalagem: 100 com sacos	Pacote 100 und	25
1	DISCO CORTE	463237	Disco de corte 3". Diâmetro do disco: 76,2 mm . Diâmetro central: 9,525mm . Espessura: 1,6 mm. Material abrasivo. Modelo de referência: EDA Profissional 0GF	Und	40
1	PLACA ESPUMA	604079	Espuma Acústica Caixa de Ovo 1,90x1 m. Aplicação: embalagem para materiais sensíveis (OVN, componentes da aeronave e etc)	Und	50

1	ACESSÓRIO EQUIPAMENTO DE SEGURANÇA	479712	Triângulo de evacuação com alças para os ombros. Especificações técnicas: com 3 alças reguláveis, sendo 2 que passam pelos ombros e uma para passar entre as pernas. Ponto de fixação constituído por três anéis metálicos com resistência aproximada de 20 kN. Carga nominal máxima: 140 kg. Vida útil média de 10 anos a partir da data de fabricação. Permite trabalhar em temperaturas de - 40° e + 80° C. Materiais: Poliéster e aço. Certificações: CE EN 1497 ou EN 1498.	Und	10
1	CAPACETE SEGURANÇA	485461	Capacete de proteção para resgate em local de difícil acesso. Especificações técnicas: sistema de ajuste morfológico; arejamento para a cabeça; diâmetro da cabeça de 53 a 63 cm; com ganchos posicionados para fixar lanterna. Cor Laranja. Modelo: Capacete Focus Tipo III Classe A Laranja; Marca: Montana; Fabricante: Montana; Garantia: 12 meses	Und	30
1	LUVA SEGURANÇA	465865	Luva para rapel. Descrição: Luva Rapel Vaqueta / Nylon Modelo Glute Luva de segurança modelo 5 dedos confeccionada em couro de vaqueta na cor natural, com punho e dorso em nylon na cor preta. Com reforço especial externo transversal na palma em couro de vaqueta, reforço interno em couro de raspa nas pontas dos dedos e reforço externo em couro de raspa nas pontas dos dedos. Tamanhos M e G.	Par	30
			MOSQUETÃO/ALUMÍNIO EM "D" ASSIMÉTRICO;		

1	MOSQUETÃO	346071	Sistema Keylock com Twist Lock (automático); Carga mínima de ruptura 24kN; Carga mínima de ruptura lateral 7kN; Carga mínima de ruptura com gatilho aberto 7kN; Certificação CE (Conformidade Europeia) ou FFPA (National Fire Protection Association - Categoria mínima Light Use) ou UIAA (União Internacional das Associações de Alpinismo). Garantia mínima de 1 ano contra defeitos de fabricação.	Und	20
1	ACESSÓRIO EQUIPAMENTO SEGURANÇA	443534	FREIO EM 8 COM ORELHAS fabricado em alumínio, para ser utilizado com cordas de 9 a 16 mm de diâmetro, Resistência de 40 KN a 67 KN, Peso:150 g até 635 g, Dimensões: 140mm de altura x 130mm de largura máxima até 172mm de altura x 170mm de largura máxima, Orifício para passagem da corda: 50 mm até 72 mm e Orifício para conexão do mosquetão: 25 mm até 40 mm. Deve possuir Certificação CE (Conformidade Europeia) ou FFPA (National Fire Protection Association - Categoria mínima Light Use) ou UIAA (União Internacional das Associações de Alpinismo). Garantia mínima de 1 ano contra defeitos de fabricação.	Und	20
			Corda semi-estática, rolo de 100m, de 11 a 12,5mm de diâmetro. Especificações técnicas: Diâmetro: de 11 a 12,5 mm. Materiais: poliéster, nylon. Certificação (s): CE EN 1891 tipo A e/ou EAC e/ou NFPA 1983. Uso Geral. Força atada com o no		

1	CORDA	338464	em forma de oito.15kN. Força de Ruptura de, no mínimo, 32 kN. Força de impacto (fator 0,3) de 5,7kN, admitida a variação de $\pm 0,1$ kN. “Porcentagem de bainha: 46%, admitida a variação de $\pm 8\%$. Alongamento estático de, no máximo, 3%”. Comprimento: 100m. MODELO DE REFERÊNCIA : PETZL.	Und	5
1	SISTEMA PARA COMPRESSÃO	454787	Torniquete de aplicação em combate APH tático militar, desenvolvido para o estancamento de hemorragias severas causadas por agentes traumáticos em membros inferiores e superiores, em condições de campo ou emergência pré-hospitalar. Indicado para situações de amputação, avulsões e lacerações decorrentes de ferimentos por armas brancas, armas de fogo e explosões. Cor preto, tamanho aproximado 95cm de comprimento e 4cm de largura, peso aproximado 60g, material plástico ABS e cinta velcro de alta resistência leve, durável e de fácil manuseio com apenas uma mão. Eficaz na oclusão do fluxo de sangue nas extremidades dos membros superiores e inferiores reutilizável após desinfecção. Ajuste de liberação rápida ou lenta. Deve possuir uma placa de estabilização interna para evitar deformações no ato da aplicação. Modelo de referência: Desmodus T-APH	Und	20

1	FITA ADESIVA	449828	Fita adesiva. Material: polietileno. Tipo: Silver Tape. Largura: 48 mm. Comprimento: 50 m. Cor: a ser definida pelo contratante ao remeter o empenho. Aplicação: multiuso.	Und	45
1	PILHA	231790	Pilha não recarregável, tamanho:pequena. Tipo: alcalina, modelo: AA. Aplicação: alimentação dos óculos e visão noturna das esquadilhas de voo. Não serão aceitas pilhas não alcalinas. Marca de referência: ELGIN ou superior	Emb 2 und	700
1	PILHA	231788	Pilha não recarregável, tamanho:pequena. Tipo: alcalina, modelo: AAA. Não serão aceitas pilhas não alcalinas. Marca de referência: ELGIN ou superior	Emb 2 und	350
1	ACESSÓRIOS /EQUIPAMENTOS DE OFICINA	486380	Esteira para mecânico, com estrutura plástica anatômica de alta qualidade com base rígida, almofada para encosto da cabeça, com porta ferramentas laterais, 6 rodas giratórias, capacidade de carga de 150kg. Com bandeja lateral para ferramentas. Material de referência SIGMA TOOLS mesma equivalência técnica ou qualidade superior.	Und	15
1	BASTÃO SINALIZADOR	480024	Bastão de luz química, material plástico PP translúcido, com alça de fixação numa das extremidades, tipo cialume, utilizado para sinalização, cor a ser definida pelo contratante, tamanho 15cm, autonomia da luz de 12 horas, a prova d'água, não	Und	300

			tóxico, não inflamável, não exige manutenção, não exige baterias, não gera calor, faísca ou chama.		
1	COADOR DESCARTÁVEL	237589	Coador descartável para tinta. Peneira com malha de fio sintético e revestimento de papelão, papel kraft ou similar. Modelo de referência. Coador Lazzuril 03403 ou Sherwin Williams.	Und	1200
1	LUVA BORRACHA	384876	Luva isolante de eletricista. Tamanho a ser definido pelo contratante ao remeter o empenho. Classe 2, para alta tensão, confeccionada em borracha na cor preta de acordo com as normas específicas ANBR 10622/NBR 16295 /ASTM D120. Para ser utilizada em situações de risco de choque elétrico, tensão de ensaio: 20KV, tensão máxima de uso: 17000 V. Und : par	Par	8
1	COLETE SEGURANÇA	220543	Colete de sinalização em X refletivo. Cor predominante: laranja. Tamanho: único. Deve possuir fecho em velcro, botões ou sistema do tipo “fixa-fácil” para poder operar em ambientes com helicópteros com rotor em movimento.	Und	30
1	PÁ COLETORA DE LIXO	395513	Pá anti faísca. Material coletor: plástico resistente e /ou emborrachado. Comprimento mínimo do cabo: 85 cm. Dimensões mínimas do coletor: 20 cm, largura 25 cm.	Und	8
1	CAIXA TÉRMICA	373317	Caixa térmica, material poliuretano expandido, densidade 35 kg/m ³ , capacidade aproximada de 45 L. Características adicionais: tampa articulada /trinco embutido, alça para transporte nas laterais e	Und	20

			dreno. Cor: azul, verde,preta ou vermelha (a ser definida pelo contratante no momento da remessa do empenho). Modelo de referência: Caixa Térmica Adventure 45,4L, COLEMAN.		
1 .	BÚSSOLA NAVEGAÇÃO	234101	Bússola com limbo móvel graduado em milésimos e graus, lente de ampliação (lupa), pontos luminosos fosforescentes e escala fixa de correção de declinação, balanceamento ME para uso no Brasil, ajuste de declinação, régua de 5cm (centro) e escalímetros 1: 25.000 e 1:50.000 nas laterais. Dimensões: 106 x 54 x 10 mm. Peso aproximado: 32g. Acompanha cordão de segurança para transporte. Deve possuir escalímetro no cordão de segurança (serve como curvímetro). Garantia mínima: 3 anos. Modelo de referência: Silva Ranger ME.	Und	10
1 .	GUINCHO	449405	Guincho Hidráulico Tipo Girafa Modelo, Manual, Capacidade de elevação: 2 Toneladas, Prolongador da haste e roda de ferro, Feitos em Aço Patinável de alta resistência à corrosão, Conjunto hidráulico com válvulas de sobrecarga - evitando excesso de carga, São fornecidos com corrente, gancho e alavanca. Curso do pistão 495mm, Altura máxima de elevação 2400mm, Dimensões: AxLxC: 179,5x110x198cm, Peso: 59 kg	Und	6
1 .	ASPIRADOR PÓ /ÁGUA	379929	Aspirador pó / água - industrial, potência motor 2.800 W, tensão alimentação 220 V, capacidade 78 L.	Und	04

			Características adicionais: 2 motores de 1.400 w, chassi envolvente e tubular.		
1	GARRAFA TÉRMICA	238455	Garrafa térmica, material plástico, capacidade 5 L. Características adicionais: sem torneira e com tampa rosqueável.	Und	26
1	CLIMATIZADOR	405293	Climatizador com pedestal e base, tipo evaporativo, tensão alimentação 220 v. Alcance frontal mínimo: 10 metros. Características adicionais: com pedestal e base. Acessórios: base com rodízios com trava, timer, capacidade do reservatório: mínimo 70 litros. Modelo de referência: Climatizador JOAPE-369998	Und	10
1	RELÓGIO TERMO-HIGRÔMETRO	369794	Relógio termo-higrômetro, tipo digital com termopar, tipo display LCD. Fonte alimentação: bateria. Dimensões aproximadas: Altura 108 mm, comprimento 58 mm, espessura 15 mm, peso 100 g, faixa temperatura interna: 0 a + 50° C, faixa temperatura externa: -50 a +70° C. Faixa medição unidade relativa 20 a 90 per. Características adicionais: indicação horas.	Und	10
1	DESUMIDIFICADOR	472825	Desumidificador, voltagem 110/220 v. Capacidade mínima: 12 litros p/dia, aplicação controle de temperatura e umidade. Garantia mínima: 1 ano. Com dreno e mangueira para uso contínuo. Características: com controlador de umidade automático (umidostato),	Und	8

			rodízios 360° e alas laterais para transporte. Modelo de referência: ARSEC 160BR		
140.	ITEM CANCELADO				
141.	COLETE	460417	Colete tático para emprego padronizado do pelotão SAR, confeccionado em cordura 1000. Deve possuir soltura Rápida, barrigueiras modulares, Costurado com fio 100% poliamida, fechamento com velcro, passadores em Nylon injetado na própria cor, alça de transporte com resistência de 450kg. Deve poder acondicionar placas balísticas rígidas frontais e traseiras e possuir braçadeiras para mangueiras de hidratação e equipamentos eletrônicos. Características adicionais: Possui velcros frontais fêmea para colocação de distintivos (brevês militares), barrigueiras com regulagem e amortecimento, bolso canguru frontal e bolso interno nas capas das alças com EVA substituível. Modelo de referência: PLATE CARRIER M7	Und	10
142.	COLETE SALVA VIDAS	399325	Colete salva vidas náutico: certificação NORMAN 05 /DPC,fabricação em poliéster grosso e espuma de polietileno de célula fechada, apito laranja com amarração e bolso, fita refletiva certificado SOLAS 164.018/6/1 ; USCG 164.018 /8/0 ,alça de segurança para resgate ,cabo liga-náufrago, fechos acetel 40mm para ajuste de cintura ,peito e antepernas , tirantes de polipropileno para ajuste na cintura ,peito e pernas. Flutuabilidade mínima: 136N. Tamanho a ser definido pelo contratante no	Und	30

			ato de remessa do empenho. Marca De Referência: ATIVA		
143.	ACESSÓRIO /EQUIPAMENTO DE SEGURANÇA	447850	Porta Torniquete. Confeccionado em Cordura 1000, possui fitas modulares costuradas com fio 100% Poliamida. Comporta um torniquete. Possui na parte frontal o Símbolo de Primeiros Socorros fixado por costura. Modelo de referência: FOR HONOR, WTC ou superior	Und	20
144.	BOTA SEGURANÇA	485649	Bota segurança, material: neoprene, material sola: borracha vulcanizada. Tipo uso: para uso conjunto com nadadeiras, características adicionais: proteção no peito do pé e calcanhar, zíper lateral, aplicação: atividade de mergulho. Tamanho a ser definido pelo contratante. Marca de referência : Seasub, Fun Dive, Mormaii, Cressi ou superior.	Par	15
145.	LUVA SEGURANÇA	485338	Luva segurança. Material: neoprene. Aplicação: prática de mergulho/natação, características adicionais: palma confeccionada em couro sintético, espessura: 2 mm, modelo: punho em neoprene e fecho em velcro. Tamanho a ser definido pelo contratante. Marca de referência : Seasub, Fun Dive, Mormaii, Cressi ou superior.	Par	15
			Maca De Resgate Rígida Tipo Cesto : Cor vermelha (pintura epoxy eletrostática a pó) , carga máxima de trabalho: 200KG, dimensões		

146.	MACA DE RESGATE	406324	1,97m x 0,52m x 0,15m , peso: 11,3 KG ,tubos em aço e perfis estruturais laminados em aço SAE1010 , soldagem processo MAG , fundo em polipropileno 2mm de espessura , braçadeiras em poliamida TIPO T50R , fitas em poliéster de alta tenacidade , fivelas e contrafivelas em aço inox 304L , costuras longitudinais em poliamida , pontos de fixação para içamento indicados por adesivos refletivos nas cores preta e amarela, permite o uso com prancha de resgate. Marca de referência: BONIER modelo: MAMUTE RÍGIDA	Und	2
147.	CHAPA DE ALUMÍNIO	475611	Placa de alumínio modelo 7075-T6. Medidas: 0,040” x 1 metro x 1 metro. Necessário possuir certificação de Alclad. Aplicação: reparo de estruturas das aeronaves.		
148.	IMPRESSORA	458740	Impressora térmica, resolução mínima :203 Dpi. Aplicação:impressão de etiquetas. Marca de referência: Zebra ou superior		
149.	CARRO LIMPEZA	280716	Limpadora de pisos com assento para condutor. Aplicação: para limpeza e manutenção de pisos internos, como pvc, vinílicos, revestimentos de resina, granitos, pisos de pedra, cravejado de borracha, entre outros. Deve acompanhar rodo, discos e demais acessórios. Modelo de referência:		
			Fonte auxiliar partida, tipo: transportável, tipo uso: externo, finalidade:dar partida em motores de		

150.	FONTE AUXILIAR PARTIDA	372779	aeronaves, funções: alimentação automática apos encaixe na tomada da ae, componentes:cabo de força comprimento 8 pés com conector para, tensão entrada: 110/220 v, tensão saída:28,5 v, tempo recarga:75 min, características adicionais:dc 20 amp, pico de amperagem na partida 1500 amp, frequência:60 hz, dimensões: 527 x 133,35 x 266,70 mm, temperatura operação:-40 c a +60 c c, temperatura estocagem:65 c a +60 c c		
151.	EXTENSÃO ELÉTRICA	451652	Extensão elétrica, tipo:pp carretel, comprimento:30 m, componentes:3 tomadas fêmeas e plugue terra, seção nominal:2,5 mm ² , número pólos:2, cor:preto, tensão nominal:bivolt v		
152.	SOPRADOR TÉRMICO	378061	Soprador, tipo:térmico portátil, acionamento: elétrico, voltagem:110/220 v, potência:2.000 w, volume ar:150 a 500 l/min, aplicação: solda, características adicionais:tipo pistola, display digital		
153.	JOGO CHAVE	486288	Jogo chave, material:aço cromo vanádio, tipo:torx, quantidade peças:9, aplicação:consertos em geral, componentes:t7, t8, t9, t10, t15, t20, t25, t30 e t40, modelo:l		
154.	BALANÇA DE PRECISÃO	432131	Balança precisão, capacidade máxima:2 kg, resolução:0,01 g, tipo painel:visor lcd frontal, características adicionais:semi-analítica, sem capela de proteção		
155.	BALANÇA DE PRECISÃO	459793	Balança precisão, capacidade máxima:15 kg, resolução: 0,01 g, tipo painel:visor digital, características adicionais:dimensões aproximada: 434 x 147 x 360 mm		

156.	EQUIPAMENTOS DE MANUTENÇÃO	446573	Acessórios / equipamentos oficina manutenção, tipo carro esteira, material aço		
157.	FURADEIRA	600950	Furadeira, tipo:furadeira e parafusadeira, tamanho mandril:1/2 pol, tensão alimentação:18 v, características adicionais: iluminação frontal por led, velocidade variável e, velocidade:baixa: 0/600 rpm. Alta 0/1900 rpm, acessórios: 2 baterias, carregador e maleta		
158.	MALETA	358678	Maleta ferramentas, material: chapa aço carbono, comprimento:400 mm, largura:200 mm, altura:210 mm, quantidade gavetas:5 un, tipo caixa:sanfona, características adicionais: com jogo de chaves.		
159.	BANQUETA	413128	Banqueta, material estrutura: aço, tipo assento:giratório, material base assento: plástico, acabamento estrutura:pintado, cor assento:preta, altura:60 cm, diâmetro assento:40 cm, características adicionais: altura regulável sistema a gás /apoio para os pés		
160.	EQUIPAMENTOS DE MANUTENÇÃO	446573	Acessórios / equipamentos oficina manutenção, tipo carro esteira, material aço		
161.	FURADEIRA	485349	Furadeira, tipo:impacto, potência:1050 w, tamanho mandril:1/2 pol, tensão alimentação:110 v, características adicionais: reversível, com velocidade variável, capacidade perfuração concreto:26 mm, capacidade perfuração aço: 13 mm, capacidade perfuração madeira:40 mm		

162.	BALDE	445171	Balde, material: aço inoxidável, capacidade: 5 l, características adicionais: com alça, tampa e bico		
163.	CARRINHO INDUSTRIAL	448056	Carrinho industrial, material: chapa aço, material plataforma: chapa aço, tipo transporte: cilindro para gás, quantidade roda: 2, tipo roda: fixas, capacidade carga: 150 kg, acabamento superficial: cromado, características adicionais: cilindro abraçado pela estrutura.		
164.	CARRINHO TRANSPORTE	394002	Carrinho transporte, material: aço galvanizado, tratamento superficial: pintura esmaltada, capacidade: 350 kg, altura: 860 mm, largura: 450 mm, quantidade rodas: 2 fixas e 2 giratórias, material rodas: poliuretano, tipo: fechado, características adicionais: 2 gavetas/1 bandeja organizadora/3 caixa p/componer, comprimento: 800 mm, aplicação: armazenamento e transporte de ferramentas, cor: azul		
165.	VÁLVULA REGULADORA DE GÁS	229647	Válvula reguladora cilindro gás, tipo fechamento: manual, componentes: 2 manômetros, características adicionais: sem filtro, material: ferro, tratamento superficial: cromado, tipo rosca: para ar comprimido		
166.	EMPILHADEIRA	361013	Empilhadeira elétrica, capacidade: 1600 kg, corrente alimentação: contínua, altura elevação garfo: 5.400 mm, características adicionais: tracionária, com bateria e carregador		
167.	TRATOR	303796	Trator, potência: 85 a 100 cv, tipo combustível: diesel, quantidade marcha frente: 6 un, quantidade marchas ré: 2 un, tração: 4x4, tipo sistema: hidráulico de 3 pontos, tipo		

			direção:hidrostática c/ bomba independente, características adicionais:tdp a 540 rpm independente, barra de tração, pneus		
168.	JOGO CHAVE	279509	Jogo chave, material: aço, tipo: relojoeiro, quantidade peças: 5, componentes: cruzadas: nº 2 e 3, simples: 1,4, 2 e 2,4 mm, características adicionais: com estojo plástico		
169.	JOGO CHAVE	445941	Jogo chave, material:aço cromo vanádio, tipo:philips / fenda, quantidade peças:10, componentes:6 fenda e 4 fenda cruzada, phillips, material cabo:polipropileno, características adicionais: ponta magnetizada		
170.	EQUIPAMENTO DE MANUTENÇÃO	486379	Acessórios / equipamentos oficina manutenção, tipo: banqueta para mecânico, material:aço carbono, revestimento assento: estofado, capacidade:100 kg, quantidade de rodízios:4, dimensões:380 x 220 mm, altura:360 mm, características adicionais: bandeja porta ferramentas		
171.	LIXEIRA	420575	Lixeira, Material: Polietileno Alta Densidade, Capacidade: 1.100 L, Tipo: Container, Características Adicionais: Tampa, 4 Rodízios Giratórios Com Trava, Dreno, Revestimento: Tratamento Em UV. Deverá ser disponível nas cores verde, azul, vermelho, marrom e/ou amarelo (a ser definido pelo contratante no ato da remessa de empenho).		
172.	EMPILHADEIRA	448209	Empilhadeira – Garfo; Capacidade mín. Elevação: 4 m; Comprimento mín. Garfo: 1 m; Capacidade mín: 3,0 T; Tipo De Torre: Duplex ou Triplex; Tipo		

			Motor: Diesel; Rodado: Simples; Transmissão: Automática.		
173.	SACO	420805	Saco, material:polietileno, cor:incolor, características adicionais:liso, atóxico, inodoro, fechamento tipo zip lock, altura:450 mm, largura: 350 mm.		
174.	SACO	455081	Saco, material:polietileno, características adicionais:zip lock,hermético, altura:17 cm, largura:12 cm, transmitância: transparente		

7. Estimativa das Quantidades a serem Contratadas

O método utilizado para estimar o quantitativo do objeto leva em conta o histórico de consumo dos últimos 3 anos acrescidos de uma margem de segurança de 30%.

Abaixo segue uma tabela com os itens com histórico de consumo dos últimos 3 anos e a previsão de aquisição para 2023-2024.

Item	Material	Unidade	2021	2022	2023
1.	ÓLEO LUBRIFICANTE MINERAL	Und	120	150	
1.	ÓLEO LUBRIFICANTE MINERAL	Und	150	200	
1.	FLUIDO HIDRÁULICO	Und	150	200	
1.	ÓLEO LUBRIFICANTE MINERAL	Emb 3,78 L	48	80	
1.	FLUIDO HIDRÁULICO	Und	1	0	
1.	ÓLEO				

	LUBRIFICANTE	Lata	40	80	
1.	ÓLEO LUBRIFICANTE	Lata	40	80	
1.	ÓLEO LUBRIFICANTE	Und	5	12	
1.	ÓLEO LUBRIFICANTE	Emb 500ml	0	0	
1.	ÁLCOOL PROPÍLICO	Litro	20	50	
1.	ÉTER DE PETRÓLEO	Litro	100	150	
1.	GRAXA	Lata 1 Kg	5	8	
1.	GRAXA	Lata 1 Kg	5	8	
1.	GRAXA	Lata 1 Kg	5	8	
1.	GRAXA	Und	1	3	
1.	GRAXA	Und	5	8	
1.	GRAXA	Und	5	8	
1.	ADESIVO USO GERAL	Und	5	10	

1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	

1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ADESIVO USO GERAL	Und	0	0	
1.	ANTICORROSIVO	Und	0	0	
1.	SELANTE	Und	5	14	
1.	SELANTE	Und	2	2	
1.	SELANTE	Und	5	18	
1.	SELANTE	Und	2	3	
1.	ANTICORROSIVO	Und	1	1	
1.	SOLUÇÃO LIMPEZA	Und	5	8	

1.	GRAXA	Und	0	0	
1.	GRAXA	Und	0	0	
1.	ANTICORROSIVO	Und	40	150	
1.	ADESIVO USO GERAL	Und	0	0	
1.	SILICONE	Bisnaga	0	0	
1.	GRAXA	Und	1	1	
1.	ADESIVO USO GERAL	Bisnaga	1	2	
1.	ADESIVO USO GERAL	Kit	5	10	
1.	ADESIVO USO GERAL	Und	5	10	
1.	MEDIDOR LABORATÓRIO	Und	2	0	
1.	MEDIDOR LABORATÓRIO	Und	5	5	
1.	ESPONJA LIMPEZA	Und	60	100	
1.					

	TINTA	Lata 400 ml	5	8	
1.	SERINGA	Und	0	0	
1.	PINCEL	Und	10	30	
1.	PALITO	Pacote 100 und	0	0	
1.	VASELINA	Und	0	0	
1.	MÁSCARA CONTRA GASES	Und	0	12	
1.	FILTRO RESPIRADOR	Und	50	150	
1.	FILTRO RESPIRADOR	Und	50	150	
1.	TUBO ISOLANTE	Metro	50	150	
1.	TUBO ISOLANTE	Metro	50	150	
1.	TUBO ISOLANTE	Metro	50	150	
1.	TUBO ISOLANTE	Metro	50	150	
1.	TUBO ISOLANTE	Metro	50	150	

1.	TUBO ISOLANTE	Metro	50	150	
1.	TUBO ISOLANTE	Metro	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	ABRAÇADEIRA	Pct 100 und	2	8	

1.	ABRAÇADEIRA	Pct 100 und	2	8	
1.	SOLDA ESTANHO	Rolo 500 g	2	5	
1.	FITA ISOLANTE ELÉTRICA	Und	2	5	
1.	LUVA EMENDA COMPRESSÃO	Und	50	150	
1.	LUVA EMENDA COMPRESSÃO	Und	50	150	
1.	LUVA EMENDA COMPRESSÃO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	
1.	TERMINAL ELÉTRICO	Und	50	150	

1.	ORGANIZADOR CABOS	Und	0	0	
1.	ORGANIZADOR CABOS	Und	0	0	
1.	PROTETOR AURICULAR	Und	700	1500	
1.	VERMICULITA	Saco 100 L	20	45	
1.	ARAME	KG	2	6	
1.	ARAME	KG	2	6	
1.	LUVA BORRACHA	Caixa	5	12	
1.	LUVA SEGURANÇA	Par	100	150	
1.	PEDESTAL	Und	0	0	
1.	CREME HIDRATANTE	Bisnaga 200 g	5	10	
1.	RÉGUA COMUM	Und	0	0	
1.	POTE ALIMENTOS	Emb 100 und	0	0	
1.	PISTOLA PINTURA	Und	0	0	

1.	PISTOLA PINTURA	Und	0	0	
1.	PISTOLA PINTURA	Und	0	0	
1.	REGULADOR DE PRESSÃO PNEUMÁTICO	Und	0	0	
1.	SUPORTE PARA LIXAS	Und	0	0	
1.	SACO PLÁSTICO LIXO	Pacote 100 und	10	15	
1.	DISCO CORTE	Und	0	0	
1.	PLACA ESPUMA	Und	0	0	
1.	ACESSÓRIO EQUIPAMENTO DE SEGURANÇA	Und	0	0	
1.	CAPACETE SEGURANÇA	Und	10	8	
1.	LUVA SEGURANÇA	Par	10	10	
1.	MOSQUETÃO	Und	5	8	
1.	ACESSÓRIO EQUIPAMENTO SEGURANÇA	Und	5	8	
1.	CORDA	Und	1	2	

1.	SISTEMA PARA COMPRESSÃO	Und	0	0	
1.	FITA ADESIVA	Und	0	0	
1.	PILHA	Emb 2 und	200	600	
1.	PILHA	Emb 2 und	150	300	
1.	ACESSÓRIOS /EQUIPAMEN-TOS DE OFICINA	Und	2	5	
1.	BASTÃO SINALIZADOR	Und	150	200	
1.	COADOR DESCARTÁVEL	Und	0	0	
1.	LUVA BORRACHA	Par	0	12	
1.	COLETE SEGURANÇA	Und	10	0	
1.	PÁ COLETORA DE LIXO	Und	0	0	
1.	CAIXA TÉRMICA	Und	10	15	
1.	BÚSSOLA NAVEGAÇÃO	Und	0	0	
1.					

	GUINCHO	Und	2	4	
1.	ASPIRADOR PÓ/ÁGUA	Und	0	0	
1.	GARRAFA TÉRMICA	Und	15	15	
1.	CLIMATIZADOR	Und	0	0	
1.	RELÓGIO TERMO-HIGRÔMETRO	Und	2	0	
1.	DESUMIDIFICADOR	Und	0	0	
140.	ITEM CANCELADO				
141.	COLETE	Und	0	0	
142.	COLETE SALVA VIDAS	Und	10	0	
143.	ACESSÓRIO/EQUIPAMENTO DE SEGURANÇA	Und	0	0	
144.	BOTA SEGURANÇA	Par	0	0	
145.	LUVA SEGURANÇA	Par	0	0	
146.	MACA DE RESGATE	Und	0	0	
147.	PLACA DE ALUMÍNIO	Und	0	0	
148.	IMPRESSORA	Und	0	0	
149.	LIMPADORA DE PISOS	Und	0	0	
150.	FONTE AUXILIAR	Und	0	0	
151.	EXTENSÃO ELÉTRICA	Und	0	0	

152.	SOPRADOR TÉRMICO	Und	0	2
153.	JOGO DE CHAVES	Und	0	1
154.	BALANÇA DE PRECISÃO	Und	1	0
155.	BALANÇA DE PRECISÃO	Und	1	0
156.	EQUIPAMENTO DE OFICINA	Und	0	0
157.	FURADEIRA	Und	0	0
158.	MALETA PARA FERRAMENTAS	Und	0	0
159.	BANQUETA	Und	0	0
160.	EQUIPAMENTO DE OFICINA	Und	0	0
161.	FURADEIRA	Und	0	0
162.	BALDE	Und	0	0
163.	CARRINHO INDUSTRIAL	Und	0	0
164.	CARRINHO TRANSPORTE	Und	0	0
165.	VÁLVULA DE GÁS	Und	0	0
166.	EMPILHADEIRA ELÉTRICA	Und	0	0
167.	TRATOR	Und	0	0
168.	JOGO DE CHAVES	Und	0	1
169.	JOGO DE CHAVES	Und	0	1
170.	EQUIPAMENTO DE OFICINA	Und	0	0
171.	LIXEIRA	Und	0	0
172.	EMPILHADEIRA	Und	0	0

173.	SACO	Pct 100 und	0	0
174.	SACO	Pct 100 und	0	0

Os itens 07, 19 a 37, 45, 46, 48 e 49 foram incluídos fruto da necessidade de se fazer a grande inspeção de 500 horas da aeronave americana modelo Black Hawk. Tais materiais não são comprados de forma anual em virtude da sua aquisição ser feita apenas em períodos onde é demandada tal manutenção.

O item 09 costumeiramente é fornecido pelo Pq Mnt 12 RM, no entanto, aos moldes de 2023, a aquisição desse material tem sido relativamente difícil e extremamente disputado, fruto das inúmeras missões que o CMA tem sido designado. Assim, resolveu-se incluir tal item em nossa ata de modo a desonerar aquela UASG e garantir o bom funcionamento das aeronaves do 4º BAvEx.

Os itens 58, 60, 61, 96, 97, 104, 106 a 112, 114 a 116, 122, 123, 128, 130, 131, 133, 135, 137 a 151, 152 a 167, 170 a 174 são frutos de análise da documentação técnica e novas demandas que surgiram recentemente. Tal motivo, explica o porquê de não terem sido adquiridos anualmente.

8. Estimativa do Valor da Contratação

Valor (R\$): 2.878.399,59

Com base na estimativa de quantidades e no valor médio orçado durante a pesquisa de preços, chegou-se ao valor de R\$2.878.399,59

A pesquisa de preços foi realizada em cumprimento ao disposto na Instrução Normativa SEGES nº 58/2022 e demais dispositivos legais. O valor máximo aceitável dos itens objeto da contratação é resultado da pesquisa de preços discriminada no Relatório de Pesquisa de Preços, anexo deste Estudo, no qual constam o período de realização da pesquisa, os critérios, os parâmetros e as metodologias utilizadas.

9. Justificativa para o Parcelamento ou não da Solução

O disposto encontra-se aplicável na presente demanda, não sendo vislumbrado, no momento, motivações para a não adoção do parcelamento do objeto.

10. Contratações Correlatas e/ou Interdependentes

Para a presente aquisição não foi visualizada contratação correlata ou interdependente.

11. Alinhamento entre a Contratação e o Planejamento

Vinculação aos Planos do Órgão

A contratação dos serviços está alinhada com o PLANO ESTRATÉGICO DO EXÉRCITO 2020-2023 (PEEx 2020-2023/EB 10-P-01.007), cuja missão é contribuir para a garantia da soberania nacional, dos poderes constitucionais, da lei e da ordem, salvaguardando os interesses nacionais e cooperando com o desenvolvimento nacional e o bem-estar social, ao contribuir para alcance dos seguintes objetivos estratégicos que lhe são correlatos abaixo:

- - Objetivos Estratégicos Do Exército:
 1. - Obtido pela interligação dos Objetivos Estratégicos do Exército com as Estratégias e Ações Estratégicas correspondentes:

OEE 01 - Contribuir com a Dissuasão Extrarregional

1.1 Ampliação da Capacidade Operacional

1.1.3 Rearticular e reestruturar a Força Terrestre na Área Estratégica da Amazônia.

1.2 Ampliação da mobilidade e elasticidade da Força

1.2.2 Estruturar a Aviação do Exército.

12. Benefícios a serem alcançados com a contratação

Temos como benefício direto da aquisição dos materiais do PIT 2024 AvEx a melhoria da manutenção, aumento da disponibilidade das aeronaves, melhor segurança do trabalho aos militares, materiais de busca e resgate em condições de pronto emprego e cumprimento da missão, contribuindo positivamente no aumento da segurança e confiabilidade de sua operação e mitigação do risco de incidentes/acidentes aéreos.

Temos como benefício indireto o aumento da satisfação dos integrantes do 4º BAvEx, que se sentirão mais motivados a cumprir sua missão tendo os insumos necessários as tarefas de manutenção diárias, cientes que sua instituição se preocupa com sua integridade física e segurança, contribuindo positivamente para a segurança de voo no 4º BAvEx.

13. Providências a serem Adotadas

Não haverá necessidade de adequação do ambiente.

14. Possíveis Impactos Ambientais

Por possuir dentre os itens elencados comércio de produtos químicos e derivados de petróleo, os licitantes deverão apresentar o Comprovante de Registro no Cadastro Técnico Federal de Atividades Potencialmente Poluidoras ou Utilizadoras de Recursos Ambientais, acompanhado do respectivo Certificado de Regularidade válido, nos termos do artigo 17, inciso II, da Lei nº 6.938, de 1981, e da Instrução Normativa IBAMA nº 06, de 15/03/2013.

15. Declaração de Viabilidade

Esta equipe de planejamento declara **viável** esta contratação.

15.1. Justificativa da Viabilidade

Nos termos do presente estudo, a opção pela aquisição dos objetos desse pregão se mostra viável para atender as necessidades do PIT AvEx 2024 do 4º BAvEx, pois é a solução com melhor custo-benefício para a demanda do Batalhão. Além disso, possui eficácia comprovada no mercado atendendo outras Organizações Militares de Aviação, contribuindo para a ampliação da capacidade operacional e da mobilidade da Força, conforme previsto no Plano Estratégico do Exército.

16. Responsáveis

Todas as assinaturas eletrônicas seguem o horário oficial de Brasília e fundamentam-se no §3º do Art. 4º do [Decreto nº 10.543, de 13 de novembro de 2020](#).

WELLINGTON LUCCAS FREITAS DE ALMEIDA KLEZEWSKY PIRES
Agente de contratação

Lista de Anexos

Atenção: Apenas arquivos nos formatos ".pdf", ".txt", ".jpg", ".jpeg", ".gif" e ".png" enumerados abaixo são anexados diretamente a este documento.

- Anexo I - WD 40 MANUAL GUINCHO PAG 215.pdf (50.89 KB)
- Anexo II - REL PREV CORDA K2.pdf (93.92 KB)
- Anexo III - Motor - Eastman 2197.pdf (21.71 KB)
- Anexo IV - Motor - Royco 500.pdf (19.35 KB)
- Anexo V - Hidráulicos - Aeroshell 31 e Aeroshell 41.pdf (34.88 KB)
- Anexo VI - Guincho Elétrico - Mobil Jet II.pdf (25.41 KB)
- Anexo VII - CTP - Aerogear 823 e Royco 555.pdf (32.65 KB)
- Anexo VIII - CHAPTER _ 17_ 18 APPENDIX _A _ B_C_D_E.pdf (9.49 MB)
- Anexo IX - 12_20-01-01-302.pdf (440.66 KB)

Anexo I - WD 40 MANUAL GUINCHO PAG 215.pdf



COMPONENT MAINTENANCE MANUAL
PART NUMBER 42325-16 AND 42325-19

CLEANING

TASK 25-00-17-100-801-A01

1. General Information

SUBTASK 25-00-17-100-001-A01

A. General

- (1) This section contains special cleaning instructions for the Hoist System.
- (2) Refer to the [ILLUSTRATED PARTS LIST \(IPL\)](#) section for item numbers, unless specified differently.

SUBTASK 25-00-17-100-002-A01

B. Tool and Materials

- (1) The recommended cleaning materials are given in [Table 4001](#).

NOTE: Equivalent alternatives can be used for the items listed.

Table 4001. Cleaning Materials

DESCRIPTION	PART NUMBER OR SPECIFICATION	SOURCE
Cleaning Solvent	Brulin 1990GD	Commercially Available
Industrial Goggles	- - - - -	Commercially Available
Isopropyl Alcohol	Fed Spec TT-I-735	Commercially Available
Leather Gloves	A-A-55060	Commercially Available
Low-Lint Cloth	A-A-59323, Type II	Commercially Available
Lubricating Oil	MIL-PRF-23699	Commercially Available
Lubricating Oil	MIL-PRF-7808	Commercially Available
Lubricant	WD-40	Commercially Available
Non-Metallic Soft-bristle Brush	MIL-B-43871	Commercially Available
White Lithium Grease	630-AA	Fiske Bros Refining Co. (V73219)



COMPONENT MAINTENANCE MANUAL
PART NUMBER 42325-16 AND 42325-19

TASK 25-00-17-100-802-A01

2. General Cleaning

SUBTASK 25-00-17-100-003-A01

A. Cleaning

WARNING: CLEANING SOLVENT, BRULIN 1990GD, IS TOXIC AND FLAMMABLE. AVOID PROLONGED BREATHING OF VAPORS. AVOID EYE AND REPEATED SKIN CONTACT. EYE PROTECTION IS REQUIRED. KEEP AWAY FROM OPEN FLAMES AND OTHER SOURCES OF IGNITION.

WARNING: USE APPROVED PERSONAL PROTECTIVE EQUIPMENT (GOGGLES/ FACE SHIELD) WHEN USING COMPRESSED AIR. AIR PRESSURE IS RESTRICTED TO A MAXIMUM OF 30 PSIG (207 KPAG). TO AVOID PERSONAL INJURY, DO NOT DIRECT AIR STREAM TOWARD SELF OR OTHER PERSONNEL.

NOTE: Do not clean parts with chlorinated solvents, such as Freon, Perchloroethylene, Trichloroethylene, Carbon Tetrachloride, etc. Do not use any type of silicone grease on any components.

NOTE: The following cleaning procedure is performed without the rescue hoist equipment.

(1) If installed, remove the hoist fairings. Refer to [DISASSEMBLY](#) section.

WARNING: TO AVOID INJURY TO PERSONNEL FROM BROKEN WIRE STRANDS, LEATHER GLOVES, A-A-55060, MUST BE WORN AT ALL TIMES WHEN HANDLING HOIST CABLE.

CAUTION: DO NOT RESTRICT THE PAYOUT OF THE CABLE DURING REELING OUT. ANY RESTRICTION OF THE CABLE CAN RESULT IN A MISWRAP, CAUSING DAMAGE TO THE CABLE AND THE HOIST.

CAUTION: DO NOT EXTEND HOIST CABLE BEYOND THE LENGTH THAT ENABLES THE CABLE ASSEMBLY TO CONTACT THE GROUND UNLESS PROVISION IS MADE TO PREVENT DAMAGE OR ENTANGLEMENT OF THE CABLE.

(2) Reel-out the hoist cable assembly to the full extent. Reel the cable into a large container filled with a mild soap and clean fresh water solution.

(3) Mask and cover any open electrical connectors and components to prevent the entrance of water.

(4) Clean electrical harnesses, connectors and components per [SUBTASK 25-00-17-100-007-A01](#) in this section. Make sure all traces of salt are removed.



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SUBTASK 25-00-17-100-004-A01

B. Hoist Cable Assembly Cleaning (Quick Wash)

WARNING: TO AVOID INJURY TO PERSONNEL FROM BROKEN WIRE STRANDS, LEATHER GLOVES, A-A-55060, MUST BE WORN AT ALL TIMES WHEN HANDLING RESCUE HOIST CABLE.

CAUTION: IF THE QUICK WASH METHOD IS USED TO REMOVE SALT WATER CONTAMINATION FROM THE CABLE ASSEMBLY, PERFORM THE HOIST ASSEMBLY CLEANING PROCEDURES MONTHLY TO PREVENT DAMAGE TO THE CABLE AND HOIST ASSEMBLY.

CAUTION: DO NOT EXTEND HOIST CABLE BEYOND THE LENGTH THAT ENABLES THE CABLE ASSEMBLY TO CONTACT THE GROUND UNLESS PROVISION IS MADE TO PREVENT DAMAGE OR ENTANGLEMENT OF THE CABLE.

- (1) Perform pre-operation checks.
- (2) Apply power to hoist and fully extend cable assembly.
- (3) Saturate a Low-lint Cloth with Lubricant (WD-40). Wrap saturated cloth around cable assembly.

CAUTION: DO NOT ALLOW SATURATED CLOTH TO GET CAUGHT UP INTO DRUM ASSEMBLY.

- (4) Slowly reel-in the cable assembly while holding Low-lint Cloth wrapped around cable.
- (5) Remove Low-lint Cloth and fully extend cable assembly.
- (6) Saturate a Low-lint Cloth with Lubricating Oil, MIL-PRF-23699 or MIL-PRF-7808. Wrap saturated cloth around cable assembly.
- (7) While holding Low-lint Cloth wrapped around cable, slowly reel-in the cable assembly.
- (8) Remove Low-lint Cloth from the cable.
- (9) Remove power from hoist.

SUBTASK 25-00-17-100-005-A01

C. Hook Assembly Cleaning

- (1) Clean the hook assembly with clean, fresh water at a low pressure. Make sure that all traces of salt are removed. Use a Non-metallic Soft-bristle Brush as necessary to remove heavy deposits.



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Table 6001. Tools and Materials List (Cont)

DESCRIPTION	PART NUMBER OR SPECIFICATION	SOURCE
Crocus Cloth	A-A-1206 (ANSI-B74.18)	Commercially Available
Epoxy Primer	MIL-PRF-23377, Type I, Class C2	Commercially Available
Grease	Aeroshell 7 (MIL-PRF-23827, Type II)	Commercially Available
Lockwire	MS20995C32	Commercially Available
LPS Tapmatic Edge Creme	43100	V66724
*Lubricating Oil, Gearbox	Mobil Jet II (sealed 1 quart (0.95 L) container)	Commercially Available
Lubricant	WD-40	Commercially Available
Lubricating Oil	MIL-PRF-23699	Commercially Available
Paint Stripper	MIL-PRF-25134	Commercially Available
Paint, Black Polyurethane (For rescue hoist, part numbers 42325-16-4 thru 42325-16-7, and 42325-19-106)	MIL-PRF-81352, Type III, FED-STD-595 Color #37038 Flat Black or MIL-PRF-85285 Type I, II or III Class H, FED-STD-595 Color #37038 Flat Black	Commercially Available
Paint, White Polyurethane (For rescue hoist, part numbers 42325-16-1 thru 42325-16-3)	MIL-PRF-85285 Type I, II or III Class H, FED-STD-595 Color #17925 White	Commercially Available
Wash Primer	MIL-C-8514	Commercially Available



COMPONENT MAINTENANCE MANUAL
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SUBTASK 25-00-17-300-005-A01

C. Hook Repair and Maintenance

- (1) ★ Minor blending of nicks and damage no greater than 0.010 inch (0.25 mm) wide by 0.010 inch (0.25 mm) deep is permitted.
- (2) ★ Remove surface corrosion and blend small scratches with fine abrasive materials that are compatible with stainless steel. Any signs of pitting are not acceptable and the D-lok hook assembly (★-145C, ★185, [IPL Figure 2](#)) must be replaced.
- (3) Lubricate latches and gate with light oil such as Lubricant (WD-40) or an equivalent product.



COMPONENT MAINTENANCE MANUAL
PART NUMBER 42325-16 AND 42325-19

Table 9002. Materials List (Cont)

DESCRIPTION	PART NUMBER OR SPECIFICATION	SOURCE	USE						
			TESTING	DISASSEMBLY	CLEANING	CHECK	REPAIR	ASSEMBLY	STORAGE
Lubricant	WD-40	Commercially Available			X		X		
Non-metallic Soft-bristle Brush	MIL-B-43871	Commercially Available			X				
Paint Stripper	MIL-PRF-25134	Commercially Available					X		
Paint, Black Polyurethane (For rescue hoist, part numbers 42325-16-4 thru 42325-16-7, and 42325-19-106)	MIL-PRF-81352, Type III, FED-STD-595 Color #37038 FLAT BLACK or MIL-PRF-85285 Type I, II or III Class H, FED-STD-595 Color #37038 FLAT BLACK	Commercially Available					X		
Paint, White Polyurethane (For rescue hoist, part numbers 42325-16-1 thru 42325-16-3)	MIL-PRF-85285 Type I, II or III Class H, FED-STD-595 Color #17925 WHITE	Commercially Available					X		
Pipe Sealant	Model # 56747	V05972						X	
Sealant	RTV-103 (Black) (SCD 145934, V3HRL4)	Commercially Available						X	
Tape, Adhesive	AMS-T-22085	Commercially Available							X
Thread Locking Compound	Loctite 243	V05972						X	
Torque Seal	83314 Orange	V98148						X	
Wash Primer	MIL-C-8514	Commercially Available					X		
White Lithium Grease	630-AA	V73219		X				X	

25-00-17-1

Anexo II - REL PREV CORDA K2.pdf



2º BAVEX

De acordo com as regulamentações brasileiras, este relato (ou parte dele) somente será usado para a prevenção de acidentes aeronáuticos, a fim de aumentar a segurança operacional. Este relato não precisa ser identificado. Caso o relator se identifique, o mesmo será informado sobre as medidas adotadas.

In accordance with Brazilian regulations, this report (or any part of it) shall only be used for the preventing aeronautical accidents, and has the sole purpose of enhancing safety. This report does not need to be identified. Should the reporter, however, chose to identify him/herself, he/she will be informed on the measures adopted.

DADOS GERAIS DA OCORRÊNCIA (OCCURRENCE INFORMATION)**LOCAL** (PLACE): UBERLÂNDIA - MG**DATE** (DATE): 02/03/23**HORA** (TIME): 15:00**PESSOAL ENVOLVIDO E/OU ANV** (PERSONNEL AND/OR AIRCRAFT INVOLVED): EQP SAR E TROPA DO 36º BI MEC

SITUAÇÃO (SITUATION): Durante a preparação e treinamento para a realização do rapel na Anv, no treinamento na torre foi constatado que a corda utilizada sofreu rompimento parcial. Na ocasião a corda utilizada foi verificada pelo especialista SAR antes da atividade e ela estava em condições (usada, mas em condições). Na execução após ter passado 12 militares nessa corda, o Especialista SAR verificou que a corda estava deformada e ao puxa-la para a avaliação foi constatado que a mesma estava sofrendo um rompimento parcial em que a alma estava se fundindo a capa. A utilização da corda foi interrompida no ato e os rapelistas utilizaram a outra metade da corda que ainda estava em condições de uso. A marca dessa corda era uma "K2". (em 08/03/23)

ANEXO (ATTACHMENT):

1 - 20230302_161933.jpg.part

2 - 20230302_161933.jpg

DO: ELO-SIPAA 2º BAVEX

PARA: SIPAA 2º BAvEx

DATA: 15/05/23

AVALIAÇÃO INICIAL DO RISCO:
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ASSINATURA DIGITAL ELO-SIPAER

PARECER DO SETOR RESPONSÁVEL (SOLUÇÃO JÁ ADOTADA): O fato é real e poderia ter resultado em lesões graves nos rapelistas. Após análise deste Rel Prev no Pel SAR, foi constatado que a corda utilizada pertencia aos militares do 36º BI Mec, localizado em Uberlândia-MG.

Antes do voo, a Eqp SAR realizou uma conferência visual na corda e reportaram que aparentemente as condições gerais estavam boas.

A corda era da marca K2, certificada para o emprego neste tipo de atividade, entretanto, não se pode afirmar que as condições de armazenagem estava adequado ou que estava sendo cumprido a sua validade.

A manobra foi interrompida e a Eqp SAR utilizou a outra metade da corda, conforme relatado.

Após o voo, foi recomendado que a corda fosse descartada, entretanto, como se trata de outra OM, não foi possível acompanhar as medidas adotadas.

Recomenda-se que nas próximas execuções, a Eqp SAR dedique maior atenção às condições do material utilizado pela tropa apoiada e assessorie a tripulação a interromper a execução da manobra caso observe alguma condição que ofereça risco aos militares. (em 19/05/23)

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ASSINATURA DIGITAL SETOR RESPONSÁVEL

AÇÕES CORRETIVAS ADICIONAIS ADOTADAS PELO ELO-SIPAER(SITUATION): 1. SIPAA: Divulgar o Rel Prev. 2. ECAp (Pel SAR): Dispensar maior atenção às condições do material utilizado pela tropa apoiada e assessorie a tripulação a interromper a execução da manobra caso observe alguma condição que ofereça risco aos militares. (em)

AVALIAÇÃO FINAL DO RISCO:
3C - Remoto / MaiorAvEx9d0b514878d4ba494f7f82f9f8ad9f5c
ASSINATURA DIGITAL ELO-SIPAER

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NOME DO RESPONSÁVEL

ASSINATURA DO RESPONSÁVEL

Anexo III - Motor - Eastman 2197.pdf

WARNING

DO NOT BREATHE THE OIL VAPORS. MAKE SURE THAT THE AREA WHERE YOU WORK IS OPEN TO THE AIR. DO NOT GET THE OIL ON YOUR SKIN. PUT THE RUBBER GLOVES AND A FACE SHIELD OR THE SAFETY GOGGLES. THE OIL CAN BE POISONOUS.

CAUTION: USE THE RECOMMENDED LUBRICANTS WHICH ARE GIVEN IN THE LIST. YOU CANNOT USE THE OTHER LUBRICANTS WITHOUT THE APPROVAL OF SAFRAN HELICOPTER ENGINES.

(1) Approved lubricants

The engine operates satisfactorily if you obey the restrictions of use, with the oils that agree with the specifications below and if you take into account the main characteristics of the lubrication oil system specified in this manual (see Task 79-00-00-870-801):

<i>Oil type</i>	<i>NATO sym- bol</i>	<i>U.S.A. SPEC.</i>	<i>U.K. SPEC.</i>	<i>FRANCE SPEC.</i>	<i>Class</i>	<i>Approved oil trade- marks</i>
RECOMMENDED SYNTHETIC OILS						
Average synthetic 5 cSt at 98,9°C (210°F)	0 - 156	MIL- PRF-2369 9 or MIL- L-23699	DEF STAN 91.101		HTS (High thermal stability)	.EASTMAN TURBO OIL 2197 .MOBIL JET OIL 254
SYNTHETIC OILS - NORMAL USE						
Average synthetic 5 cSt at 98,9°C (210°F)	0 - 156	MIL- PRF-2369 9 or MIL- L-23699	DEF STAN 91.101		Corrosion inhibiting	.CASTROL AERO- JET 5
					Standard	.CASTROL 5000 .ASTO 500 .MOBIL JET OIL 2 .TURBONYCOIL 600 .TOTAL AERO TUR- BINE 535 .ELF TURBOJET II .TOTAL PRESLIA SE JET
SYNTHETIC OILS - NORMAL USE WITH RESTRICTION (Drain frequency: 300 Operating hours)						
Average synthetic 5 cSt at 98,9°C (210°F)	0 - 156	MIL- PRF-2369 9 or MIL- L-23699	DEF STAN 91.101		Standard	.ASTO 560* .ROYCO 560* .EASTMAN TURBO OIL 2380*
OTHER OIL TYPES						

Anexo IV - Motor - Royco 500.pdf

AIR standard	NATO Sym- bol	Specification		Oil Characteristics		Manufactur- er	Manufacturer	Re- marks
		Us	UK	Pour point (°C)	Flash point (°C)			
DCSEA 299/A (4) Synthetic oil for tur- boma- chines (5 cst type) (6)	O-156	MIL- PRF- 23699G GRADE STD	DEF STAN 91-101 ind 3 Amdt 1	GRADE STD (NATO O-156): standard				
				- 63	256	SHELL	AEROSHELL TURBINE OIL 529 (obsolete)	
				- 59	270	EXXON MOBIL	MOBIL JET OIL II	
				- 57	235	Eastman	Eastman TURBO OIL 2380	
				- 57	273	NYCO	TURBONYCOIL 600	
				- 59	264	TOTAL	ROYCO 500	
				- 54	262	TOTAL	AEROTURBINE 535 (obsolete)	
				- 63	256	Shell	Aeroshell turbine oil 500	

(2): authorized for use by DGAC, AVCO-LYCOMING, TELEDYNE-CONTINENTAL.

** : products which meet the specifications but were not submitted to Aviation Authorities for approval.

Oil								
AIR standard	NATO Symbol	Specification		Characteristic- s		Manufactur- er	Commercial name	Re- marks
		Us	UK	Pour point (°C)	Flash point (°C)			
DCSEA 299/A (4) Synthetic oil for tur- boma- chines (5 c- st type) (6)	O-156 O-154 O-152	MIL- PRF- 23699G GRADE HTS MIL- PRF- 23699G GRADE C/I	DEF STAN 91-101 ind 3 Amdt 1	GRADE HTS (NATO O-156/O-154): High Thermal Stability				
				- 63	274	Nyco	Turbonycoil 640	
				- 60	268	SHELL	AEROSHELL TURBINE OIL 560	
				- 62	254	EXXON MOBIL	MOBIL JET OIL 254	
				- 57	Greater than 205	Eastman	Eastman TURBO OIL 2197	
				- 58	260	TOTAL	ROYCO 560	
				GRADE C/I (NATO O-156/O-152): corrosion inhibiting				
					254	NYCO	TURBONYCOIL 601	
				- 54	246	SHELL	AEROSHELL TURBINE OIL 531 (obsolete)	

Anexo V - Hidráulicos - Aeroshell 31 e Aeroshell 41.pdf

Miscellaneous products used on helicopters

305. Use Of Hydraulic Fluids

A. Miscellaneous products used in helicopters

NOTE

This work card is applicable to technical documentations not using CM codes for the identification of materials.

Hydraulic fluids:

AIR Specification	NATO Symbol	Specification		Specification DATA		Supplier	Trade Name (1) (2)		
		US	UK	Pour Point (°C)	Flash Point (°C)				
DCSEA 415/A (ex AIR 3520/B grade H-520) Mineral oil based hydraulic fluids for hydraulic transmission system (NO MICROFILTERED)	H-520 (obsolete)	MIL-H-5606 (obsolete)	DEF STAN 91-48 ind.2 Grade OM 18	- 66	100	TOTAL	Aerohydraulic 520	*	
				- 65	94	NYCO	Hydraunycil FH5		
				Inf. to - 60	105	SHELL	Aeroshell Fluid 4		
				- 66	108	EXXON MOBIL	Mobil aero HFA	*	
DCSEA 415/A grade H-515 (ex Air 3520/B grade H-515) Mineral oil based hydraulic fluids for hydraulic transmission systems, (superclean i.e MICROFILTERED)	H-515	MIL - PRF - 5606H Amdt 3 Notice 1	DEF STAN 91-48 ind 2 Grade OM 15	- 70	105	TOTAL	Roycon hydraulic oil 756 (obsolete)		
				Inf. to - 60	104	SHELL	Aeroshell Fluid 41		
				- 66	94	NYCO	Hydraulic oil FH51		
				Inf. to - 60	93	CASTROL	Brayco micron 756		
				- 66	90	EXXON MOBIL	Mobil aero HF		
				- 62	111	ANDEROL	Royco 756		

AIR Specification	NATO Symbol	Specification		Specification DATA		Supplier	Trade Name	(1)	(2)
		US	UK	Pour Point (°C)	Flash Point (°C)				
DCSEA 437/A Synthetic hydrocarbon based fluid	H-537	MIL - PRF - 83282D Amdt 1		- 61	218	ANDEROL	Royco 782		
				Inf. to - 60	225	NYCO	Hydraulic oil FH2		
				Inf. to - 55	237	SHELL	Aeroshell Fluid 31		
				- 58 - 60	235	TOTAL	Royco hydraulic oil 782 (obsolete)		
				66	224	EXXON MOBIL	Mobil aero HFS (obsolete)		
				63	224	AIR BP lubricants	Brayco micronic 882		
Low temperature, synthetic hydrocarbon based fluid, fire resistant	H-538	MIL - PRF 87257B		- 65	175	SHELL	Aeroshell fluid 51		
				- 72	172	NYCO	Hydraulic oil FH 42		
				- 66	172	CASTROL	Brayco Micronic 881		

* = Remarks: products which meet specification requirements but which have not been submitted to Aviation Authorities for qualification.

AIR Specification	NATO Symbol	Specification		Specification DATA		Supplier	Trade Name	(1)	(2)
		US	UK	Pour Point (°C)	Flash Point (°C)				
Silicone oil		FRF 192 - 001				LINKE & Partner	RHO-DORSIL TYPE 47V		UK
Mineral fluid for hydraulic power not microfiltered				Below - 30	190	WYNN'S France	HPO 32	**	F
				Below - 30	195	WYNN'S France	HPO 46	**	F
Synthetic hydraulic fluid		ASTMD 2115		Below - 50	425	CAS-TROL NYCO	HYDRO-SAFE 620		

(1) Products approved in the country of origin.

(2) Country of origin.

Anexo VI - Guincho Elétrico - Mobil Jet II.pdf



COMPONENT MAINTENANCE MANUAL
PART NUMBER 42325-16 AND 42325-19

- (i) If removed, install the aft fairing (55, -55A), aft gearbox fairing (790), or gearbox assembly fairing (-870). Refer to [ASSEMBLY](#) section.

SUBTASK 25-00-17-300-007-A01

B. Fill or Service Lubricating Oil System

CAUTION: FILL THE GEARBOX LUBRICATING OIL SYSTEM USING ONLY GEARBOX OIL, MOBIL JET II, FROM SEALED 1 QUART (0.95 L) CONTAINERS ONLY.

- (1) Using a flashlight and viewed through the hole provided in the aft fairing (55, -55A), or aft gearbox fairing (790), or gearbox assembly fairing (-870) to check the gearbox lubricating oil level. Make sure that the lubricating oil level is at the mid to 3/4 level of the oil level indicator (505A). If the lubricating oil level is below the mid level, continue with the following steps.
- (2) If required, remove the aft fairing (55, -55A), or aft gearbox fairing (790), or gearbox assembly fairing (-870). Refer to [DISASSEMBLY](#) section.
- (3) Cut, remove and discard the lockwire which secures the filler plug (485, -485A).
- (4) Remove the filler plug (485, -485A) from the rescue hoist gearbox. Remove and discard the preformed packing (495) from filler plug.

WARNING: GEARBOX LUBRICATING OIL, MOBIL JET II, IS TOXIC TO SKIN, EYES AND RESPIRATORY TRACT. AVOID SKIN AND EYE CONTACT. GOOD GENERAL VENTILATION IS NORMALLY ADEQUATE.

NOTE: Approximately 1.16 US quarts (1100 mL) of gearbox lubricating oil is required when refilling.

- (5) Install the filler plug (485, -485A) with a new preformed packing (495) in the rescue hoist gearbox. Torque the filler plug between 135 and 150 in-lbs (15 and 17 N-m). Safety the filler plug with Lockwire, MS20995C32.
- (6) Install the aft fairing (55, -55A), or aft gearbox fairing (790), or gearbox assembly fairing (-870). Refer to [ASSEMBLY](#) section.

Anexo VII - CTP - Aerogear 823 e Royco 555.pdf

AIR standard	NATO Symbol	Specification		Oil Characteristics		Manufacturer	Commercial name	Remarks
		Us	UK	Pour point (°C)	Flash point (°C)			
DCSEA 255/A	O-155	MIL-PRF-6086	DEFS-TAN 91-112	- 30	240	NYCO	NYCOLUBE 3525	
(e.g. AIR 3525B) "Extreme pressure" mineral oil for gear lubrication		GRADE M	GRADE M	Less than - 29	204	SHELL	AEROSHELL FLUID 5MA see NOTE	
				- 36	222	TOTAL	TOTAL AEROGear 823 *	
				- 39	232	TOTAL	TOTAL AEROGear 1032 *	

* : Total Aerogear 823: the temperature must not drop below - 25°C.

* : Total Aerogear 1032: recommended for temperatures up to - 35°C.

** : products which meet the specifications but were not submitted to Aviation Authorities for approval.

(5): products under symbols O-149 and O-159 are interchangeable and can be mixed.

NOTE

This oil can be used with restrictions. Refer to the section "Limitations" of each specific flight manual.

AIR standard	NATO Symbol	Specification		Oil Characteristics		Manufacturer	Commercial name	Remarks
		Us	UK	Pour point (°C)	Flash point (°C)			
Mineral oil grade 65 for piston engines (e.g. AIR 3560D Grade SAE 30)	O-113 (obsolete)	J-1966 SAE GRADE 30 (supercedes MIL-L-6082E)		- 33	246	AIR BP LUBRICANTS	CASTROL AVIATOR S65	
				Less than - 20	230	SHELL	AEROSHELL OIL 65	
Mineral oil for piston engines (e.g. AIR 3560D Grade SAE 40)	O-115 (obsolete)	J-1966 SAE GRADE 40 (supercedes MIL-L-6082E)		- 24	246	AIR BP LUBRICANTS	CASTROL AVIATOR S80	**
				- 20	260	SHELL	AEROSHELL OIL 80	
				- 15	268	TOTAL	TOTAL AERO 80	

AIR standard	NATO Symbol	Oil				Manufactur- er	Commercial name	Re- marks
		Specification		Characteristic- s				
		Us	UK	Pour point (°C)	Flash point (°C)			
Synthetic oil for tur- boma- chines and helicopter transmis- sion sys- tems (type 5 cst)	O-160	DOD- PRF- 85734 A	DEF STAN 91-100 ind 3 Amdt 1	- 60	260	SHELL	AEROSHELL TURBINE OIL 555	
				- 60	255	Eastman	Eastman TURBO OIL 25	
				- 57	260	Anderol	Royco turbine oil 555	
				- 57	272	Nyco	Turbonycoil 699	

(1): product not recommended for French SNECMA / ATAR type engines (refer to standard AIR 0115A).

(2): authorized for use by DGAC, AVCO-LYCOMING, TELEDYNE-CONTINENTAL.

(3): oil approved by CEP Sarclay and JPX.

(4): do not mix oils of different grades.

(5): products under symbols O-149 and O-159 are interchangeable and can be mixed.

(6): do not mix oils of different grades with a same specification. However, if a mixture of different grades is accidentally produced, completely wash the lubrication system.

* : Total Aerogear 823: the temperature must not drop below - 25°C.

* : Total Aerogear 1032: recommended for temperatures up to - 35°C.

** : products which meet the specifications but were not submitted to Aviation Authorities for approval.

**Anexo VIII - CHAPTER _ 17_ 18 APPENDIX _A _
B_C_D_E.pdf**

TECHNICAL MANUAL

**AIRCRAFT MAINTENANCE PROCEDURES MANUAL
FOR**

**SIKORSKY MODEL
S-70A-36 HELICOPTER**

CHAPTER 17 - EMERGENCY EQUIPMENT

CHAPTER 18 - GROUND SUPPORT EQUIPMENT

APPENDIX A - REFERENCES

APPENDIX B - METRIC CONVERSION CHARTS

APPENDIX C - SPECIAL TOOLS AND GROUND SUPPORT EQUIPMENT

APPENDIX D - EXPENDABLE SUPPLIES AND MATERIALS LIST

APPENDIX E - STORAGE OF AIRCRAFT

T-REVISIONS 1 - 81 HAVE BEEN INCORPORATED WHERE APPLICABLE. CHANGES TO THIS MANUAL ARE INDICATED BY A CHANGE NUMBER ON THE BOTTOM OF THE PAGE. INSERT PAGES ISSUED WITH THIS CHANGE INTO THE MANUAL. DISCARD AND DESTROY ALL COPIES OF REPLACED PAGES.

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CHANGE 13 - 1 NOVEMBER 2022

**SIKORSKY AIRCRAFT CORPORATION
1 OCTOBER 2005**

LIST OF EFFECTIVE PAGES

Insert latest change pages; dispose of superseded pages in accordance with applicable policies.

NOTE: On a change page, the portion of the text affected by the change is indicated by a vertical line (change bar) in the outer margin of the page and a change number at the bottom of the page. A new Chapter, Section, or Paragraph is indicated with only a change number at the bottom of the page. A change to an illustration is indicated by a change bar next to the illustration's title.

Dates of issue for original and change pages are:

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Change	1	1 October 2006
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Change	3	1 June 2008
Change	4	1 May 2010
Change	5	1 June 2011
Change	6	1 June 2012
Change	7	1 May 2013
Change	8	1 May 2014
Change	9	1 May 2015
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Change	11	1 January 2018
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WARNING

Personnel performing operations, procedures, and practices which are included or implied in this technical manual shall observe the following warnings. To disregard these warnings and precautionary information can cause serious injury, death, or an aborted mission.

WARNING**FSCAP**

This technical manual contains procedures for identifying critical characteristics of FSCAP. Critical characteristics may be identified as dimensions, tolerances, finishes, materials, assembly, or inspection procedures. Some processes may require qualified sources. FSCAP indicating a maximum allowable limit shall not be continued in use when limits have been exceeded. These parts must be replaced.

WARNING**AC POWER**

Before applying ac power to the helicopter, make sure that the area around the stabilator is clear of personnel and equipment. Should the stabilator be in any position other than trailing edge fully down, it may reposition automatically to fully down when ac power is applied.

WARNING**AVIATION FUEL**

Pending the release of more detailed guidance on acceptable occupational exposure limits, personnel involved in the handling of aviation turbine fuels are to adhere to the following general practices when exposure to fuel or fuel vapours is likely:

- a. Avoid skin contact with fuels and observe good personal hygiene, in particular prior to eating, drinking, or smoking.
- b. Be familiar with basic safety and handling requirements for aviation fuels and other flammable/explosive materials, including:
 - (1) avoid generation of static electricity,
 - (2) avoid ignition sources,
 - (3) earth all lines and equipment,

- (4) use spark free tools where necessary, and
 - (5) avoid contact with incompatible materials.
- c. If contamination occurs, clothing is to be changed as soon as possible. Clothing wet with fuel should be soaked with water prior to removal to prevent the possibility of ignition by electrostatic discharge. Contaminated clothing should be laundered separately prior to reuse.

WARNING

BERYLLIUM COPPER AND BERYLLIUM OXIDE

Beryllium copper and beryllium oxide can be serious health hazards. Dust created by breakage of beryllium copper/oxide is a serious toxic hazard, and if involved in fire, gives off large amounts of toxic fumes. Inhaled beryllium materials affect lungs, causing chronic beryllium disease, which is incurable, progressive, and fatal. Beryllium materials absorbed into body tissues, mouth, skin, or wound, cause the formation of tumors. Keep beryllium copper/oxide out of open wounds. Deliberate abrasion of beryllium materials must not be attempted in any circumstance. Use PPE specified while handling parts containing beryllium copper or beryllium oxide. Clean up visible dust piles and wash hands and arms after maintenance.

WARNING

CARBON MONOXIDE

During cold weather operations when preheating is necessary, all personnel shall become acquainted with the various types of heaters and where they are to be used. Be careful of accumulations of carbon monoxide and damage to heat-sensitive equipment.

WARNING

CHEMICAL FILM MATERIALS

Chemical film materials are strongly oxidizing and are a fire hazard when in contact with organic materials such as paint thinners. Do not store or mix surface treatment materials in containers previously containing flammable products. Rags contaminated with chemical film materials should be thoroughly rinsed and disposed of as soon as practicable.

WARNING**CONSUMABLE MATERIALS**

Observe all cautions and warnings on the containers when using consumables. When applicable wear necessary protective gear during handling and use. If a consumable is flammable or explosive, **MAKE SURE** consumable and its vapors are kept away from heat, spark, and flame. **MAKE SURE** helicopter is properly grounded and firefighting equipment is readily available for use.

WARNING**SAFETY PINS**

Make sure all safety pins are installed in ejector racks prior to performing any maintenance. To disregard this warning can cause serious injury, death, or an aborted mission.

WARNING**ELECTRICAL GROUNDING OF THE HELICOPTER**

Safety require the grounding of the helicopter when doing all fueling and defueling operations. Do not operate helicopter electrical switches, except those essential for servicing during fueling and defueling. Do not smoke or use flame during fueling and defueling operations.

WARNING**HIGH VOLTAGE**

There are dangerous voltages in the helicopter. Use extreme care when working with equipment having these voltages.

WARNING**HYDRAULIC SYSTEMS**

There are dangerous high hydraulic system pressures in the helicopter. Use extreme care when working on systems having this pressure.

WARNING

USE OF FIRE EXTINGUISHER

When fire extinguishers are used in a confined area, ventilate immediately. Serious injury or death could result if the area is not ventilated or the user does not use a self-contained breathing device.

WARNING

MAIN ROTOR PYLON SLIDING COVER

When opening and closing main pylon sliding cover, keep hands away from sharp edges near track, mating end, and especially ventilation blower inlet hole.

WARNING

NOISE

Sound pressure levels in and around this helicopter during some operating conditions exceed the surgeon generals hearing conservation criteria, as defined in DA PAM 40-501. Hearing protection devices are required to be worn by all personnel in and around the helicopter during operation of main engine and/or auxiliary power unit (APU).

WARNING

AIRWORTHINESS OF COMPONENTS

Parties may plan to retain components from helicopters involved in crashes/accidents or offer parts from such aircraft for sale and use on other aircraft. Please be advised that whenever a part from an aircraft involved in a crash/accident it may have been subjected to stresses, thermal effects or other damage outside of the normal operating parameters and some adverse change(s) in that part may occur. Such damage may not be visually detectable and may therefore require destructive testing to determine airworthiness. Unless stresses, thermal effects, or other damage to which parts are subjected as the result of a crash can be evaluated and reasonably determined to be acceptable in conjunction with appropriately qualified Sikorsky Engineering personnel, any part that may affect safe operation of the helicopters shall be assumed to be damaged beyond acceptable limits and must not be used on any airworthy helicopter. Sikorsky should be contacted for assistance in regard to the evaluation and continued use of any such parts. Ultimately, the safe operation of the aircraft is the responsibility of the operator.

WARNING**LOCKWIRE**

In critical applications use lockwire instead of safety cable which is specifically prohibited from use in critical applications. The use of safety cable is restricted in these specific applications.

WARNING**SAFETY CABLE**

Extreme caution should be exercised when using safety cable. It is absolutely critical that the ferrule does not interfere with or make contact with any movable flight control component, or electrical harness.

CAUTION

Do not operate the rotor system while the main rotor pylon sliding cover is in the open position. Main rotor blades could contact the main rotor pylon sliding cover. If rotor system operation is required when the main rotor pylon sliding cover is open, remove main rotor pylon sliding cover.

CAUTION

Damage to main rotor servo piston rods seal will occur if piston rods come in contact with contaminants during maintenance procedures. Contaminated main rotor servo piston rods will cause seal damage during use causing excessive leakage past seals. Cover up main rotor servos prior to maintenance work to keep area clean.

CAUTION

Damage can occur if limits noted on engine cowlings are exceeded. Maximum weight, engine cowlings can support including equipment, is 400 pounds. No more than two people are permitted on engine cowlings at any one time, with no one person weighing over 250 pounds. Do not apply load to vertical surface.

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HOW TO USE THIS MANUAL

This manual includes purpose, function, physical characteristics, location, access, theory of operation, servicing, cleaning, lubrication, inspection, troubleshooting, maintenance, and repair procedures for the maintenance specialist to perform specific maintenance tasks. Wire data information for all helicopter systems and major components is also included. See the Operator's Manual for personnel requirements and procedures for ground run and flight checking the helicopter. Procedures contained in the manuals are specific to the model S-70 helicopters.

Chapter 1 of TM 1-70-36-23 contains eight sections.

- Section 1 contains general information that pertains to the helicopter.
- Section 2 contains the aircraft description and data. This includes items such as helicopter dimensions, access and inspection provisions, and steps, handholds, and walkways. The Flight Safety Part Program table is also listed here.
- Section 3 contains all helicopter servicing requirements and procedures.
- Section 4 contains helicopter cleaning requirements and procedures.
- Section 5 contains helicopter lubrication requirements and procedures.
- Section 6 contains helicopter ground handling requirements and procedures.
- Section 7 contains the Periodic/Special Inspections requirements and procedures.
- Section 8 contains the Retirement Schedule.

Chapters 3 through 15, 17, and 18 of TM 1-70-36-23 each contain 5 sections.

- Section 1 contains the description and data for all systems/components applicable to that chapter.
- Section 2 contains data for troubleshooting that chapter's systems. Operational checkout procedures and logic-type troubleshooting charts

give detailed step-by-step instructions to identify malfunctioning components. Component location diagrams and schematics are also included.

- Section 3 contains on-aircraft inspections that do not require the removal and/or disassembly of components. These inspections are primarily in support of the inspection requirement called out in the preventive maintenance service checklists and the Periodic/Special Inspections called out in Section 1-7 of Chapter 1.
- Section 4 contains organizational level maintenance procedures. These procedures may contain one or more of the following type of tasks: Removal/Replacement, Disassembly/Assembly, Inspections, and Repair of the components applicable to that chapter.
- Section 5 contains Bench maintenance procedures.

Chapters 2 and 16 of TM 1-70-36-23 each contain 6 sections. Sections 1 through 5 are the same as listed above for the other maintenance chapters. In chapter 2, the additional Section 6 contains helicopter structural repair requirements and procedures. In Chapter 16, the additional Section 6 contains the removal/installation procedures for the various kits which can be installed on the helicopter.

This manual is one of a set of 6 separate manuals that cover maintenance, inspection, and troubleshooting instructions for the model S-70 helicopters. The helicopters are manufactured by Sikorsky, a Lockheed Martin Company, 6900 Main Street, Post Office Box 9729, Stratford, Connecticut, 06614-9129. The other 5 manuals are:

- Aircraft Avionics Maintenance Procedures Manual, TM 11-70-36-23
- 10 Hour/14 Day (30 Hour/42 Day) Inspection Checklist, TM 1-70-36-PMS-1
- Periodic Inspection Checklist, TM 1-70-36-PMS-2
- Airworthiness Limitations Manual, TM 1-70-23AW-1

These manuals contain equipment description and data, troubleshooting, inspection, and maintenance data for field and Bench maintenance.

The Aircraft Avionics Maintenance Procedures Manual, TM 11-70-36-23, contains descriptions, theories of operation, maintenance tasks, and Aircraft Fault Isolation Procedures for all the helicopter avionics systems.

The 10 Hour/14 Day (30 Hour/42 Day) Inspection Checklist, TM 1-70-36-PMS-1, contains complete inspection requirements for 10 hour/14 day (30 hour/42 day) inspections. It does not have instructions for repair, adjustment, or other means of correcting conditions, nor does it have troubleshooting instructions to find causes for malfunctioning. Refer to TM 1-70-36-23 or TM 11-70-36-23 for specific inspection, accept/reject criteria, or operational checks.

The Periodic Inspection Checklist, TM 1-70-36-PMS-2, contains complete inspection requirements for periodic (500 hour) inspections. It does not have instructions for repair, adjustment or other means of correcting conditions, nor does it have troubleshooting instructions to find causes for malfunctioning. Refer to TM 1-70-36-23 or TM 11-70-36-23 for specific inspection, accept/reject criteria, or operational checks.

The Airworthiness Limitations Manual, TM 1-70-23AW-1, contains a list of all components installed in the helicopter that must be removed from service for overhaul or replacement at the expiration of a specified number of flight hours.

Use of Icons.

Ranges of helicopter effectivities, equipment configurations, and production line modifications referenced throughout this manual shall be identified by an icon.

Ranges of helicopter effectivities shall be identified by an icon. **70588-SUBQ** This icon is an example of an effectivity for helicopters serial numbers 70588 and subsequent.

External Stores Support System (ESSS).

ESSS designates helicopters with provisions for external stores support system.

W/O ESSS designates helicopters with no provisions for external stores support system.

Hover Infrared Suppressor System (HIRSS).

HIRSS designates helicopters equipped with hover infrared suppressor system.

W/O HIRSS designates helicopters not equipped with hover infrared suppressor system.

Warnings, Cautions, and Notes. Warnings, Cautions, and Notes which appear in the manuals are:

WARNING

Highlights an operating or maintenance procedure, practice, condition, statement, etc., which if not strictly observed, could result in injury to or death of personnel.

CAUTION

Highlights an operating or maintenance procedure, practice, condition, statement, etc., which if not strictly observed, could result in damage to equipment, destruction of equipment, loss of mission effectiveness, or long-term health hazards to personnel.

NOTE

Highlights an essential operating or maintenance procedure, condition, or statement, which must be highlighted.

Changes to this Manual.

On a changed page, the portion of text effected by the latest change is indicated by a vertical line in the outer margin of the page. Changes to illustrations are indicated by a vertical line in the outer margin next to the figure title.

In order to recommend changes to this manual, locally reproduce the enclosed Soundoff Report and complete the following sections: Aircraft Model, Document No., Document Change No./Date, Chapter/WP No., Paragraph/Step, Figure No. (if

applicable), Table No. (if applicable), Deficiency, and Recommendation. Forward the Soundoff Report to your local Sikorsky Field Representative or forward the information to the Sikorsky Help Desk.

Sikorsky Aircraft Corporation

Technical Publication SoundOff ReportE-mail completed report: soundoff.dl-sik@groups.lmco.com

SOUNDOFF No:	
NAME (required):	
E-MAIL (required):	
PHONE (required):	
ORGANIZATION (required):	
LOCATION (required):	
DATE (required):	
AIRCRAFT MODEL (required):	
DOCUMENT NO. (required):	
DOCUMENT CHANGE NO / DATE. (required):	
CHAPTER/WP NO. (required):	
PARAGRAPH/STEP:	
FIGURE NO.:	
TABLE NO.:	
DEFICIENCY (required): (Please provide detailed description.)	
RECOMMENDATION (required): (Please provide recommended change to the document.)	
MAINTENANCE OPTIMIZATION: (Our goal is to reduce the time it takes our customers to perform maintenance.)	Given proper parts and tools, how much time did it take, for the maintainer, to complete this task, in hours? (Round to the nearest tenths. For example: 2.5)
	If the recommendation was adopted, what would the time savings be in hours? (Round to the nearest tenths. For example: 2.5)
Enter other time saving recommendations, if any, and include time savings in hours. (Round to the nearest tenths. For example: 2.5)	
If you were performing a troubleshooting task, would your recommendation prevent a false removal of a component?	☐ Yes ☐ No

RESPONSE DATE:	
RESPONSE:	
SIKORSKY USE ONLY	

CHAPTER 17

EMERGENCY EQUIPMENT

CHAPTER OVERVIEW

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17-1	Equipment Description and Data
17-2	Troubleshooting
17-3	On Aircraft Inspections
17-4	Maintenance Procedures
17-5	Maintenance Procedures (BENCH)

SECTION 17-1

EQUIPMENT DESCRIPTION AND DATA

SECTION OVERVIEW

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17-1-2	Cabin Emergency Equipment Description and Data

17-1-1 COCKPIT EMERGENCY EQUIPMENT DESCRIPTION AND DATA.

17-1-1.1 Cockpit Emergency Equipment.

The Cockpit Emergency Equipment consists of a fire extinguisher, two first aid kits and an emergency locator transmitter used when

emergency conditions exist. A first aid kit is located on the back of each of the pilot and copilot seats. The fire extinguisher is mounted on the side of the copilot seat. The emergency locator transmitter is located to the right of the pilot seat.

17-1-2 CABIN EMERGENCY EQUIPMENT DESCRIPTION AND DATA.

17-1-2.1 Cabin Emergency Equipment.

The Cabin Emergency Equipment consists of a fire extinguisher, first aid kit and a crash ax used when emergency conditions exist. A first aid kit is

located on the back of the copilot seat. The fire extinguisher is mounted on the inner side of controls closure. The crash ax is mounted behind the lower console.

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TROUBLESHOOTING
NOT APPLICABLE

SECTION 17-3

ON AIRCRAFT INSPECTIONS

NOT APPLICABLE

I

SECTION 17-4

MAINTENANCE PROCEDURES

SECTION OVERVIEW

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17-4-2	Cabin Emergency Equipment

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17-4-1 COCKPIT EMERGENCY EQUIPMENT.

PARAGRAPH BREAKDOWN

		PAGE			PAGE
17-4-1.1	Replace Fire Extinguisher	17-4-1-1	17-4-1.2	Replace First Aid Kit	17-4-1-1

INITIAL SETUP

Tools

- Aircraft Mechanic’s Toolkit

17-4-1.1 Replace Fire Extinguisher.

17-4-1.1.1 Remove.

Unlatch and remove fire extinguisher from mounting bracket on pilot’s seat stowage panel (Figure 17-4-1-1, Detail A).

17-4-1.1.2 Install.

Position fire extinguisher on mounting bracket and secure latch (Figure 17-4-1-1, Detail A).

17-4-1.2 Replace First Aid Kit.

NOTE

Replacement of both first aid kits is the same.

17-4-1.2.1 Remove.

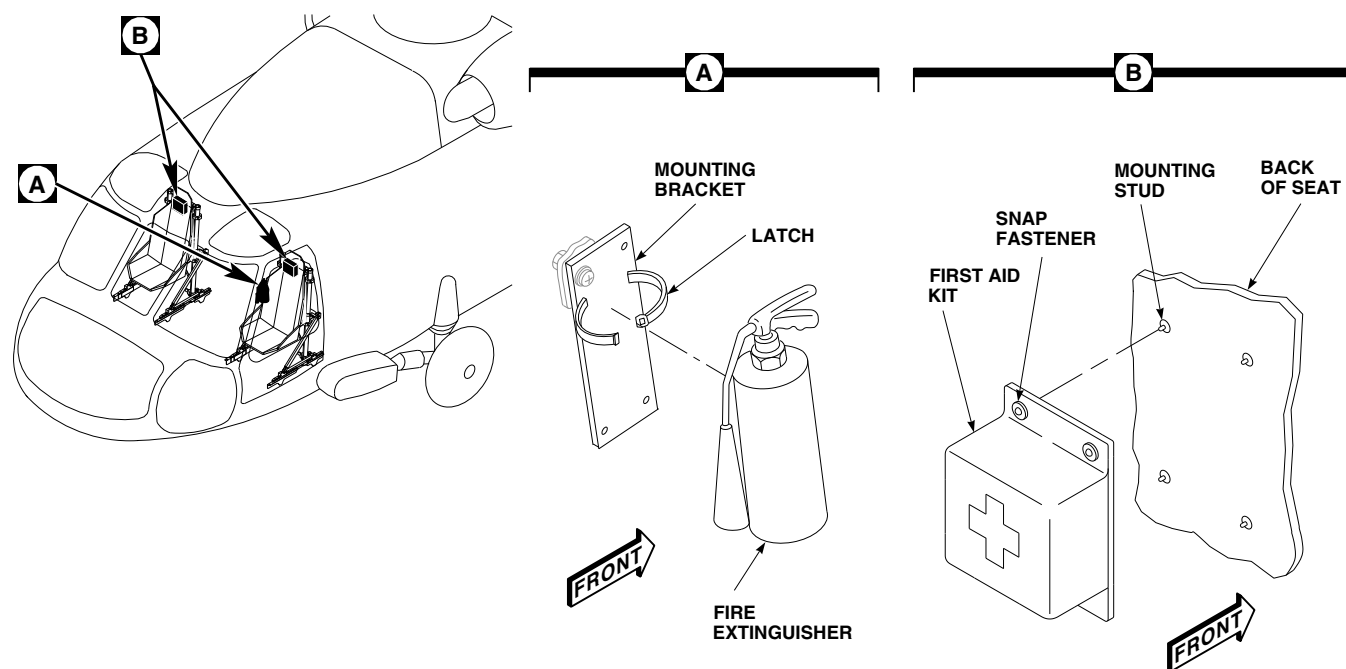
Remove first aid kit from mounting studs on back of pilot’s or copilot’s seat by pulling and disengaging snap fasteners (Figure 17-4-1-1, Detail B).

17-4-1.2.2 Inspect.

Inspect replacement first aid kit for unbroken seal. If seal is broken, replace first aid kit.

17-4-1.2.3 Install.

Position replacement first aid kit on mounting studs on back of pilot’s or copilot’s seat and secure by pressing and engaging snap fasteners (Figure 17-4-1-1, Detail B).

FA5260B
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17-4-2 CABIN EMERGENCY EQUIPMENT.

PARAGRAPH BREAKDOWN

		PAGE			PAGE
17-4-2.1	Replace Fire Extinguisher	17-4-2-1	17-4-2.3	Replace Crash Ax	17-4-2-1
17-4-2.2	Replace First Aid Kit	17-4-2-1			

INITIAL SETUP

Tools

- Aircraft Mechanic’s Toolkit

17-4-2.1 Replace Fire Extinguisher.

17-4-2.1.1 Remove.

Unlatch and remove fire extinguisher from mounting bracket on inner side of controls closure (Figure 17-4-2-1, Detail A).

17-4-2.1.2 Install.

Position fire extinguisher in mounting bracket and secure latch (Figure 17-4-2-1, Detail A).

17-4-2.2 Replace First Aid Kit.

17-4-2.2.1 Remove.

Remove first aid kit from mounting studs on back of copilot’s seat by pulling and disengaging snap fasteners (Figure 17-4-2-1, Detail B).

17-4-2.2.2 Inspect.

Inspect replacement first aid kit for unbroken seal. If seal is broken, replace first aid kit.

17-4-2.2.3 Install.

Position replacement first aid kit on mounting studs on back of copilot’s seat and secure by pressing and engaging snap fasteners (Figure 17-4-2-1, Detail B).

17-4-2.3 Replace Crash Ax.

NOTE

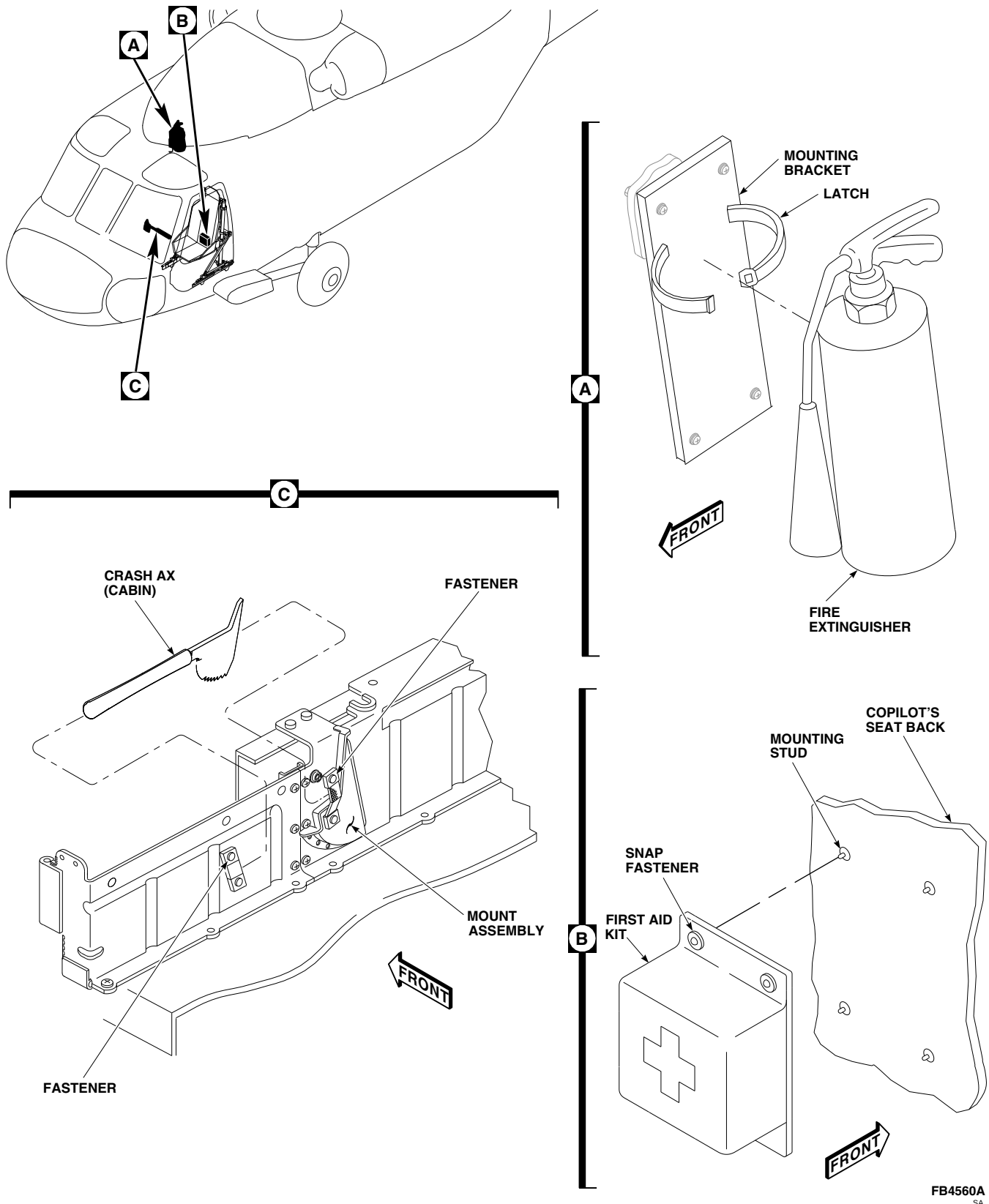
Replacement of left and right crash ax is the same.

17-4-2.3.1 Remove.

Unlatch fastener and remove crash ax from mount assembly (Figure 17-4-2-1, Detail C).

17-4-2.3.2 Install.

Install crash ax in mount assembly and secure with fastener (Figure 17-4-2-1, Detail C).



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FIGURE 17-4-2-1. REPLACE FIRE EXTINGUISHER, FIRST AID KIT, AND CRASH AX

SECTION 17-5

MAINTENANCE PROCEDURES (BENCH)

NOT APPLICABLE

CHAPTER 18

GROUND SUPPORT EQUIPMENT

CHAPTER OVERVIEW

SECTION	TITLE
18-1	Equipment Description and Data
18-2	Troubleshooting
18-3	On Aircraft Inspections
18-4	Maintenance Procedures
18-5	Maintenance Procedures (BENCH)

SECTION 18-1

EQUIPMENT DESCRIPTION AND DATA

SECTION OVERVIEW

PARAGRAPH	TITLE
18-1-1	Ground Support Equipment Description and Data

18-1-1 GROUND SUPPORT EQUIPMENT DESCRIPTION AND DATA.

18-1-1.1 Component Handling Adapter Kit.

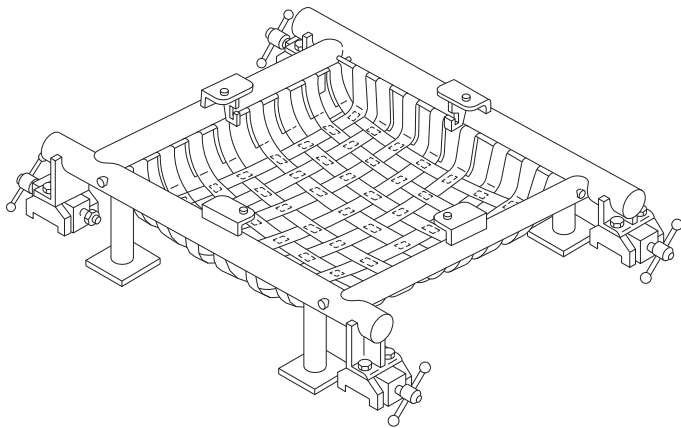
The component handling adapter kit (Figure 18-1-1-1) consists of six maintenance stand adapters for major components. The major components for these adapters are:

- a. main rotor head
- b. main gear box
- c. auxiliary power unit (APU)
- d. oil cooler blower
- e. main and tail rotor blades

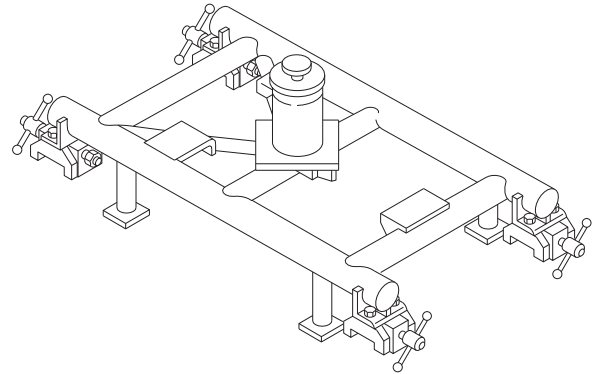
Each adapter is easily attached to standard maintenance trailer by four vise-like latches.

18-1-1.2 Fuel Quantity System Harness Adapter.

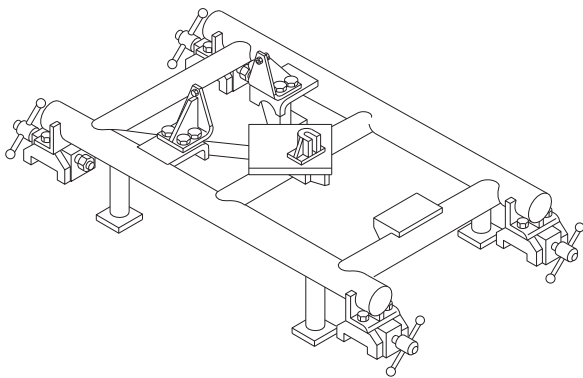
The fuel quantity system harness adapter (Figure 18-1-1-2) is used in conjunction with fuel quantity test set to adjust and/or fault isolate the fuel quantity system. The harness adapter contains a FUNCTION tank select switch to enable fuel quantity test set to read tank unit capacitance or simulate tank unit capacitance for fuel quantity system adjustment. Two test jacks provide means for measuring DC voltage output of signal conditioner.



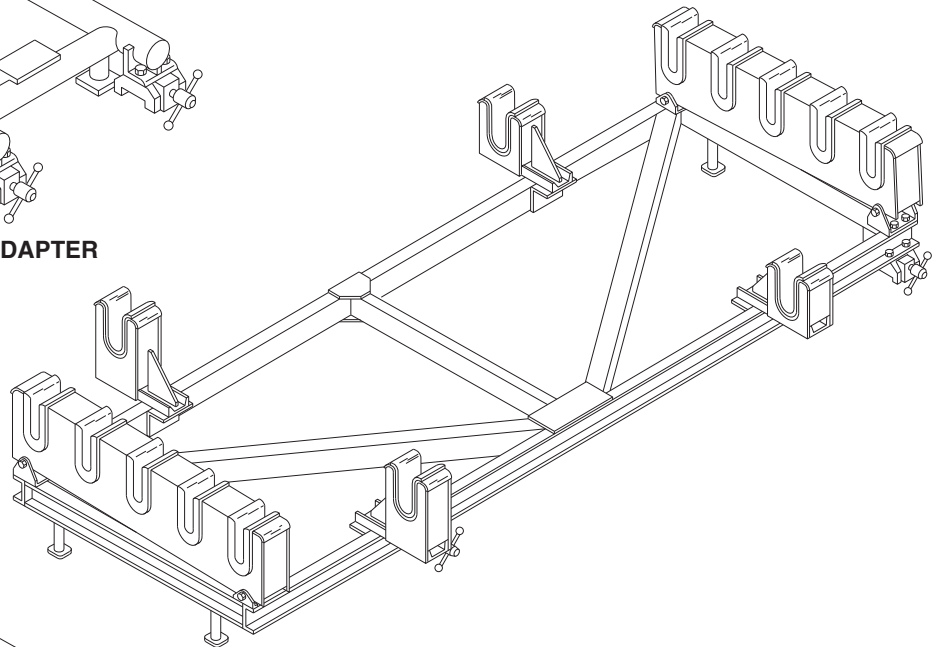
MAIN GEAR BOX ADAPTER
70700-20420-041



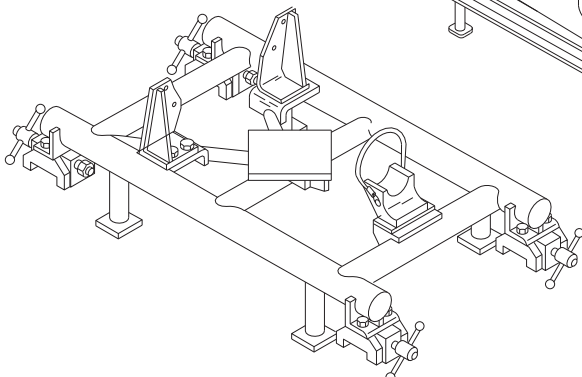
ROTARY WING HEAD ADAPTER
70700-20421-041



AUXILIARY POWER UNIT ADAPTER
70700-20423-041



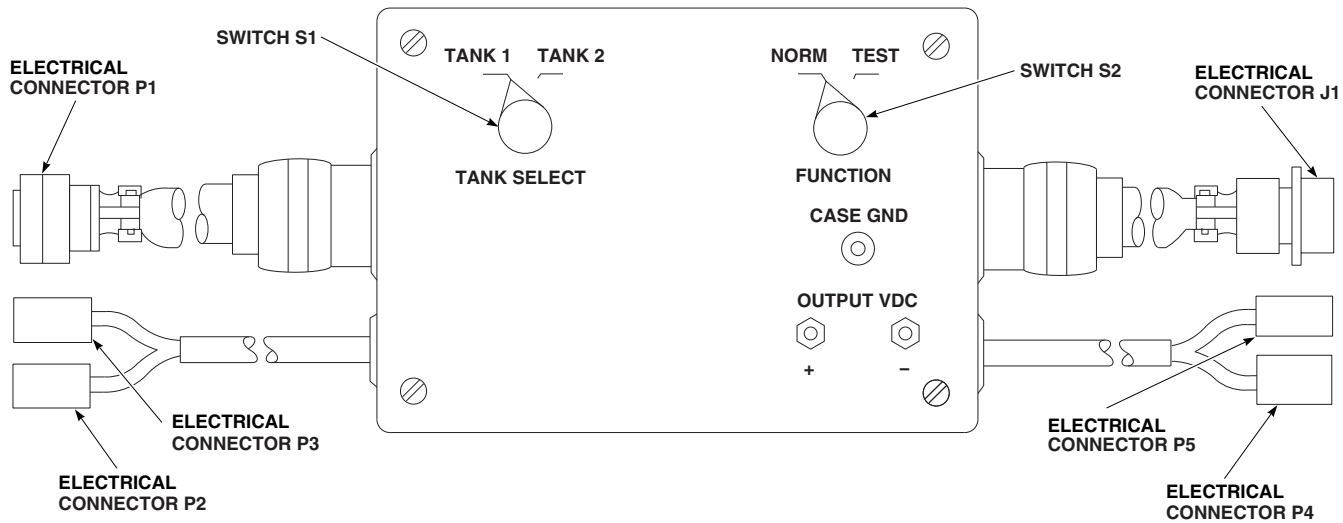
MAIN AND TAIL ROTOR BLADE ADAPTER
70700-20426-041



TRANSMISSION OIL COOLER ADAPTER
70700-20425-041

FIGURE 18-1-1-1. COMPONENT HANDLING ADAPTER KIT

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FIGURE 18-1-1-2. FUEL QUANTITY SYSTEM HARNESS ADAPTER

SECTION 18-2
TROUBLESHOOTING
NOT APPLICABLE

SECTION 18-3
ON AIRCRAFT INSPECTIONS
NOT APPLICABLE

SECTION 18-4

MAINTENANCE PROCEDURES

SECTION OVERVIEW

PARAGRAPH	TITLE
18-4-1	Cabin Maintenance Crane
18-4-2	Tail Maintenance Crane
18-4-3	Maintenance Light
18-4-4	Buddy Start System Hose

18-4-1 CABIN MAINTENANCE CRANE.

PARAGRAPH BREAKDOWN

		PAGE			PAGE
18-4-1.1	Erect Cabin Maintenance Crane	18-4-1-1	18-4-1.2	Inspect/Repair Cabin Maintenance Crane	18-4-1-7

INITIAL SETUP

Tools

- Aircraft Mechanic’s Toolkit
- Cabin Maintenance Crane
- Cargo Strap

Materials/Parts

- Acetone, Item 25, Appendix D
- Grease, Item 147, Appendix D

- Scouring Pad, Item 270, Appendix D

References

- Appendix D
- PARA 2-4-41
- PARA 4-4-4
- PARA 16-4-21
- PARA 16-4-48

18-4-1.1 Erect Cabin Maintenance Crane.

18-4-1.1.1 Prepare Helicopter.

a. If required, perform the following:

- (1) Remove ESSS external 230 gallon fuel tanks (inboard and outboard) from left or right side of helicopter (PARA 16-4-48).
- (2) Remove upper and lower ESSS horizontal stores support (HSS) root fairings (PARA 16-4-21).
- (3) Remove front and rear vertical support pylon fairings from inboard and outboard HSS (PARA 16-4-21).
- (4) Disconnect the following from inboard ejector rack, BRU-22A/A, adapter:
 - (a) Pneumatic hose.

- (b) Fuel hose.
- (c) Electrical connector, J835.
- (d) Electrical connector, J707.
- (e) Electrical connector, P709/J709, and remove harness from clamps.
- (f) Bonding wires, two each.
- (g) Remove rear inboard and outboard quick-release pins and hinge down ejector rack adapter.
- (5) Disconnect the following from outboard ejector rack, BRU-22A/A, adapter:
 - (a) Pneumatic hose.
 - (b) Fuel hose.

- (c) Electrical connector, J849.
- (d) Electrical connector, J705.
- (e) Bonding wires, two each.
- (f) Remove rear inboard and outboard quick-release pins and hinge down ejector rack adapter.

- b. Remove passenger's seats between STA 288.0 and STA 343.0 (PARA 2-4-41).
- c. Remove screw and washer securing disc plug to soundproofing panel in cabin ceiling at STA 312.3 (Figure 18-4-1-1, Sheet 3, Detail C).
- d. If engine is to be replaced, remove engine air inlet (PARA 4-4-4).

18-4-1.1.2 Assemble.

WARNING

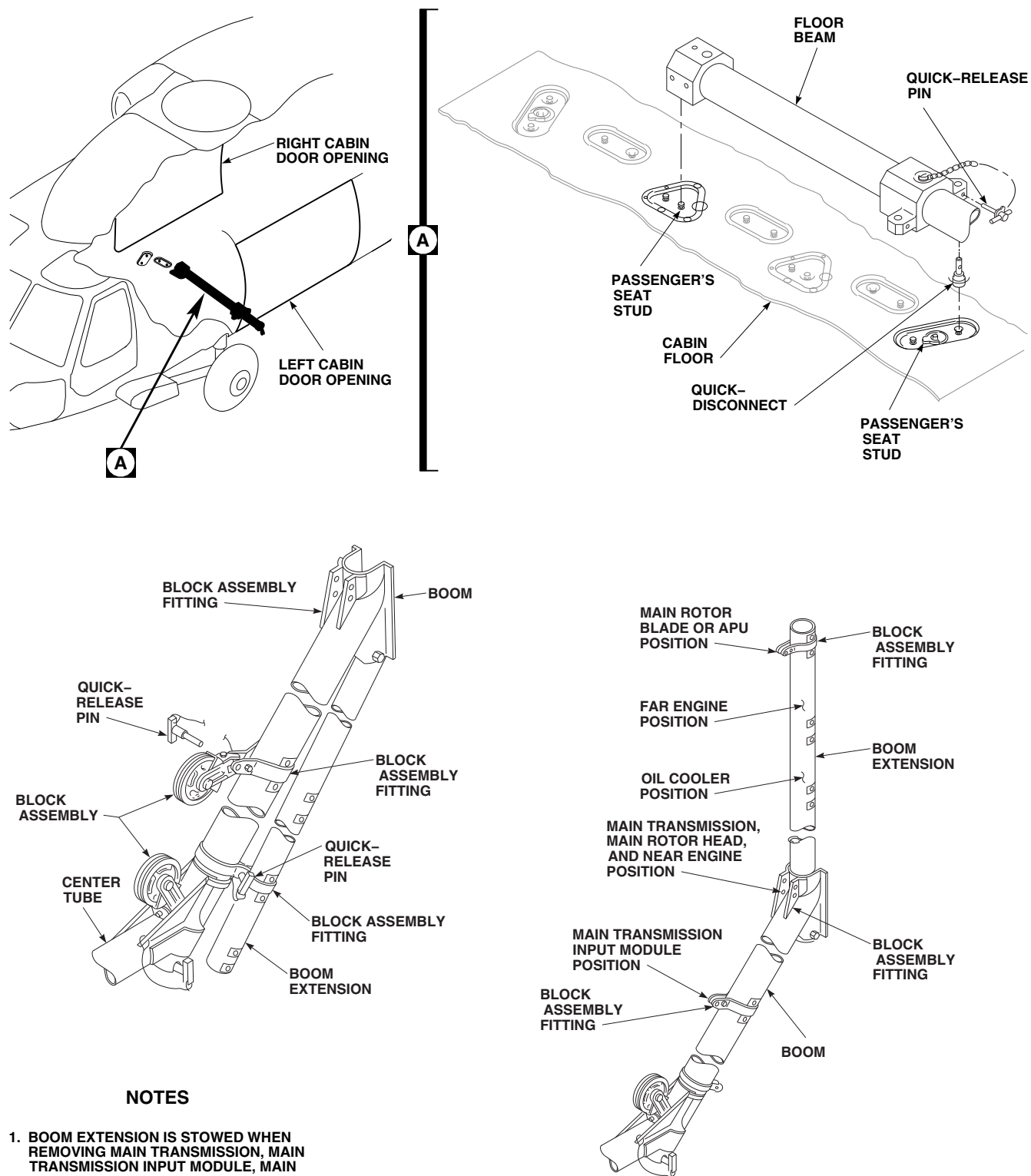
- Use extreme care when releasing last bolt or nut securing part to be removed on helicopter, as slight out-of-line condition or uneven ground could cause sudden shifting of part.
- Hoist cable may break, causing injury to personnel or damage to equipment if hoist is used to free a sticking component being removed from helicopter. Do not use too much force on hoist when removing a component.

- Hoist cable may be damaged or broken, causing injury to personnel or damage to equipment if hook is allowed to contact pulley when removing a component from helicopter. Do not allow hook assembly to contact pulley.

NOTE

Cabin maintenance crane may be used on either side of helicopter if rescue hoist is not installed. If rescue hoist is installed, cabin maintenance crane can only be installed on left side of helicopter.

- a. Secure floor beam to troop seat studs on cabin floor with quick-disconnects and quick-release pins (Figure 18-4-1-1, Sheet 1, Detail A). Make sure beam is securely attached to floor with quick-disconnects and quick-release pins.
- b. Find proper position where block assembly is to be installed on boom (Figure 18-4-1-1, Sheet 1 and Table 18-4-1-1). Secure block assembly to block assembly fitting with quick-release pin (Figure 18-4-1-1, Sheet 2).
- c. If boom is to be used to replace main transmission, input module, main rotor head, or near engine, stow boom extension as shown (Figure 18-4-1-1, Sheet 1).
- d. Connect lower gear box to floor beam with quick-release pin (Figure 18-4-1-1, Sheet 2). Let gear box rest on ground.



NOTES

1. BOOM EXTENSION IS STOWED WHEN REMOVING MAIN TRANSMISSION, MAIN TRANSMISSION INPUT MODULE, MAIN ROTOR HEAD, OR NEAR ENGINE.
2. INSTALL BLOCK ASSEMBLY ON BLOCK ASSEMBLY FITTING IN POSITION DESIRED FOR SPECIFIC COMPONENT REPLACEMENT.

FIGURE 18-4-1-1. ERECT CABIN MAINTENANCE CRANE (SHEET 1 OF 3)

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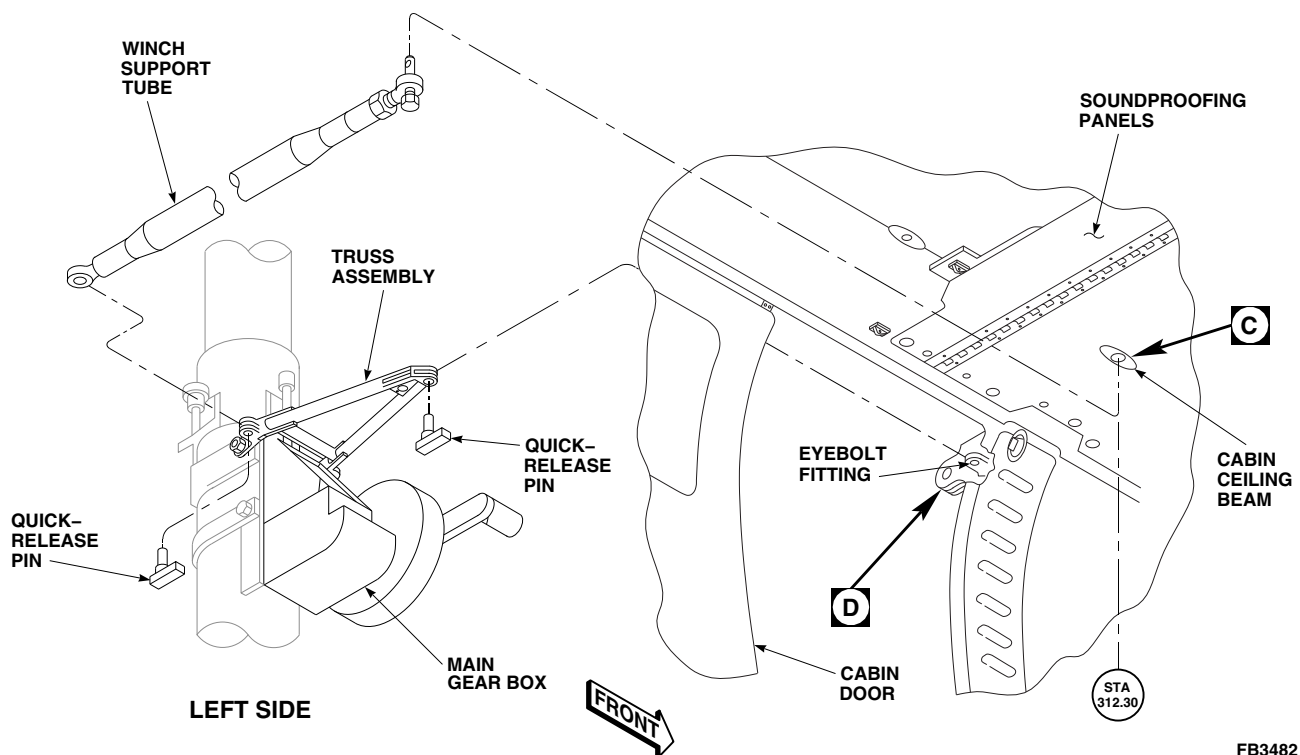
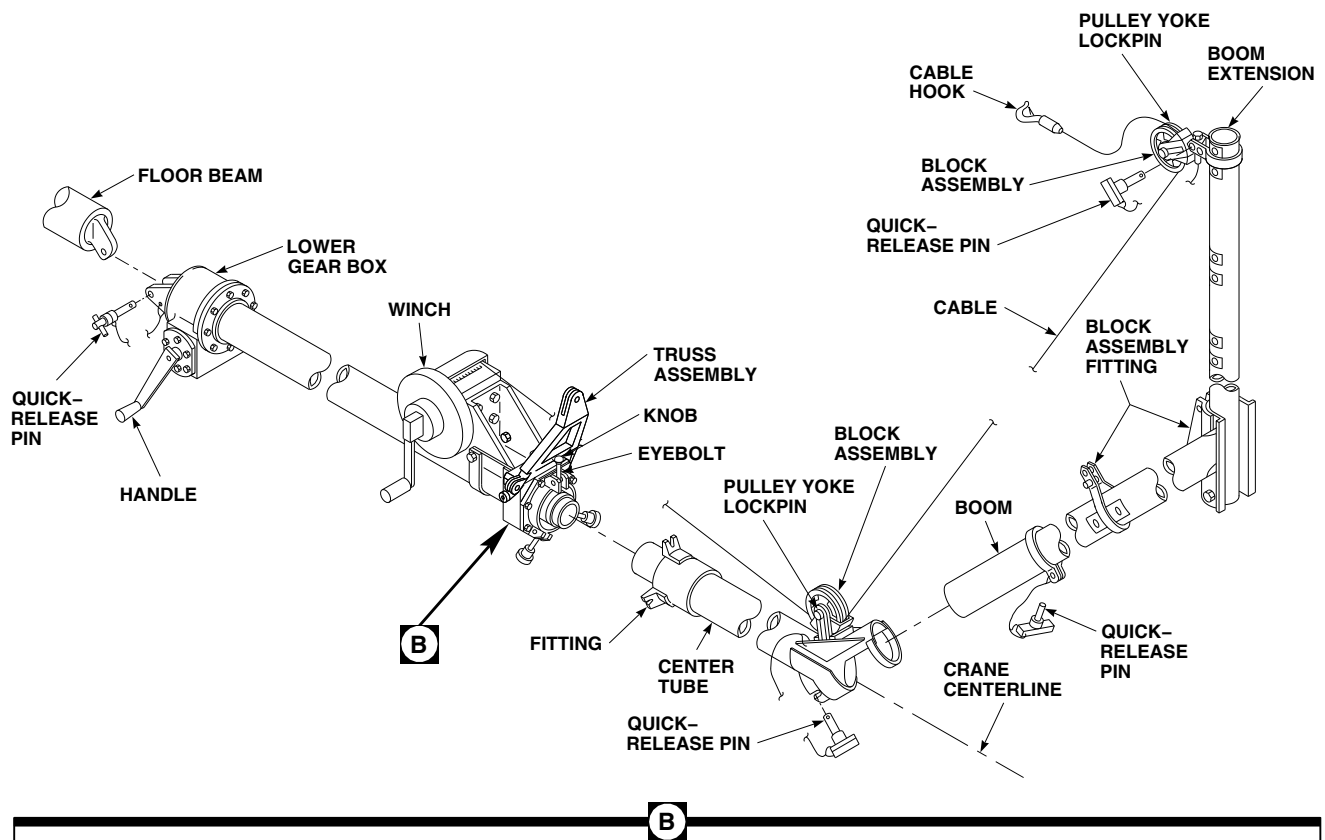
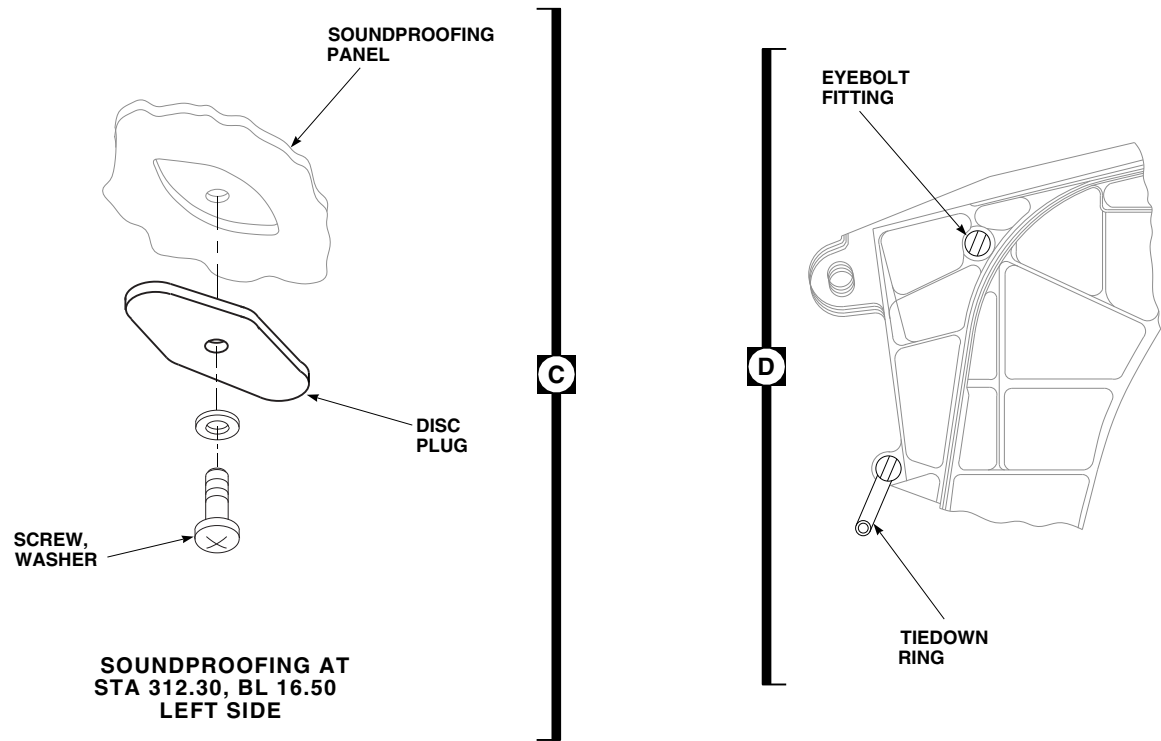
FB3482_2C
SA

FIGURE 18-4-1-1. ERECT CABIN MAINTENANCE CRANE (SHEET 2 OF 3)



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FIGURE 18-4-1-1. ERECT CABIN MAINTENANCE CRANE (SHEET 3 OF 3)

Table 18-4-1-1. Cabin Maintenance Crane Hoisting Data			
Component	Approximate Location of Block Assembly (See Note 1)		Approximate Distance from Crane Centerline to Block Assembly (See Note 2)
	STA	BL	Inches
Main Rotor Blade	362.0	154.0 left	110.0
Main Rotor Head	342.0	0.0	52.0
Bifilar	342.0	0.0	52.0
Swashplate	342.0	0.0	52.0
Main Transmission	342.0	0.0	52.0
Input Module	317.0	24.0 left or right	28.0
Oil Cooler	391.0	0.0	82.0
APU	428.0	10.0 left	110.0
Engine (left)	375.0	30.0 left	52.0

Table 18-4-1-1. Cabin Maintenance Crane Hoisting Data (Cont)

Component	Approximate Location of Block Assembly (See Note 1)	Approximate Distance from Crane Centerline to Block Assembly (See Note 2)	
	STA	BL	Inches
Engine (right)	375.0	30.0 right	94.0

NOTES

1. Location of block assembly is given in relation to helicopter STA and BL.
2. Distance is measured at a right angle to cabin maintenance crane centerline.

- e. Slide center tube into main gear box. Engage eyebolts in fittings on center tube and tighten knobs.
- f. Slide boom into center tube, turn 90°, and install quick-release pin locking boom to tube.
- g. Remove pulley yoke lockpins on both block assemblies and install cable from winch on pulleys. Install pulley yoke lockpins.

NOTE

Before winching up cabin maintenance crane, make sure floor beam is securely attached to cabin floor.

- h. Secure cable hook to cargo strap attached to bifilar or main rotor head and winch-up cabin maintenance crane vertically.
- i. Install winch support tube on rear of truss with quick-release pin (Figure 18-4-1-1, Sheet 2, Detail B).
- j. Bolt winch support tube to cabin ceiling beam at STA 312.3 about 3 ½-inches to rear of cargo door opening.
- k. Secure truss assembly to eyebolt fitting (Figure 18-4-1-1, Sheet 2, Detail B and Sheet 3, Detail D).

- l. Secure truss to eyebolt fitting with quick-release pin.
- m. Turn handle on lower gear box to position boom over component to be removed (Figure 18-4-1-1, Sheet 2). Locate block assembly in relation to helicopter STA and BL (Table 18-4-1-1).

18-4-1.1.3 Disassemble.

- a. Remove quick-release pin securing truss assembly to eyebolt fitting (Figure 18-4-1-1, Sheet 2, Detail B).
- b. Remove truss assembly from eyebolt fitting.
- c. Unbolt winch support tube from cabin ceiling beam at STA 312.3.
- d. Remove quick-release pin and remove winch support tube from rear of truss assembly.
- e. Winch-down cabin maintenance crane horizontally. Disconnect cable hook from cargo strap attached to bifilar or main rotor head (Figure 18-4-1-1, Sheet 2).
- f. Remove pulley yoke lockpins and remove cable from winch on pulleys. Replace pulley yoke lockpins.

- g. Remove quick-release pin locking boom to center tube. Slide boom out of center tube and turn 90°.
- h. Loosen knobs on center tube and disengage eyebolts in fittings. Slide center tube out of main gear box.
- i. Remove quick-release pin and disconnect lower gear box from floor beam.
- j. Remove quick-release pin securing block assembly to block assembly fitting.
- k. Remove quick-release pins and disconnect quick-disconnects, and remove floor beam from cabin floor (Figure 18-4-1-1, Sheet 1, Detail A).
- l. If engine was replaced, install engine air inlet (PARA 4-4-4).
- m. Install disc plug in soundproofing panel at cabin ceiling STA 312.3, and secure with screw and washer (Figure 18-4-1-1, Sheet 3, Detail C).
- n. Install passenger's seats between STA 288.0 and STA 343.0 (PARA 2-4-41).
- o. If required, connect/install the following:
 - (1) Connect the following to outboard ejector rack, BRU-22A/A, adapter:
 - (a) Install rear inboard and outboard quick-release pins and hinge up ejector rack adapter.
 - (b) Bonding wires, two each.
 - (c) Electrical connector, J705.
 - (d) Electrical connector, J849.
 - (e) Fuel hose.
 - (f) Pneumatic hose.
 - (2) Connect the following to inboard ejector rack, BRU-22A/A, adapter:
 - (a) Install rear inboard and outboard quick-release pins and hinge down ejector rack adapter.
 - (b) Bonding wires, two each.
 - (c) Electrical connector, P709/J709, and install harness to clamps.
 - (d) Electrical connector, J707.
 - (e) Electrical connector, J835.
 - (f) Fuel hose.
 - (g) Pneumatic hose.
- (3) Install front and rear ESSS horizontal stores support (HSS) vertical support pylon fairings to inboard and outboard stores support (PARA 16-4-21).
- (4) Install upper and lower ESSS horizontal stores support (HSS) root fairings (PARA 16-4-21).
- (5) Install ESSS external 230 gallon fuel tanks (inboard and outboard) to left or right side of helicopter (PARA 16-4-48).

18-4-1.2 Inspect/Repair Cabin Maintenance Crane.

- a. Check all tubes for dents, cracks, and corrosion. **DENTS MUST NOT EXCEED ¼-INCH IN DEPTH. NO CRACKS ALLOWED.** If dents exceed limit, replace tube. If cracked, weld cracks. Light corrosion can be cleaned using scouring pad, Item 270, Appendix D. If tubes have heavy corrosion, replace tubes.
- b. Check all quick-release pins and fittings for breaks, cracks, and corrosion. **NONE ALLOWED.** If broken, cracked, or corroded, replace pins and fittings.
- c. Check block assemblies for wear, binding, and cracks. **WEAR ON BLOCK ASSEMBLY SHALL NOT EXCEED ⅛-INCH. PLAY IN BEARINGS SHALL NOT EXCEED 0.020-INCH IN ANY DIRECTION. NO CRACKS ALLOWED.** If damage exceeds limits, replace block assembly.

d. Check winch support tube for dents and play in bearings. **NONE ALLOWED.** If dent(s) or play is found, replace bearing(s) as follows (Figure 18-4-1-2, Detail A):

- (1) Remove pin from non-adjustable end and remove bearing from winch support tube.
- (2) Remove special bolt from bearing by removing retaining ring and collars.
- (3) Loosen jamnut on adjustable end. Unscrew bearing from tube. Remove jamnut and quick-release pin from bearing.
- (4) Place special bolt and collars on bearing and secure with retaining ring. **PLACE QUICK-RELEASE PIN IN BEARING. THREAD BEARING INTO TUBE UNTIL MEASUREMENT BETWEEN BEARING CENTERS IS 31.89-INCHES.** Lock bearing in place using jamnut.
- (5) Install bearing in tube and secure with pin.
- (6) Place cable assembly over other bearing and thread jamnut on as far as possible.

e. Check truss for corrosion, dents, and wear. **NONE ALLOWED.** If truss is corroded, dented, or worn, remove all quick-release pins and replace truss (Figure 18-4-1-2, Detail B).

f. Check winch for smooth operation and check cable for condition. **WINCH MUST NOT BIND OR SLIP UNDER LOAD. NO MORE THAN TWO STRANDS OF CABLE MAY BE BROKEN. OUTER STRANDS OF CABLE MUST NOT BE BLENDED TOGETHER, DUE TO WEAR.** If any of the above conditions are met or exceeded, replace winch as follows (Figure 18-4-1-2, Detail C):

NOTE

- Winch and cable are replaced as one unit.
- Note screw location before removing.

(1) Remove screws securing winch to winch support.

(2) Install replacement winch on winch support and secure with screws.

g. Check winch support for cracks, dents, and corrosion. **NONE ALLOWED.** If winch support is cracked, dented, or corroded, replace by removing bolts and washers securing it to lower tube assembly.

h. Check bearings on lower tube assembly for play. **NONE ALLOWED.** If bearings have play, replace bearings as follows (Figure 18-4-1-2, Detail D):

(1) Remove locknut. Slide off coupling and key.

(2) Remove bolts and washers securing cover plate to housing. Remove cover plate.

(3) Remove housing from lower tube assembly. Remove upper bearing and spacer from housing.

(4) Remove screws, retainer, and lower bearing from housing.

(5) Using acetone, Item 25, Appendix D, clean all components.

(6) Inspect for wear and damage. **NONE ALLOWED.** If damaged, replace parts as necessary.

(7) Using grease, Item 147, Appendix D, repack bearings.

(8) Place lower bearing in housing with seal facing down. Position retainer on housing and secure with screws.

(9) Slide housing assembly over lower tube assembly. Slide spacer over tube, seating it on lower bearing. Using grease, Item 147, Appendix D, fill gap between spacer and housing.

(10) Install upper bearing with seal facing up.

- (11) Install cover plate on housing and secure with bolts and washers.
- (12) Slide coupling and key on tube.
- (13) Install locknut and tighten until no play is felt in bearings.

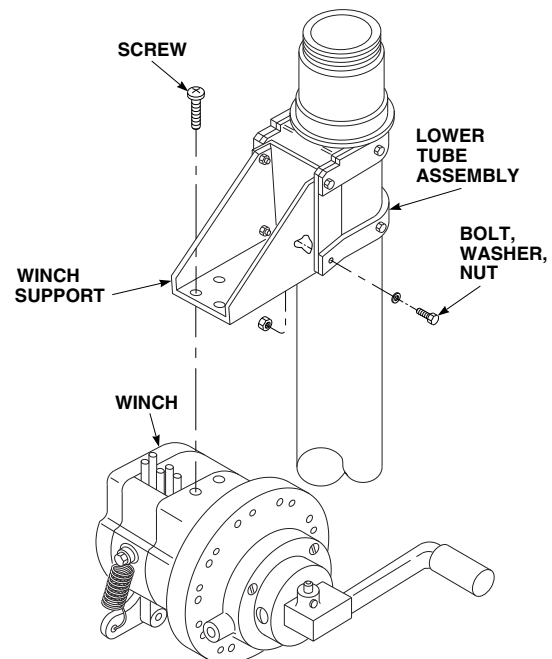
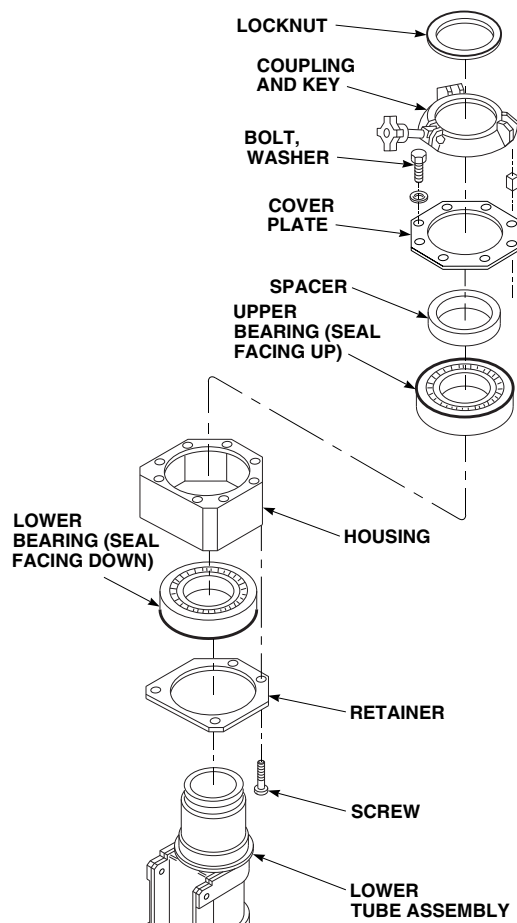
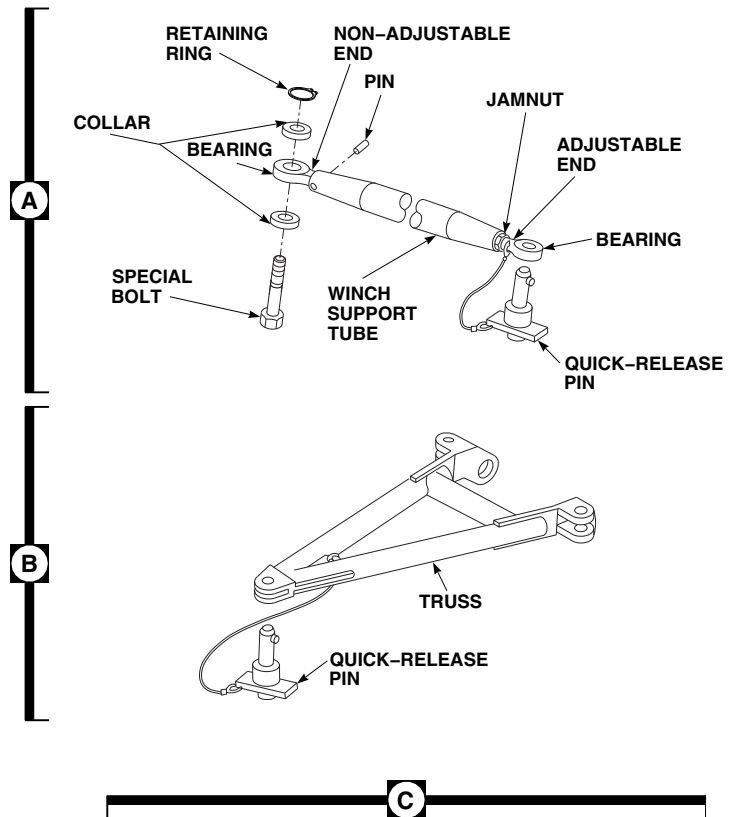
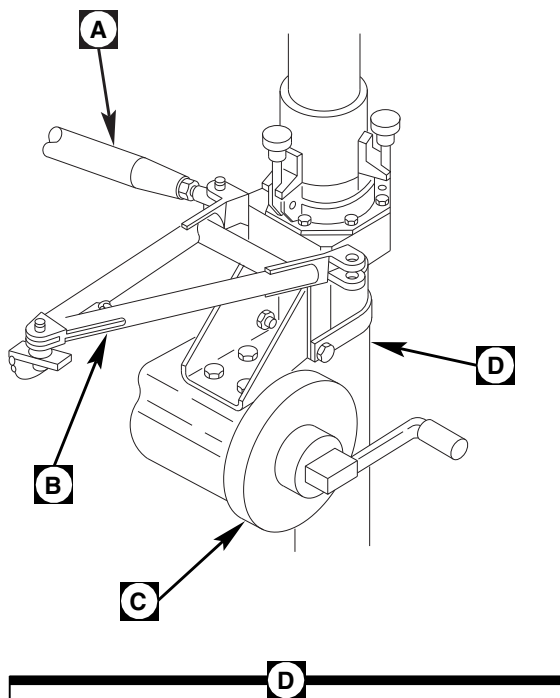


FIGURE 18-4-1-2. INSPECT/REPAIR CABIN MAINTENANCE CRANE

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18-4-2 TAIL MAINTENANCE CRANE.

PARAGRAPH BREAKDOWN

	PAGE
18-4-2.1 Install Tail Maintenance Crane	18-4-2-1

INITIAL SETUP

Tools

- Aircraft Mechanic’s Toolkit
- Maintenance Platform
- Tail Maintenance Crane

References

- PARA 2-4-134

18-4-2.1 Install Tail Maintenance Crane.

18-4-2.1.1 Prepare Helicopter.

- If tail maintenance crane will be used to remove tail gear box, remove tail gear box fairings (PARA 2-4-134).
- If tail maintenance crane will be used to remove tail rotor blades, remove access panel on top of rear tail gear box fairing as follows:

NOTE

Access panel is located behind anticollision light.

- Position suitable maintenance platform next to tail gear box fairing.
- Loosen turnlock fasteners and remove access panel (Figure 18-4-2-1, Detail A).

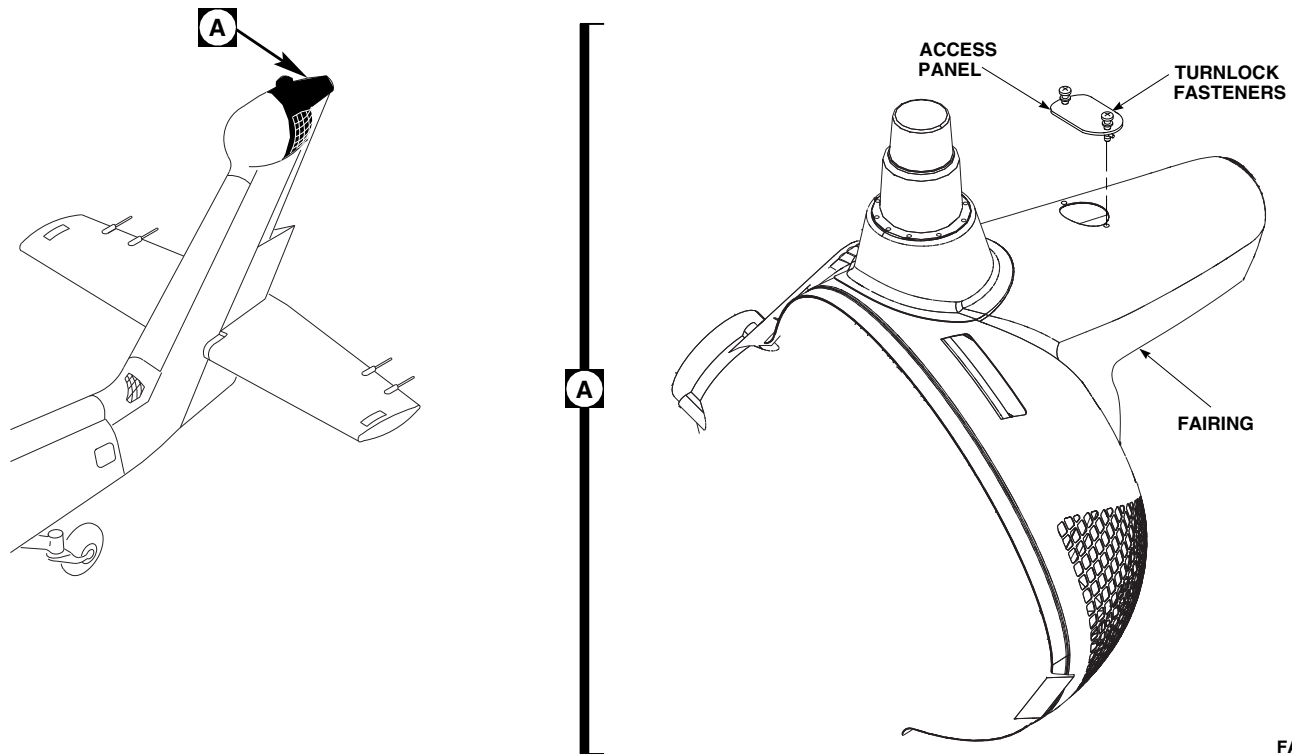
18-4-2.1.2 Install.

- Insert support assembly through hole into tail rotor pylon (Figure 18-4-2-2, Detail A).
- Install arm assembly into support assembly, positioning as follows:

- If removing tail gear box, position arm pointing toward front.
- If removing tail rotor blades, position arm pointing toward side.
- Lock arm assembly in place with pin.
- Connect chain hoist to arm assembly as follows:
 - If removing tail gear box, install chain hoist on lower lug.
 - If removing tail rotor blades, install chain hoist on upper lug.

18-4-2.1.3 Remove.

- Disconnect chain hoist from arm assembly (Figure 18-4-2-2, Detail A).
- Remove pin securing arm assembly to support assembly.
- Remove arm assembly from support assembly.
- Remove support assembly from hole in pylon.

FA5278
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e. Install tail gear box fairings (PARA 2-4-134) or access panel as follows (Figure 18-4-2-1, Detail A):

(1) Position suitable maintenance platform next to tail gear box.

(2) Position access panel on top of rear tail gear box fairing and secure with turnlock fasteners.

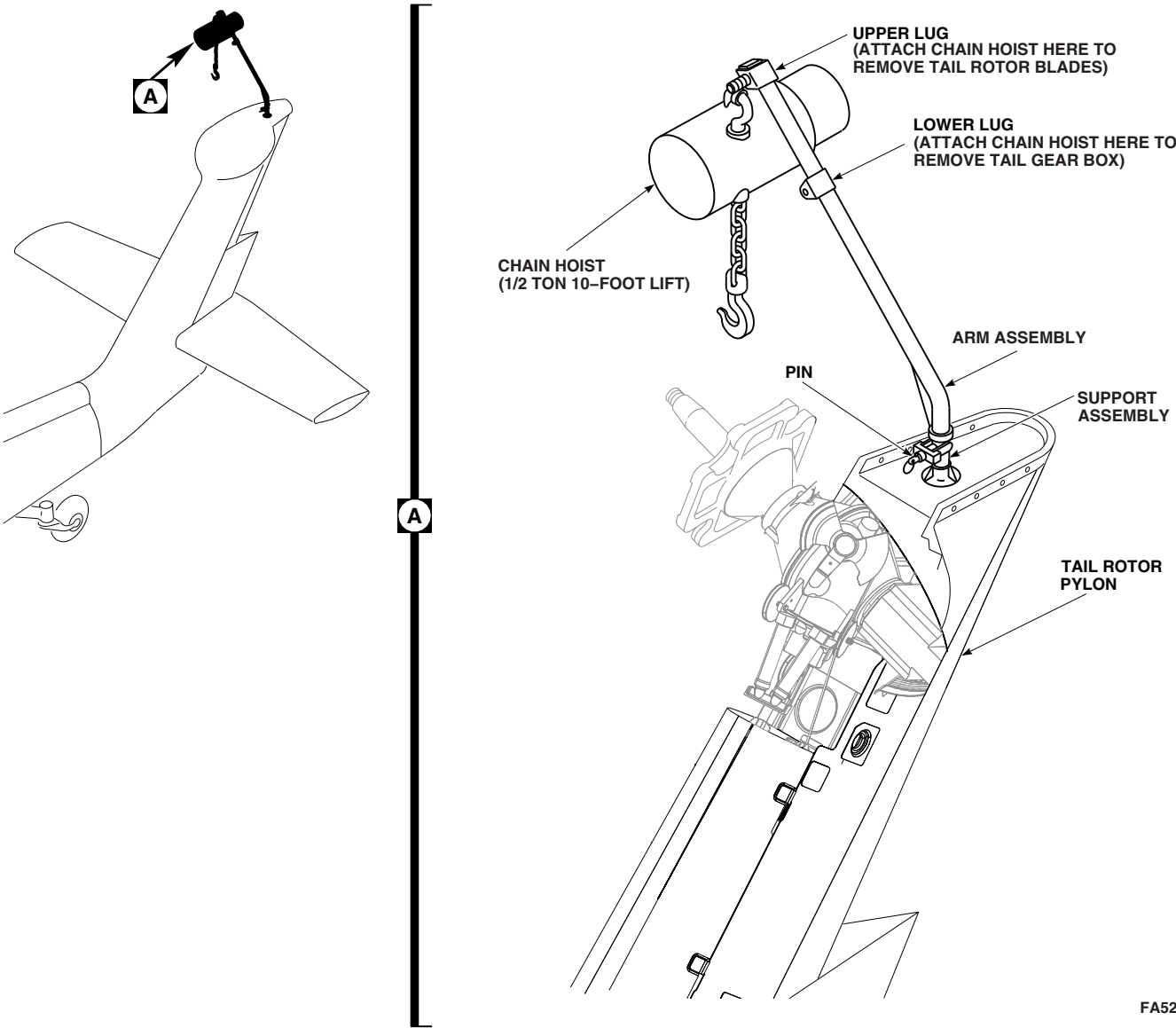


FIGURE 18-4-2-2. INSTALL TAIL MAINTENANCE CRANE

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18-4-3 MAINTENANCE LIGHT.

PARAGRAPH BREAKDOWN

	PAGE
18-4-3.1 Replace Maintenance Light	18-4-3-1

INITIAL SETUP

Tools

- Aircraft Mechanic’s Toolkit

Materials/Parts

- Protective Caps and Plugs

References

- PARA 1-7-20

18-4-3.1 Replace Maintenance Light.

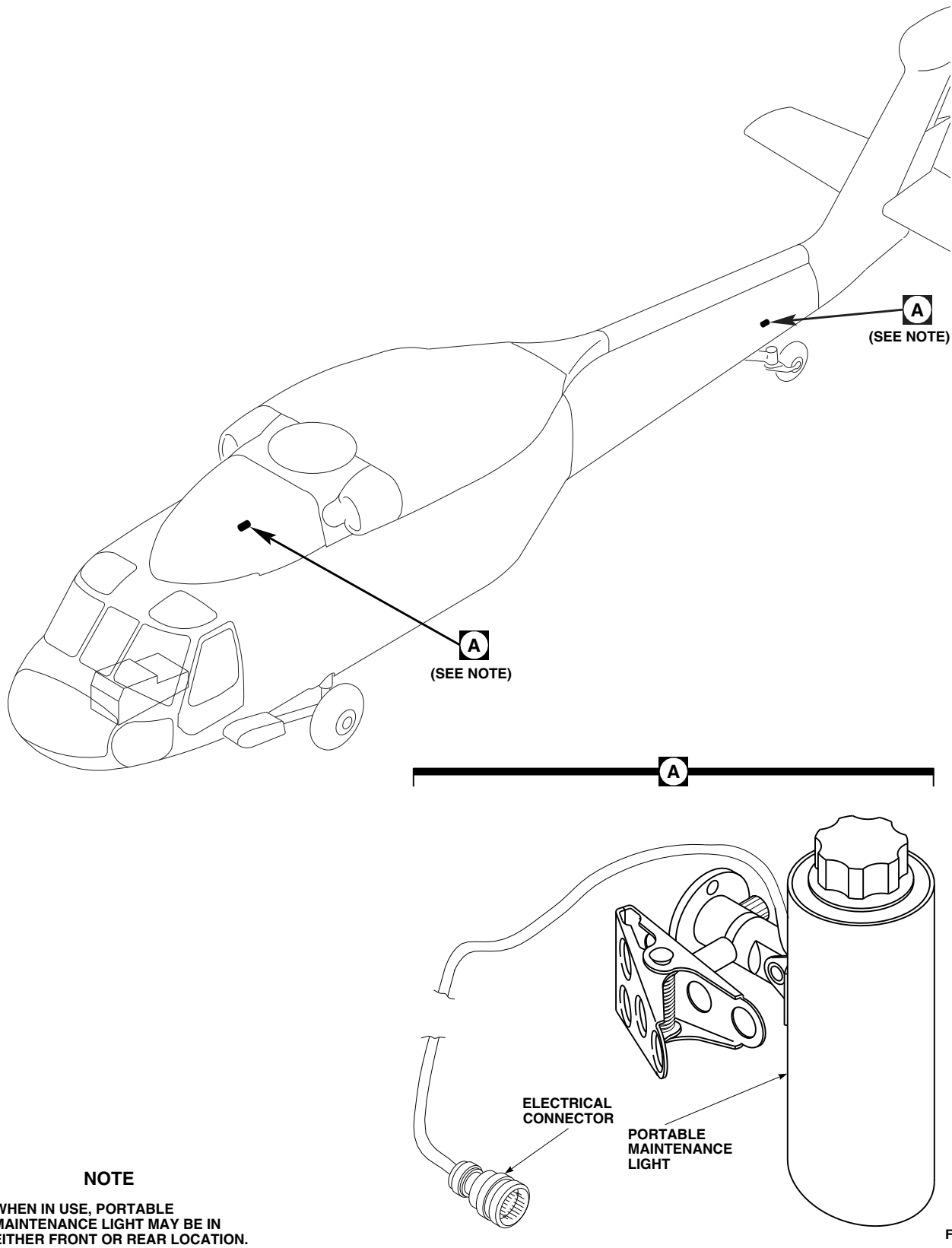
18-4-3.1.1 Install.

- Remove maintenance light from stowage bag on back of pilot’s seat.
- If installing maintenance light in cabin, open access door in soundproofing at STA 293.0 in cabin ceiling on right side of helicopter.
- Remove protective cover from MAINT LIGHT receptacle and protective cap from electrical connector.
- If required, inspect and treat receptacle and electrical connector (PARA 1-7-20).

- Connect light to MAINT LIGHT receptacle (Figure 18-4-3-1, Detail A).

18-4-3.1.2 Remove.

- Disconnect light from MAINT LIGHT receptacle (Figure 18-4-3-1, Detail A).
- Install protective cover on receptacle and protective cap on electrical connector.
- Coil light cord and store light in stowage bag on back of pilot’s seat.
- Close soundproofing access door in cabin ceiling.



18-4-4 BUDDY START SYSTEM HOSE.

PARAGRAPH BREAKDOWN

	PAGE
18-4-4.1 Repair Buddy Start System Hose	18-4-4-1

INITIAL SETUP

- Torque Wrench, 30 - 150 in. lbs

Tools

- Aircraft Mechanic’s Toolkit
- Clamp Tool

18-4-4.1 Repair Buddy Start System Hose.

- (3) Pull coupling assembly from hose.

18-4-4.1.1 Disassemble.

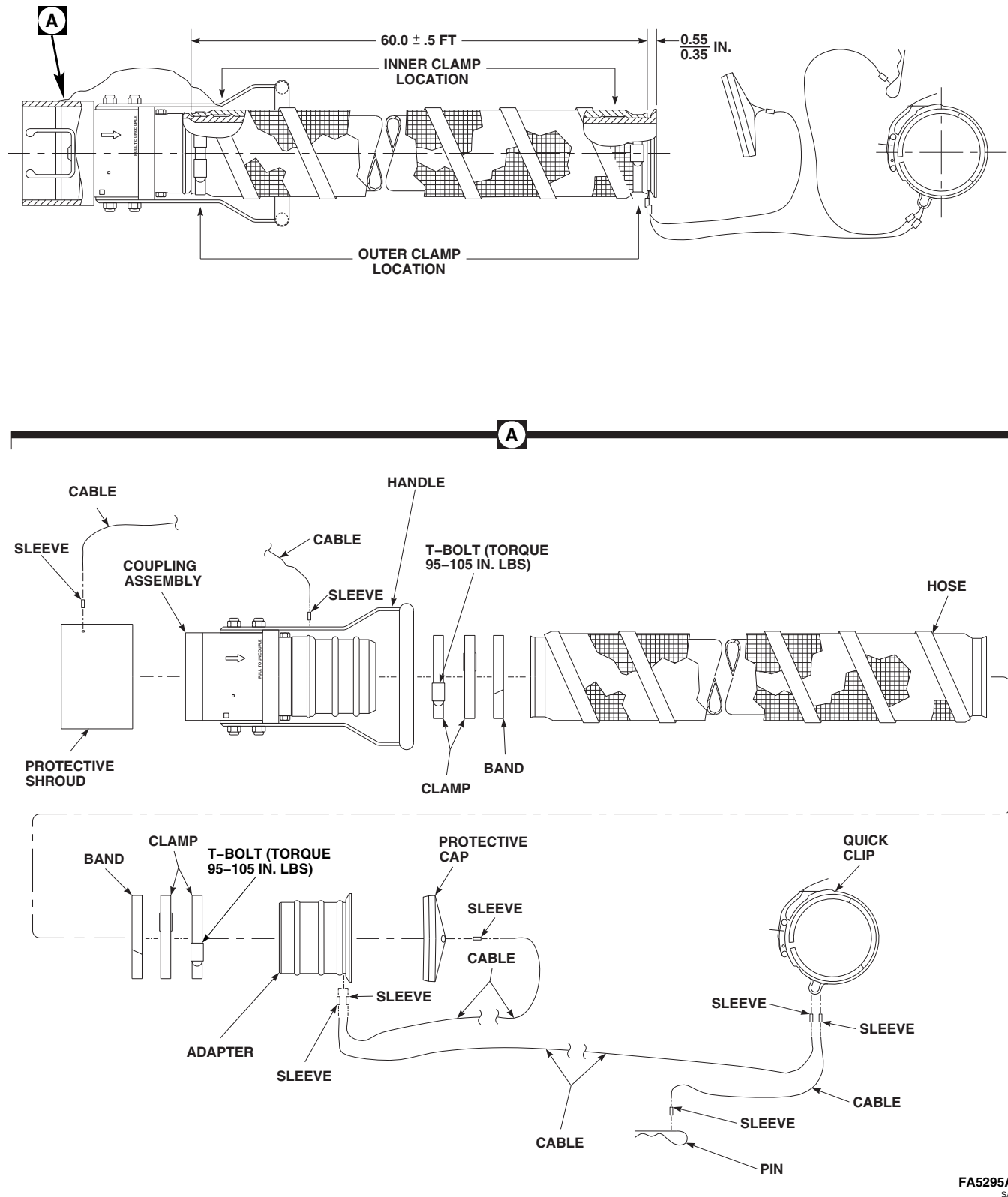
- Remove quick clip and pin by cutting cable at adapter and quick clip. Remove cable securing pin to quick clip (Figure 18-4-4-1, Detail A).
- Remove protective cap by cutting cable at adapter and protective cap.
- Remove adapter as follows:
 - Cut and remove outer clamp.
 - Pull back hose jacket to expose inner clamp. Cut and remove clamp. Remove band.
 - Pull adapter from hose.
- Remove protective shroud by cutting cable at shroud and at handle.
- Remove coupling assembly as follows:
 - Cut and remove outer clamp.
 - Pull back hose jacket to expose inner clamp. Cut and remove inner clamp. Remove band.

18-4-4.1.2 Assemble.

NOTE

Make sure clamp is centered on band.

- Pull hose jacket back and place band around hose at inner clamp location. Place clamp over band (Figure 18-4-4-1, Detail A).
- Insert adapter into hose.
- Tighten and lock clamp as follows:
 - Place tail of clamp into clamp tool and grip tail end with gripper lever.
 - Apply tension to clamp by turning T-bolt clockwise until hose starts to compress. **TORQUE T-BOLT TO 95 - 105 INCH-POUNDS.**
 - Roll tool over hose, backing off tension handle ¼ to ½ turn through course of roll, until shear hook engages T-bolt edge.
 - Tighten knurled nut by hand securing T-bolt tightly between edge of hook and



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FIGURE 18-4-4-1. REPAIR BUDDY START SYSTEM HOSE

nose of adapter. Turn hex nut clockwise until band is sheared.

- d. Push hose jacket over clamp and back into place. Place clamp over jacket and hose at outer clamp location. Locate T-bolt 180° opposite from inner clamp T-bolt location.
- e. Tighten and lock clamp in place. Refer to step c.
- f. Install cable to protective cap and adapter.
- g. Install cable to pin and quick clip.
- h. Install cable to quick clip and adapter.
- i. Insert coupling assembly into hose.

NOTE

Make sure clamp is centered on band.

- j. Pull hose jacket back and place band around hose at inner clamp location. Place clamp over band.
- k. Tighten and lock clamp in place. Refer to step c.
- l. Push hose jacket over clamp and back into place. Place clamp over jacket and hose at outer clamp location. Locate T-bolt 180° opposite from inner clamp T-bolt location.
- m. Tighten and lock clamp in place. Refer to step c.
- n. Install cable to protective shroud and handle.

SECTION 18-5

MAINTENANCE PROCEDURES (BENCH)

SECTION OVERVIEW

PARAGRAPH	TITLE
18-5-1	Cabin Maintenance Crane (BENCH)

18-5-1 CABIN MAINTENANCE CRANE (BENCH).

PARAGRAPH BREAKDOWN

	PAGE
18-5-1.1 Repair Cabin Maintenance Crane Gear Box (BENCH)	18-5-1-0

INITIAL SETUP

Tools

- Aircraft Mechanic’s Toolkit
- Feeler Gage
- Phenolic Drift
- Plastic Hammer

Materials/Parts

- Acetone, Item 25, Appendix D
- Adhesive, Item 37, Appendix D
- Grease, Item 147, Appendix D

References

- Appendix D

18-5-1.1 Repair Cabin Maintenance Crane Gear Box (BENCH).

18-5-1.1.1 Disassemble.

- Loosen setscrew and slide handle and key off shaft (Figure 18-5-1-1).
- Remove bolts and washers holding open and closed caps on housing. Remove caps and peel-off shims.
- Check grease seal in open cap. Replace if necessary.

NOTE

Worm gear and gear must be replaced as a set.

- Remove worm gear by turning gear to loosen bearing packages. Remove cups and cones from gear.

- Remove bolts and washers from bearing retainer, and pull lower tube from housing.
- Remove nut, lower bearing, gear, and key from lower tube.
- Using plastic hammer, tap bearing retainer from lower tube. Remove upper bearing from retainer.
- Remove screws, washers, cover, and gasket from housing.
- Clean all parts in acetone, Item 25, Appendix D.
- Inspect for wear and damage. Replace as necessary.

18-5-1.1.2 Inspect.

- Pack all bearings with grease, Item 147, Appendix D, or equivalent.

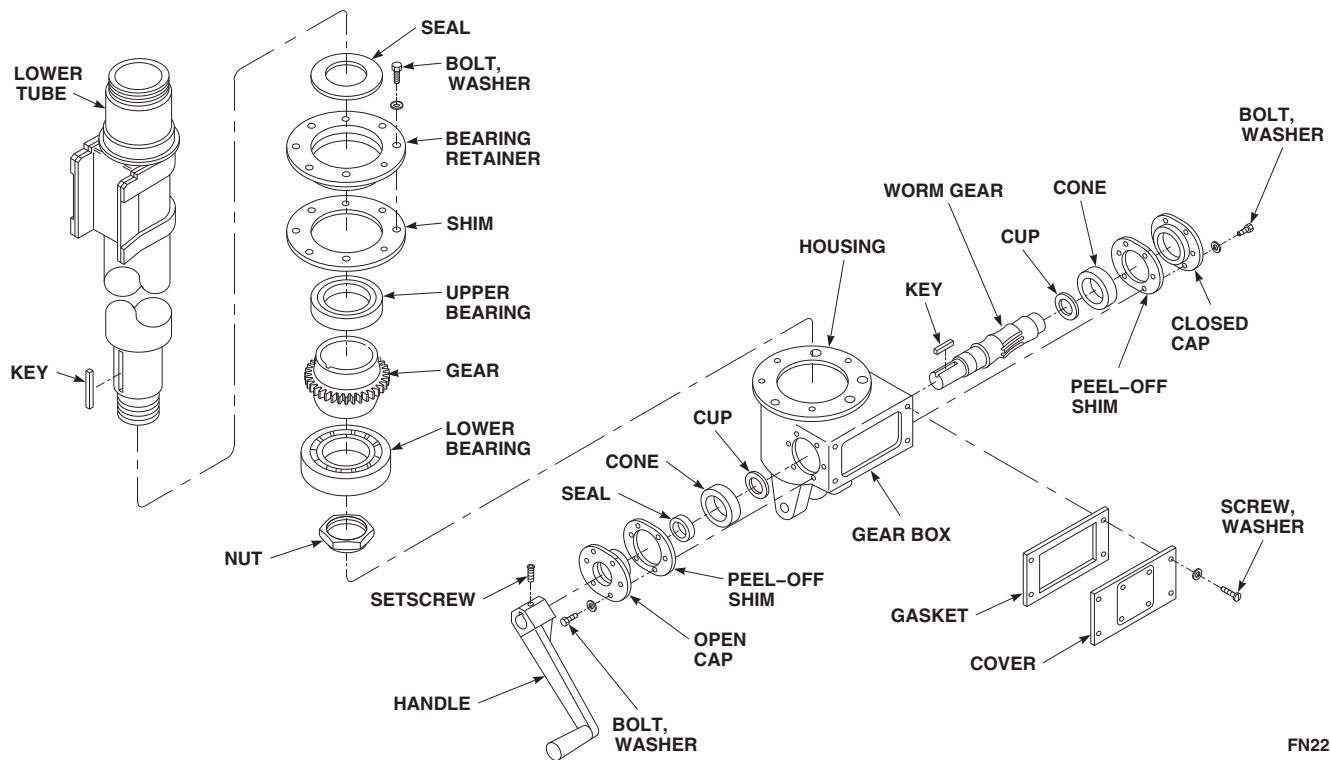
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FIGURE 18-5-1-1. REPAIR CABIN MAINTENANCE CRANE GEAR BOX (BENCH)

- b. Inspect seal on lower tube for damage. **NONE ALLOWED.** If damaged, replace seal.
- c. Bond new seal to tube using adhesive, Item 37, Appendix D, per manufacturer's instructions.
- d. Press upper bearing in retainer. Bearing seal should be on top after installation.
- e. Secure bearing retainer to housing with bolts and washers.
- f. Press cones on worm gear. Slide worm gear in housing.
- g. Place cups in housing.

NOTE

If worm gear or its bearings were replaced, replace peel-off shims.

18-5-1.1.3 Assemble.

- a. Install bearing retainer on lower tube, using a plastic hammer to seat bearing (Figure 18-5-1-1).
- b. Install gear (unmarked face on top) and key on lower tube, using hammer and phenolic drift to seat it against bearing.
- c. Install lower bearing with seal on bottom. Fasten bearing with nut.
- d. Place shim and lower tube on housing. Using feeler gage, measure between shim and bearing retainer. **CLEARANCE SHALL BE 0.001-INCH.** Peel shim if necessary.
- h. Install peel-off shims and caps with bolts and washers. Tighten bolts in pairs opposite to each other to evenly draw covers and cups into housing.
- i. Check that worm gear is centered on gear, and there is no endplay on worm. If endplay is found, perform the following:
 - (1) Remove bolts and washers securing open and closed caps on housing. Remove caps and peel-off shims.

- (2) Peel equal layers of shim to eliminate endplay.
- (3) Install peel-off shims and caps with bolts and washers. Tighten bolts in pairs opposite to each other to evenly draw covers and cups into housing.
- j. Attach handle with key and setscrew.
- k. Install cover and gasket on housing with screws and washers.

APPENDIX A

REFERENCES

A-1 SPECIFICATIONS AND STANDARDS.

A-A-1417	Plywood (Construction and Industrial)
A-A-8	Shellac Varnish
AMS 2689	Fusion Welding Titanium and Titanium Alloys
AMS 3195	Silicone Rubber Sponge Closed Cell, Medium
AMS 3240	Chloroprene (CR) Rubber Weather Resistant 35 - 45
AMS 4013	Aluminum Sheet, Laminated Surface Bonded
AMS 4036	Aluminum Alloy Sheet and Plate, Alclad One Side 4.4Cu - 1.5Mg - 0.60Mn Alclad One Side 2024 and 1-1/2% Alclad One Side 2024-T3 Sheet 1-1/2% Alclad One Side 2024-T351 Plate UNS A82024
AMS 4149	Aluminum Alloy, Die and Hand Forgings 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7175-T74) Solution and Precipitation Heat Treated UNS A9717
AMS 4229	Aluminum Alloy Castings, High Strength 4.5Cu - 0.70Ag - 0.30Mn - 0.25Mg - 0.25Ti (A201.0-T7) Solution Heat Treated and Overaged
AMS 4260	Aluminum Alloy, Investment Castings 7.0Si - 0.32Mg (356.0-T6) (Solution and Precipitation Heat Treated UNS A03560)
AMS 4590	Extrusions Nickel-Aluminum Bronze, Martensitic 78.5Cu - 10.5Al - 5.1Ni - 4.8Fe Solution Heat Treated and Tempered (TQ50) (UNS C63020)
AMS 5334	Steel, Investment Castings 0.50Cr - 0.55Ni - 0.20Mo (0.25 - 0.35C) (SAE 8630 Mod) Normalized and Tempered (UNS J13042)
AMS 5355	Steel, Corrosion Resistant, Investment Castings 16Cr - 4.1Ni - 0.28Cb - 3.2Cu Homogenization and Solution Heat Treated or Homogenization, Solution, and Precipitation Heat Treated UNS J92200

AMS 5561	Steel, Corrosion and Heat Resistant, Welded and Drawn or Seamless and Drawn Tubing 9.0Mn - 20Cr - 6.5Ni - 0.28N High-Pressure Hydraulic (UNS S21900)
AMS 5643	Steel, Corrosion Resistant, Bars, Wire, Forgings, Tubing, and Rings 16Cr - 4.0Ni - 0.30 (Cb+Ta) - 4.0Cu Solution Heat Treated, Precipitation Hardenable UNS S17400
AMS 6359	Steel Sheet, Strip, and Plate 0.80Cr - 1.8Ni - 0.25Mo (0.38 - 0.43C) (SAE 4340) (UNS G43400)
ASTM A 231	Standard Specification for Chromium-Vanadium Alloy Steel Spring Wire
ASTM E1417	Standard Practice for Liquid Penetrant Testing
ASTM E1444	Standard Process for Magnetic Particle Examination
FED-STD-595	Colors Used in Government Procurement
FED-STD-751	Stitches, Seams and Stitching
L-P-410	Plastic, Polyamide (Nylon), Rigid: Rods, Tubes, Flats, Molded and Cast Parts
MIL-A-21180	Aluminum-Alloy Castings, High Strength
MIL-C-13874	Compressors, Reciprocating and Rotary, Air, Electric Motor Driven
MIL-C-20696	Cloth, Waterproof, Weather Resistant
MIL-C-26482	Connector, Electrical, (Circular, Miniature, Quick Disconnect, Environment Resisting), Receptacles and Plugs, General Specification for
MIL-C-3133	Cellular Elastomeric Materials, Molded or Fabricated
MIL-C-3432	Military Specification Cables, (Power and Special Purpose) and Wire, Electrical (300 and 600 Volts)
MIL-C-38999	Military Specification Sheet Connectors, Electrical, Circular, Miniature, High Density, Quick Disconnect (Bayonet, Threaded, and Breech Coupling), Environment Resistant, Removable Crimp and Hermetic Solder Contacts, General Specification for
MIL-C-5015	Military Specification Sheet Connectors, Electrical, Circular Threaded, AN Type, General Specification for

MIL-C-5040	Cord, Fibrous, Nylon
MIL-C-5541	Chemical Conversion Coatings on Aluminum and Aluminum Alloys
MIL-C-5651	Cord, Elastic, Exerciser and Shock Absorber, for Aeronautical Use
MIL-C-7438	Core Material, Aluminum, for Sandwich Construction
MIL-C-7439	Coating System, Elastomeric, Rain Erosion Resistant and Rain Erosion Resistant with Anti-Static Treatment, for Exterior Aircraft and Missile Plastic Parts
MIL-C-7637	Cloth, Coated, Chloroprene, Fiberglass
MIL-C-81706	Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys
MIL-C-83723	Military Specification Connectors, Electrical, (Circular, Environment Resisting), Receptacles and Plugs General Specification for
MIL-C-85054	Corrosion Preventive Compound, Water Displacing, Clear (Amlguard)
MIL-DTL-53039	Coating, Aliphatic Polyurethane, Single Component, Chemical Agent Resistant
MIL-F-9084	Cloth, Glass, Finished, for Resin Laminates
MIL-H-5593	Hose, Aircraft, Low Pressure, Flexible
MIL-H-6875	Heat Treatment of Steels (Aircraft Practice, Process for)
MIL-I-22129	Insulation Tubing, Electrical Polytetrafluoroethylene Resin, Nonrigid
MIL-I-25135	Inspection Material, Penetrants
MIL-I-631	Insulation, Electrical, Synthetic-Resin Composition, Nonrigid
MIL-I-6868	Inspection Process, Magnetic Particle
MIL-I-7444	Insulation Sleeving, Electrical, Flexible
MIL-L-19538	Lacquer: Acrylic Nitrocellulose, Camouflage (for Aircraft Use)

MIL-L-46159	Lacquer, Acrylic, Low Reflective
MIL-L-8937	Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting, NATO Code Number S-1738
MIL-P-15035	Plastic Sheet, Laminated, Thermosetting, Cotton-Fabric-Base, Phenolic-Resin
MIL-P-15037	Plastic Sheet, Laminated, Thermosetting, Glass-Cloth Melamine-Resin
MIL-P-25515	Plastic Materials, Phenolic Resin, Glass-Fiber Base, Laminated
MIL-P-25690	Plastic, Sheets and Formed Parts, Modified Acrylic Base, Monolithic, Crack Propagation Resistant
MIL-P-46060	Plastic, Polyamide (Nylon), Rigid Rods, Tubes and Flats
MIL-P-46144	Plastic Sheet, Polycarbonate
MIL-PRF-22750	Coating, Epoxy, High Solids
MIL-PRF-23377	Primer Coatings: Epoxy, High-Solids
MIL-PRF-6081	Lubricating Oil, Jet Engine
MIL-PRF-81733	Sealing and Coating Compound, Corrosion Inhibitive
MIL-PRF-85285	Coating: Polyurethane, Aircraft and Support Equipment
MIL-R-17343	Rope, Nylon
MIL-R-3065	Rubber, Fabricated Products
MIL-R-46089	Rubber, Sponge, Silicone, Closed Cell
MIL-R-5847	Rubber, Silicone, Low-and High-Temperature-and Tear Resistant
MIL-R-6130	Rubber, Cellular, Chemically Blown
MIL-R-6855	Elastomer, Synthetic, Sheets, Strips, Molded or Extruded Shapes, General Specification for
MIL-R-83248	Rubber, Fluorocarbon Elastomer, High Temperature, Fluid and Compression Set Resistant

MIL-R-83397	Rubber, Polyurethane, Castable, Humidity Resistant
MIL-R-9300	Resin, Epoxy, Low-Pressure Laminating
MIL-S-18729	Steel Plate, Sheet, and Strip, Alloy 4130 Aircraft Quality
MIL-S-22499	Shim Stock, Laminated
MIL-S-36157	Syringes (and Needles), Hypodermic, Disposable
MIL-S-5000	Steel, Chrome-Nickel-Molybdenum (4340) Bars, and Forging Stock
MIL-S-5002	Surface Treatments and Inorganic Coatings for Metal Surfaces of Weapons Systems
MIL-S-5059	Steel, Corrosion Resistant (18-8) Plate, Sheet and Strip
MIL-S-5626	Steel, Chrome-Molybdenum (4140) Bars, Rods, and Forging Stock (for Aircraft Applications)
MIL-S-6721	Steel, Corrosion and Heat Resistant (Chemically Stabilized) Plate, Sheet and Strip
MIL-S-6758	Steel, Chrome-Molybdenum (4130) Bars and Reforging Stock (Aircraft Quality)
MIL-S-7947	Steel, Sheet and Strip (1095) (Aircraft Quality)
MIL-S-7998	Sandwich Construction Core Material, Balsa Wood
MIL-S-8512	Support Equipment, Aeronautical, Special, General Specification for The Design of
MIL-S-8802	Sealing Compound, Temperature-Resistant, Integral Fuel Tanks and Fuel Cell Cavities, High Adhesion
MIL-S-8879	Screw Threads, Controlled Radius Root with Increased Minor Diameter, General Specification for
MIL-STD-12	Abbreviations for Use on Drawings, Specifications, Standards and in Technical Documents
MIL-STD-1247	Markings, Functions and Hazard Designations of Hose, Pipe, and Tube Lines for Aircraft Missile, and Space Systems
MIL-STD-130	Identification Markings of U.S. Military Property

MIL-STD-1686	Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices) (Metric)
MIL-STD-190	Identification Markings of Rubber Products
MIL-STD-670	Classification System and Tests for Cellular Elastomeric Materials
MIL-STD-681	Identification Coding and Application of Hookup and Lead Wire
■ MIL-STD-6866	Liquid Penetrant Inspection
MIL-STD-794	Parts and Equipment, Procedures for Packaging of
MIL-T-5660	Thread, Cotton, High Tenacity
MIL-T-6736	Tubing, Chrome-Molybdenum (4130 or 8630) Steel, Seamless and Welded
MIL-T-9046	Titanium and Titanium Alloy, Sheet, Strip, and Plate
MIL-T-9047	Titanium and Titanium Alloy Bars (Rolled or Forged) and Reforging Stock, Aircraft Quality
MIL-W-4088	Webbing, Textile, Woven Nylon
MIL-W-5086	Wire, Electric, Polyvinyl Chloride Insulated, Copper or Copper Alloy
MIL-W-5088	Wiring, Aerospace Vehicle
MIL-W-5665	Webbing, Textile, Cotton Warp
MIL-W-6858	Welding, Resistance: Spot and Seam
MIL-W-83420	Wire Rope, Flexible, for Aircraft Control
MIL-W-8611	Process for Welding, Metal Arc and Gas, Steels, and Corrosion and Heat Resistant Alloys
MS3316	Tool, Crimp, Hand, for MIL-T-7928 Insulated Terminals, 12-10
NAVAIR 17-15BAD-1	Naval Aircraft and Naval Aircraft Support Equipment Storage Batteries

QQ-A-200	Aluminum Alloy, Bar, Rod, Shapes, Structural Shapes, Tube, and Wire, Extruded: General Specification for
QQ-A-225	Aluminum and Aluminum Alloy, Bar, Rod, Wire, or Special Shapes; Rolled, Drawn, or Cold Finished; General Specification for
QQ-A-250	Aluminum and Aluminum Alloy, Plate and Sheet General Specification for
QQ-A-255	Aluminum Alloy Plates and Sheets Alclad 2014 (R301, Clad 14S)
QQ-A-357	Aluminum Alloy, Bars, Rods, and Shapes, Extruded 3003
QQ-A-362	Aluminum Alloy Plate and Sheet, Alclad 2024
QQ-A-367	Aluminum Alloy Forgings
QQ-P-35	Passivation Treatments for Corrosion-Resistant Steel
QQ-P-416	Plating, Cadmium (Electrodeposited)
QQ-W-423	Wire, Steel, Corrosion-Resisting
QQ-W-470	Wire, Steel, Carbon, Spring, Music
TT-I-1795	Ink, Marking, Stencil, Opaque (Porous and Non-Porous Surfaces)
TT-L-20	Lacquer, Camouflage
V-T-276	Thread, Cotton
V-T-295	Thread, Nylon
WW-T-700	Tube, Aluminum and Aluminum Alloy, Drawn, Seamless, General Specification for

A-2 TECHNICAL MANUALS.

SEI 671	Supplement Maintenance Instructions with Repair Parts and Special Tools List for T700 Turboshift Engines Models T700-GE-700, T700-GE-701, T700-GE-701A, T700-GE-701A-1, and T700-GE-701C
SEI 673	T700 Turboshift Engines T700-GE-701A, T700-GE-701A-1, Repair Parts and Special Tools List
TM 1-1500-204-23	Aviation Unit Maintenance (AVUM) and Aviation Intermediate Maintenance (AVIM) Manual for General Aircraft Maintenance (General Maintenance and Practices)
TM 1-70-VIB	Organizational Maintenance Procedures, Vibration Manual, Sikorsky Model, S-70A/C
TM 1-70-23AW-1	Airworthiness Limitations Manual for Sikorsky Model S-70 Helicopters, Operating Under Sikorsky Qualification Assurance Board Cognizance
TM 1-70-36-MTF	Maintenance Test Flight Manual
TM 1-70-36-PMS-1	Preventive Maintenance Services, 10 Hour/14 Day (30 Hour/42 Day) Inspection Checklist
TM 1-70-36-PMS-2	Preventive Maintenance Services, Periodic Inspection Checklist
TM 1-70-36-10	Operator's Manual
TM 1-70-36-23	Aircraft Maintenance Procedures Manual
TM 1-70-36-23P	Aviation Maintenance Repair Parts and Special Tool Manual
TM 11-70-36-23	Aircraft Avionics Maintenance Procedures Manual
TM 11-70-36-23P	Aircraft Avionics Repair Parts and Special Tool Manual
49-20-05	Hamilton Sundstrand Line Maintenance Manual Auxiliary Power Unit (APU), Model Number T-62T-40-1, Part Number 116305-302

APPENDIX B

METRIC CONVERSION CHARTS

B-1 SCOPE.

This appendix contains information for converting values in terms of United States System of Weights and Measures to equivalent IS metric units (International System of Units). This information is not intended to be comprehensive for the classes of measurement conversions provided. Appropriate conversion tables and/or guides, of which there are many, should be consulted for more complete information.

B-2 DESCRIPTION.

This appendix contains conversion tables for converting the more common classes of measurement that may be encountered in this manual: Length, Weight, Temperature, Torque, and Pressure.

B-3 RULES FOR CONVERSION AND ROUNDING.

B-3.1 Quantity.

Conversion of quantities must be handled carefully with regard to the intended accuracy of the data and the given number of digits. In all conversions, the number of significant digits must be such that accuracy is neither sacrificed nor exaggerated.

B-3.2 Precision.

First determine the intended precision. This should not be smaller than the measurement capability. (For example, a room temperature of 70°F converts to 21.111°C; however, the average thermometer could be read only with difficulty to 21.1°C, and in most cases, 21°C is the better conversion.) After estimating the intended precision, the converted value should be rounded to a minimum number of significant digits, so that a unit of the last place is equal to or smaller than the converted precision.

For example, convert 2.47-inch to metric.

$$2.47 \times 25.4 = 62.738\text{-mm}$$

Assume a precision of ± 0.005 -inch is desired. (Less than 2.465 would be rounded to 2.46; 2.475 or more would be rounded to 2.48).

$$0.005 \times 25.4 = 0.127\text{-mm}$$

A unit of 0.1-mm is smaller than 0.127-mm; therefore the conversion to intended precision is 62.7-mm (nearest tenth of mm).

However, converting 2.47-inch to cm is as follows:

$$2.47 \times 2.54 = 6.274\text{-cm}$$

Intended precision is ± 0.005 -inch.

$$0.005 \times 2.54 = 0.0127$$

A unit of 0.01 is smaller than 0.0127; therefore, the conversion to intended precision is now 6.27-cm.

B-3.3 Decimal.

It is the intended precision, not the number of decimal places in the original measurement, that determines the decimal places in the conversion. Expressed in meters, 2.47-inch is 0.0627-m. However, 2.470-inch assumes an intended precision of ± 0.0005 -inch, and converts to 62.74-mm, 6.274-cm, and 0.06274-m respectively.

B-4 NUMBER GROUPING.

B-4.1 Digits.

To make it easier to read numbers having four or more digits, the digits should be placed in groups of three separated by spaces instead of commas. Use separate groups of three both to the left and to the right of the decimal point. In case of four digits, the spacing is optional.

B-4.2 Grouping.

This style of number grouping instead of using commas, also avoids confusion caused by the use of commas to express decimal points in some countries. The conversion factors and numbers in this section are written in this style.

Examples:

1 532 or 1532	instead of	1,532
2 126 750	instead of	2,126,750
6.894 757	instead of	6.894757
0.453 592 4	instead of	0.4535924

B-5 CONVERSION USING FACTORS.

Figure B-2 has a list of general conversion factors to convert from U.S. Measure to IS metric. Multiply the given measure by the factor in the center column to get the conversion equivalent. The example in paragraph B-3.2 was done in this manner.

B-6 CONVERSION USING TABLES.

B-6.1 Tables.

Tables are provided for frequently used conversions of length, fractions, temperature, weight, torque, and pressure. The Tables for length, weight, torque, and pressure are read as shown below. The Table of fractions is self-explanatory and the use of the table of temperature conversions is explained in paragraph B-6.4.

B-6.2 Length.

Figure B-3 has the data for converting inches to millimeters.

For example, convert 2.47-inch:

From the fourth block: 2.00-inch = 50.80-mm

From the third block: 0.47-inch = 11.938-mm

$$2.47\text{-inch} = 62.738\text{-mm}$$

Rounding off to the intended accuracy, the result is 62.7-mm. (Refer to paragraph B-3.)

B-6.3 Fractions.

Figure B-4 has data for converting common fractions of an inch, or their decimal equivalents, to millimeters.

B-6.4 Temperature.

Figure B-5 has data for converting Fahrenheit and Celsius (centigrade) temperature. Find the known temperature in the column labeled C. OR F. If converting from degrees Fahrenheit to degrees Celsius, the equivalent temperature will be found in the left column. If converting from degrees Celsius to degrees Fahrenheit, the equivalent temperature will be found in the right column. A small chart of INTERPOLATION FACTORS located at the end of the table lets you convert readings within the 10° steps used above 100.

For example, convert 227°F to Celsius:

From Table: 220°F = 104°C

From Interpolation Factors Chart: 7°F = 3.89°C

$$227^{\circ}\text{F} = 108^{\circ}\text{C (rounded to intended accuracy)}$$

B-6.5 Weight (Mass).

Figure B-6 has data for converting ounces and up to 1000 pounds to kilograms. Figure B-7 has data for converting 1000 to 20000 pounds to kilograms.

IN.-LB	0	1	2	3	4	5	6
	N · m	N · m	N · m	N · m	N · m	N · m	N · m
		0.11	0.23	0.34	0.45	0.56	0.68
10	1.13	1.24	1.36	1.47	1.58	1.69	1.81
20	2.26	2.37	2.49	2.60	2.71	2.82	2.94
30	3.39	3.50	3.62	3.73	3.84	3.95	4.07
40	4.52	4.63	4.75	4.86	4.97	5.08	5.20
50	5.65	5.76	5.88	5.99	6.10	6.21	6.33
60	6.78	6.89	7.01	7.12	7.23	7.34	7.46
70	7.91	8.02	8.13	8.25	8.36	8.47	8.59
80	9.04	9.15					

(1 IN.-LB = 0.112 984 8 N · m)

USE CONVERSION CHARTS LIKE THIS:

25 INCH-POUNDS = ? N · m
 READ ACROSS THE 20 LINE TO THE 5 COLUMN AND READ
 2.82 N · m

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FIGURE B-1. TORQUE: INCH-POUNDS TO NEWTON-METERS

B-6.6 Torque.

Figure B-8 has data for converting inch-pounds to newton-meters, and Figure B-9 has data for converting foot-pounds to newton-meters.

NOTE

A pascal is equal to one newton-meter²; a kilopascal is 1000 pascals.

B-6.7 Pressure.

Figure B-10 has data for converting 1 to 100 pounds per-square-inch (psi) to kilopascals (kPa). Figure B-11 has conversion data for 100 to 10000 psi. To convert inches of water pressure, use the conversion factor given in Figure B-1.

<u>MULTIPLY</u>	<u>BY</u>	<u>TO GET</u>
<u>LENGTH</u>		
INCH	25.400 0	MILLIMETER (mm)
FOOT	0.304 8	METER (m)
YARD	0.914 4	METER (m)
MILE (STATUTE)	1.609 3	KILOMETER (km)
MILE (NAUTICAL)	1.852 0	KILOMETER (km)
<u>AREA</u>		
INCH ²	6.451 6	CENTIMETER ² (cm ²)
FOOT ²	0.092 9	METER ² (m ²)
YARD ²	0.836 1	METER ² (m ²)
<u>VOLUME</u>		
INCH ³	16.387 1	CENTIMETER ³ (cm ³)
FOOT ³	28.316 8	LITER (L)
	0.028 3	METER ³ (m ³)
OUNCE (U.S. FLUID)	29.573 5	CENTIMETER ³ (cm ³)
OUNCE (IMPERIAL)	28.413 0	CENTIMETER ³ (cm ³)
QUART (U.S. FLUID)	0.946 4	LITER (L)
GALLON (U.S. FLUID)	3.785 4	LITER (L)
GALLON (IMPERIAL)	4.546 1	LITER (L)
<u>MASS (WEIGHT)</u>		
OUNCE	28.349 5	GRAMS (g)
POUND	0.453 6	KILOGRAM (kg)
TON	907.184 7	KILOGRAM (kg)
<u>FORCE</u>		
OUNCE	0.278 0	NEWTON (N)
POUND	4.448 2	NEWTON (N)
KILOGRAM	9.806 6	NEWTON (N)
<u>TORQUE</u>		
INCH-POUND	0.113 0	NEWTON-METER (N · m)
FOOT-POUND	1.355 8	NEWTON-METER (N · m)
<u>POWER</u>		
HORSEPOWER	0.745 7	KILOWATT (kW)

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FIGURE B-2. CONVERSION FACTORS - U.S. MEASURE TO METRIC (SHEET 1 OF 2)

<u>MULTIPLY</u>	<u>BY</u>	<u>TO GET</u>
<u>PRESSURE OR STRESS</u>		
INCHES OF WATER	0.249 1	KILOPASCAL (kPa)
INCHES OF MERCURY	3.376 8	KILOPASCAL (kPa)
POUNDS PER INCH ² (PSI)	6.894 8	KILOPASCAL (kPa)
<u>ENERGY OR WORK</u>		
BTU	1055.	JOULE (J)
FOOT-POUND (FORCE)	1.355 8	JOULE (J) (J = N·m)
WATT-SECOND	1.000 0	JOULE (J)
KILOWATT-HOUR	3.6 X 10 ⁶	JOULE (J)
<u>ACCELERATION</u>		
FREE FALL	9.806 6	METER / SEC ² (m / s ²)
FOOT / SECOND ²	0.304 8	METER / SEC ² (m / s ²)
INCH / SECOND ²	0.025 4	METER / SEC ² (m / s ²)
<u>VELOCITY</u>		
KNOT	0.5144	METER / SEC (m / s)
	1.852 0	KILOMETER / HOUR (km / h)
MILE / HOUR	1.609 3	KILOMETER / HOUR (km / h)
<u>FUEL PERFORMANCE</u>		
MILE / GALLON	0.425 1	KILOMETER / LITER (km / L)
GALLON / MILE	2.352 7	LITER / KILOMETER (L / km)
<u>FLOW (MASS / TIME)</u>		
POUNDS PER HOUR	0.453 6	KILOGRAM / HOUR (Kg / h)
<u>FLOW (VOLUME / TIME)</u>		
GALLONS PER HOUR	3.785 4	LITER / HOUR (L / h)
	0.003 8	METER / HOUR (m ³ / h)
<u>LIGHT</u>		
FOOT-CANDLE	1.076 4	LUMEN / METER ² (Lm / m ²)
<u>TEMPERATURE</u>		
FAHRENHEIT	(°F - 32) X 5 / 9	= CELSIUS (°C)
CELSIUS	(°C X 9 / 5) + 32	= FAHRENHEIT (°F)

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FIGURE B-2. CONVERSION FACTORS - U.S. MEASURE TO METRIC (SHEET 2 OF 2)

INCHES	0.0000	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009
MILLIMETERS										
0.000		0.0025	0.0050	0.0076	0.0101	0.0127	0.0152	0.0177	0.0203	0.0228
0.001	0.0254	0.0279	0.0304	0.0330	0.0355	0.0381	0.0406	0.0431	0.0457	0.0482
0.002	0.0508	0.0533	0.0558	0.0584	0.0609	0.0635	0.0660	0.0685	0.0711	0.0736
0.003	0.0762	0.0787	0.0812	0.0838	0.0863	0.0889	0.0914	0.0939	0.0965	0.0990
0.004	0.1016	0.1041	0.1066	0.1092	0.1117	0.1143	0.1168	0.1193	0.1219	0.1244
0.005	0.1270	0.1295	0.1320	0.1346	0.1371	0.1397	0.1422	0.1447	0.1473	0.1498
0.006	0.1524	0.1549	0.1574	0.1600	0.1625	0.1651	0.1676	0.1701	0.1727	0.1752
0.007	0.1778	0.1803	0.1828	0.1854	0.1879	0.1905	0.1930	0.1955	0.1981	0.2006
0.008	0.2032	0.2057	0.2082	0.2108	0.2133	0.2159	0.2184	0.2209	0.2235	0.2260
0.009	0.2286	0.2311	0.2336	0.2362	0.2387	0.2413	0.2438	0.2463	0.2489	0.2514
INCHES	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
MILLIMETERS										
0.00		0.025	0.050	0.076	0.101	0.127	0.152	0.177	0.203	0.228
0.01	0.254	0.279	0.304	0.330	0.355	0.381	0.406	0.431	0.457	0.482
0.02	0.508	0.533	0.558	0.584	0.609	0.635	0.660	0.685	0.711	0.736
0.03	0.762	0.787	0.812	0.838	0.863	0.889	0.914	0.939	0.965	0.990
0.04	1.016	1.041	1.066	1.092	1.117	1.143	1.168	1.193	1.219	1.244
0.05	1.270	1.295	1.320	1.346	1.371	1.397	1.422	1.447	1.473	1.498
0.06	1.524	1.549	1.574	1.600	1.625	1.651	1.676	1.701	1.727	1.752
0.07	1.778	1.803	1.828	1.854	1.879	1.905	1.930	1.955	1.981	2.006
0.08	2.032	2.057	2.082	2.108	2.133	2.159	2.184	2.209	2.235	2.260
0.09	2.286	2.311	2.336	2.362	2.387	2.413	2.438	2.463	2.489	2.514
INCHES	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
MILLIMETERS										
0.0		0.254	0.508	0.762	1.016	1.270	1.524	1.778	2.032	2.286
0.1	2.540	2.794	3.048	3.302	3.556	3.810	4.064	4.318	4.572	4.826
0.2	5.080	5.334	5.588	5.842	6.096	6.350	6.604	6.858	7.112	7.366
0.3	7.620	7.874	8.128	8.382	8.636	8.890	9.144	9.398	9.652	9.906
0.4	10.160	10.414	10.668	10.922	11.176	11.430	11.684	11.938	12.192	12.446
0.5	12.700	12.954	13.208	13.462	13.716	13.970	14.224	14.478	14.732	14.986
0.6	15.240	15.494	15.748	16.002	16.256	16.510	16.764	17.018	17.272	17.526
0.7	17.780	18.034	18.288	18.542	18.796	19.050	19.304	19.558	19.812	20.066
0.8	20.320	20.574	20.828	21.082	21.336	21.590	21.844	22.098	22.352	22.606
0.9	22.860	23.114	23.368	23.622	23.876	24.130	24.384	24.638	24.892	25.146
INCHES	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
MILLIMETERS										
0.0		2.54	5.08	7.62	10.16	12.70	15.24	17.78	20.32	22.86
1.0	25.40	27.94	30.48	33.02	35.56	38.10	40.64	43.18	45.72	48.26
2.0	50.80	53.34	55.88	58.42	60.96	63.50	66.04	68.58	71.12	73.66
3.0	76.20	78.74	81.28	83.82	86.36	88.90	91.44	93.98	96.52	99.06
4.0	101.60	104.14	106.68	109.22	111.76	114.30	116.84	119.38	121.92	124.46
5.0	127.00	129.54	132.08	134.62	137.16	139.70	142.24	144.78	147.32	149.86
6.0	152.40	154.94	157.48	160.02	162.56	165.10	167.64	170.18	172.72	175.26
7.0	177.80	180.34	182.88	185.42	187.96	190.50	193.04	195.58	198.12	200.66
8.0	203.20	205.74	208.28	210.82	213.36	215.90	218.44	220.98	223.52	226.06
9.0	228.60	231.14	233.68	236.22	238.76	241.30	243.84	246.38	248.92	251.46

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FIGURE B-3. INCHES TO MILLIMETERS (0.0001-INCH TO 10-INCHES)

INCH	1/2's	1/4's	8ths	16ths	32nds	64ths	MILLIMETERS	DECIMALS OF AN INCH*
						1	0.397	0.015 625
					1	2	0.794	0.031 25
						3	1.191	0.046 875
				1	2	4	1.588	0.062 5
						5	1.984	0.078 125
					3	6	2.381	0.093 75
						7	2.778	0.109 375
			1	2	4	8	3.175*	0.125 0
						9	3.572	0.140 625
					5	10	3.969	0.156 25
						11	4.366	0.171 875
				3	6	12	4.762	0.187 5
						13	5.159	0.203 125
					7	14	5.556	0.218 75
						15	5.953	0.234 375
		1	2	4	8	16	6.350*	0.250 0
						17	6.747	0.265 625
						9	7.144	0.281 25
						19	7.541	0.296 875
				5	10	20	7.938	0.312 5
						21	8.334	0.328 125
					11	22	8.731	0.343 75
						23	9.128	0.359 375
			3	6	12	24	9.525*	0.375 0
						25	9.922	0.390 625
					13	26	10.319	0.406 25
						27	10.716	0.421 875
				7	14	28	11.112	0.437 5
						29	11.509	0.453 125
					15	30	11.906	0.468 75
						31	12.303	0.484 375
	1	2	4	8	16	32	12.700*	0.500 0
*EXACT								

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FIGURE B-4. COMMON FRACTIONS AND DECIMALS TO MILLIMETERS (SHEET 1 OF 2)

INCH	1/2's	1/4's	8ths	16ths	32nds	64ths	MILLIMETERS	DECIMALS OF AN INCH*
						33	13.097	0.515 625
					17	34	13.494	0.531 25
						35	13.891	0.546 875
				9	18	36	14.288	0.562 5
						37	14.984	0.578 125
					19	38	15.081	0.593 75
						39	15.478	0.609 375
			5	10	20	40	15.875*	0.625 0
						41	16.272	0.640 625
					21	42	16.669	0.656 25
						43	17.066	0.671 875
				11	22	44	17.462	0.687 5
						45	17.859	0.703 125
					23	46	18.256	0.718 75
						47	18.653	0.734 375
		3	6	12	24	48	19.050*	0.750 0
						49	19.447	0.765 625
					25	50	19.844	0.781 25
						51	20.241	0.796 875
				13	26	52	20.638	0.812 5
						53	21.034	0.828 125
					27	54	21.431	0.843 75
						55	21.828	0.859 375
			7	14	28	56	22.225*	0.875 0
						57	22.622	0.890 625
					29	58	23.019	0.906 25
						59	23.416	0.921 875
				15	30	60	23.812	0.937 5
						61	24.209	0.953 125
					31	62	24.606	0.968 75
						63	25.003	0.984 375
1	2	4	8	16	32	64	25.400*	1.000 0
*EXACT								

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FIGURE B-4. COMMON FRACTIONS AND DECIMALS TO MILLIMETERS (SHEET 2 OF 2)

-459.4 TO -220			-210 TO 0			1 TO 25			26 TO 50		
C.	C. OR F.	F.	C.	C. OR F.	F.	C.	C. OR F.	F.	C.	C. OR F.	F.
-273	-459.4		-134	-210	-346	-17.2	1	33.8	-3.33	26	78.8
-268	-450		-129	-200	-328	-16.7	2	35.6	-2.78	27	80.6
-262	-440		-123	-190	-310	-16.1	3	37.4	-2.22	28	82.4
-257	-430		-118	-180	-292	-15.6	4	39.2	-1.67	29	84.2
-251	-420		-112	-170	-274	-15.0	5	41.0	-1.11	30	86.0
-246	-410		-107	-160	-256	-14.4	6	42.8	-0.56	31	87.8
-240	-400		-101	-150	-238	-13.9	7	44.6	0	32	89.6
-234	-390		-95.6	-140	-220	-13.3	8	46.4	0.56	33	91.4
-229	-380		-90.0	-130	-202	-12.8	9	48.2	1.11	34	93.2
-223	-370		-84.4	-120	-184	-12.2	10	50.0	1.67	35	95.0
-218	-360		-78.9	-110	-166	-11.7	11	51.8	2.22	36	96.8
-212	-350		-73.3	-100	-148	-11.1	12	53.6	2.78	37	98.6
-207	-340		-67.8	-90	-130	-10.6	13	55.4	3.33	38	100.4
-201	-330		-62.2	-80	-112	-10.0	14	57.2	3.89	39	102.2
-196	-320		-56.7	-70	-94	-9.44	15	59.0	4.44	40	104.0
-190	-310		-51.1	-60	-76	-8.89	16	60.8	5.00	41	105.8
-184	-300		-45.6	-50	-58	-8.33	17	62.6	5.56	42	107.6
-179	-290		-40.0	-40	-40	-7.78	18	64.4	6.11	43	109.4
-173	-280		-34.4	-30	-22	-7.22	19	66.2	6.67	44	111.2
-169	-273	-459.4	-28.9	-20	-4	-6.67	20	68.0	7.22	45	113.0
-168	-270	-454	-23.3	-10	14	-6.11	21	69.8	7.78	46	114.8
-163	-260	-436	-17.8	0	32	-5.56	22	71.6	8.33	47	116.6
-157	-250	-418				-5.00	23	73.4	8.89	48	118.4
-151	-240	-400				-4.44	24	75.2	9.44	49	120.2
-146	-230	-382				-3.89	25	77.0	10.0	50	122.0
-140	-220	-364									

51 TO 75			76 TO 100			101 TO 340			341 TO 490			491 TO 750		
C.	C. OR F.	F.	C.	C. OR F.	F.	C.	C. OR F.	F.	C.	C. OR F.	F.	C.	C. OR F.	F.
10.6	51	123.8	24.4	76	168.8	43	110	230	177	350	662	260	500	932
11.1	52	125.6	25.0	77	170.6	49	120	248	182	360	680	266	510	950
11.7	53	127.4	25.6	78	172.4	54	130	266	188	370	698	271	520	968
12.2	54	129.2	26.1	79	174.2	60	140	284	193	380	716	277	530	986
12.8	55	131.0	26.7	80	176.0	66	150	302	199	390	734	282	540	1004
13.3	56	132.8	27.2	81	177.8	71	160	320	204	400	752	288	550	1022
13.9	57	134.6	27.8	82	179.6	77	170	338	210	410	770	293	560	1040
14.4	58	136.4	28.3	83	181.4	82	180	356	216	420	788	299	570	1058
15.0	59	138.2	28.9	84	183.2	88	190	374	221	430	806	304	580	1076
15.6	60	140.0	29.4	85	185.0	93	200	392	227	440	824	310	590	1094
16.1	61	141.8	30.0	86	186.8	99	210	410	232	450	842	316	600	1112
16.7	62	143.6	30.6	87	188.6	100	212	413	238	460	860	321	610	1130
17.2	63	145.4	31.1	88	190.4	104	220	428	243	470	878	327	620	1148
17.8	64	147.2	31.7	89	192.2	110	230	446	249	480	896	332	630	1166
18.3	65	149.0	32.2	90	194.0	116	240	464	254	490	914	338	640	1184
18.9	66	150.8	32.8	91	195.8	121	250	482				343	650	1202
19.4	67	152.6	33.3	92	197.6	127	260	500				349	660	1220
20.0	68	154.4	33.9	93	199.4	132	270	518				354	670	1238
20.6	69	156.2	34.4	94	201.2	138	290	536				360	680	1256
21.1	70	158.0	35.0	95	203.0	143	290	554				366	690	1274
21.7	71	159.8	35.6	96	204.8	149	300	572				371	700	1292
22.2	72	161.6	36.1	97	206.6	154	310	590				377	710	1310
22.8	73	163.4	36.7	98	208.4	160	320	608				382	720	1328
23.3	74	165.2	37.2	99	210.2	166	330	626				388	730	1346
23.9	75	167.0	37.8	100	212.0	171	340	644				393	740	1364
												399	750	1382

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**FIGURE B-5. FAHRENHEIT AND CELSIUS (CENTIGRADE) TEMPERATURE CONVERSION
(SHEET 1 OF 3)**

751 TO 1000			1001 TO 1250			1251 TO 1490			1491 TO 1750		
C.	C. OR F.	F.	C.	C. OR F.	F.	C.	C. OR F.	F.	C.	C. OR F.	F.
404	760	1400	543	1010	1850	682	1260	2300	816	1500	2732
410	770	1418	549	1020	1868	688	1270	2318	821	1510	2750
416	780	1436	554	1030	1886	693	1280	2336	827	1520	2768
421	790	1454	560	1040	1904	699	1290	2354	832	1530	2786
427	800	1472	566	1050	1922	704	1300	2372	838	1540	2804
432	810	1490	571	1060	1940	710	1310	2390	843	1550	2822
438	820	1508	577	1070	1958	716	1320	2408	849	1560	2840
443	830	1526	582	1080	1976	721	1330	2426	854	1570	2858
449	840	1544	588	1090	1994	727	1340	2444	860	1580	2876
454	850	1562	593	1100	2012	732	1350	2462	866	1590	2894
460	860	1580	599	1110	2030	738	1360	2480	871	1600	2912
466	870	1598	604	1120	2048	743	1370	2498	877	1610	2930
471	880	1616	610	1130	2066	749	1380	2516	882	1620	2948
477	890	1634	616	1140	2084	754	1390	2534	888	1630	2966
482	900	1652	621	1150	2102	760	1400	2552	893	1640	2984
488	910	1670	627	1160	2120	766	1410	2570	899	1650	3002
493	920	1688	632	1170	2138	771	1420	2588	904	1660	3020
499	930	1706	638	1180	2156	777	1430	2606	910	1670	3038
504	940	1724	643	1190	2174	782	1440	2624	916	1680	3056
510	950	1742	649	1200	2192	788	1450	2642	921	1690	3074
516	960	1760	654	1210	2210	793	1460	2660	927	1700	3092
521	970	1778	660	1220	2228	799	1470	2678	932	1710	3110
527	980	1796	666	1230	2246	804	1480	2696	938	1720	3128
532	990	1814	671	1240	2264	810	1490	2714	943	1730	3146
538	1000	1832	677	1250	2282				949	1740	3164
									954	1750	3182

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**FIGURE B-5. FAHRENHEIT AND CELSIUS (CENTIGRADE) TEMPERATURE CONVERSION
(SHEET 2 OF 3)**

1751 TO 2000			2001 TO 2250			2251 TO 2490			2491 TO 2750			2751 TO 3000		
C.	C. OR F.	F.	C.	C. OR F.	F.	C.	C. OR F.	F.	C.	C. OR F.	F.	C.	C. OR F.	F.
960	1760	3200	1099	2010	3650	1238	2260	4100	1371	2500	4532	1516	2760	5000
966	1770	3218	1104	2020	3668	1243	2270	4118	1377	2510	4550	1521	2770	5018
971	1780	3236	1110	2030	3686	1249	2280	4136	1382	2520	4568	1527	2780	5036
977	1790	3254	1116	2040	3704	1254	2290	4154	1388	2530	4586	1532	2790	5054
982	1800	3272	1121	2050	3722	1260	2300	4172	1393	2540	4604	1538	2800	5072
988	1810	3290	1127	2060	3740	1266	2310	4190	1399	2550	4622	1543	2810	5090
993	8120	3308	1132	2070	3758	1271	2320	4208	1404	2560	4640	1549	2820	5184
999	1830	3326	1138	2080	3776	1277	2330	4226	1410	2570	4658	1554	2830	5126
1004	1840	3344	1143	2090	3794	1282	2340	4244	1416	2580	4676	1560	2840	5144
1010	1850	3362	1149	2100	3812	1288	2350	4262	1421	2590	4694	1566	2850	5162
1016	1860	3380	1154	2110	3830	1293	2360	4280	1427	2600	4712	1571	2860	5180
1021	1870	3398	1160	2120	3848	1299	2370	4298	1432	2610	4730	1577	2870	5198
1027	1880	3416	1166	2030	3866	1304	2380	4316	1438	2620	4748	1582	2880	5216
1032	1890	3434	1171	2140	3884	1310	2390	4334	1443	2630	4766	1588	2890	5234
1038	1900	3452	1177	2150	3902	1316	2400	4352	1449	2640	4784	1593	2900	5252
1043	1910	3470	1182	2160	3920	1321	2410	4370	1454	2650	4802	1599	2910	5270
1049	1920	3488	1188	2170	3938	1327	2420	4388	1460	2660	4820	1604	2920	5288
1054	1930	3506	1193	2180	3956	1332	2430	4406	1466	2670	4838	1610	2930	5306
1060	1940	3524	1199	2190	3974	1338	2440	4424	1471	2680	4856	1616	2940	5324
1066	1950	3542	1204	2200	3992	1343	2450	4442	1477	2690	4874	1621	2950	5342
1071	1960	3560	1210	2210	4010	1349	2460	4460	1482	2700	4892	1627	2960	5360
1077	1970	3578	1216	2220	4028	1354	2470	4478	1488	2710	4910	1632	2970	5378
1082	1980	3596	1221	2230	4046	1360	2480	4496	1493	2720	4928	1638	2980	5396
1088	1990	3614	1227	2240	4064	1366	2490	4514	1499	2730	4946	1643	2990	5414
1093	2000	3632	1232	2250	4082				1504	2740	4965	1649	3000	5432
									1510	2750	4982			

NOTE

THE NUMBERS IN COLUMN LABELED "C. OR F." REFER TO THE TEMPERATURE EITHER IN DEGREES CELSIUS OR FAHRENHEIT WHICH IT IS DESIRED TO CONVERT INTO THE OTHER SCALE. IF CONVERTING FROM DEGREES FAHRENHEIT TO DEGREES CELSIUS THE EQUIVALENT TEMPERATURE WILL BE FOUND IN THE LEFT COLUMN, WHILE IF CONVERTING FROM DEGREES CELSIUS TO DEGREES FAHRENHEIT, THE ANSWER WILL BE FOUND IN THE COLUMN ON THE RIGHT.

$$^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times 5 / 9$$

$$^{\circ}\text{F} = (^{\circ}\text{C} \times 9 / 5) + 32$$

INTERPOLATION FACTORS	C.		F.		C.		F.	
	0.56	1	1.8		3.33	6	10.8	
	1.11	2	3.6		3.89	7	12.6	
	1.67	3	5.4		4.44	8	14.4	
	2.22	4	7.2		5.00	9	16.2	
	2.78	5	9.0		5.56	10	18.0	

FB1631_3C
SA

**FIGURE B-5. FAHRENHEIT AND CELSIUS (CENTIGRADE) TEMPERATURE CONVERSION
(SHEET 3 OF 3)**

	0	1	2	3	4	5	6	7	8	9
	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg
OZ										
0	–	0.028	0.057	0.085	0.113	0.142	0.170	0.198	0.227	0.255
10	0.283	0.312	0.340	0.369	0.397	0.425	0.454	0.482	0.510	0.539
LB										
0	–	0.45	0.91	1.36	1.81	2.27	2.72	3.18	3.63	4.08
10	4.5	5.0	5.4	5.9	6.4	6.8	7.3	7.7	8.2	8.6
20	9.1	9.5	10.0	10.4	10.9	11.3	11.8	12.2	12.7	13.2
30	13.6	14.1	14.5	15.0	15.4	15.9	16.3	16.8	17.2	17.7
40	18.1	18.6	19.1	19.5	20.0	20.4	20.9	21.3	21.8	22.2
50	22.7	23.1	23.6	24.0	24.5	24.9	25.4	25.9	26.3	26.8
60	27.2	27.7	28.1	28.6	29.0	29.5	29.9	30.4	30.8	31.3
70	31.8	32.2	32.7	33.1	33.6	34.0	34.5	34.9	35.4	35.8
80	36.3	36.7	37.2	37.6	38.1	38.6	39.0	39.5	39.9	40.4
90	40.8	41.3	41.7	42.2	42.6	43.1	43.5	44.0	44.5	44.9
100	45	46	46	47	47	48	48	49	49	49
	0	10	20	30	40	50	60	70	80	90
200	91	95	100	104	109	113	118	122	127	132
300	136	141	145	150	154	159	163	168	172	177
400	181	186	191	195	200	204	209	213	218	222
500	227	231	236	240	245	249	254	259	263	268
600	272	277	281	286	290	295	299	304	308	313
700	318	322	327	331	336	340	345	349	354	358
800	363	367	372	376	381	386	390	395	399	404
900	408	413	417	422	426	431	435	440	445	449
1000	454	458	463	467	472	476	481	485	490	494

(1 OZ = 0.028 349 52 kg) (1 LB = 0.453 592 4 kg)

FB1632
SA

FIGURE B-6. WEIGHT (MASS): OUNCES OR POUNDS TO KILOGRAMS

LB	0	100	200	300	400	500	600	700	800	900
(000)*	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg
1	454	499	544	590	635	680	726	771	816	862
2	907	953	998	1043	1089	1134	1179	1225	1270	1315
3	1361	1406	1451	1497	1542	1588	1633	1678	1724	1769
4	1814	1860	1905	1950	1996	2041	2087	2132	2177	2223
5	2268	2313	2359	2404	2449	2495	2540	2585	2631	2676
6	2722	2767	2812	2858	2903	2948	2994	3039	3084	3130
7	3175	3221	3266	3311	3357	3402	3447	3493	3538	3583
8	3629	3674	3719	3765	3810	3856	3901	3946	3992	4037
9	4082	4128	4173	4218	4264	4309	4354	4400	4445	4491
10	4536	4581	4627	4672	4717	4763	4803	4853	4899	4944
11	4990	5035	5080	5126	5171	5216	5262	5307	5352	5398
12	5443	5488	5534	5579	5625	5670	5715	5761	5806	5851
13	5897	5942	5987	6033	6078	6123	6169	6214	6260	6305
14	6350	6369	6441	6486	6532	6577	6622	6668	6713	6759
15	6804	6849	6895	6940	6985	7031	7076	7121	7167	7212
16	7257	7303	7348	7394	7439	7484	7530	7575	7620	7666
17	7711	7756	7802	7847	7893	7938	7983	8029	8074	8119
18	8165	8210	8255	8301	8346	8391	8437	8482	8528	8573
19	8618	8664	8709	8754	8800	8845	8890	8936	8981	9026
20	9072	9117	9163	9208	9253	9299	9344	9389	9435	9480
*MULTIPLY LB VALUE BY 1000										

(1 LB = 0.453 592 4 kg)

FB1633
SA**FIGURE B-7. WEIGHT (MASS): THOUSAND POUNDS TO KILOGRAMS**

IN.-LB	0	1	2	3	4	5	6	7	8	9
	N · m	N · m	N · m	N · m	N · m	N · m	N · m	N · m	N · m	N · m
10	1.13	0.11	0.23	0.34	0.45	0.56	0.68	0.79	0.90	1.02
20	2.26	1.24	1.36	1.47	1.58	1.69	1.81	1.92	2.03	2.15
30	3.39	2.37	2.49	2.60	2.71	2.82	2.94	3.05	3.16	3.28
40	4.52	3.50	3.62	3.73	3.84	3.95	4.07	4.18	4.29	4.41
50	5.65	4.63	4.75	4.86	4.97	5.08	5.20	5.31	5.42	5.54
60	6.78	5.76	5.88	5.99	6.10	6.21	6.33	6.44	6.55	6.67
70	7.91	6.89	7.01	7.12	7.23	7.34	7.46	7.57	7.68	7.80
80	9.04	8.02	8.13	8.25	8.36	8.47	8.59	8.70	8.81	8.93
90	10.17	9.15	9.26	9.38	9.49	9.60	9.72	9.83	9.94	10.06
100	11.30	10.28	10.39	10.51	10.62	10.73	10.85	10.96	11.07	11.19
	11.30	11.41	11.52	11.64	11.75	11.86	11.98	12.09	12.20	12.32
	0	10	20	30	40	50	60	70	80	90
200	22.60	23.73	24.86	25.99	27.12	28.25	29.38	30.51	31.64	32.77
300	33.90	35.03	36.16	37.28	38.41	39.54	40.67	41.80	42.93	44.06
400	45.19	46.32	47.45	48.58	49.71	50.84	51.97	53.10	54.23	55.36
500	56.49	57.62	58.75	59.88	61.01	62.14	63.27	64.40	65.53	66.66

(1 IN.-LB = 0.112 984 8 N · m)

FB1634
SA**FIGURE B-8. TORQUE: INCH-POUNDS TO NEWTON-METERS**

FT-LB	0	1	2	3	4	5	6	7	8	9
	N · m	N · m	N · m	N · m	N · m	N · m	N · m	N · m	N · m	N · m
10	14	15	16	18	19	20	22	23	24	26
20	27	28	30	31	33	34	35	37	38	39
30	41	42	43	45	46	47	49	50	52	53
40	54	56	57	58	60	61	62	64	65	66
50	68	69	71	72	73	75	76	77	79	80
60	81	83	84	85	87	88	89	91	92	94
70	95	96	98	99	100	102	103	104	106	107
80	108	110	111	113	114	115	117	118	119	121
90	122	123	125	126	127	129	130	132	133	134
FT-LB		100	200	300	400	500	600	700	800	900
N · m		136	271	407	542	678	813	949	1085	1220
FT-LB		1000	2000	3000	4000	5000	6000	7000	8000	9000
N · m		1356	2712	4067	5423	6779	8135	9491	10 847	12 202

(1 FT-LB = 1.355 838 N · m)

FB1635
SA

FIGURE B-9. TORQUE: FOOT-POUNDS TO NEWTON-METERS

PSI	0	100	200	300	400	500	600	700	800	900
(000)*	kPa	kPa	kPa	kPa	kPa	kPa	kPa	kPa	kPa	kPa
		689	1 379	2 068	2 758	3 447	4 137	4 826	5 516	6 205
1	6 895	7 584	8 274	8 963	9 653	10 342	11 032	11 721	12 411	13 100
2	13 790	14 479	15 168	15 858	16 547	17 237	17 926	18 616	19 305	19 995
3	20 684	21 374	22 063	22 753	23 442	24 132	24 821	25 511	26 200	26 890
4	27 579	28 268	28 958	29 647	30 337	31 026	31 716	32 405	33 095	33 784
5	34 474	35 163	35 853	36 542	37 232	37 921	38 611	39 300	39 990	40 678
6	41 369	42 058	42 747	43 437	44 126	44 816	45 505	46 195	46 884	47 574
7	48 263	48 953	49 642	50 332	51 021	51 711	52 400	53 090	53 779	54 469
8	55 158	55 848	56 537	57 226	57 916	58 605	59 295	59 984	60 674	61 363
9	62 053	62 742	63 432	64 121	64 811	65 500	66 190	66 879	67 569	68 258
10	68 948	69 637	70 327	71 016	71 705	72 395	73 084	73 774	74 463	75 153
*MULTIPLY PSI VALUE BY 1000										

(1 PSI = 6.894 757 kPa)

FB1636
SA**FIGURE B-10. PRESSURE: THOUSAND POUNDS PER-SQUARE-INCH TO KILOPASCALS**

PSI	0	1	2	3	4	5	6	7	8	9
	kPa	kPa	kPa	kPa	kPa	kPa	kPa	kPa	kPa	kPa
		6.9	13.8	20.7	27.6	34.5	41.4	48.3	55.2	62.1
10	69	76	83	90	97	103	110	117	124	131
20	138	145	152	159	165	172	179	186	193	200
30	207	214	221	228	234	241	248	255	262	269
40	276	283	290	296	303	310	317	324	331	338
50	345	352	359	365	372	379	386	393	400	407
60	414	421	427	434	441	448	455	462	469	476
70	483	490	496	503	510	517	524	531	538	545
80	552	558	565	572	579	586	593	600	607	614
90	621	627	634	641	648	655	662	669	676	683
100	689	696	703	710	717	724	731	738	745	752

(1 PSI = 6.894 757 kPa)

FB2197
SA

FIGURE B-11. PRESSURE: POUNDS PER-SQUARE-INCH TO KILOPASCALS

APPENDIX C

SPECIAL TOOLS AND GROUND SUPPORT EQUIPMENT

C-1 SPECIAL TOOLS AND GROUND SUPPORT EQUIPMENT.

C-1.1 Introduction.

NOTE

New support equipment purchased from Sikorsky Aircraft has passed all quality requirements and should be considered calibrated upon delivery. The recommended calibration requirements specified within this appendix are recommended for new support equipment that have been inducted into each customer's inventory. Specific calibration requirements may vary depending on the internal process that have been established by each customer for support equipment calibration.

This appendix includes special tools and ground support equipment required to support and maintain the helicopter. Individual illustrations for these items include simplified line drawings and supporting text containing item description and calibration procedures if an item requires calibration.

C-1.2 Figure Number Index.

The figure number index lists all items in numerical figure sequence.

Figure Number Index

<u>Figure No.</u>	<u>Nomenclature</u>
Figure C-1	Aircraft Tow Bar, 01-1185-0000 or 01-1185-0010
Figure C-2	Accelerometer Bracket, 70351-08408-102
Figure C-3	Air Conditioning Gage and Manifold, 41213J
Figure C-4	Air Conditioning Leak Detector, TIF Model 5650
Figure C-5	Air Conditioning Vacuum Pump, 93462
Figure C-6	Air Data Test Set, 1811H-665
Figure C-7	Air Inlet Plug, 70700-20114-109
Figure C-8	APU Spline Adapter Installer, 1106841-1
Figure C-9	APU Spline Adapter Puller, 110679-4
Figure C-10	Battery Charger/Analyzer, PCA-131 50/60
Figure C-11	Bearing Staking Tool, RST2153
Figure C-12	Buddy Start System, 70073-30001-011
Figure C-13	Blade Repair Mission Kit, 70073-15000-011
Figure C-14	Check and Fill Unit, BIM® System, 70700-77669-041
Figure C-15	Composites Repair Kit, 70700-77325-041
Figure C-16	Rotary Wing Blade Repair Kit, 70072-15001-011
Figure C-17	Digital Multimeter, Fluke 45
Figure C-18	Digital Propeller Protractor, 02500-01
Figure C-19	Electrical Connector Maintenance/Repair Kit, DMC 787-ELEC

Figure Number Index (Cont)

<u>Figure No.</u>	<u>Nomenclature</u>
Figure C-20	Electrical Generator, Diesel-Powered, 60J20P
Figure C-21	Electrical System Analyzer, 60B63-5A
Figure C-22	Electrical Repairer's Toolkit
Figure C-23	Engine Mount Staking Tool, STD1850.451-005
Figure C-24	Engine Strut Staking Tool, STD1850.458-024
Figure C-25	Extender Card, 220-419916-000
Figure C-26	Fuel Quantity Test Set, PSD 60-2R
Figure C-27	Fuel Quantity Test Harness, PSD 40-542
Figure C-28	Fuel Quantity Cable Assembly, PSD 60-113
Figure C-29	Long Hex Head Wrench, FA12L
Figure C-30	Hydraulic Cart Adapter Fittings, KHC 1004
Figure C-31	Hydraulic Filler/Bleeder, 1102SP
Figure C-32	Hydraulic Power Unit, 05-7040-1200
Figure C-33	Hydraulic Tripod Jack, 12-3-14
Figure C-34	Intermediate/Tail Gear Box Drain Line, H538A-3
Figure C-35	Micrometer Set, 0 - 4-inch, PMF114
Figure C-36	Main Gear Box Drain Line, D-730-L
Figure C-37	Nulling Fixture, 70700-20675-041
Figure C-38	Photocell Bracket, 70700-20114-044
Figure C-39	Pitch Beam Puller, 70700-77389-041
Figure C-40	Pitot Pressure Adapter, 884DB
Figure C-41	Pressure Regulator, 14-6804-6000
Figure C-42	APU Combustor Puller, ST 91125
Figure C-43	APU Combustor Adapter, ST 93014
Figure C-44	RADS-AT VIB Analyzer, 29313100
Figure C-45	Flight Control Rigging Set, 70700-20389-042
Figure C-46	Rotor Brake Wrench, 70700-77117-041
Figure C-47	Main Rotor Head Wrench, 70700-20210-101
Figure C-48	Engine Inlet Screen, 70700-20222-044
Figure C-49	Simulator Temp/Speed APU Test Set, H296B-1
Figure C-50	Cargo Sling Assembly, 3900061 or XB-4-20-16
Figure C-51	Spanner Wrench Set, AN8514-1
Figure C-52	Spanner Wrench Set, AN8515-1
Figure C-53	Spring Testers, 719-5, 719-10, 719-40
Figure C-54	Staking Tool Kit, Stabilator Fittings, 70700-20129-041
Figure C-55	Steering Bar, 70700-20374-041
Figure C-56	Surface Probe, 00790
Figure C-57	Torque Wrench
Figure C-58	Tail Wheel Jack, 1926-10
Figure C-59	Tail Rotor Lockout Blocks, 70700-20463-041
Figure C-60	Telescoping Gage Set, PMF119

Figure Number Index (Cont)

<u>Figure No.</u>	<u>Nomenclature</u>
Figure C-61	Tensiometer, T5-2002-104-00
Figure C-62	Time Domain Reflectometer Cable Tester, 1503C
Figure C-63	Tire Inflator, M85352/1
Figure C-64	Torque Reactor, 70700-20688-041
Figure C-65	Torque Wrench, Pylon Fold, 28420
Figure C-66	Trim Tab Adjustment Set, 70700-20308-041
Figure C-67	Universal Hoisting Sling Assembly, 70700-20320-045
Figure C-68	VIDS Bench Test Set, 100-601165-000
Figure C-69	VIDS Line Test Set, 100-601164-000
Figure C-70	VOR/ILS/MB Ramp Test Set, 972Q-4
Figure C-71	Tail Drive Flange Wrench, 70700-20687-102
Figure C-72	Aircraft Mechanic's Toolkit
Figure C-73	Airframe Repairer's Toolkit, SIK-AF-92
Figure C-74	Simulator, SM-C-877251
Figure C-75	Temperature Meter, 385-3L
Figure C-76	Pyrometer, 4000A
Figure C-77	Thermocouple, Type 4040
Figure C-78	Flexible Extension Arm, Type 4020
Figure C-79	Puller Set, Mechanical, 1677
Figure C-80	Wattmeter, 43
Figure C-81	Aircraft Tire Inflation Cage, 7201-010
Figure C-82	Aircraft Tire Bead Breaker, 5033-010
Figure C-83	Protractor
Figure C-84	Maintenance Lock Strut, 70700-20385-041
Figure C-85	Main and Tail Rotor Blade Adapter, 70700-20426-041
Figure C-86	Main Gear Box Adapter, 70700-20420-041
Figure C-87	Rotary Wing Head Adapter, 70700-20421-041
Figure C-88	Auxiliary Power Unit Adapter, 70700-20423-041
Figure C-89	Battery Charger/Analyzer, RF80-K
Figure C-90	Aircraft Tire Bead Breaker, LEE-1X
Figure C-91	Digital Propeller Protractor, Pro 3600
Figure C-92	VRSLAB - Battery Charger/Analyzer, 4159
Figure C-93	Battery Charger, 282/4105
Figure C-94	Seal Installer, 70700-77308-041
Figure C-95	Seal Installer, 70700-77309-041
Figure C-96	Seal Installer, 70700-77310-041
Figure C-97	Nitrogen Servicing Unit, 1428AS100-1
Figure C-98	Fuel Integrity Test Set, RJP001
Figure C-99	Fuel Cell Test Kit, RJP002-2
Figure C-100	Electrical Generator, Diesel-Powered, 90C24P5-S/A
Figure C-101	Tiedown Chain Assembly, 627728A

Figure Number Index (Cont)

<u>Figure No.</u>	<u>Nomenclature</u>
Figure C-102	Tiedown Tensioner, CGU-4/E
Figure C-103	Digital Low-Resistance Ohmmeter, 247000
Figure C-104	Ammeter, Clamp-On, 749
Figure C-105	Thermometer, 389-3L
Figure C-106	Fuel Integrity Tester, SK2000FIT

C-1.3 Figure Alphabetical Index.

The figure index lists all items in alphabetical sequence.

Figure Alphabetical Index

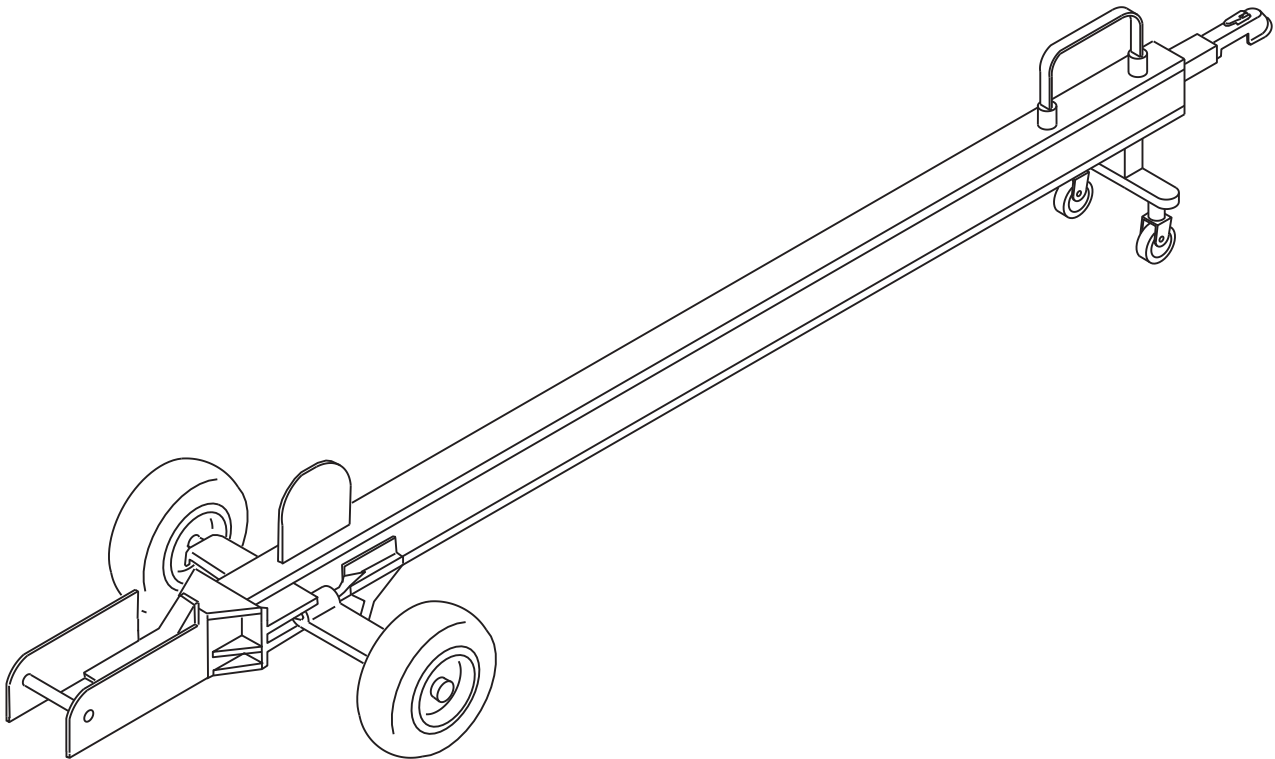
<u>Nomenclature</u>	<u>Figure No.</u>
Accelerometer Bracket, 70351-08408-102	Figure C-2
Air Conditioning Gage and Manifold, 41213J	Figure C-3
Air Conditioning Leak Detector, TIF Model 5650	Figure C-4
Air Conditioning Vacuum Pump, 93462	Figure C-5
Air Data Test Set, 1811H-665	Figure C-6
Air Inlet Plug, 70700-20114-109	Figure C-7
Aircraft Mechanic's Toolkit	Figure C-72
Aircraft Tire Bead Breaker, LEE-1X	Figure C-90
Aircraft Tire Bead Breaker, 5033-010	Figure C-82
Aircraft Tire Inflation Cage, 7201-010	Figure C-81
Aircraft Tow Bar, 01-1185-0000 or 01-1185-0010	Figure C-1
Airframe Repairer's Toolkit, SIK-AF-92	Figure C-73
Ammeter, Clamp-On, 749	Figure C-104
APU Combustor Adapter, ST 93014	Figure C-43
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APU Spline Adapter Installer, 1106841-1	Figure C-8
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Auxiliary Power Unit Adapter, 70700-20423-041	Figure C-88
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Check and Fill Unit, BIM® System, 70700-77669-041	Figure C-14
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Digital Low-Resistance Ohmmeter, 247000	Figure C-103
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Digital Propeller Protractor, Pro 3600	Figure C-91
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Electrical Connector Maintenance/Repair Kit, DMC 787-ELEC	Figure C-19
Electrical Generator, Diesel-Powered, 60J20P	Figure C-20
Electrical Generator, Diesel-Powered, 90C24P5-S/A	Figure C-100
Electrical Repairer's Toolkit	Figure C-22
Electrical System Analyzer, 60B63-5A	Figure C-21
Engine Inlet Screen, 70700-20222-044	Figure C-48
Engine Mount Staking Tool, STD1850.451-005	Figure C-23

Figure Alphabetical Index (Cont)

<u>Nomenclature</u>	<u>Figure No.</u>
Engine Strut Staking Tool, STD1850.458-024	Figure C-24
Extender Card, 220-419916-000	Figure C-25
Flexible Extension Arm, Type 4020	Figure C-78
Flight Control Rigging Set, 70700-20389-042	Figure C-45
Fuel Cell Test Kit, RJP002-2	Figure C-99
Fuel Integrity Tester, SK2000FIT	Figure C-106
Fuel Integrity Test Set, RJP001	Figure C-98
Fuel Quantity Cable Assembly, PSD 60-113	Figure C-28
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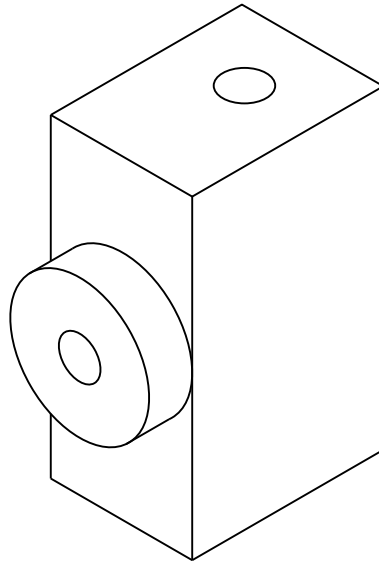
DESCRIPTION: The tow bar is designed as a single leg aluminum tubular structure having a yoke at one end for attachment to the helicopter tail wheel. It is designed to accept loads imposed by a fully loaded helicopter.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-1. AIRCRAFT TOW BAR, 01-1185-0000 OR 01-1185-0010



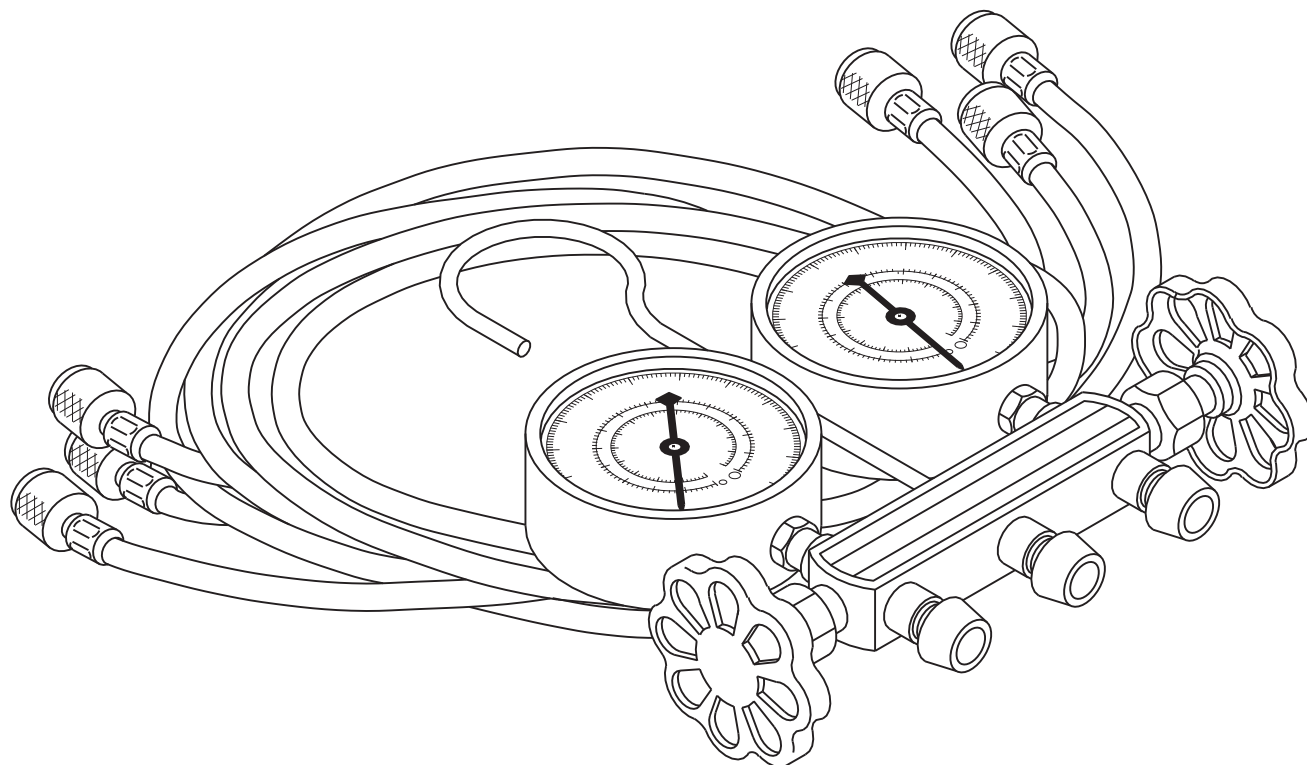
DESCRIPTION: The accelerometer bracket is mounted to the airframe and is used as a base for the track and balance accelerometer. When track and balance of the helicopter is complete, the bracket is removed from the airframe.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

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SA

FIGURE C-2. ACCELEROMETER BRACKET, 70351-08408-102



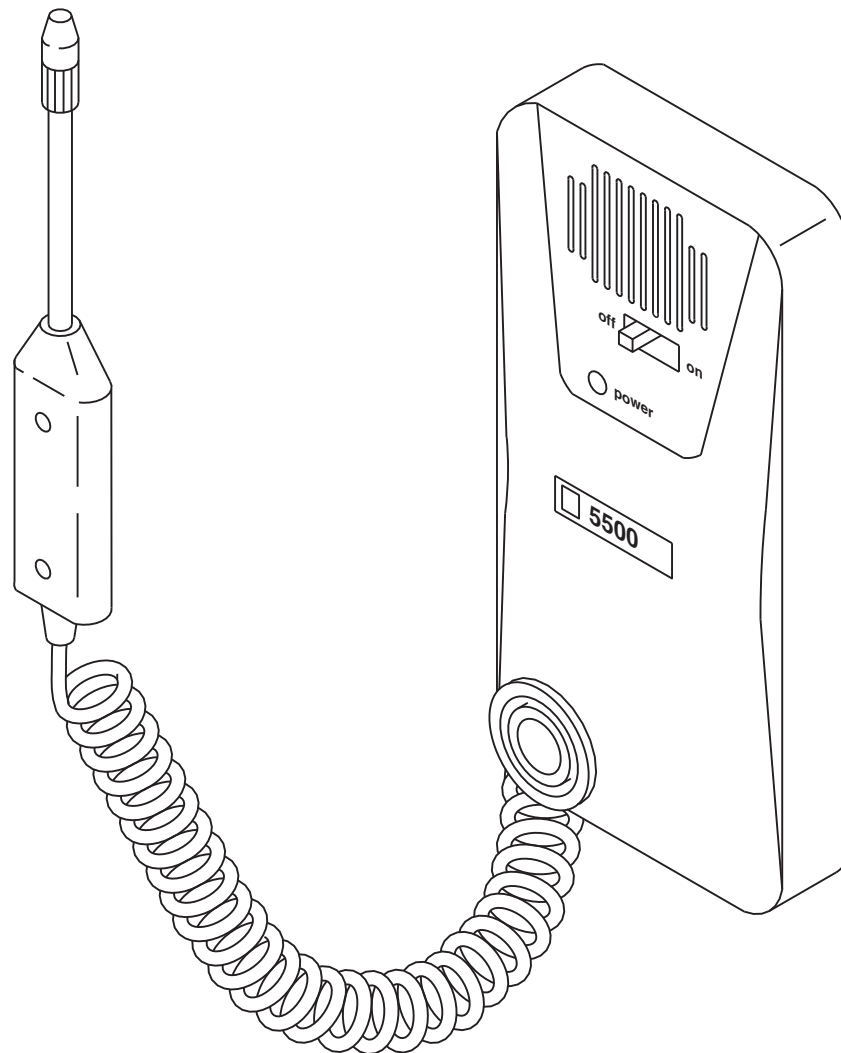
DESCRIPTION: The manifold gage is used to check and service the gas pressure in the air-conditioning system. It consists of two gages, hoses, and a regulating valve to control the pressure while servicing.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

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SA

FIGURE C-3. AIR CONDITIONING GAGE AND MANIFOLD, 41213J



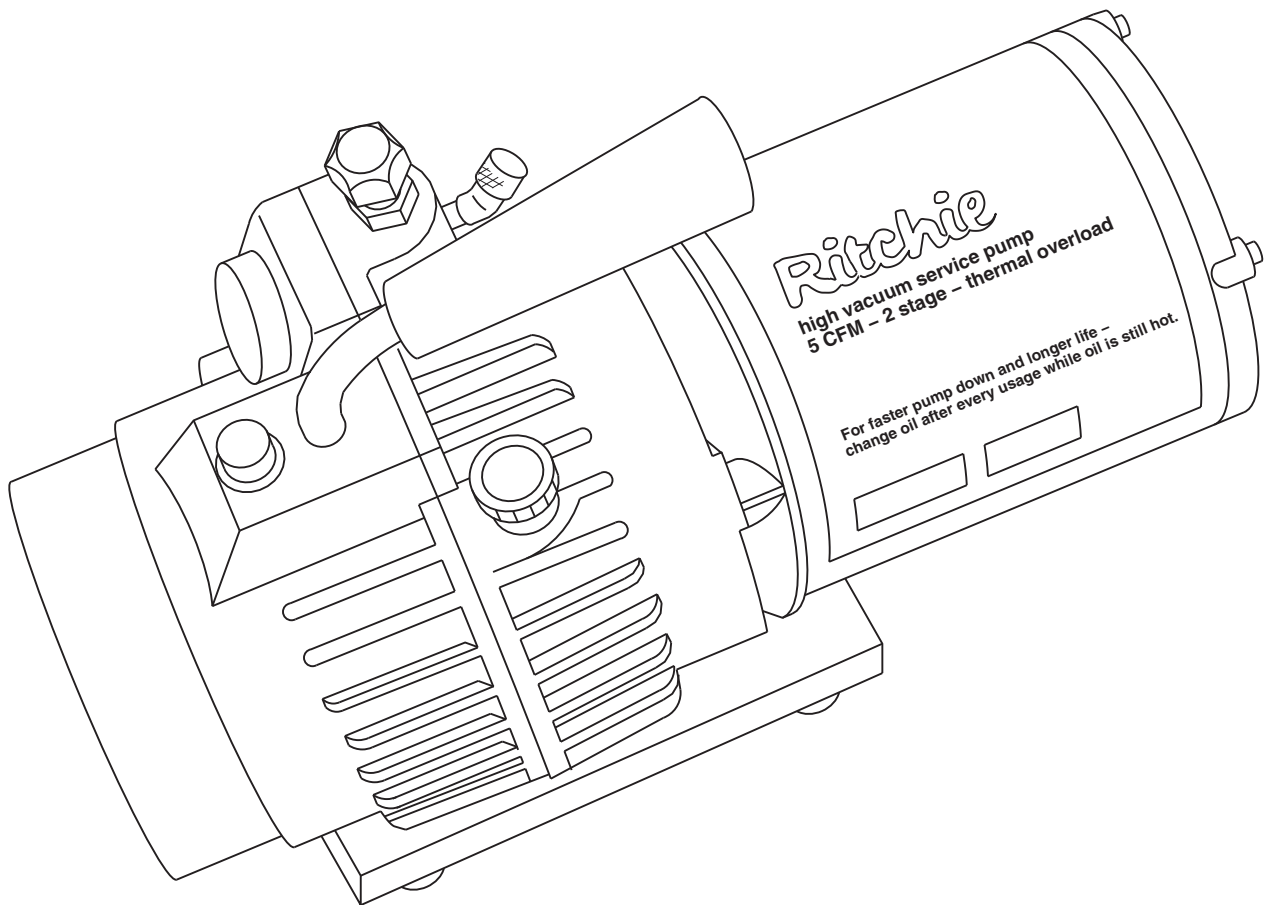
DESCRIPTION: The leak detector is designed to detect all HFC, CFC, and HCFC refrigerants. It is a hand held unit with 36-inch cord for hard to reach places. The detector responds to minute traces of halogen gas with a leak rate accuracy of better than 0.40 ounces per year.

POWER REQUIREMENTS: Battery powered, two C-Cell 3 Volt DC.

CALIBRATION REQUIREMENTS: Not Applicable

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SA

FIGURE C-4. AIR CONDITIONING LEAK DETECTOR, TIF MODEL 5650



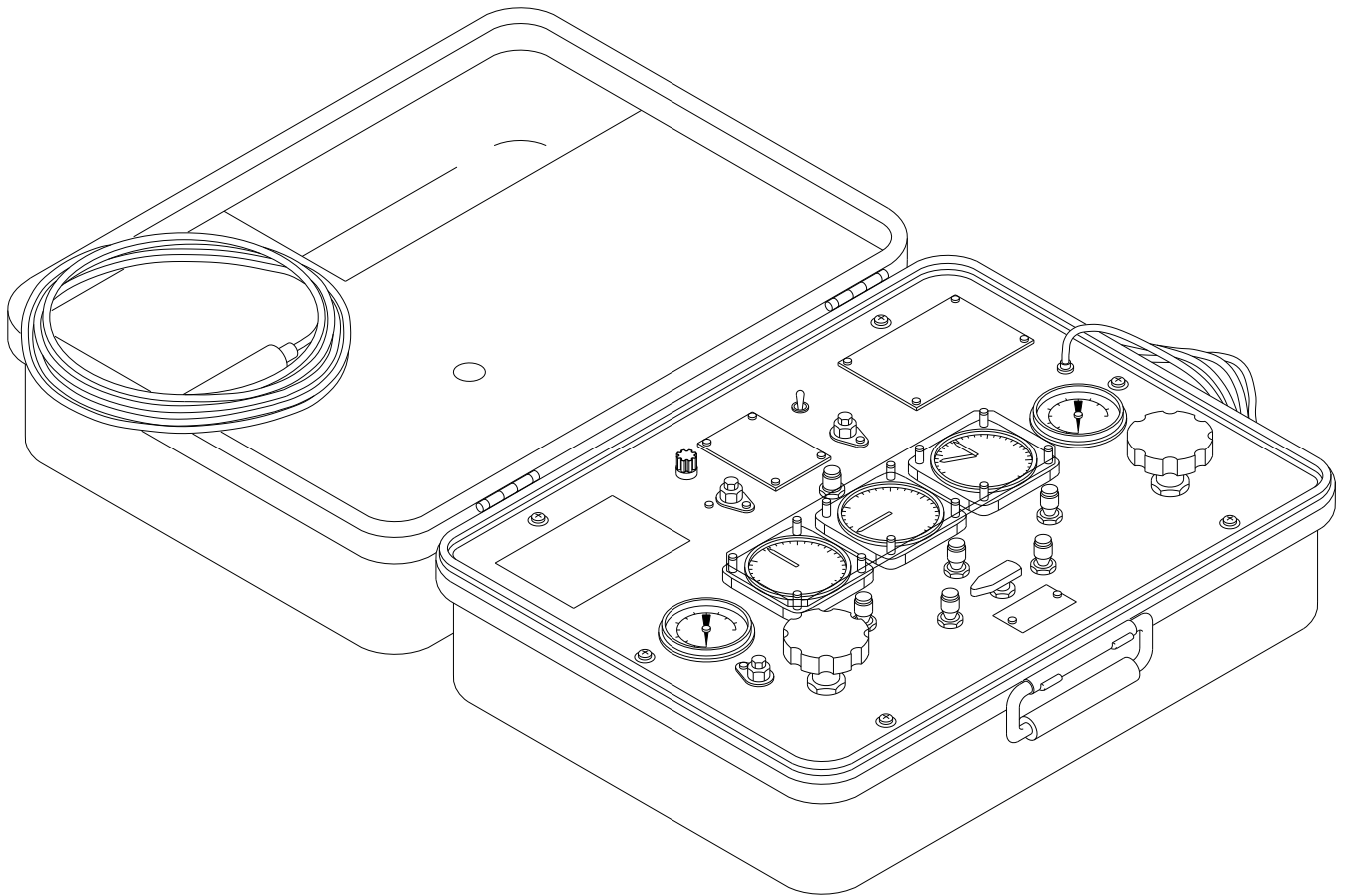
DESCRIPTION: The air conditioning vacuum pump is used when removing and reinstalling components of the helicopter air conditioning system.

POWER REQUIREMENTS: 120 / 220 volts, 50 / 60 Hz.

CALIBRATION REQUIREMENTS: Not Applicable

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SA

FIGURE C-5. AIR CONDITIONING VACUUM PUMP, 93462



DESCRIPTION: The air data test set is used to test the helicopter pitot static system. It is also used in testing the operation and calibration of airspeed, engine pressure ratio, manifold pressure indicators, and other vacuum or low pressure systems.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS:

FREQUENCY

Air data test set must be calibrated every 24 weeks regardless of being used or not.

EQUIPMENT REQUIRED

- Mensor Precision Quartz Pressure Gage or equivalent
- Micron Vacuum Gage and Sensor
- Vacuum Pump
- Stop Watch

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FIGURE C-6. AIR DATA TEST SET, 1811H-665 (SHEET 1 OF 5)

CALIBRATION REQUIREMENTS:(CONT)

CALIBRATION PROCEDURE

Inspect

1. Check test set for excessive oil, dirt, and foreign matter on unit. Check connectors, hoses, external pressure and vacuum ports for obstructions.
2. Check for broken valves, connectors, and instruments. Check pump and selector positions by observing tank gages.

Function and Leak Check

1. Close valves, cap test ports on static and pitot ports on test set, to check pitot side for leaks.
2. Turn on test set pump to achieve 5 psi in pressure tank as shown on gage. Slowly open pressure valve and observe airspeed indicator. Close valve at 200 knots on airspeed indicator. Airspeed shall not fall more than 2 knots in one minute. If airspeed falls 2 knots, repair system and repeat check.
3. Release pressure by slowly opening pressure vent valve.
4. Make sure all valves are closed, pitot and static test ports are capped. Fully open cross bleed valve to check static for leaks.
5. Turn on test set pump to achieve 20 in. on vacuum tank gage. Slowly open vacuum valve and observe altimeter. Close vacuum valve when altitude reads 20000 feet. Altimeter shall not drop more than 100 feet in one minute. If altimeter drops more than 100 feet, repair system and repeat check.
6. Release pressure by slowly opening pressure vent valve.
7. Make sure all valves are closed, pitot and static ports are capped, for overall functional check of tester. Turn on tester pump to achieve 5 psi on pressure tank gage and 20 in. on vacuum tank gage.
8. Open cross bleed valve and slowly open vacuum valve. Open vertical speed valve and observe rate of climb / descent indicator. Rate is controlled by vacuum valve. DO NOT EXCEED full scale range.

NOTE

Airspeed indicator may indicate temporary drop in airspeed below 0-knots. This condition will correct itself when vacuum valve is closed.

9. Vertical speed indicator should show some upscale movement with vacuum valve open. If pointer does not move, check and repair system.
10. Close cross bleed valve and slowly open pressure valve to achieve 100 knots on airspeed indicator. Close pressure valve and observe altimeter for drop in altitude, any drop beyond 100 feet is possible static system leak. Any drop in altitude and a drop in airspeed beyond 2 knots is possible leak between pitot and static. Any rise in airspeed is sign of leak in pitot. Repair any leaks and repeat check.
11. With checks complete, open cross bleed valve to bring airspeed down. Slowly open pressure vent to bring down altitude. Vent vacuum by means of pressure vent to avoid reverse airspeed.

Preliminary Measurement

1. Insert quartz gage capsule into gage. Turn on power at gage and allow to warmup.
2. Check capsule for proper temperature. Connect for differential as shown in view "A" and for absolute measurement in view "B". Connect as shown with both vent valves on tester open.
3. Turn on vacuum pump and observe vacuum gage. Gage should read 200 microns or less. Adjust gage containing absolute capsule to correspond with vacuum gage.
4. Close zero valve for differential. Stop vacuum pump for absolute. Vent gage and connect to testers static port, see view B. The gage with absolute capsule will read ambient atmospheric pressure.

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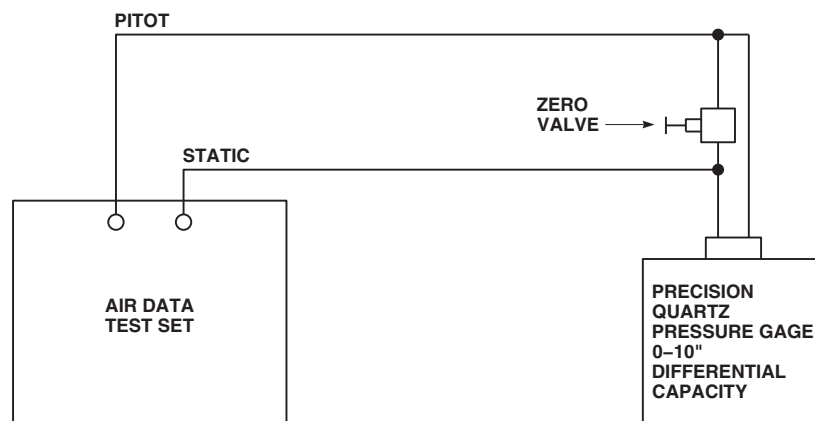
FIGURE C-6. AIR DATA TEST SET, 1811H-665 (SHEET 2 OF 5)

CALIBRATION REQUIREMENTS:(CONT)**CALIBRATION PROCEDURE (CONT)****Altimeter Check**

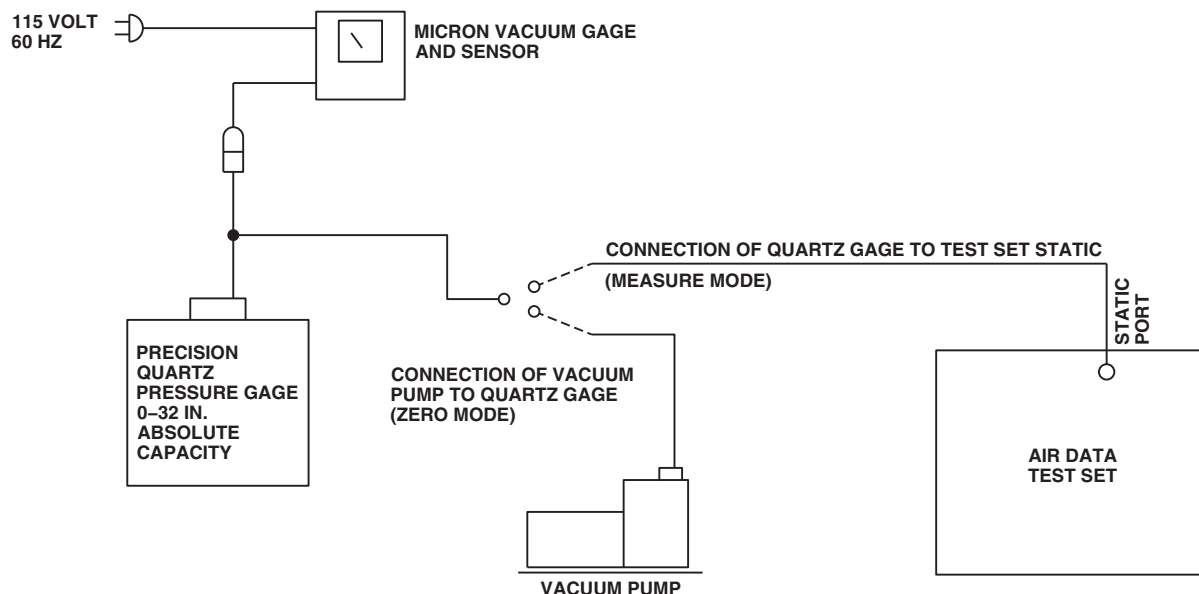
5. Connect test set as shown in view B, and open cross bleed and close pressure vent valve on tester. Make sure vacuum valve and vacuum vent valve are closed. Turn on tester pump to achieve 25 in. of vacuum on tank gage.
6. Slowly open vacuum valve and observe altimeter, also rate of climb indicator on tester indicators will rise up scale and quartz gage will go down scale. Close vacuum valve when altimeter is at 20000 feet. If altitude drops, check for leaks and repair as required.
7. Open pressure vent valve and slowly bring system back to atmospheric pressure.

NOTE

Altimeter reading may not be at zero with pressure at ambient due to work area most likely not being at sea-level pressure of 29.92 in.



**AIRSPEED MEASUREMENT
VIEW A**



**ALTITUDE MEASUREMENT
VIEW B**

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SA

FIGURE C-6. AIR DATA TEST SET, 1811H-665 (SHEET 3 OF 5)

CALIBRATION REQUIREMENTS:(CONT)**CALIBRATION PROCEDURE (CONT)****Altimeter Check (cont)**

8. Repeat tests in steps 5 through 7.
9. Adjust barometric reading on test set altimeter to read 29.92 in. and close pressure vent valve.
10. Depending on ambient room pressure, open either vacuum or pressure valve on test set to achieve 29.92 in. on altimeter. Lightly tap altimeter and record reading. Repeat measurements at remaining points as listed in Table 1.

TABLE 1 (ALTIMETER)

ALTITUDE	PRESSURE	INDICATOR	STANDARD	TOTAL
0 ft	29.9213 "HgA	± 50 ft	± 4.3 ft	± 54.3 ft
+1000	28.8557	75	4.5	79.5
2000	27.8210	100	4.7	104.7
5000	24.8959	100	5.1	105.1
10000	20.5770	150	5.8	155.8
15000	16.8858	200	6.9	206.9
18000	14.9421	200	7.8	207.8
20000	13.7501	200	8.1	208.1
10000	20.5770	150	5.8	155.8
5000	24.8959	100	5.1	105.1
0	29.9213	50	4.3	54.3
-1000	31.0185	50	4.3	54.3

11. If tolerance in Table 1 can not be achieved, adjust and repeat check. Open vacuum vent before disconnecting system.

Airspeed Indicator Check

1. Connect airspeed indicator to test set as shown in view A. Make sure vacuum vent is open and zero valve is closed.
2. Make sure pressure valve, cross bleed valve, and pressure vent valve are closed. Turn on tester pump to achieve 5 psi on tank pressure gage.
3. Slowly open pressure valve and observe reading on airspeed indicator going upscale. Quartz gage shall also go upscale. Close pressure valve when airspeed indicator reaches 200 knots and check for leaks.
4. Open pressure vent valve to bring system back to ambient pressure and repeat step 3.
5. With pitot side of airspeed indicator at ambient pressure, open cross bleed valve and measure zero. Read and record indications. Repeat measurements for remaining points as listed in Table 2.

TABLE 2 (AIRSPEED)

AIRSPEED	PRESSURE	INDICATOR	STANDARD	TOTAL
20 Knots	.0192 "HgD	± 2.5 Knots	± 2.5 Knots	± 4.8 Knots
40	.0767	2.0	1.2	3.2
60	.1729	2.0	.8	2.8
80	.3079	2.0	.7	2.7
100	.4821	2.0	.6	2.6
120	.6959	2.0	.5	2.5
140	.9501	2.0	.4	2.4
160	1.2452	2.5	.4	2.9
200	1.9616	4.0	.4	4.4
100	.4821	2.0	.6	2.6
60	.1721	2.0	.8	2.8

6. If tolerance in Table 2 can not be achieved, adjust and repeat check. Open pressure vent valve and cross bleed valve before disconnecting system.

Rate of Climb / Descent Indicator Check

1. Close vent valves, make sure pitot and static output ports are capped, and cross bleed valve is open. Make sure vertical speed indicator control valve is open on tester.

FB0998_4A
SA**FIGURE C-6. AIR DATA TEST SET, 1811H-665 (SHEET 4 OF 5)**

CALIBRATION REQUIREMENTS:(CONT)**CALIBRATION PROCEDURE (CONT)****Rate of Climb / Descent Indicator Check (cont)**

2. Close vacuum valve, pressure vent, and vacuum vent valves. Turn on tester pump to achieve 25 in. on vacuum tank gage.

NOTE

The following check requires the altimeter be operable and calibrated.

3. Slowly open vacuum valve while observing altimeter and vertical speed indicator. Using stop watch, measure the rate of climb at several points on the scale. Turn on tester pump if needed for more vacuum.
4. Check descent scale in same manner as step 3 except slowly open pressure vent valve to bleed vacuum. With checks completed, bring system back to ambient pressure.
5. Check suggested points and tolerances shown in Table 3.

TABLE 3 (RATE OF CLIMB / DESCENT)

INDICATED	TOLERANCE*	
500 ft / min	109.1	TO 133.3 sec
1000	54.6	66.7
2000	27.3	33.3
3000	18.2	26.2
**4000	13.7	16.7

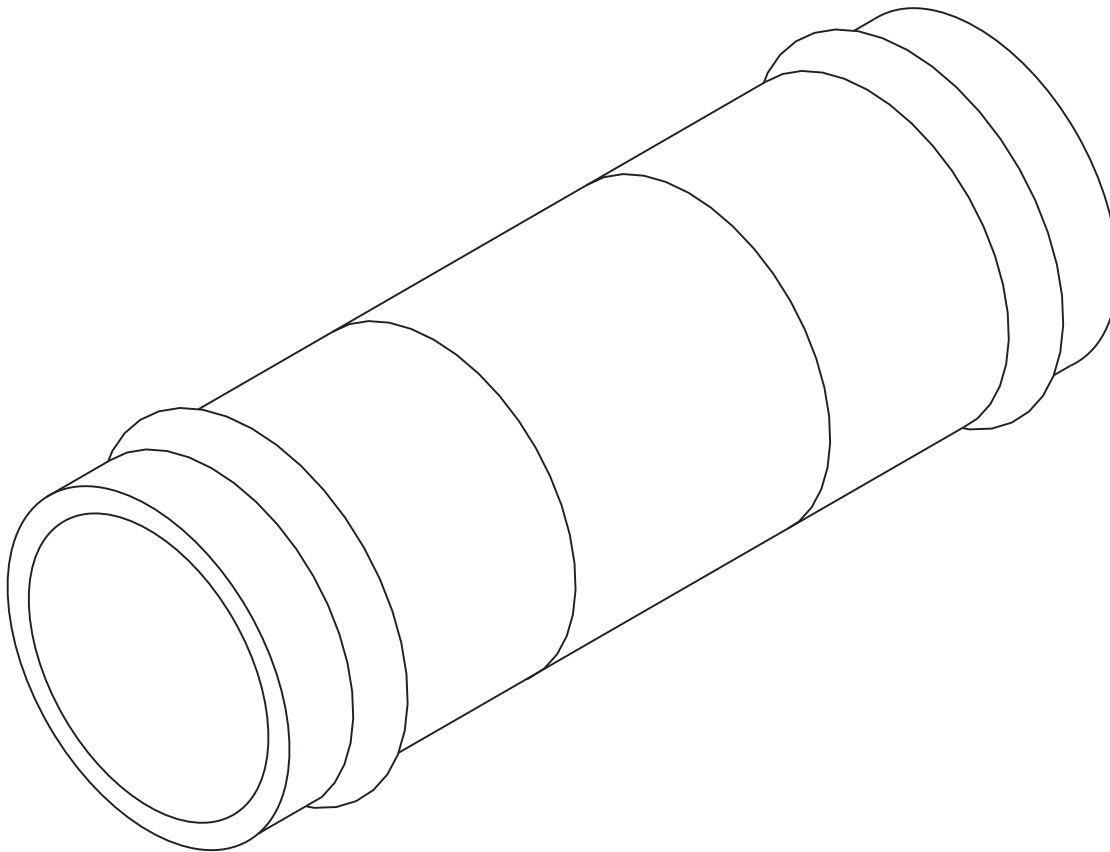
* Net altitude of 1000 ft and $\pm 10\%$ of indicator+ tol. of altimeter.

** Only on a 6000 ft / min indicator.

6. When checks are complete on tester, disconnect equipment and install calibration sticker.

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SA

FIGURE C-6. AIR DATA TEST SET, 1811H-665 (SHEET 5 OF 5)



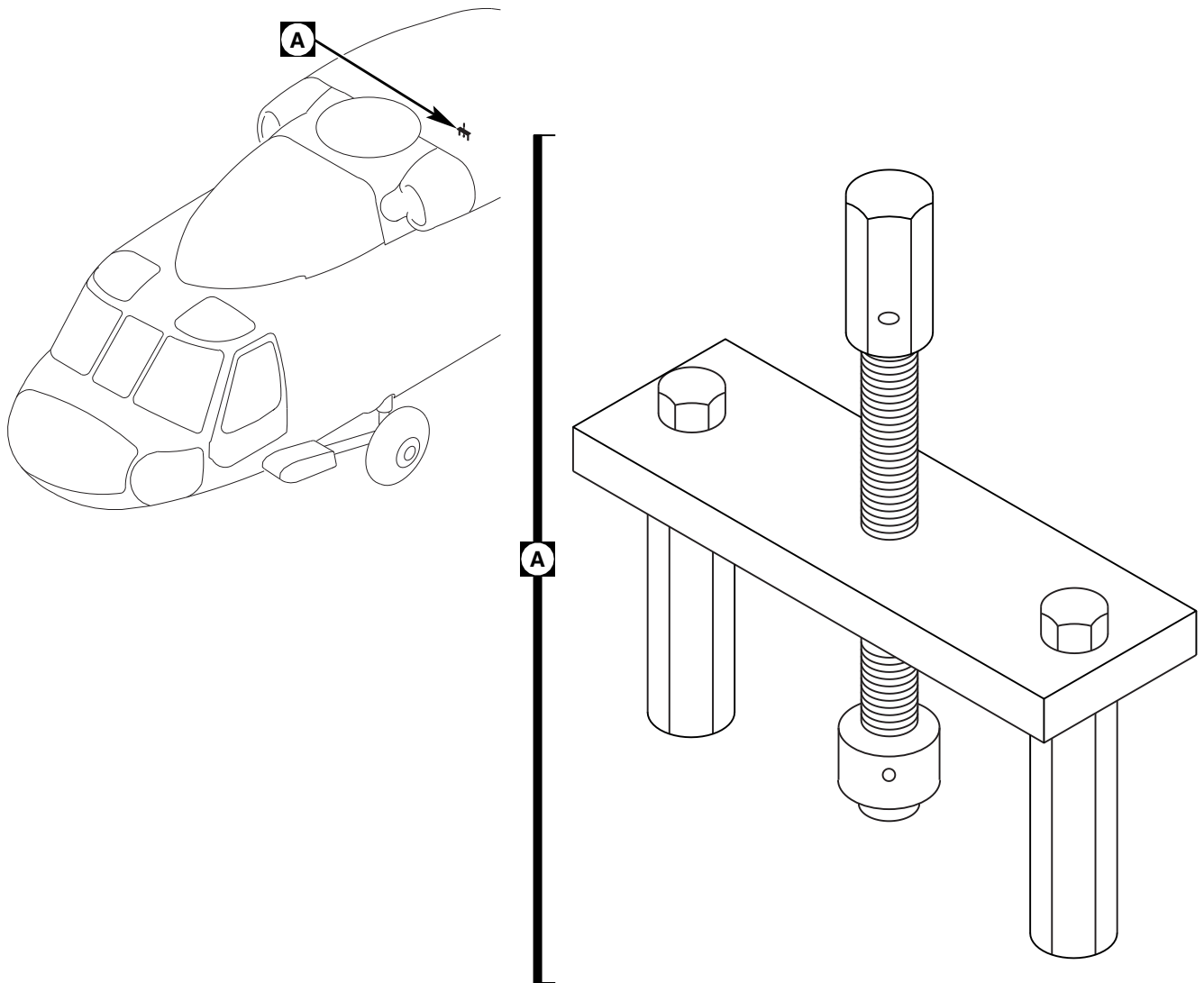
DESCRIPTION: The air inlet plug is used to block the inlet anti-ice bleed air tubes when the engine air inlets are removed to balance the engine output shaft.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FIGURE C-7. AIR INLET PLUG, 70700-20114-109

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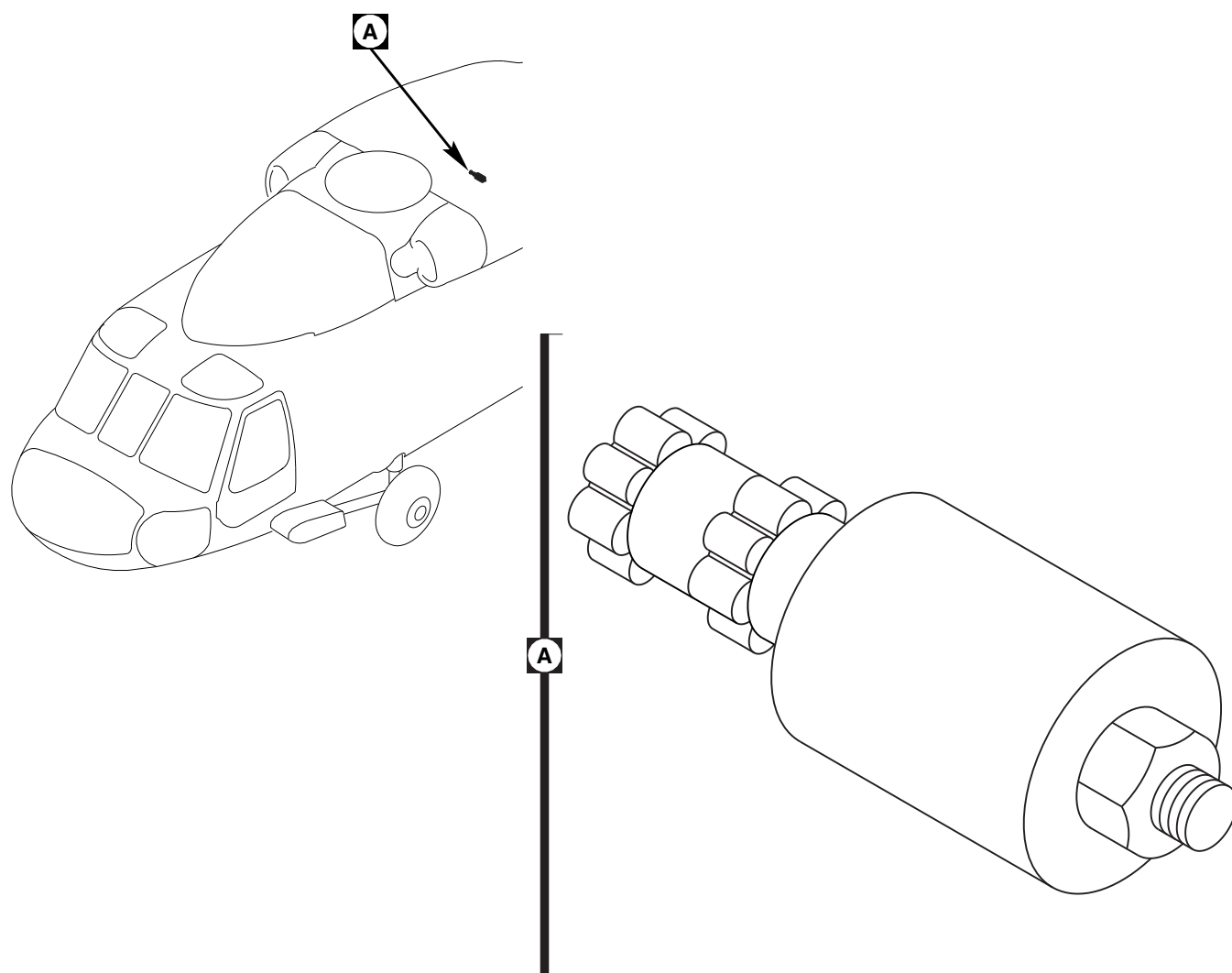
DESCRIPTION: The APU spline adapter installer consists of an externally threaded shaft, plug, plate, two externally threaded posts, and two hex head screws. It must be used when installing the vespel spline adapter into the APU generator recess.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1124
SA

FIGURE C-8. APU SPLINE ADAPTER INSTALLER, 1106841-1



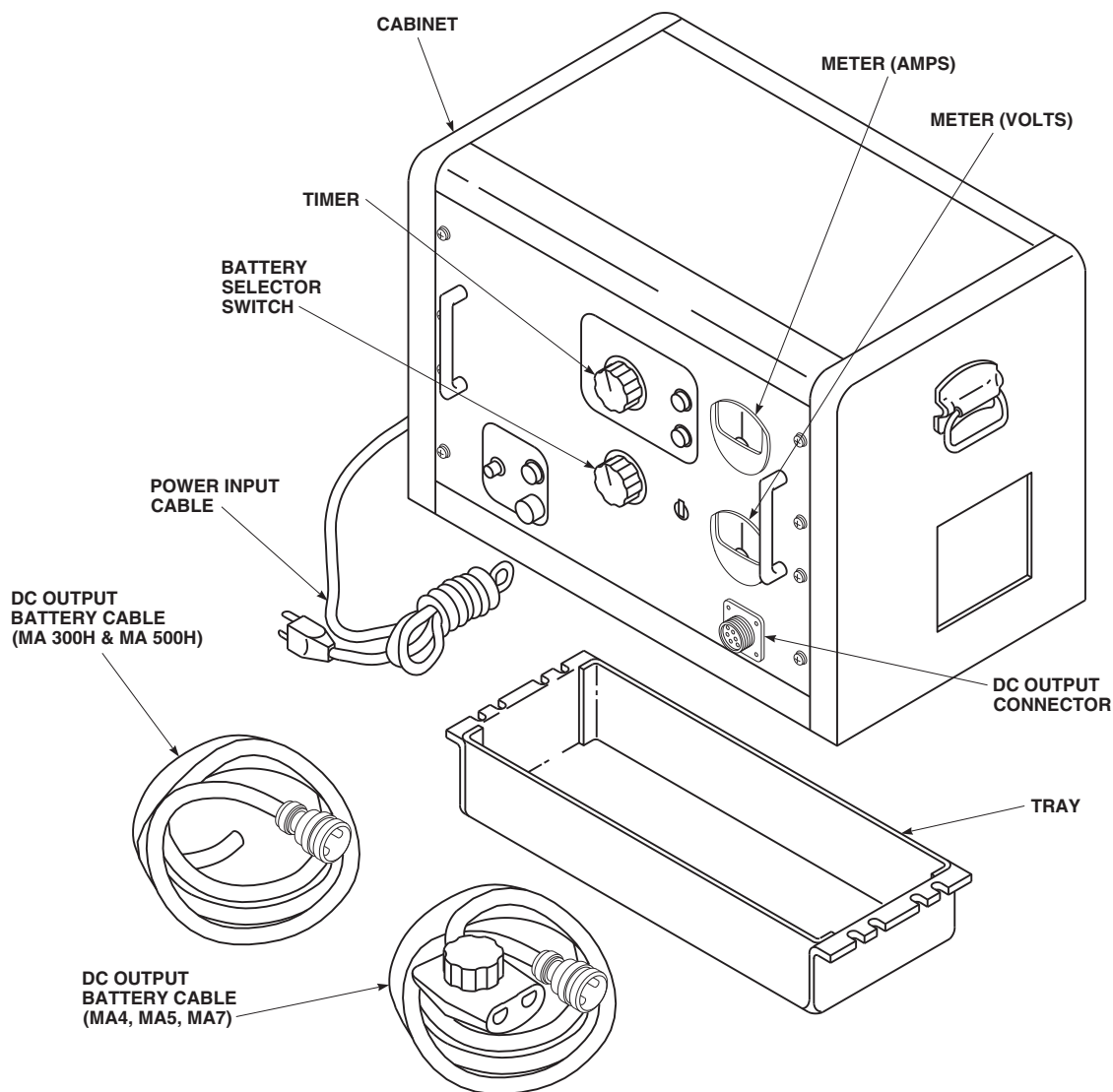
DESCRIPTION: The APU spline adapter puller is used to remove the vespel spline adapter and threaded shaft from the APU generator drive recess.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

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SA

FIGURE C-9. APU SPLINE ADAPTER PULLER, 110679-4



DESCRIPTION: The battery charger / analyzer consists of a transformer, rectifier, passing regulator circuit, timer programmer, and test discharge load bank. The unit is designed to charge and analyze aircraft batteries of the nickel-cadmium (NiCad) type automatically.

POWER REQUIREMENTS: This unit operates from a source of either 110, 117, 220, or 234 volts, 50-60 Hz, single phase (nominal $\pm 10\%$).

CALIBRATION REQUIREMENTS:

FREQUENCY

As required due to abnormal or erratic operation.

EQUIPMENT REQUIRED

- Digital Multimeter
- TS-1037 Charger Interface
- 19 or 20 cell NiCad Battery

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FIGURE C-10. BATTERY CHARGER/ANALYZER, PCA-131 50/60 (SHEET 1 OF 2)

CLEANING MATERIALS

- Source of dry air under pressure.

CALIBRATION PROCEDURES

Cleaning / Inspection

1. Clean battery charger / analyzer with clean dry air.
2. Check condition of fuse, exposed resistors, and wiring.

Calibration Voltmeter

1. Make sure air temperature is within 65° – 85°F (18° – 29°C) and relative humidity is less than 85% during calibration.
2. Apply power to battery charger / analyzer and digital multimeter. Allow 10 minutes for warmup.
3. Set selector switch on battery charger to type of NiCad battery being used in this test.
4. Connect the battery charger / analyzer to the NiCad battery with the charger interface in series with the battery charger cabling.
5. Set charger interface switch to VOLT position and connect digital multimeter input to charger interface binding post.
6. Verify battery charger / analyzer voltmeter and digital multimeter indications agree to within ± 1 volt DC.
7. Do not disconnect at this time, leave set-up for ammeter test.

Calibration Ammeter

1. Operate battery charger / analyzer in charge (+) and discharge (–) modes to apply and withdraw current from NiCad battery.
2. Monitor digital multimeter and battery charger / analyzer ammeter for current indications.

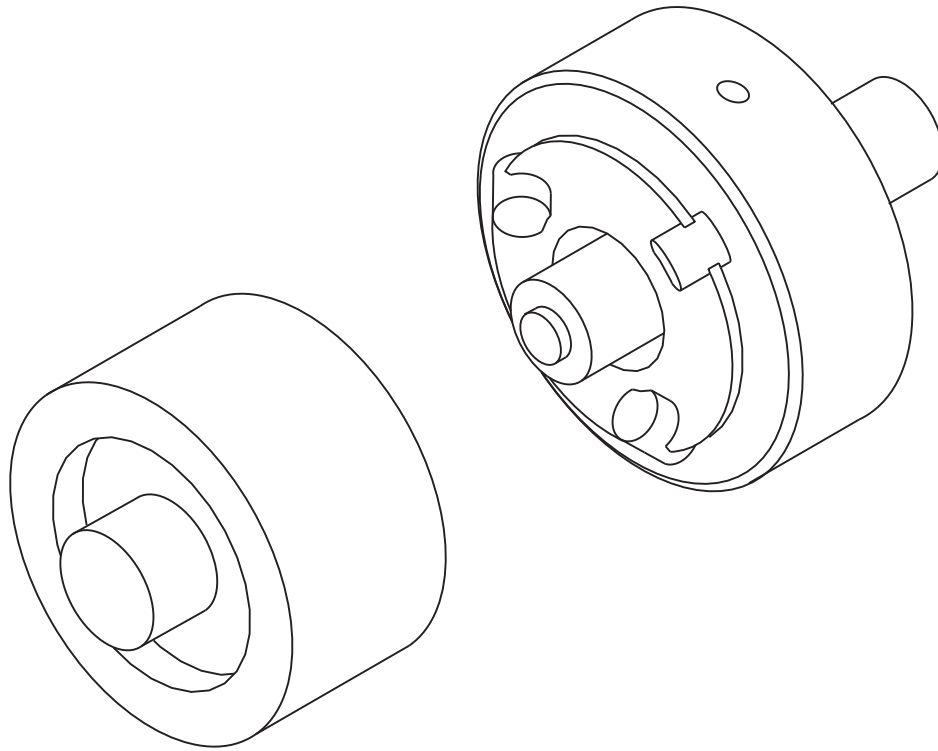
NOTE

Digital multimeter indication in millivolts is actual current reading in amps.

3. Check amp readings by comparing at least one positive (+) and one negative (–) indication. Make sure readings on ammeter and digital multimeter are within two amps of each other.
4. Turn off battery charger / analyzer and digital multimeter.
5. Disconnect battery, charger interface, and digital multimeter.
6. Install calibration label on battery charger / analyzer.

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FIGURE C-10. BATTERY CHARGER/ANALYZER, PCA-131 50/60 (SHEET 2 OF 2)



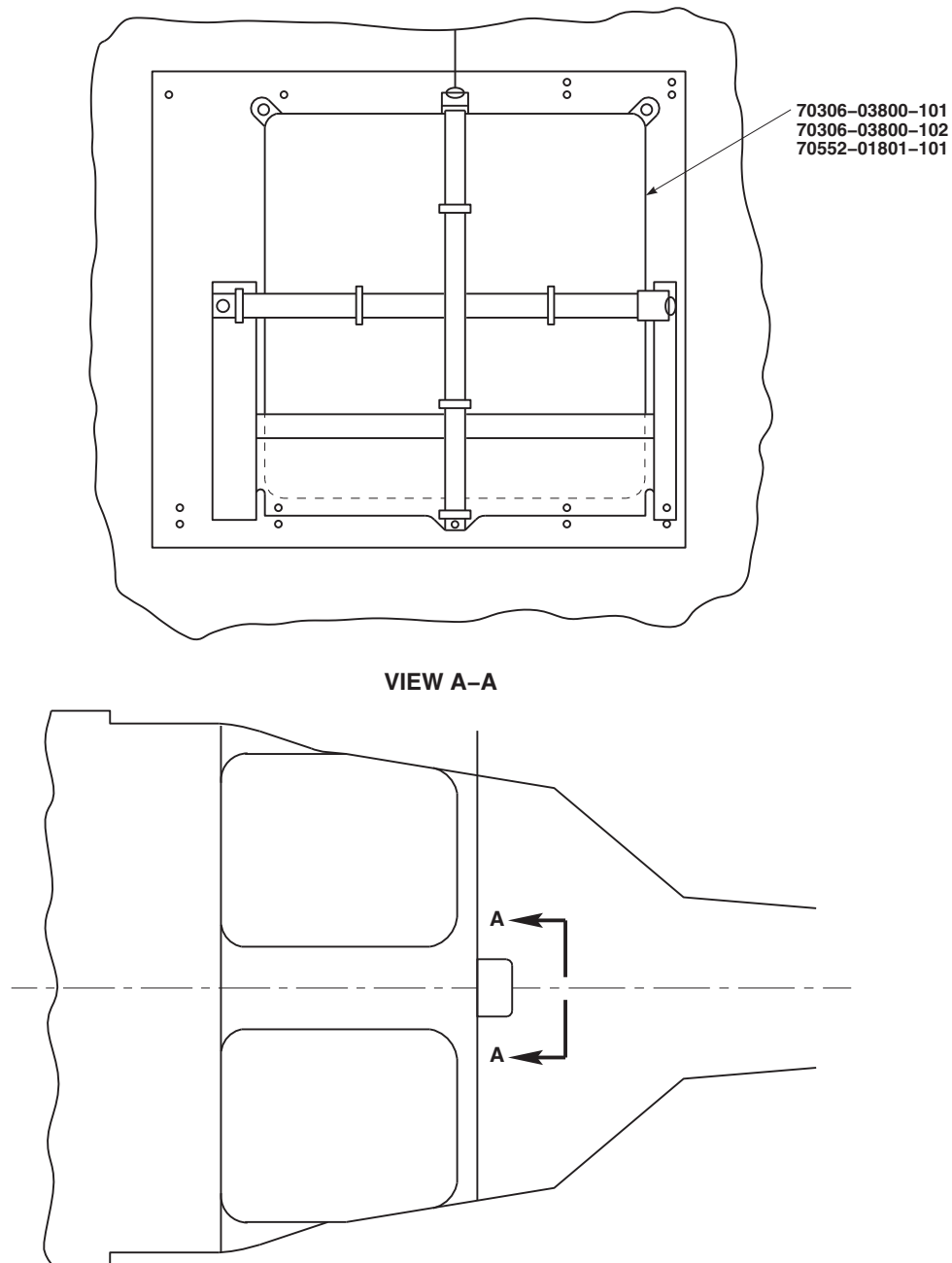
DESCRIPTION: This bearing staking tool is used to stake bearing, SB5302, into the rod end of the tail rotor pitch control rod 70103-11007-041.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1000A
SA

FIGURE C-11. BEARING STAKING TOOL, RST2153



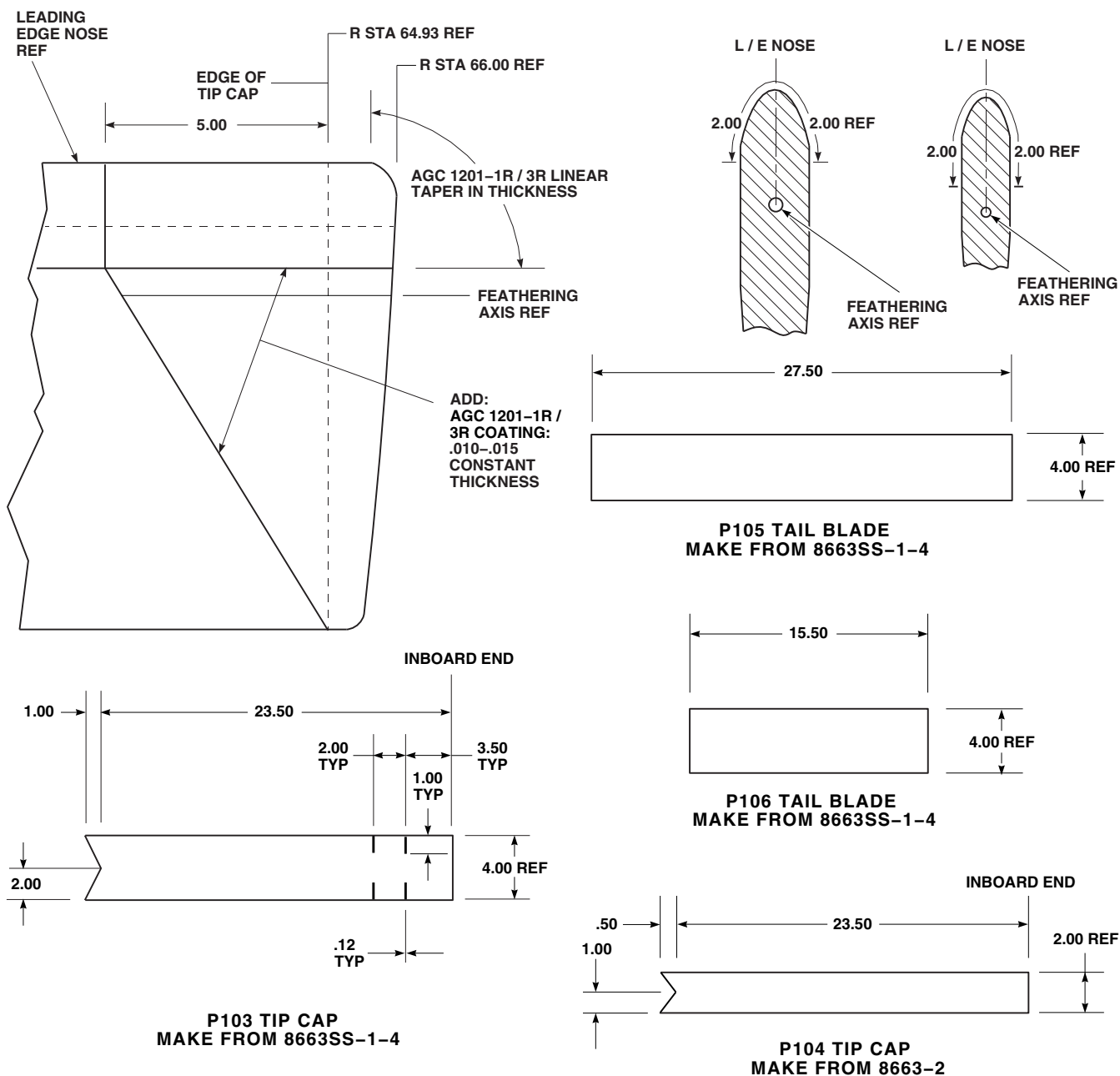
DESCRIPTION: The buddy start system is used to supply power from one helicopter to another for engine starts. When the second helicopter has an inoperable auxiliary power unit (APU) or no APU installed.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

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SA

FIGURE C-12. BUDDY START SYSTEM, 70073-30001-011



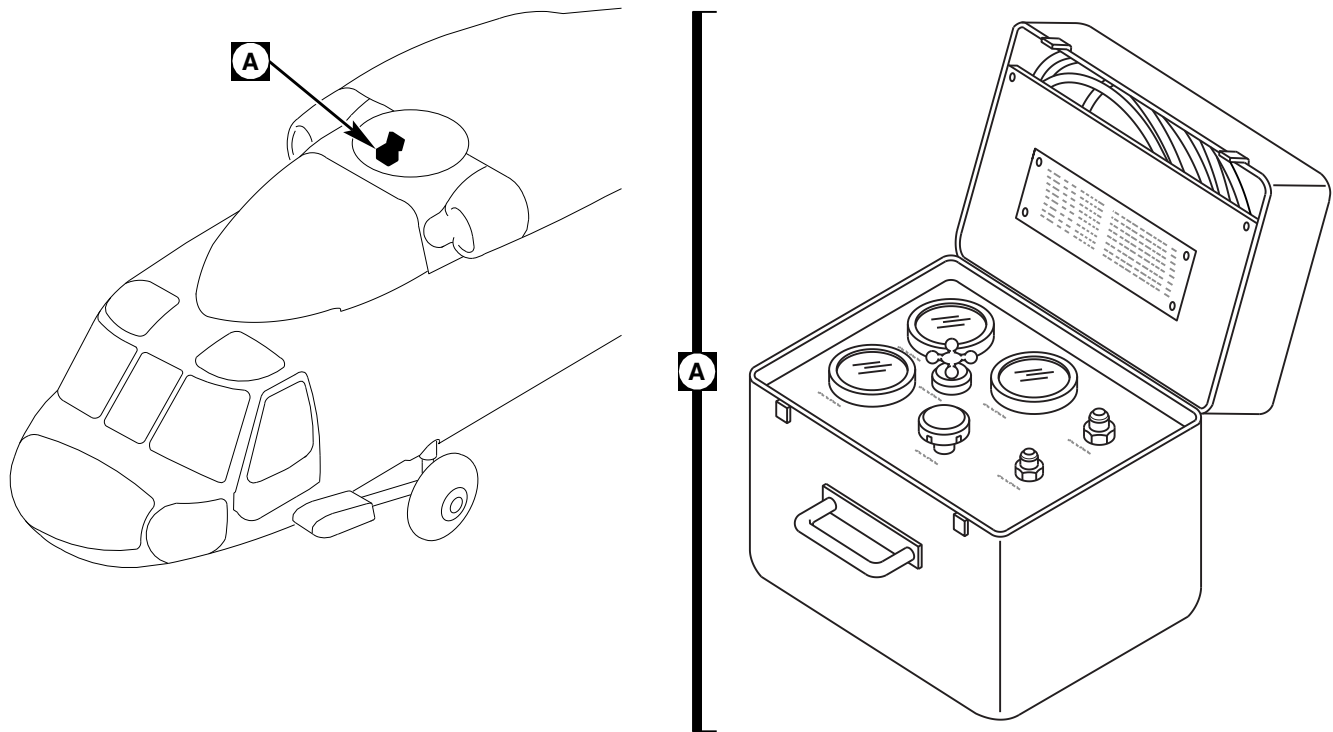
DESCRIPTION: The mission kit is used for repair of leading edge of main and tail rotor blades, and for repair of main rotor blade tip caps.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FIGURE C-13. BLADE REPAIR MISSION KIT, 70073-15000-011

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23



DESCRIPTION: The check and fill unit provides the capability to transfer nitrogen from 3000 psi source into the main rotor blade spar, at required 8 to 14 psi and check loss of spar pressure.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS:

EQUIPMENT REQUIRED

- Nitrogen Bottle, Item 221, Appendix D
- Vacuum Pump
- Ruska Pressure Controller
- Micron Vacuum Gage
- Differential Pressure Gage, 0 to 200 psi range
- Soap and Water
- Machinery Towel, Item 211, Appendix D

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SA

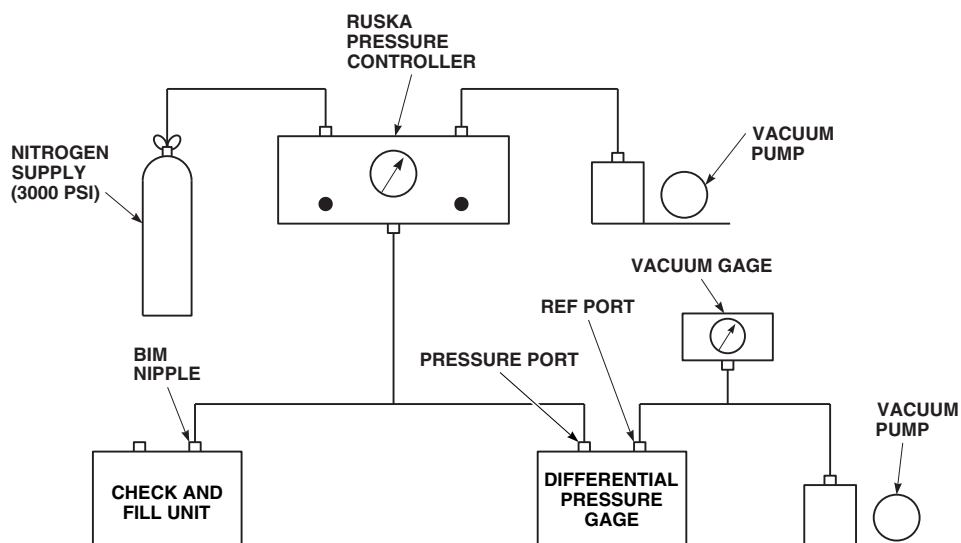
FIGURE C-14. CHECK AND FILL UNIT, BIM® SYSTEM, 70700-77669-041 (SHEET 1 OF 3)

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURES****Cleaning / Inspection**

1. Clean case and gage glass using soap and water. Wipe dry using machinery towel, Item 211, Appendix D.
2. Inspect check and fill unit for broken gage glass, bent pointers, damaged or unreadable dial face and any damage to case and fittings.

Calibration

1. Make sure thermometer is calibrated.
2. Connect check and fill unit to differential pressure gage and nitrogen bottle, 3000 psi in accordance with view A-A.
3. Connect Ruska Pressure Controller and vacuum pumps in accordance with view A-A.

**VIEW A-A**

4. Disconnect Ruska Pressure Controller. Using switches on front panel adjust gage to zero (PSIA). Reconnect pressure controller.
5. Turn on vacuum pump. Evacuate pressure in differential pressure gage at reference port. Pressure shall be 100 millitorr or less.

FK2211_2B
SA**FIGURE C-14. CHECK AND FILL UNIT, BIM® SYSTEM, 70700-77669-041 (SHEET 2 OF 3)**

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURES (CONT)****Calibration (cont)**

6. Check calibration points of gage by increasing pressure from absolute zero as shown in Table 1.

NOTE

To ensure proper readings on gage, tap gage lightly prior to each reading.

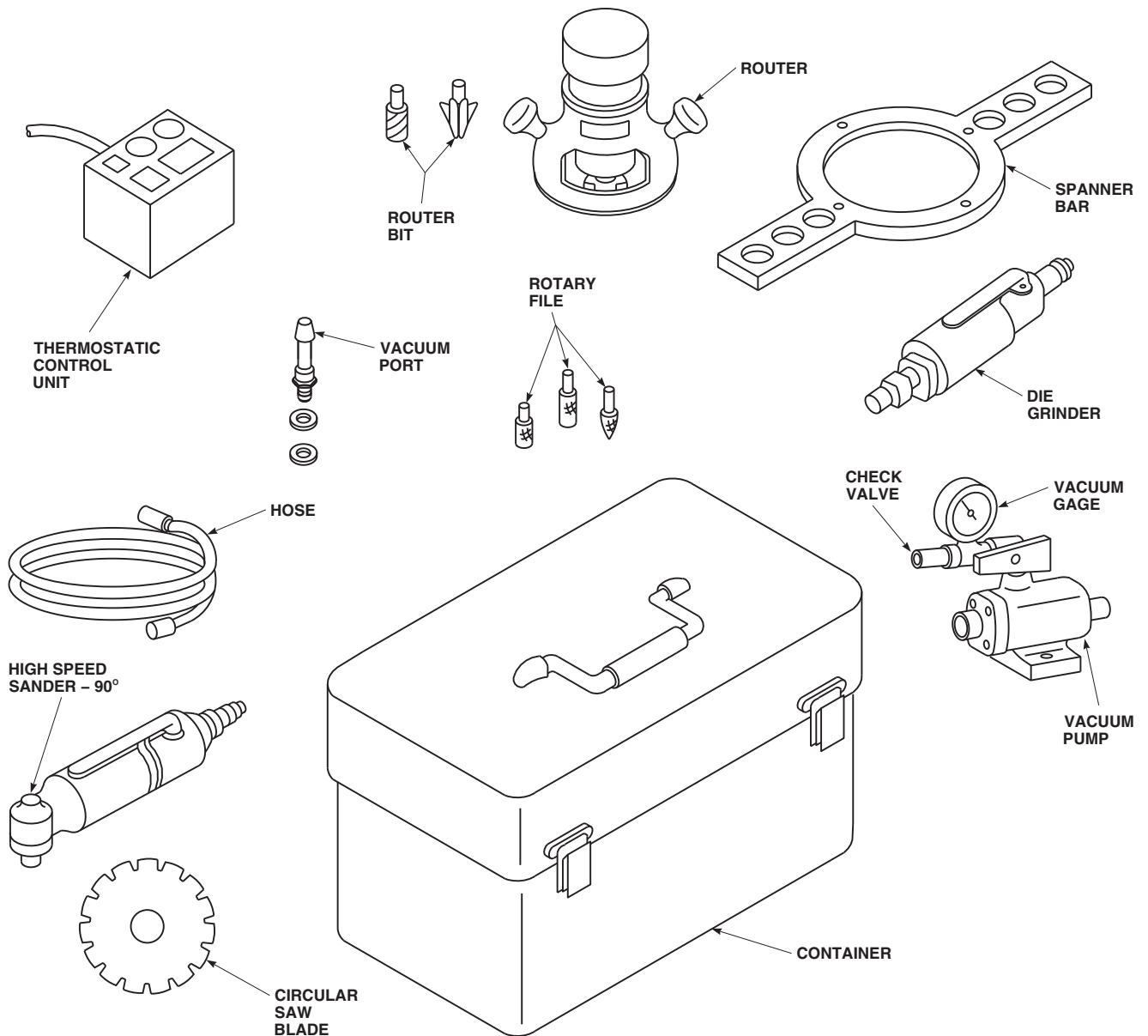
TABLE 1

CHECK AND FILL UNIT – SCALE	DIFFERENTIAL PRESSURE GAGE TOLERANCE (PSIA)
10.0 in Hg	4.783 to 5.012
20.0 in Hg	9.681 to 9.910
29.9 in Hg	14.585 to 14.815
5.0 psig	19.585 to 19.815
10.0 psig	24.585 to 24.815
15.0 psig	29.585 to 29.815

7. Adjust pointer on gage if all readings are off by same value over entire range. Adjustment is limited to 10 degree movement of pointer. If readings are off after adjustment of pointer, replace gage.
8. To adjust absolute pressure gage, remove gage from panel and disconnect fittings from back of gage.
9. Remove glass face from gage, adjust gage to zero with adjusting screw on face of gage.
10. Install glass face on gage and fittings on back of gage. Install gage into panel.
11. To check accuracy of gage adjustment, repeat step 6. If requirements are not met, replace gage.
12. Disconnect the test setup from check and fill unit.
13. Apply calibration label.

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SA

FIGURE C-14. CHECK AND FILL UNIT, BIM® SYSTEM, 70700-77669-041 (SHEET 3 OF 3)



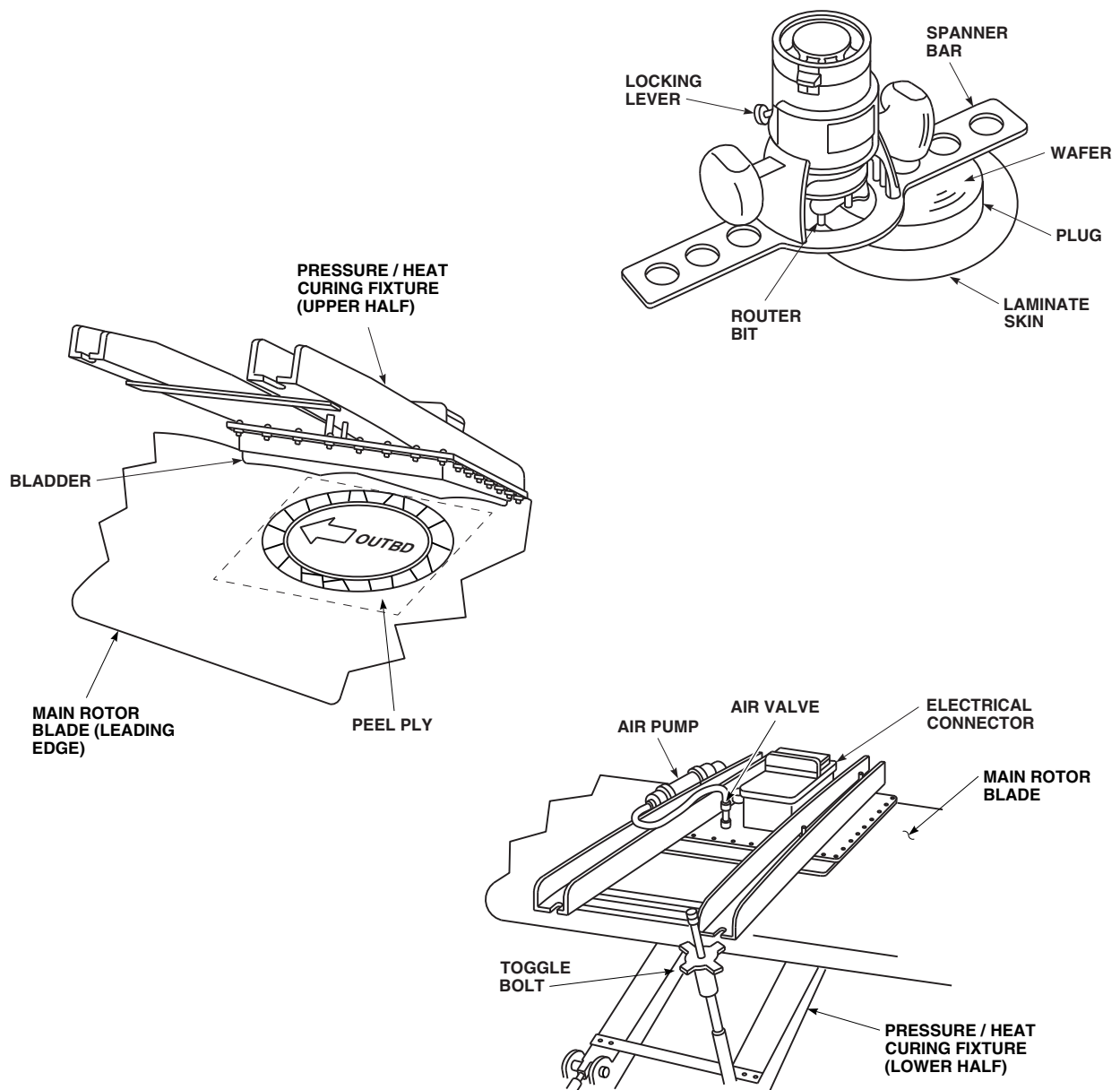
DESCRIPTION: The composite repair kit is required for repairs of components made of composite materials. Items include main and tail rotor blades and various helicopter components.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1003
SA

FIGURE C-15. COMPOSITES REPAIR KIT, 70700-77325-041



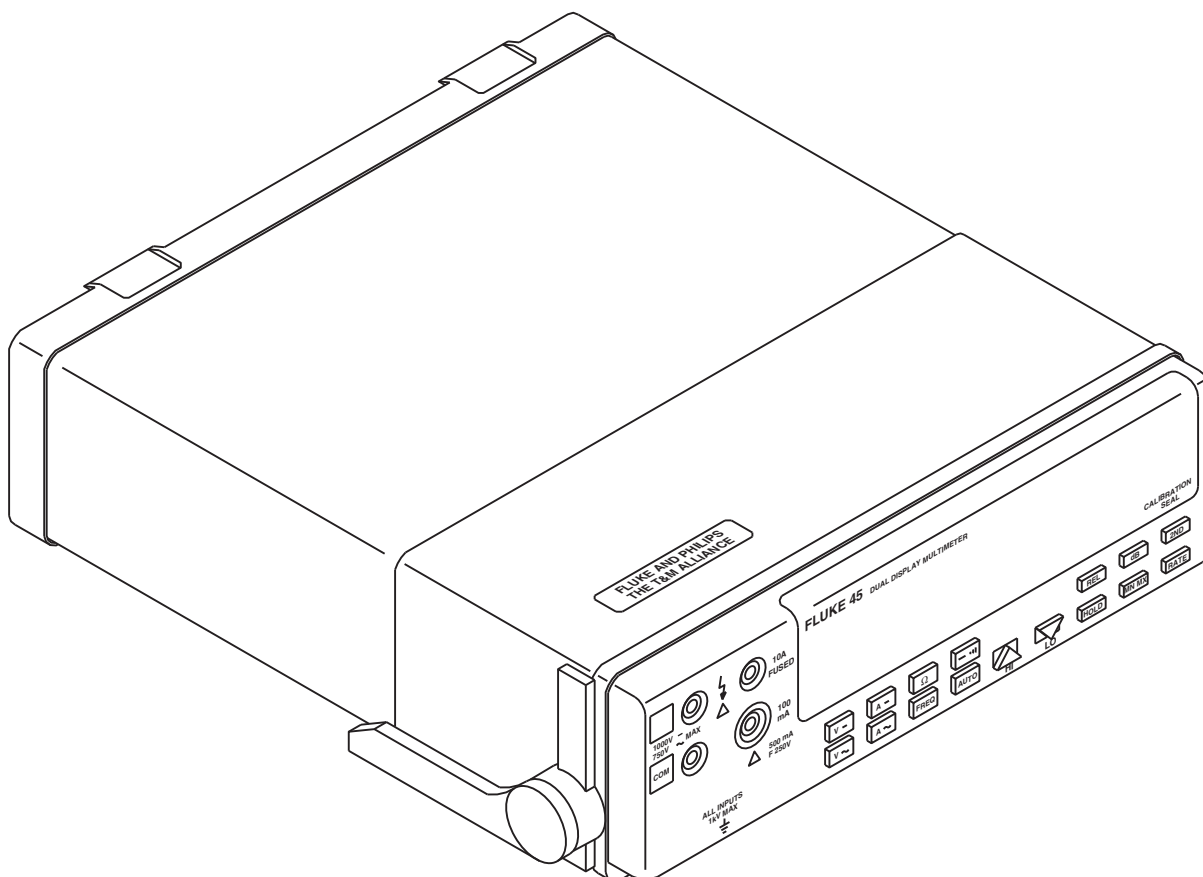
DESCRIPTION: The rotary wing blade repair kit is used in repairing main and tail rotor blade composite area, and main rotor blade tip cap.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1004B
SA

FIGURE C-16. ROTARY WING BLADE REPAIR KIT, 70072-15001-011



DESCRIPTION: The Fluke 45 is a 5 digit, 100,000 count multimeter, with a multifunction dual display allowing measurement of two signal parameters from a single test connection. This test set is used on electrical systems during installation and troubleshooting on or off the helicopter.

POWER REQUIREMENTS: 90 to 264 VAC, 50 Hz and 60 Hz
Battery: lead acid, rechargeable within unit, with unit turned on.

CALIBRATION REQUIREMENTS:

FREQUENCY

Fluke 45 multimeter must be calibrated whenever unit fails, or every 48 weeks.

EQUIPMENT REQUIRED

- Fluke 5700A Multifunction Calibrator (or Equivalent)
- Fluke 5725A Amplifier (or Equivalent)

NOTE:

All measurements listed in the performance test tables are made in the medium reading rate unless otherwise noted.

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FIGURE C-17. DIGITAL MULTIMETER, FLUKE 45 (SHEET 1 OF 3)

CALIBRATION REQUIREMENTS:(CONT)**CALIBRATION PROCEDURES****Cleaning / Inspection**

1. Inspect Fluke 45 for signs of physical damage, loose or broken parts. Clean and repair as required.

Calibration

1. Turn on multimeter and allow it to stabilize for one hour.
2. Connect a cable from output VA HI and LO connectors of 5700A to $V\Omega \rightarrow$ and COM connectors on Fluke 45.
3. Select function and range on Fluke 45 and input level from 5700A using values listed in Table 1. The display should read between minimum and maximum values listed in table 1.
4. Connect a cable from Output VA HI and LO connectors of 5700A to the 100 mA and COM connectors on the Fluke 45. Select function and range on Fluke 45 and input level from 5700A using the values in Table 2. The display should read between minimum and maximum readings listed in table 2.

NOTE

The following tests require a Fluke 5725A Amplifier (or equivalent) to be used with 5700A Multifunction Calibrator. The input level for the performance test will be set on 5700A but will be output from 5725A Amplifier.

5. Connect a cable from Output VA HI and LO connectors of 5725A to 10 A and COMM connectors on Fluke 45. Select function and range on Fluke 45 and input level from 5700A using values contained in Table 3. The display should read between the minimum and maximum readings listed in table 3.

Table 1. Performance Tests for Volts, Diode Test, Ohms, and Frequency, Functions

FUNCTION	RANGE (RATE)	INPUT LEVEL	FREQUENCY	DISPLAY	
				MIN	MAX
$V \text{ ---}$	100 mV (slow)	short	—	−0.006	0.006
		+90 mV	—	89.971	90.029
	1000 mV (slow)	+900 mV	—	899.71	900.29
	300 mV	short	—	−0.02	0.02
		300 mV	—	299.90	300.10
	3V	+3V	—	2.9990	3.0010
		−3V	—	−3.0010	−2.9990
	30V	+30V	—	29.990	30.010
	300V	+300V	—	299.90	300.10
	1000V	+1000V	—	999.5	1000.5
$\rightarrow $	—	short	—	−0.0008	0.0008
	—	open	—	(tone) OL	(tone) OL
$V \sim$	300 mV	short		—	< 75
		15 mV	1 kHz	14.87	15.13
			100 kHz	13.75	16.25
		300 mV	1 kHz	299.30	300.70
			100 kHz	284.50	315.50
	3V	3.0V	1 kHz	2.9930	3.0070
	30V	30V	1 kHz	29.930	30.070
	300V	300V	1 kHz	299.30	300.70
	750V	750V	1 kHz	747.5	752.5

FB1005_2A
SA**FIGURE C-17. DIGITAL MULTIMETER, FLUKE 45 (SHEET 2 OF 3)**

Table 1. Performance Tests for Volts, Diode Test, Ohms, and Frequency, Functions (cont)

FUNCTION	RANGE (RATE)	INPUT LEVEL	FREQUENCY	DISPLAY	
				MIN	MAX
Ω	Using decades of 1.9:				
	300 ohm	short	—	0.00	0.04
		190 ohms	—	189.88	190.14
	3 kohm	short	—	0.0000	0.0002
		1.9 kohms	—	1.8988	1.9012
	30 kohm	19 kohms	—	18.988	19.012
	300 kohm	190 kohms	—	189.88	190.12
	3 Mohm	1.9 Mohms	—	1.8987	1.9013
	30 Mohm*	19 Mohms	—	18.949	19.051
	300 Mohm*	190 Mohms	—	186.2	193.8
	Using decades of 1:				
	300 ohm	short	—	0.00	0.04
		100 ohms	—	99.93	100.09
	3 kohm	short	—	0.0000	0.0002
	3 kohm	1 kohms	—	0.9993	1.0007
	30 kohm	10 kohms	—	9.993	10.007
	300 kohm	100 kohms	—	99.93	100.07
	3 Mohm	1 Mohms	—	0.9992	1.0008
	30 Mohm*	10 Mohms	—	9.972	10.028
	300 Mohm*	100 Mohms	—	98.0	102.0
FREQ	10 / 100 kHz	0.1 to 10V	10 kHz	9.9949	10.006
* Optional test points that can be used if standards are available.					

Table 2. Performance Tests for mA Current Functions

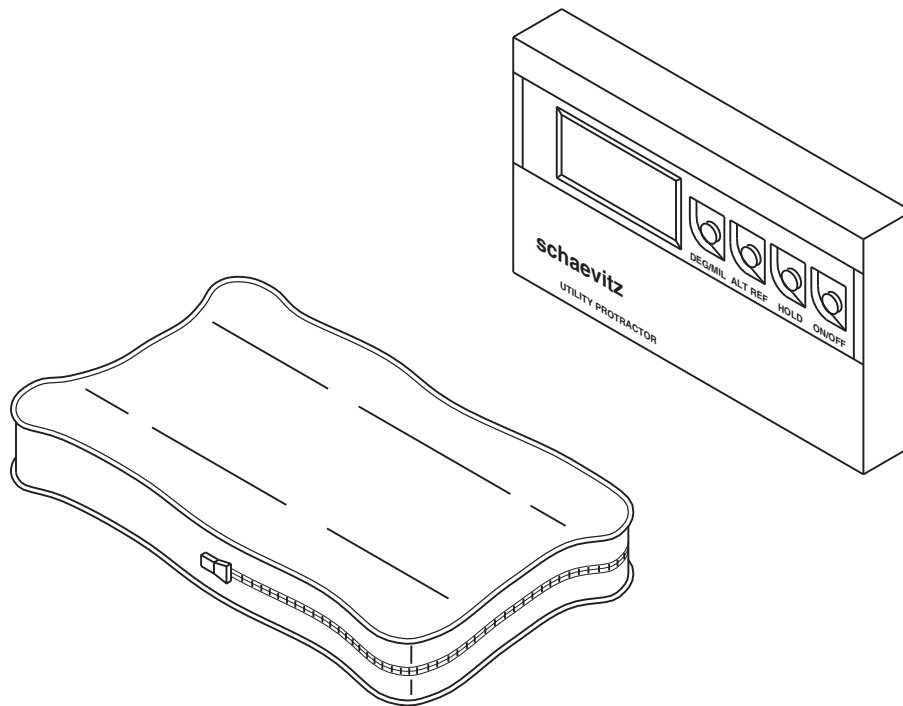
FUNCTION	RANGE (RATE)	INPUT LEVEL	FREQUENCY	DISPLAY	
				MIN	MAX
A $\square\square\square$ (mA)	30 mA	+30 mA	—	29.982	30.018
	100 mA	+100 mA	—	99.93	100.07
A $\sim$ (mA)	30 mA	30 mA	1 kHz	29.840	30.160
	100 mA	100 mA	1 kHz	99.40	100.60

Table 3. Performance Tests for A Current Functions

FUNCTION	RANGE (RATE)	INPUT LEVEL	FREQUENCY	DISPLAY	
				MIN	MAX
A $\square\square\square$	10A	+10A	—	9.975	10.025
A $\sim$	10A	10A	1 kHz	9.890	10.110

FB1005_3
SA

FIGURE C-17. DIGITAL MULTIMETER, FLUKE 45 (SHEET 3 OF 3)



DESCRIPTION: The digital prop protractor is a universal digital unit, which provides maintenance personnel with immediate indication of level, angle, or tilt of main rotor head at time of rigging. The protractor is handheld and battery powered.

POWER REQUIREMENTS: Standard 9 volt battery

CALIBRATION REQUIREMENTS:

FREQUENCY

Digital protractor must be calibrated every 24 weeks regardless of being used or not.

EQUIPMENT REQUIRED

- Precision Level
- Precision Leveling Plate
- Angle Gage Blocks 15° and 45°

CLEANING MATERIALS

- Isopropyl Alcohol, Item 72, Appendix D
- Machinery Towel, Item 211, Appendix D

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FIGURE C-18. DIGITAL PROPELLER PROTRACTOR, 02500-01 (SHEET 1 OF 2)

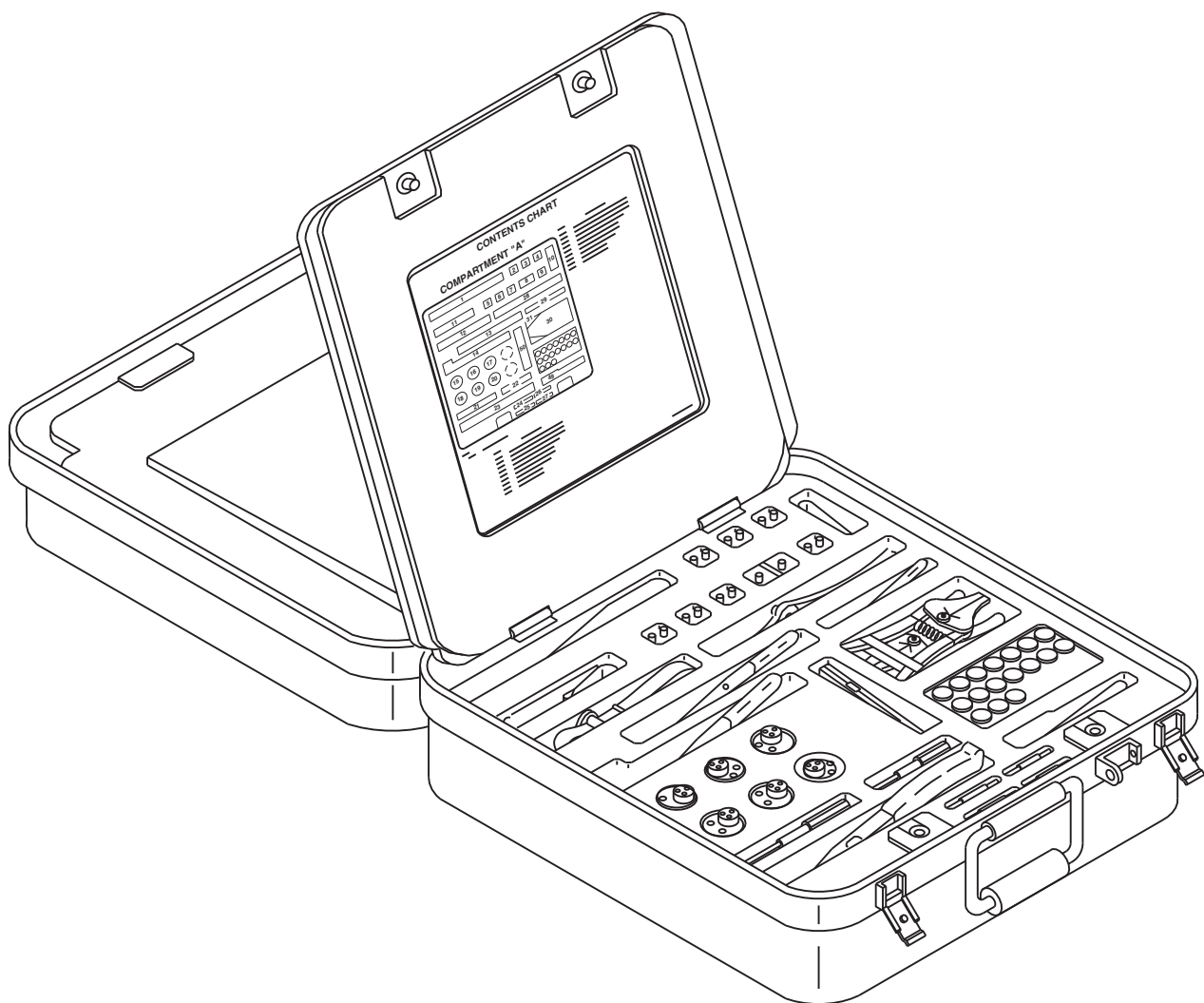
CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURES****Cleaning / Inspection**

1. Clean protractor using isopropyl alcohol, Item 72, Appendix D and wipe dry using machinery towel, Item 211, Appendix D.
2. Inspect for signs of damage, abuse, nicks, and dents.
3. Make sure a fresh battery is installed.

Calibration

1. Make sure leveling plate and precision level are clean before starting calibration.
2. Adjust leveling plate and check for level using precision level to achieve centered bubble.
3. Place protractor on leveling plate. Turn on protractor and allow five minutes for warmup, allow for reading to stabilize.
4. Check protractor angle reading at zero, reading shall be $0^{\circ} \pm .05^{\circ}$.
5. Place 15° angle gage block on leveling plate, place protractor on angle block, allow reading to stabilize, record reading. Rotate protractor 180° and record reading. Readings shall be $15^{\circ} \pm .05^{\circ}$. Remove 15° angle block.
6. Place 45° angle gage block on leveling plate, place protractor on angle block, allow reading to stabilize, record reading. Rotate protractor 180° and record reading. Readings shall be $45^{\circ} \pm .1^{\circ}$. Remove 45° angle block.
7. If protractor does not meet specified readings, refer to manufacturer's calibration procedure.

FK2212_2A
SA**FIGURE C-18. DIGITAL PROPELLER PROTRACTOR, 02500-01 (SHEET 2 OF 2)**



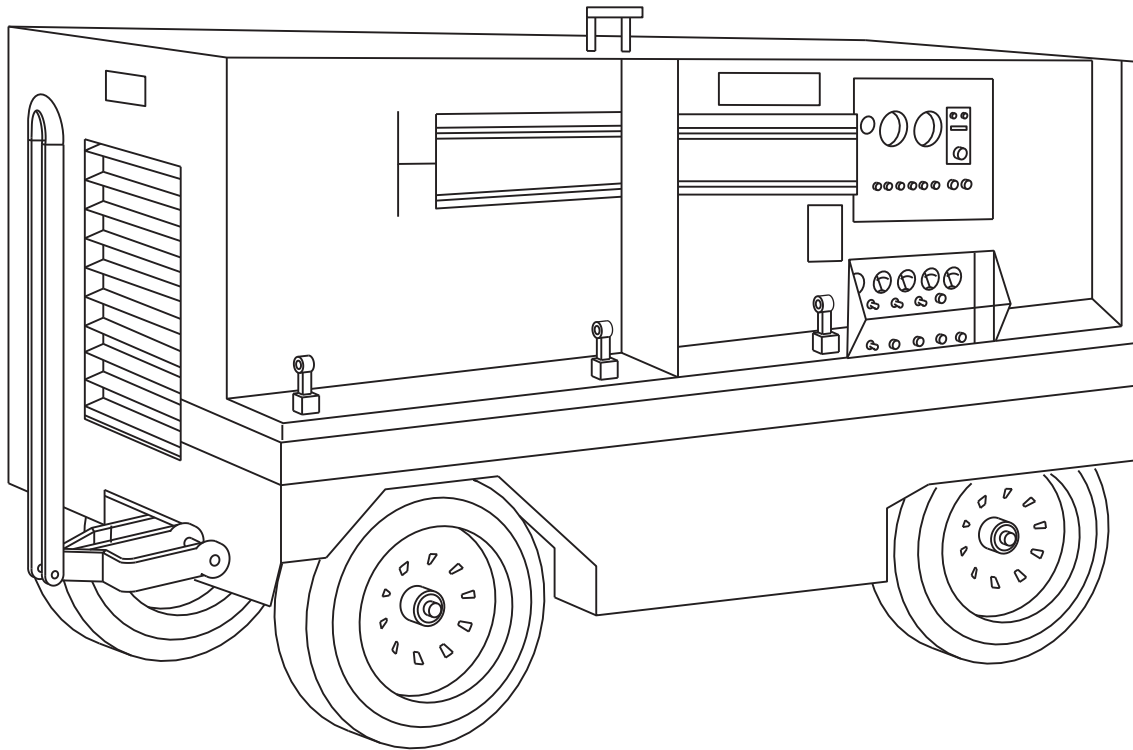
DESCRIPTION: The electronic maintenance / repair kit is used for installation, repair and splicing of wires to maintain helicopter electrical systems.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1007
SA

FIGURE C-19. ELECTRICAL CONNECTOR MAINTENANCE/REPAIR KIT, DMC 787-ELEC



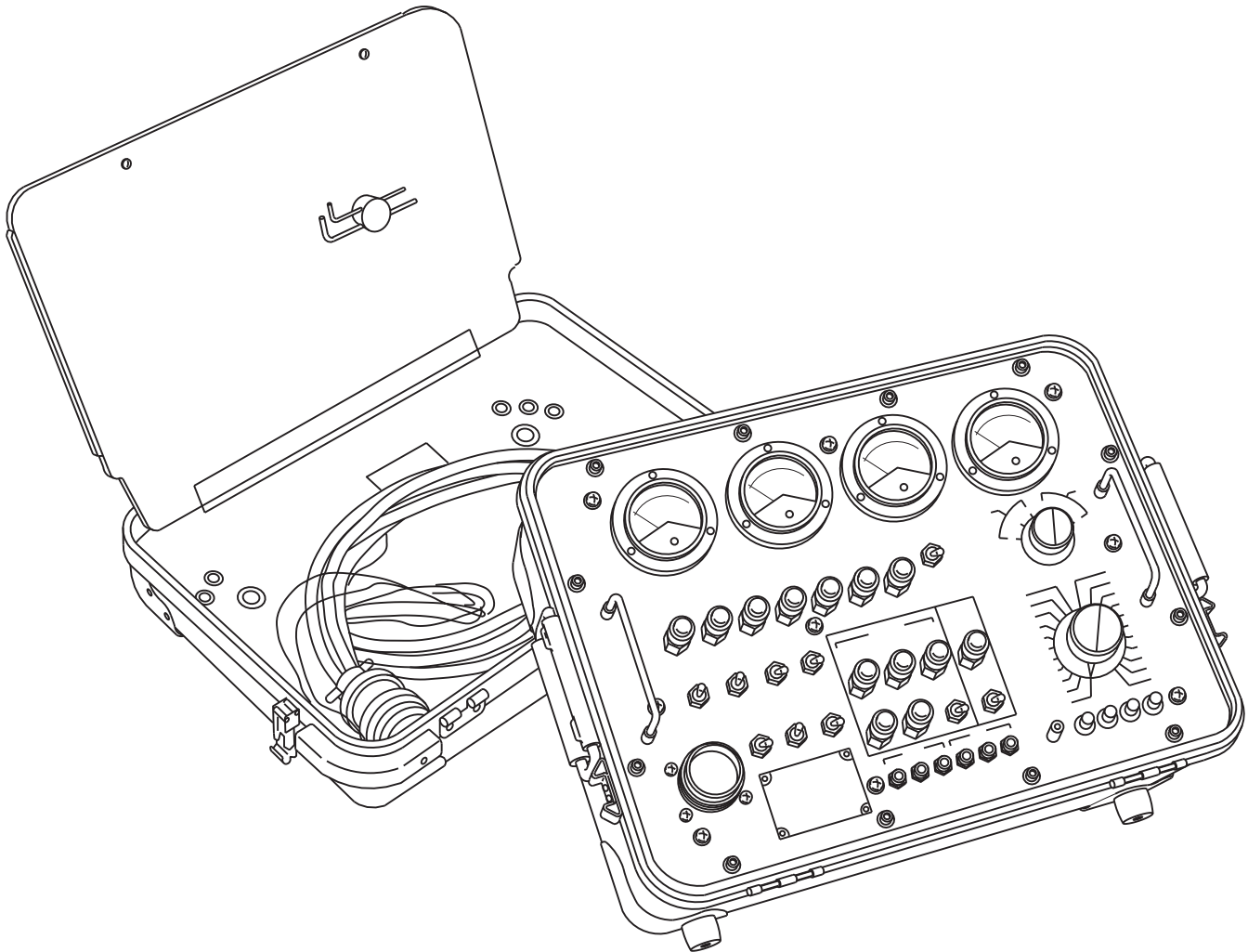
DESCRIPTION: The Generator unit will provide all AC electrical power needed to perform system checks and troubleshooting of various electrical systems. The Generator unit is used in place of the helicopter APU in ground test.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

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SA

FIGURE C-20. ELECTRICAL GENERATOR, DIESEL-POWERED, 60J20P



DESCRIPTION: The Analyzer Test Set, type 60B63-5A, provides a means of simulating the variations of electrical inputs to the generator control unit (GCU), and of monitoring the GCU's responses to the variations.

POWER REQUIREMENTS: Power supply, 0-28 VDC @ 4A.
Power supply, 115 VAC 1 ϕ 360-440 Hz.

CALIBRATION REQUIREMENTS:

FREQUENCY

Analyzer Test Set must be calibrated every 24 weeks, regardless of it's being used or not.

EQUIPMENT REQUIRED

- Behlman 3-200A AC Power Supply with EIP-3 Plug-In or equivalent.
- Fluke 8010A Digital Multimeter or equivalent.
- Hewlett Packard 5300A/5307A Counter or equivalent.
- Hewlett Packard 6002A DC Power Supply or equivalent.

FB1009_1
SA

FIGURE C-21. ELECTRICAL SYSTEM ANALYZER, 60B63-5A (SHEET 1 OF 7)

CALIBRATION REQUIREMENTS: (CONT)**EQUIPMENT REQUIRED (CONT)**

- Interstate F47 Function Generator or equivalent.
- Sikorsky TS 1060 Test Box.
- Decade Resistor 1100–3300 ohms.
- Oscilloscope – vertical.

ACCESSORIES REQUIRED

- Adapter, BNC plug to double banana jacks.
- Adapter Box, SKD 4850–3, or equivalent.
- Cable Assembly, 30–in., RG–58 / U; BNC plug terminations, 2 required.
- Lead, 24–in., single banana plug terminations (red), 4 required.
- Lead, 24–in., single banana plug terminations (black), 4 required.
- Test Hook Probe, SKC 4850–14 or equivalent.
- Tee Connector, BNC TGG or equivalent.

CALIBRATION PROCEDURES**Inspection / Preliminary**

1. Inspect ANALYZER for physical damage.
NO DAMAGE ALLOWED.
2. Set all ANALYZER switches to OFF or down positions.
3. Pull all ANALYZER GEN and PMG circuit breakers.
4. Check mechanical zero (or lowest reading) of all meters and adjust as required.
5. Set all TEST BOX switches to OFF.

CAUTION

ASSURE THAT THE LAB 200–A 400HZ BENCH POWER SUPPLY IS NOT BEING UTILIZED BEFORE PROCEEDING. OUTPUT VOLTAGE AND FREQUENCY WILL BE VARIED IN THIS PROCEDURE.

6. Connect test set–up shown in figure 1.
7. Set test equipment and ANALYZER power to ON and allow 30 minutes warm–up.

WARNING

HIGH VOLTAGE IS USED DURING THE PERFORMANCE OF THIS CALIBRATION. DEATH ON CONTACT MAY RESULT IF SAFETY PRECAUTIONS ARE NOT OBSERVED.

CAUTION

ASSURE THAT ALL ANALYZER CIRCUIT BREAKERS ARE PULLED AND THAT TEST SET A ϕ , B ϕ , AND C ϕ SWITCHES ARE SET TO OFF.

FREQUENCY METER

1. Adjust FUNCTION GENERATOR frequency for 400 Hz COUNTER indication – leave output set to minimum.
2. Provide a short across TEST BOX I terminals, set 28 VDC – ON and adjust POWER SUPPLY output for 28 VDC Digital Multimeter indication.
3. Reconnect Digital Multimeter, set for VAC, to 115 VAC test points.
4. Set TEST BOX 115 VAC switch to ON position.
5. Slowly increase FUNCTION GENERATOR output until Digital Multimeter indicates approximately 115 VAC.

FB1009_2
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FIGURE C-21. ELECTRICAL SYSTEM ANALYZER, 60B63-5A (SHEET 2 OF 7)

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURES: (CONT)****FREQUENCY METER (CONT)****6. Set ANALYZER controls:**

a. GEN / PMG VOLTS selector to T1.

b. 400 GEN T1 breaker to IN.

7. Adjust FUNCTION GENERATOR frequency for ANALYZER FREQUENCY meter indications and note COUNTER indications are within tolerance of TABLE 1.**TABLE 1**

FREQUENCY METER	COUNTER Hz
360	356 to 364
400	396 to 404
440	436 to 444

8. Adjust FUNCTION GENERATOR frequency for COUNTER indication of 400 Hz.**9. Leave set-up for next test.****GEN / PMG VOLTS METER****1. Adjust FUNCTION GENERATOR output for ANALYZER GEN / PMG VOLTS meter 115 VAC indication and then note the Digital Multimeter indicates 113 to 117 VAC.**

2. Pull 400 ~ GEN T1 circuit breaker and depress T2.

3. Set GEN / PMG VOLTS selector to T2 and note 115 V meter indication.

4. Pull 400 ~ GEN T2 circuit breaker and depress T3.

5. Set GEN / PMG VOLTS selector to T3 and note 115 V meter indication.

6. Adjust FUNCTION GENERATOR for minimum output and leave set-up for the next test.

CT TEST CURRENT METER**1. Set ANALYZER controls:**

a. 400 ~ GEN T1 breaker to IN

b. 400 ~ GEN T2 breaker to OUT

c. 400 ~ GEN T3 breaker to OUT

d. TEST SELECT to A ϕ GEN CT

e. CT CUR READ to UP

f. GEN / PMG VOLTS to T1

2. Connect DECADE RESISTOR, set for 3300 ohms, across TEST BOX R terminals.

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SA

FIGURE C-21. ELECTRICAL SYSTEM ANALYZER, 60B63-5A (SHEET 3 OF 7)

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURES: (CONT)****CT TEST CURRENT METER (CONT)**

3. Set TEST BOX switches
 - a. $A\phi$, $B\phi$, and $C\phi$ to OFF
 - b. 115 VAC to ON
 - c. 28 VDC to ON
4. Adjust FUNCTION GENERATOR output for 115 VAC indication on ANALYZER GEN / PMG VOLTS meter.
5. Set DECADE RESISTOR and note CT TEST CURRENT meter indications of TABLE 2.

TABLE 2

DECADE RESISTOR	CT TEST CURRENT
3300	0.9 to 1.1
2100	1.4 to 1.6
1500	1.9 to 2.1
1100	2.4 to 2.6

6. Adjust FUNCTION GENERATOR for minimum output and leave set-up for next test.

PMG VOLTS METER

1. Set ANALYZER controls:
 - a. 400 ~ GEN T1, T2, T3 breakers to OUT
 - b. PMG $A\phi$, $B\phi$, $C\phi$ breakers to OUT
 - c. GEN / PMG VOLTS selector to AB
2. Set TEST BOX controls:
 - a. 115 VAC to OFF
 - b. 28 VDC to OFF
 - c. $A\phi$ to ON
 - d. $B\phi$ to ∇
 - e. $C\phi$ to OFF
3. Remove DECADE RESISTOR from set-up.

CAUTION

ASSURE THAT LAB 400 Hz BENCH POWER IS NOT BEING UTILIZED AND THAT SWITCH SETTINGS ARE AS SPECIFIED BEFORE CONTINUING.

4. Remove Digital Multimeter from TEST BOX 115 VAC test points and reconnect to 18 VAC test points.
5. Adjust FUNCTION GENERATOR frequency for 1200 Hz COUNTER indication.
6. Slowly adjust FUNCTION GENERATOR output for approximate 18 VAC Digital Multimeter indication.

FB1009_4
SA**FIGURE C-21. ELECTRICAL SYSTEM ANALYZER, 60B63-5A (SHEET 4 OF 7)**

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURES: (CONT)****PMG VOLTS METER (CONT)**

7. Set ANALYZER PMG A ϕ , and B ϕ circuit breakers to IN and then adjust FUNCTION GENERATOR output for 18V GEN / PMG VOLTS meter indication.
8. Note Digital Multimeter indicates 17.6 to 18.4 VAC.
9. Adjust FUNCTION GENERATOR output for GEN / PMG VOLTS meter indications and note Digital Multimeter indications are within tolerances specified in TABLE 3.

TABLE 3

GEN/PMG VOLTS METER	DMM
21	20.6 to 21.4
24	23.6 to 24.4
27	26.6 to 27.4

10. Adjust FUNCTION GENERATOR output for 18V GEN / PMG VOLTS meter indication.
11. Set ANALYZER controls:
 - a. PMG A ϕ breaker to OUT
 - b. PMG B ϕ and C ϕ breaker to IN
 - c. GEN / PMG VOLTS to BC
12. Set TEST BOX switches:
 - a. A ϕ to OFF
 - b. C ϕ to ON
13. Note GEN / PMG VOLTS meter indicates 18 VAC.
14. Set ANALYZER controls:
 - a. PMG A ϕ breaker to IN
 - b. PMG B ϕ breaker to OUT
 - c. PMG C ϕ breaker to IN
 - d. GEN / PMG VOLTS to CA
15. Set TEST BOX switches:
 - a. A ϕ to ON
 - b. B ϕ to OFF
 - c. C ϕ to 
16. Note GEN / PMG VOLTS meter indicates 18 VAC.
17. Adjust FUNCTION GENERATOR for minimum output.

FB1009_5
SA**FIGURE C-21. ELECTRICAL SYSTEM ANALYZER, 60B63-5A (SHEET 5 OF 7)**

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURES: (CONT)****PMG VOLTS METER (CONT)**

18. Remove TEST BOX 115V power plug from bench source.

19. Set TEST BOX switches:

a. 115 VAC to OFF

b. $A\phi$, $B\phi$, AND $C\phi$ to OFF

NOTE

The lab 200-A 115V 400 Hz Power supply is not needed for the remainder of the procedure. Assure that the TEST BOX 115V power plug is removed from the bench supply plug.

FIELD AMPS / REG VOLTS METER

1. Connect Digital Multimeter, set for VDC, to TEST BOX 28 VDC test points.
2. Short TEST BOX I terminals.
3. Set ANALYZER READ REG BUS VOLTS-FLD CUR switch to up.
4. Set TEST BOX 28 VDC switch to ON and adjust DC POWER SUPPLY for 28 V FIELD AMPS / REG VOLTS meter indication.
5. Note Digital Multimeter indicates 27 to 29 VDC.
6. Adjust DC POWER SUPPLY for minimum output.
7. Connect Digital Multimeter DCA (10A) input across TEST BOX I terminals and set AMP to ON.
8. Set ANALYZER READ BUS VOLTS-FLD CUR switch to down.
9. Adjust DC POWER SUPPLY output for FIELD AMPS meter indications and note Digital Multimeter reads are within specified tolerances of TABLE 4.

TABLE 4

FIELD AMPS	DMM DCA
2.0	1.8 to 2.2
2.5	2.3 to 2.7
3.0	2.8 to 3.2
4.0	3.8 to 4.2

10. Adjust DC POWER SUPPLY for minimum output and leave set-up for next test.

TIMER TIME DELAY

1. Remove Digital Multimeter from TEST BOX I terminals and reconnect, set for VDC, to 28 VDC test points.
2. Provide a short across the TEST BOX I terminals and set AMP to OFF.
3. Adjust DC POWER SUPPLY output for 28 VDC Digital Multimeter indication.
4. Connect COUNTER A and B inputs to ANALYZER J2 (TRIG) and J4 (T2 CAL) bnc jacks respectively.
5. Set COUNTER for TIME INTERVAL measurement, separate inputs, and to start / stop trigger on a +20 VDC pulse.

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FIGURE C-21. ELECTRICAL SYSTEM ANALYZER, 60B63-5A (SHEET 6 OF 7)

CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION PROCEDURES: (CONT)

TIMER TIME DELAY (CONT)

6. Set ANALYZER TEST SELECT to 3 ϕ OVB.
7. Note as TRIP TIME START is toggled from down to up the COUNTER indicates 100 to 140 mSec. (Adjustment R1).
8. Make connections, set controls and then note COUNTER indications are with specified tolerances of TABLE 5 after TRIP TIME START switch is toggled.

TABLE 5

COUNTER B input	TEST SELECT	COUNTER T. I.	ADJUST
J4 (T2 CAL)	A ϕ UV	4.5 to 5.5 sec	R3
J4 (T2 CAL)	UND FREQ	3.0 to 4.0 sec	R7
J3 (T1 CAL)	A ϕ UV	3.0 to 4.0 sec	R5
J3 (T1 CAL)	UND FREQ	0.90 to 1.1 sec	R119

- 9. Leave set-up for next test.**

UNDER FREQUENCY

1. Tee COUNTER A input and OSCILLOSCOPE input to J5 (UF CAL) bnc jack.
2. Set COUNTER to read frequency.
3. Set ANALYZER TEST SELECT to UND FREQ and TRIP TIME START to DOWN.
4. Note COUNTER indication of 1145 to 1165 Hz and 20 to 30 Vpp OSCILLOSCOPE display.
5. Set TRIP TIME START to UP, note 1085 to 1105 Hz COUNTER indication and 20 to 30 Vpp OSCILLOSCOPE display.
6. Unless further tests are to be made disconnect the set-up.

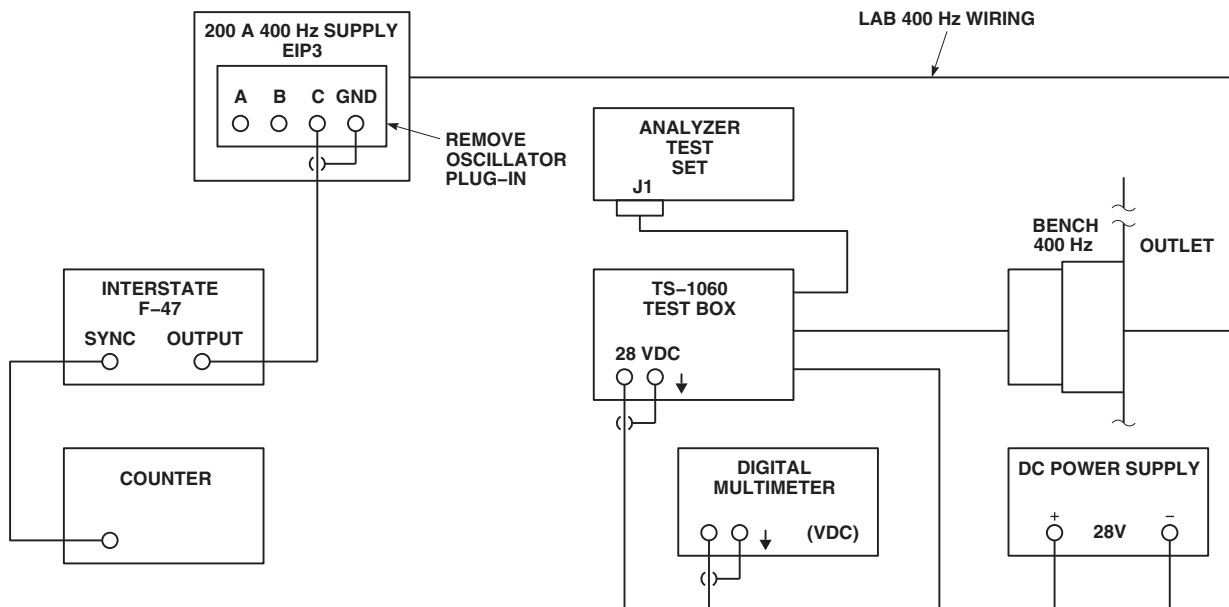
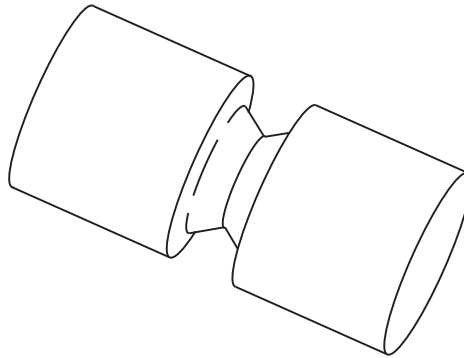


FIGURE 1

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FIGURE C-21. ELECTRICAL SYSTEM ANALYZER, 60B63-5A (SHEET 7 OF 7)



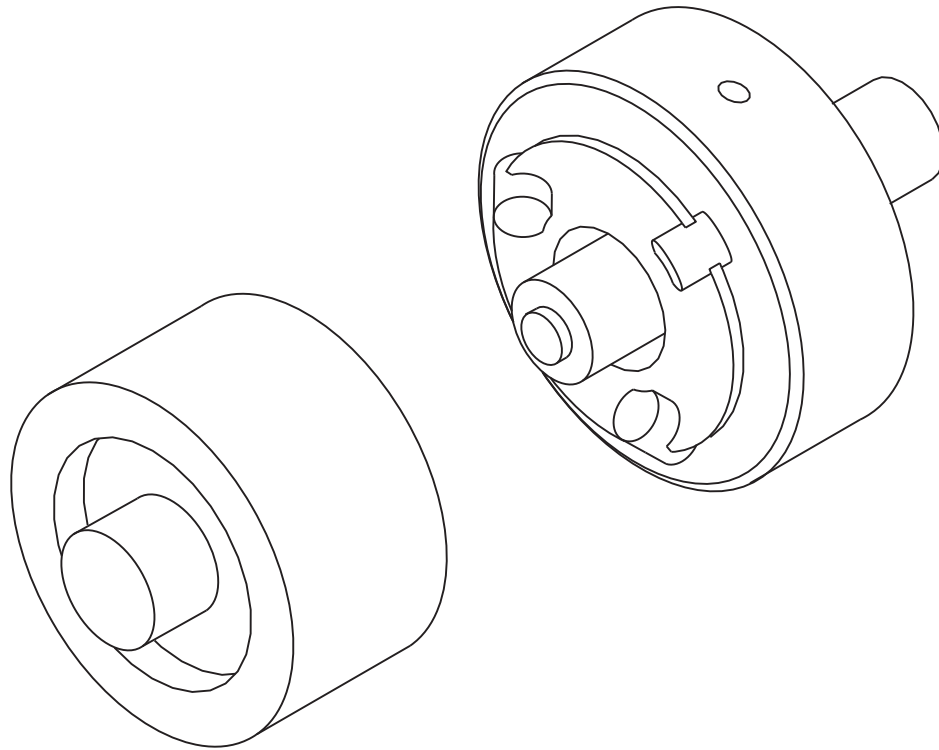
DESCRIPTION: The staking tool is used to stake bearings on the engine mount fittings.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FIGURE C-23. ENGINE MOUNT STAKING TOOL, STD1850.451-005

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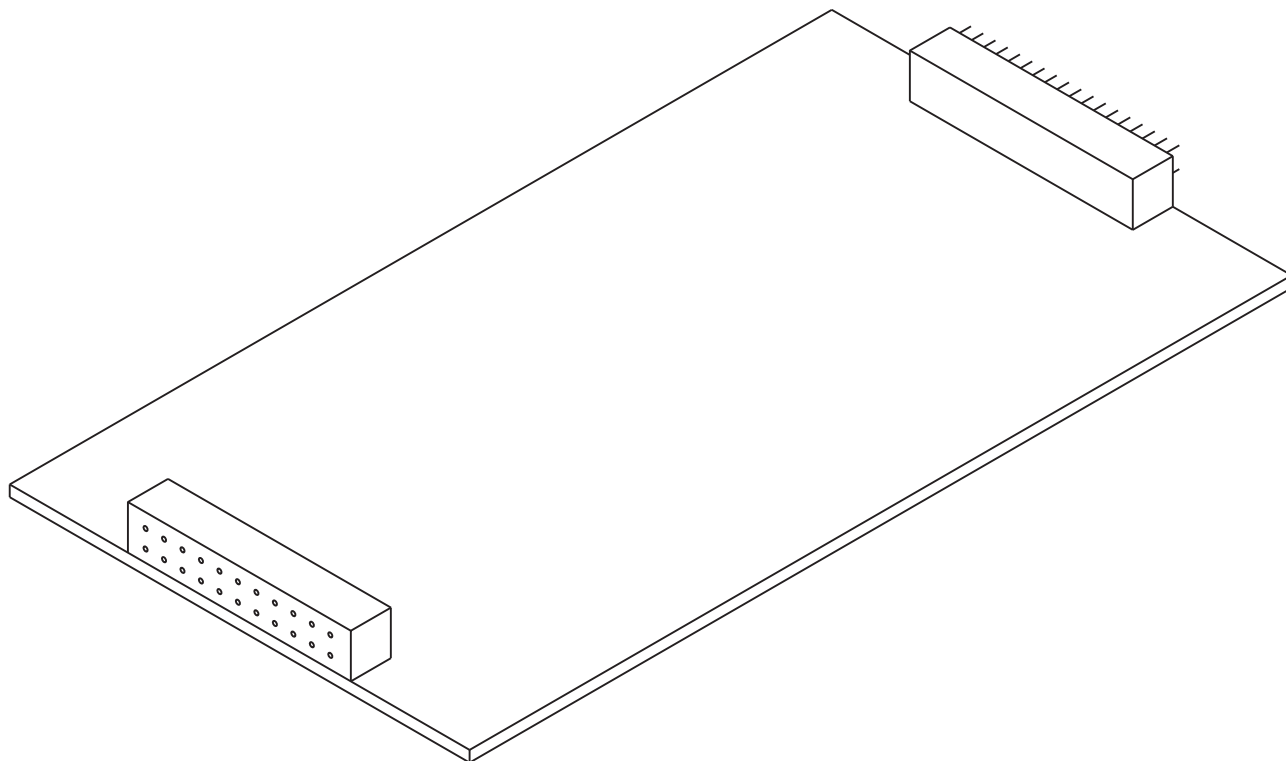
DESCRIPTION: This staking tool is used to roll stake bearings in engine mount struts.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FIGURE C-24. ENGINE STRUT STAKING TOOL, STD1850.458-024

FB1012
SA



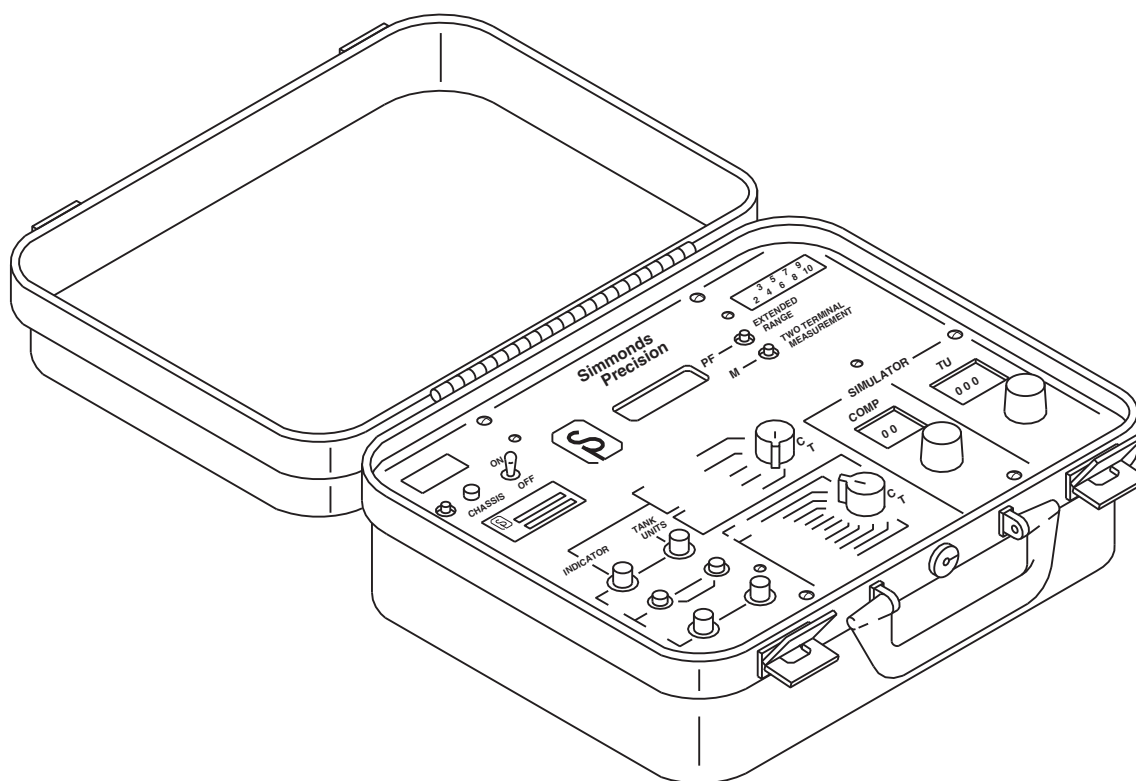
DESCRIPTION: The extender card provides an extension from vertical instrument display system (VIDS) components to line test sets during calibration or repair of VIDS.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

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SA

FIGURE C-25. EXTENDER CARD, 220-419916-000



DESCRIPTION: The fuel quantity test set is an instrument that permits complete functional checkout and calibration of an ac fuel gaging system, on or off the helicopter. The fuel quantity test set can accurately measure the capacitance of tank units, compensators, or entire systems. The fuel quantity test set can also simulate capacitance values for the operation of indicators as well as measure the insulation resistance of tank units and cabling.

POWER REQUIREMENTS: 18 1.5 Volt C-Cell Batteries

CALIBRATION REQUIREMENTS:

FREQUENCY

Fuel quantity test set must be calibrated every 24 weeks regardless of being used or not.

EQUIPMENT REQUIRED

- Simmonds capacitance transfer standard, 932005 (or equivalent).

NOTE

P / N 932005 consists of 14 fixed value capacitors, three terminal configurations, ranging from 10 pf to 10,000 pf with a temperature stability factor of ± 25 ppm per degree C, with consistent accuracy of $\pm .05$ pf at ambient temperature of 25°C.

- General Radio 1620A capacitance measuring system (or equivalent).
- High resistance decade – one hundred kilohms to one thousand megohms with $\pm 1\%$ tolerance.

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SA

FIGURE C-26. FUEL QUANTITY TEST SET, PSD 60-2R (SHEET 1 OF 4)

CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION PROCEDURE

CAUTION:

THE PSD 60-2R CONTAINS ESD SENSITIVE DEVICES.
OPEN AND CALIBRATE AT ESD PROTECTED AREA ONLY.

1. Remove the panel from the case.
2. Turn power ON and allow a 5 minute warm-up before proceeding.

Calibration of Capacitance Bridge Section

1. FUNCT switch to MEASURE EXT. SELECT switch to TU. Adjust Capacitance Low Range Zero potentiometer to a zero reading on the display.

NOTE:

- A true zero reading is when the "-" (minus) sign on the display is ON half the time and OFF the other half.
2. Adjust Capacitance Extended Range Zero potentiometer while the EXTENDED RANGE switch is depressed to a zero reading on the display.
 3. Repeat Steps 1 and 2 to assure that zero is correct and no adjustment is required.
 4. Connect 1000 pf (nominal) standard to J4 and J5 (TANK UNITS LO Z and HI Z). Adjust Capacitance Low Range Gain potentiometer to the standard's value within ± 1 LSD on the display (± 0.1 pf).
 5. Connect 10,000 pf (nominal) standard to J4 and J5 (TANK UNITS LO Z and HI Z). Adjust Capacitance Extended Range Gain potentiometer to the standard's value within ± 1 LSD on the display (± 1 pf) while depressing the EXTENDED RANGE switch.
 6. Repeat Steps 1 thru 5 until no adjustment is required.

Calibration of Megger Section

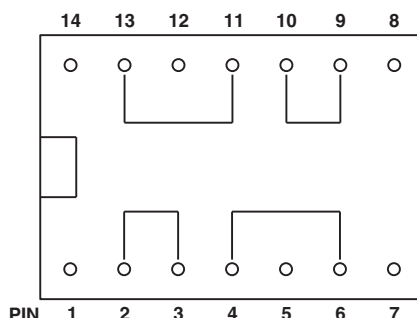
1. FUNCT switch to MEASURE EXT. SELECT switch to LO Z - HI Z.
2. Turn power OFF, remove U15 and short pins together as shown in View A then turn power ON.
3. With a 0.1 M (nominal) standard connected to TANK UNITS LO Z and HI Z (center conductors of J4 and J5) adjust Meg Low Range Gain potentiometer to the standard's value within $\pm 2 - 0$ LSD on the display ($\pm 2 - 0$ K ohms).
4. Turn power OFF and replace jumpers with U15, then turn power ON.
5. Replace the standard with a 10 M (nominal) standard and adjust Meg Low Range Zero potentiometer to the standard's value within ± 1 LSD on the display (± 0.1 M).
6. Replace the standard with a 100 M (nominal) standard and adjust Meg Mid Range Zero potentiometer to the standard's value within ± 1 LSD on the display (± 1 M).
7. Replace the standard with a 1000 M (nominal) standard and adjust Meg High Range Zero potentiometer to the standard's value within ± 1 LSD on the display (± 10 M).

FB1014_2A
SA

FIGURE C-26. FUEL QUANTITY TEST SET, PSD 60-2R (SHEET 2 OF 4)

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURE (CONT)****Calibration of Megger Section (cont)**

8. Reassemble unit. To assure a correct calibration and test set functioning, perform the Calibration Check Procedure after the unit is reassembled.

**CALIBRATION JUMPERS****VIEW A****CALIBRATION CHECK PROCEDURE****Check Calibration of Capacitance Measuring Section**

1. Turn test set power ON and allow a five minute warm-up period.
2. Set SELECT switch (S3) to TU. Set FUNCT switch (S2) to MEASURE EXT.
3. Connect J4 and J5 panel connectors to capacitance source using suitable test leads (J5 to HI Z & J4 to LO Z).
4. Read capacitance directly on digital display (D3).

NOTE:

Tolerance for capacitance measuring section is $\pm 0.1\%$ of reading or 0.2 pf whichever is greater.

NOTE:

The same test can be performed by connecting J5 and J6 to external capacitance source and SELECT switch (S3) to COMP.

Check Operation of Capacitance Simulation Section

1. Turn test set power ON and allow five minute warm-up period.
2. Set SELECT switch (S3) to TU. Set FUNCT switch (S2) to MEASURE INT.
3. Connect test set J1 and J2 panel connectors to the General Radio 1620A capacitance measuring system "UNKNOWN" panel connectors (J1 to "L" and J2 to "H").
4. Set D1 capacitance decade to all zero's and adjust V1 vernier control for a reading of 20.0 pf on the digital display (D3). This sets the simulator to a calibrated value.
5. Set FUNCT switch (S2) to SIM TU ONLY.

NOTE:

With FUNCT switch in any simulate mode, the reading on the display is to be disregarded.

6. Read capacitance being simulated by the TU simulator on GR1620A bridge. The GR1620A should show the value of the TU SIMULATOR to be 20.0 ± 0.2 pf.

FB1014_3
SA

FIGURE C-26. FUEL QUANTITY TEST SET, PSD 60-2R (SHEET 3 OF 4)

CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION CHECK PROCEDURE (CONT)

Check Operation of Capacitance Simulation Section (CONT)

7. Set SELECT switch (S3) to COMP. Set FUNCT switch (S2) to MEASURE INT.
8. Connect test set J3 and J2 panel electrical connectors to the General Radio 1620A capacitance measuring system "UNKNOWN" panel electrical connectors (J3 to "L" and J2 to "H").
9. Using electrical jumper wire, connect the CHASSIS jack (J7) to the center conductor of J1.
10. Set D2 capacitance decade to all zero's and adjust V2 vernier control for a reading of 20.0 pf on the digital display (D3). This sets the simulator to a calibrated value.
11. Set FUNCT switch (S2) to SIM TU & COMP.

NOTE

With FUNCT switch in any simulate mode, the reading on the display is to be disregarded.

12. Read capacitance being simulated by the COMP simulator on GR1620A bridge. The GR1620A should show the value of the COMP SIMULATOR to be 20.0 ± 0.2 pf.

Check Accuracy of Megohmmeter Section

1. Turn test set power ON and allow a five minute warm-up period.
2. Set SELECT switch (S3) to LO Z - HI Z.
3. Set FUNCT Switch (S2) to MEASURE EXT.
4. Connect high resistance decade between the appropriate points of panel electrical connectors J4, J5 and / or J6 as indicated by the following list of SELECT switch positions for the megohmmeter functions:

LO Z - HI Z

COMP - HI Z

LO Z - COMP

LO Z - SHIELD

COMP - SHIELD

HI Z - SHIELD

SHIELD - GND

LO Z - GND

COMP - GND

HI Z - GND

NOTE

Shells of electrical connectors J4 and J6 are ground. Shell of J5 is shield.

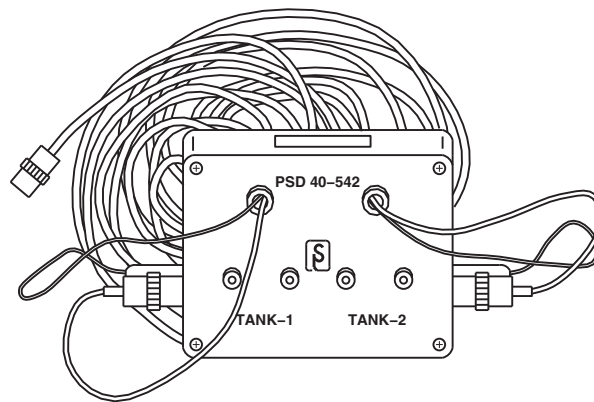
5. Read resistance values directly on digital display. Tolerance for megohmmeter section is $\pm 10\%$.

NOTE

The use of a commercial BNC to dual binding post adapter on J5 during this test may be helpful.

FB1014_4A
SA

FIGURE C-26. FUEL QUANTITY TEST SET, PSD 60-2R (SHEET 4 OF 4)



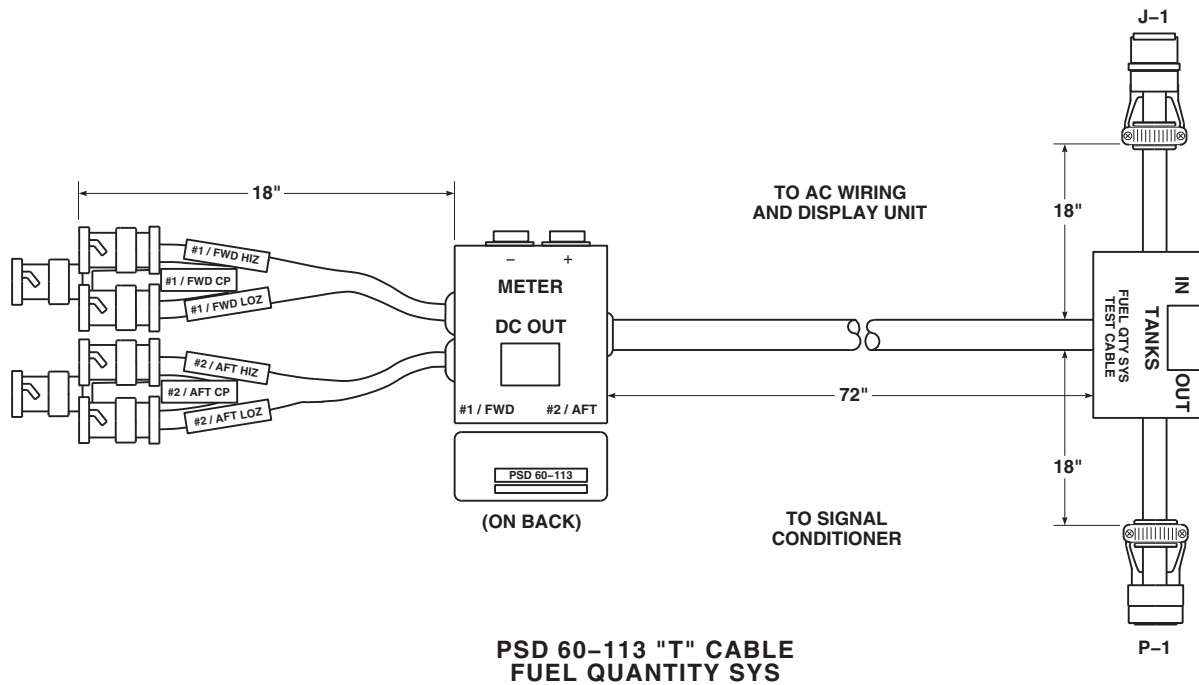
DESCRIPTION: The test harness is used to connect the fuel quantity test set to the fuel system for test purposes.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1015A
SA

FIGURE C-27. FUEL QUANTITY TEST HARNESS, PSD 40-542



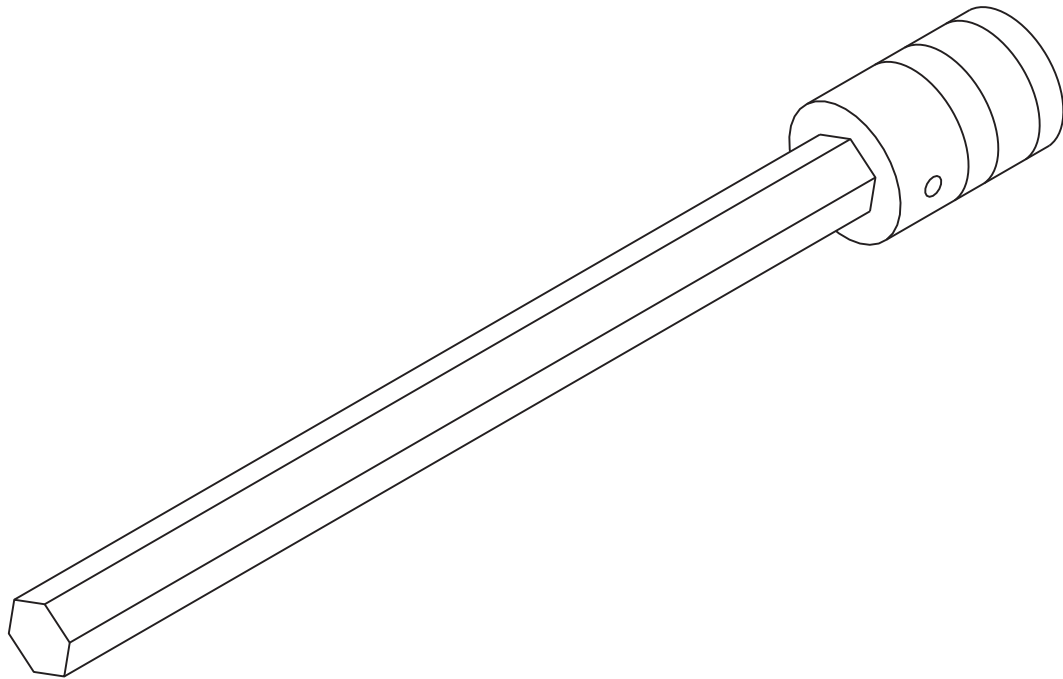
DESCRIPTION: The test cable is used to connect the fuel quantity tester set to the helicopter for test of fuel system.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1127A
SA

FIGURE C-28. FUEL QUANTITY CABLE ASSEMBLY, PSD 60-113



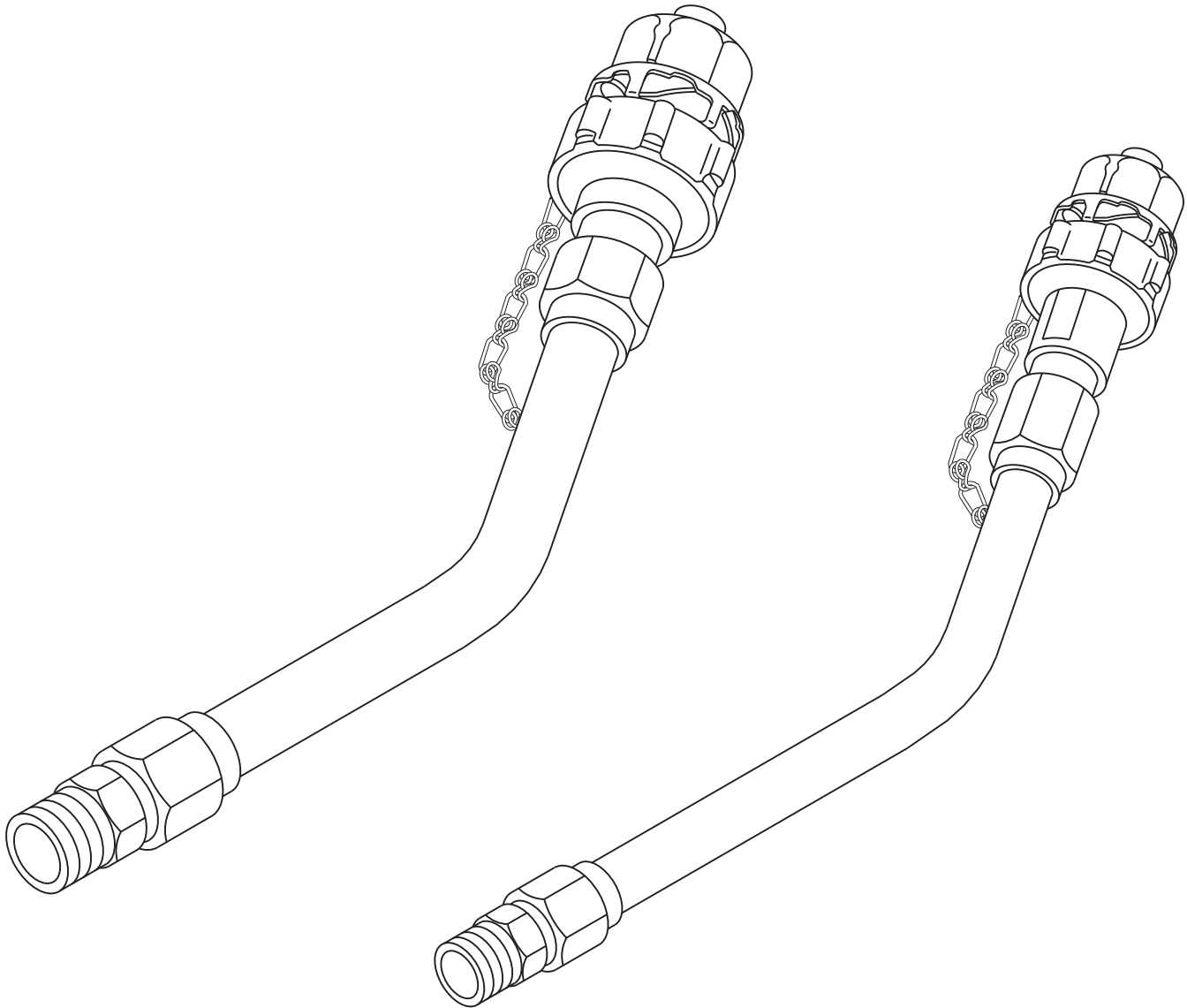
DESCRIPTION: The long hex head wrench is used on helicopter vibration absorbers.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FIGURE C-29. LONG HEX HEAD WRENCH, FA12L

FB1016
SA



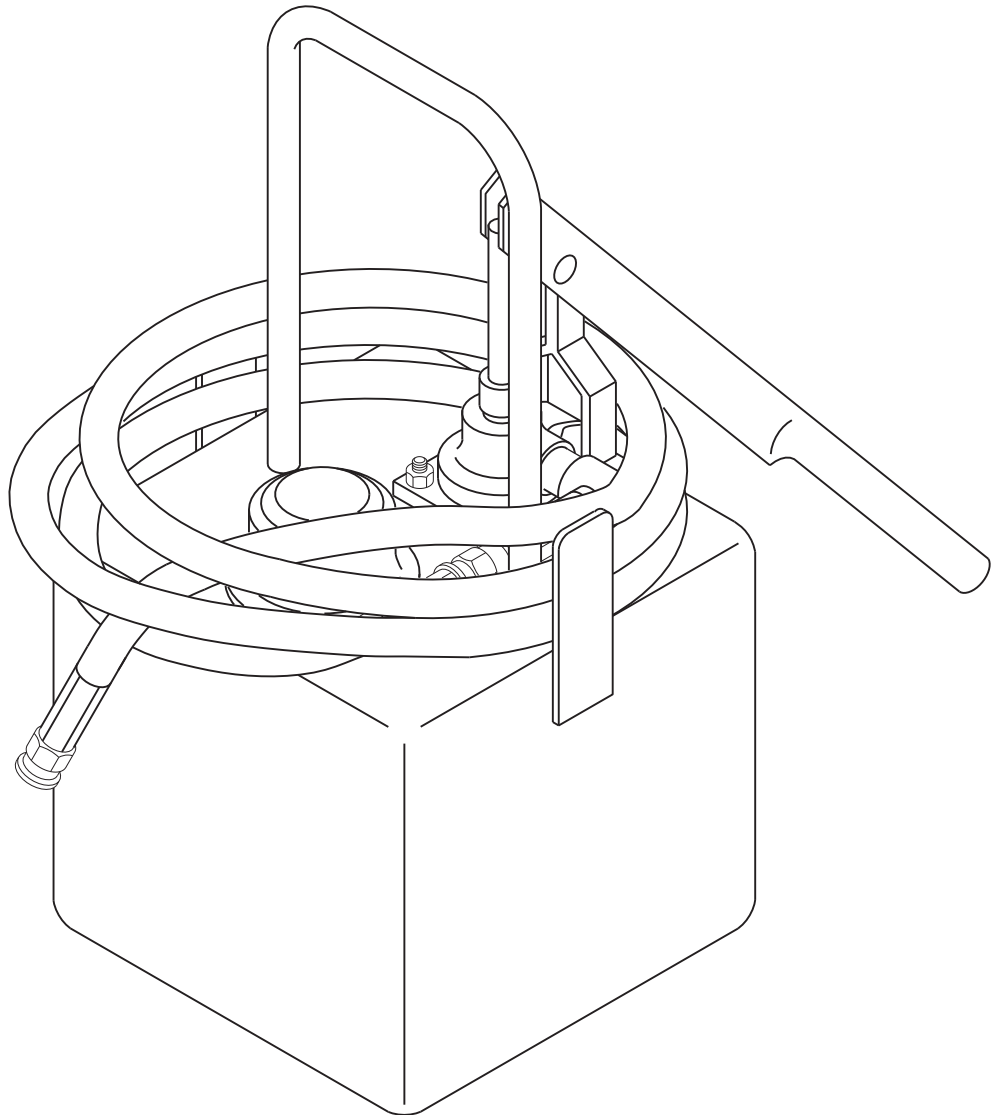
DESCRIPTION: The hydraulic cart adapter fittings are used to service the helicopter, and provide hydraulic power to move flight controls. The adapters are for hydraulic pressure and return to the power cart.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1017
SA

FIGURE C-30. HYDRAULIC CART ADAPTER FITTINGS, KHC 1004



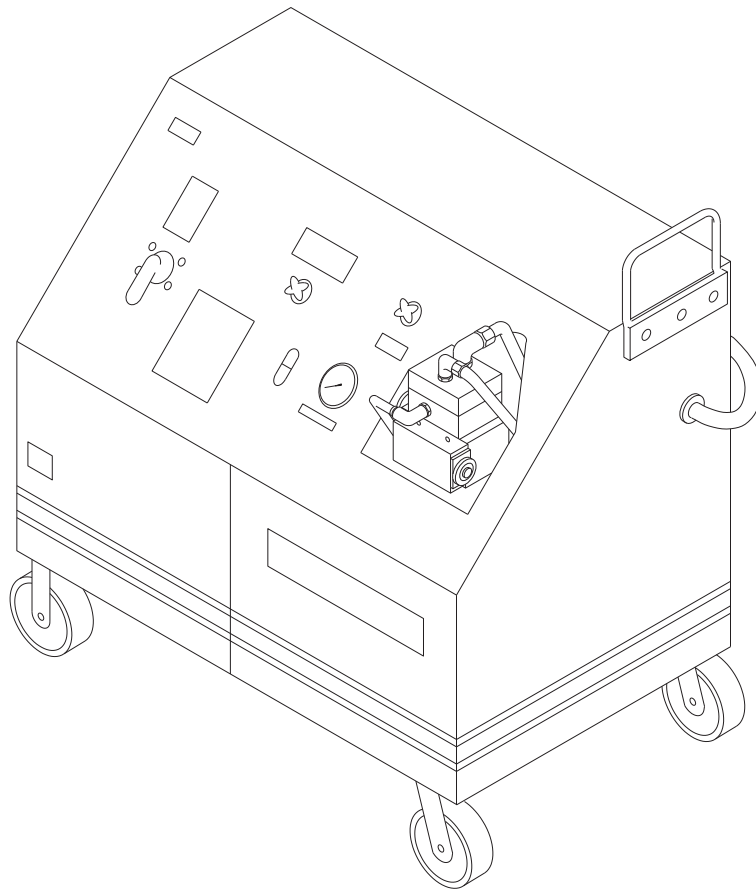
DESCRIPTION: The hydraulic filler / bleeder is a pressurized reservoir used to service hydraulic reservoir and bleed brake system on helicopter.

POWER REQUIREMENTS: External source of compressed air.

CALIBRATION REQUIREMENTS: Not Applicable

FB1018
SA

FIGURE C-31. HYDRAULIC FILLER/BLEEDER, 1102SP



DESCRIPTION: The hydraulic power unit is electrically powered to provide a source of clean, pressurized hydraulic fluid for performing required helicopter maintenance and servicing.

POWER REQUIREMENTS: 440 volts, 60 Hz

CALIBRATION REQUIREMENTS:

FREQUENCY

Hydraulic power unit must be calibrated every 52 weeks regardless of being used or not.

EQUIPMENT REQUIRED

- Hydraulic Hand Pump, model 10 or equivalent.
- Portable Hydraulic Circuit Tester, Model PHS-60-6 or equivalent flow and temperature measuring equipment.
- Standard Oil Service Pressure Gages, 0-2000 and 0-5000 psi.
- Hydraulic Pressure and Return Lines.

FB1129_1B
SA

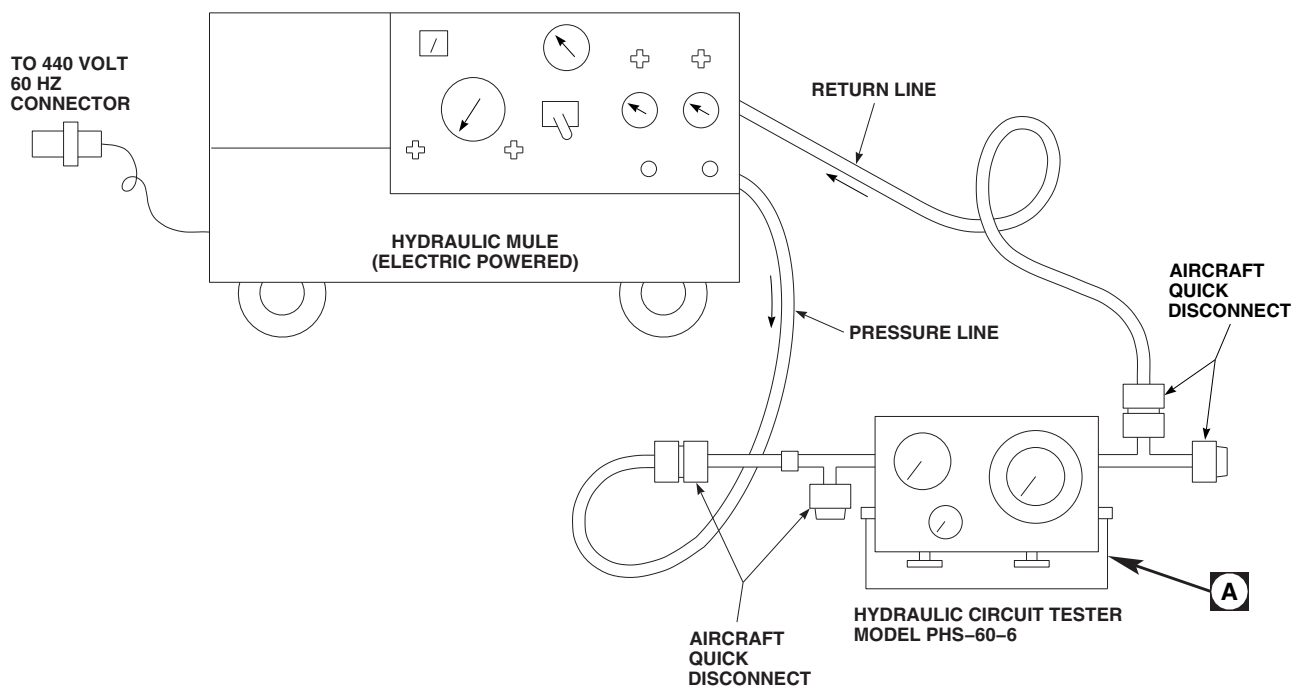
FIGURE C-32. HYDRAULIC POWER UNIT, 05-7040-1200 (SHEET 1 OF 4)

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURES****Inspection**

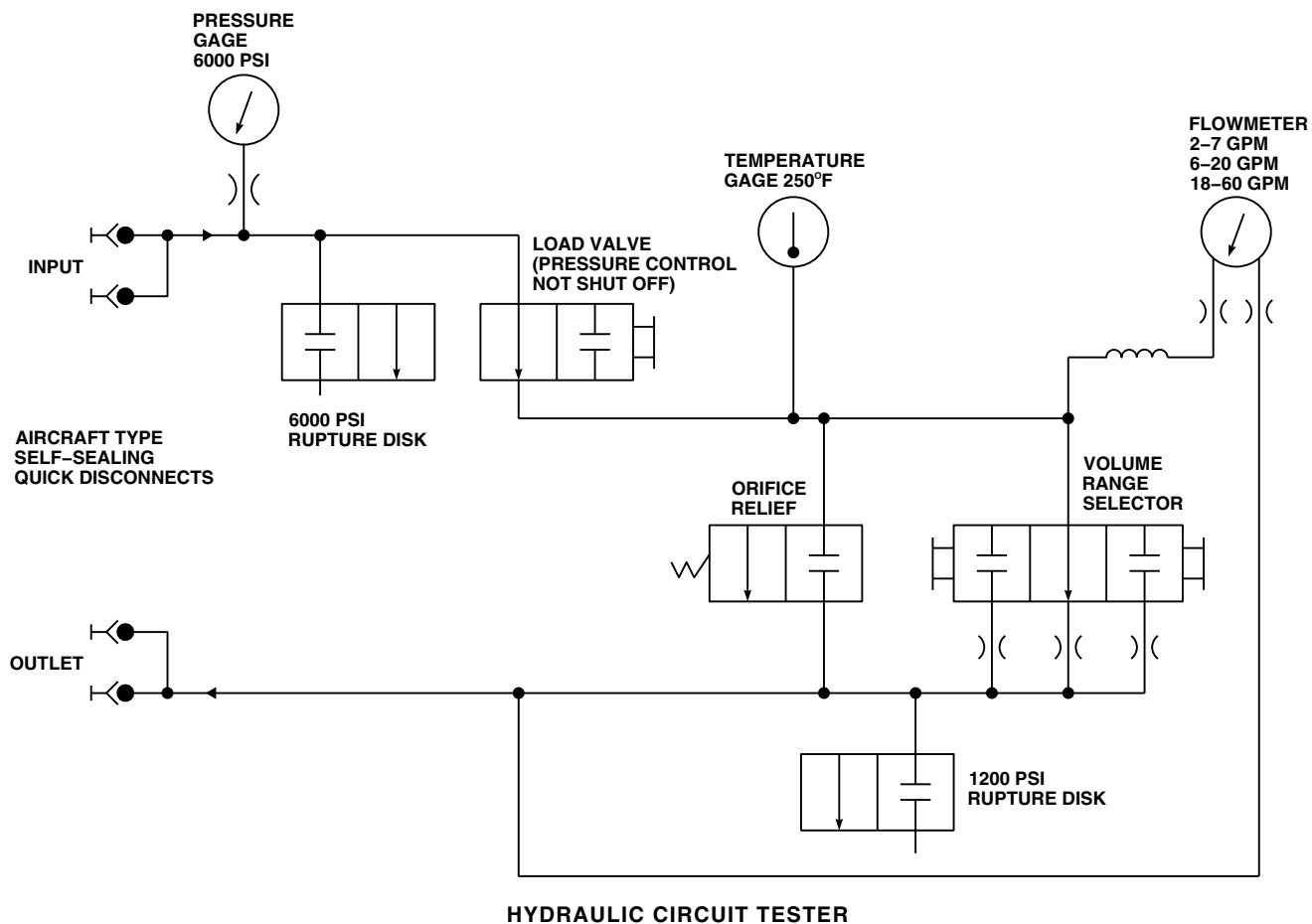
1. Check hydraulic fluid reservoir. Make sure reservoir is at least 1/2 full before starting calibration.
2. Check hoses for damage, cracks, loose or missing connectors, and dirt.
3. Check all gages for broken glass, bent pointers, and dirt.
4. Check drip pan and floor for signs of hydraulic fluid leaks. Repair any leaks.

Calibration

1. Connect pressure and return lines from hydraulic power unit to PHS-60-6, portable hydraulic circuit tester. Return line is larger than pressure line.
2. Place volume range selector on, PHS-60-6 circuit tester in #20 position.
3. Make sure power switch on hydraulic power unit is off. Connect power cord to 440 volt power receptacle.
4. Make sure fittings are capped and output valves are closed. Open by-pass valve on hydraulic power unit. Open load valve of PHS-60-6 circuit tester. Place selector valve on hydraulic unit to STAND RESERVOIR position.
5. Turn on power of hydraulic unit. With pump operating, check for leaks. If leaking, stop pump and repair. Restart pump.
6. Check hydraulic unit and circuit tester gages for high pressure readings. If readings are high, replace filters.
7. Operate controls on hydraulic power unit through full range of flow and full range of pressure. Do not exceed pressure or flow range of circuit tester, PHS-60-6 gages.

FB1129_2A
SA**FIGURE C-32. HYDRAULIC POWER UNIT, 05-7040-1200 (SHEET 2 OF 4)**

A

**CALIBRATION REQUIREMENTS (CONT)****CALIBRATION PROCEDURES (CONT)****Calibration (CONT)**

8. Increase pressure by closing load valve on circuit tester, PHS-60-6. Open by-pass valve and turn off hydraulic power unit. Repair as required.
9. Calibration of pressure gages on hydraulic power unit is checked using external hydraulic hand pump and standard pressure gage. Make sure by-pass valve is open and hydraulic power unit is turned off.
10. Connect hydraulic hand pump and pressure gage to gage port on hydraulic power unit with a high pressure line. Close gage shut off valve and power unit to isolate gage.
11. Increase pressure using hand pump on gage being tested. Make sure pressure on standard gage is not exceeded. Release pressure on hand pump system. Using hand pump increase pressure once more to full scale on gage being tested.
12. Observe pointer of gage being tested, any deviation from smooth operation may indicate worn gears or sector. Remove or repair gage as required.

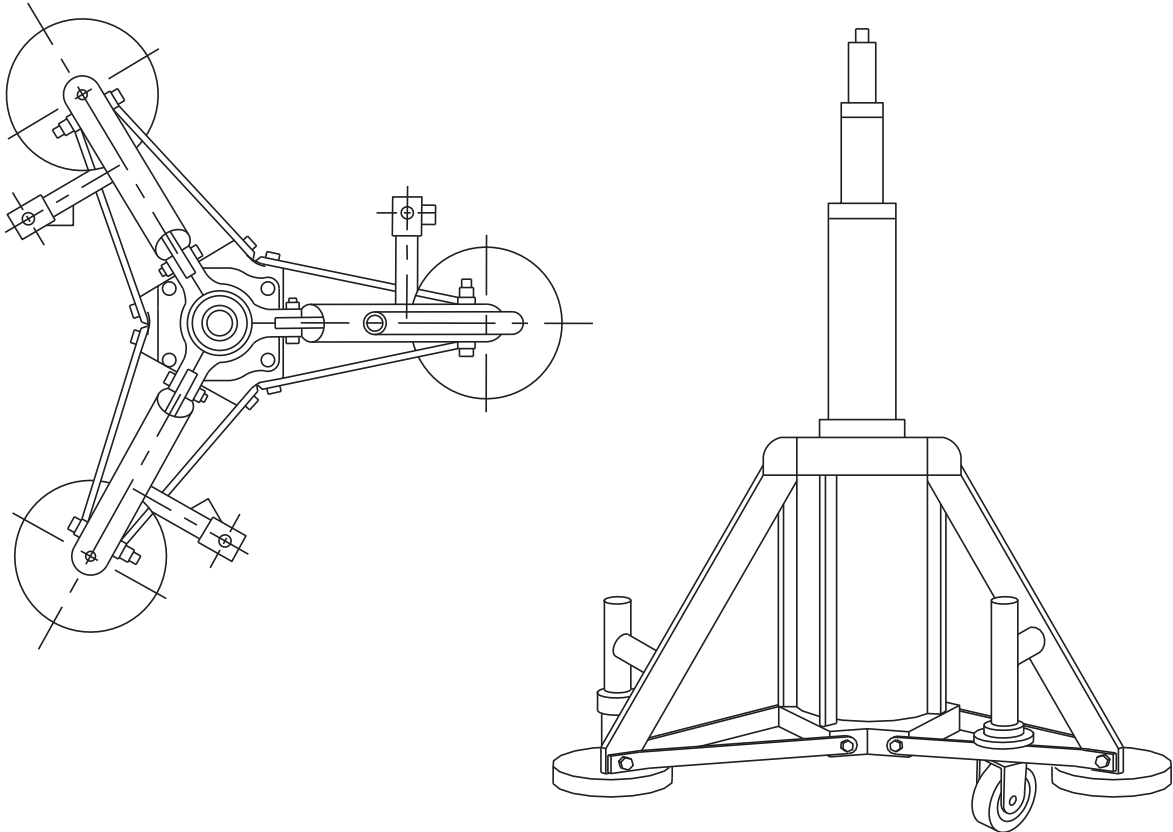
FB1129_3A
SA**FIGURE C-32. HYDRAULIC POWER UNIT, 05-7040-1200 (SHEET 3 OF 4)**

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURES (CONT)****Calibration (CONT)**

13. Hold pressure at full scale on gage being tested for one minute. Any detectable movement of pointer down scale is a sign of system leak. Check system and repair leaks as required. Release pressure.
14. Increase pressure in system until standard pressure gage reads exactly 50% of full scale on gage being tested. Lightly tap test gage and observe gage reading. Adjust test gage to read exact pressure as on standard gage by adjusting screw or resetting pointer on gage. After adjustment, lightly tap gage and check reading. Reading must be same as standard pressure gage.
15. Release system pressure down to minimum value.
16. Increase pressure in system until standard pressure gage reads 20%, 40%, 60%, and 80% of test gage. Check test gage at each point. Tap test gage and check readings at each point.
17. Adjust test gage, if necessary, to bring the center 2/3 of its span within one scale division on gage.
18. Repeat steps 9 through 17 for any other pressure gages on hydraulic power unit, not used for filter condition monitoring.
19. Remove hydraulic hand pump, pressure hose, and standard pressure gage.
20. Calibration of flow gage on hydraulic power unit is checked using standard flowmeter in circuit tester, PHS-60-6, at an oil temperature of $100^{\circ}\text{F} \pm 20^{\circ}\text{F}$.
21. Make sure by-pass valve is open. Turn on hydraulic power unit. Open load valve on circuit tester to allow flow through system loop. Make sure volume range selector is on #20 position on circuit tester.
22. Adjust flow on hydraulic power unit to full flow. If under 20 GPM, also check flow indication on circuit tester to insure flow is not running over 20 GPM. If full flow can't be reached, open bypass valve and turn off power unit. Repair as required.
23. Check oil flow through system loop, while observing oil temperature on gage of circuit tester, PHS-60-6. Temperature shall read $100^{\circ}\text{F} \pm 20^{\circ}\text{F}$. Adjust temperature by adding pressure to raise temperature and release pressure to lower temperature.
24. Lower pressure and flow to minimum and place circuit tester range selector to #7.
25. When oil temperature is reasonably stable, adjust flow and pressure to achieve 20% of full flow on power unit gage. Check flow reading on power unit flow meter and compare with circuit tester reading.
26. Make sure oil temperature is $100^{\circ}\text{F} \pm 20^{\circ}\text{F}$. If necessary, adjust to maintain oil temperature. Bring oil flow and pressure to a minimum, place range selector on circuit tester to #20 position.
27. Check flow readings at 40%, 60%, and 80% on power unit gage with readings on circuit tester, PHS-60-6. Readings shall be within $\pm 8\%$ indicated, ± 1 division of circuit tester gage.
28. Adjust flowmeter, if necessary, and recheck readings. Final adjustment should leave a $\pm 8\%$ difference, ± 1 division on flow rate throughout the 25% to 75% scale range.
29. Install limited use calibration sticker to hydraulic power unit.

FB1129_4A
SA**FIGURE C-32. HYDRAULIC POWER UNIT, 05-7040-1200 (SHEET 4 OF 4)**

VERT. CAP.	MIN. CLOSED HEIGHT	HYD. LIFT	SCREW EXT.	MAX. EXTENDED HEIGHT	NET WEIGHT	CRATED WEIGHT
TONS	INCH	INCH	INCH	INCH	LBS	LBS
12	14	23	3	40	100	125



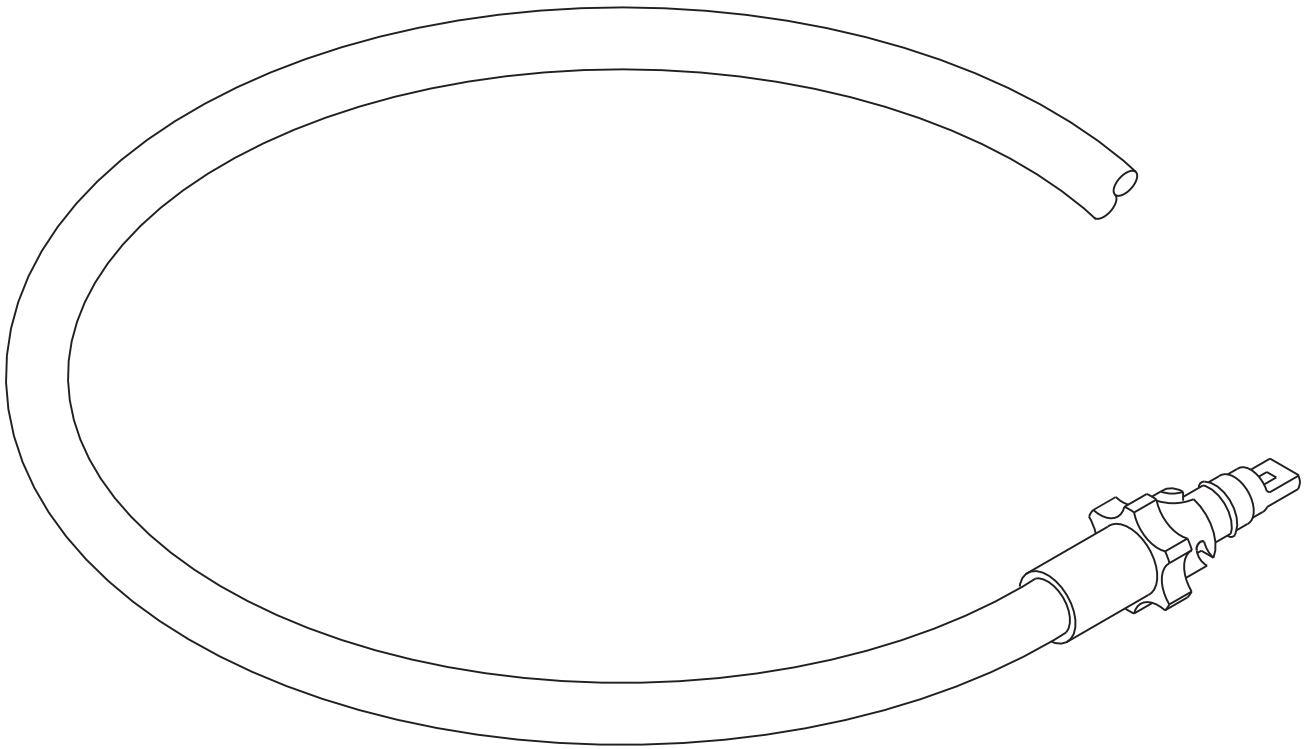
DESCRIPTION: The hydraulic jack has a load capacity of 12 tons, and a hydraulic lift height of 23 inches to a maximum of 40 inches.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1130
SA

FIGURE C-33. HYDRAULIC TRIPOD JACK, 12-3-14



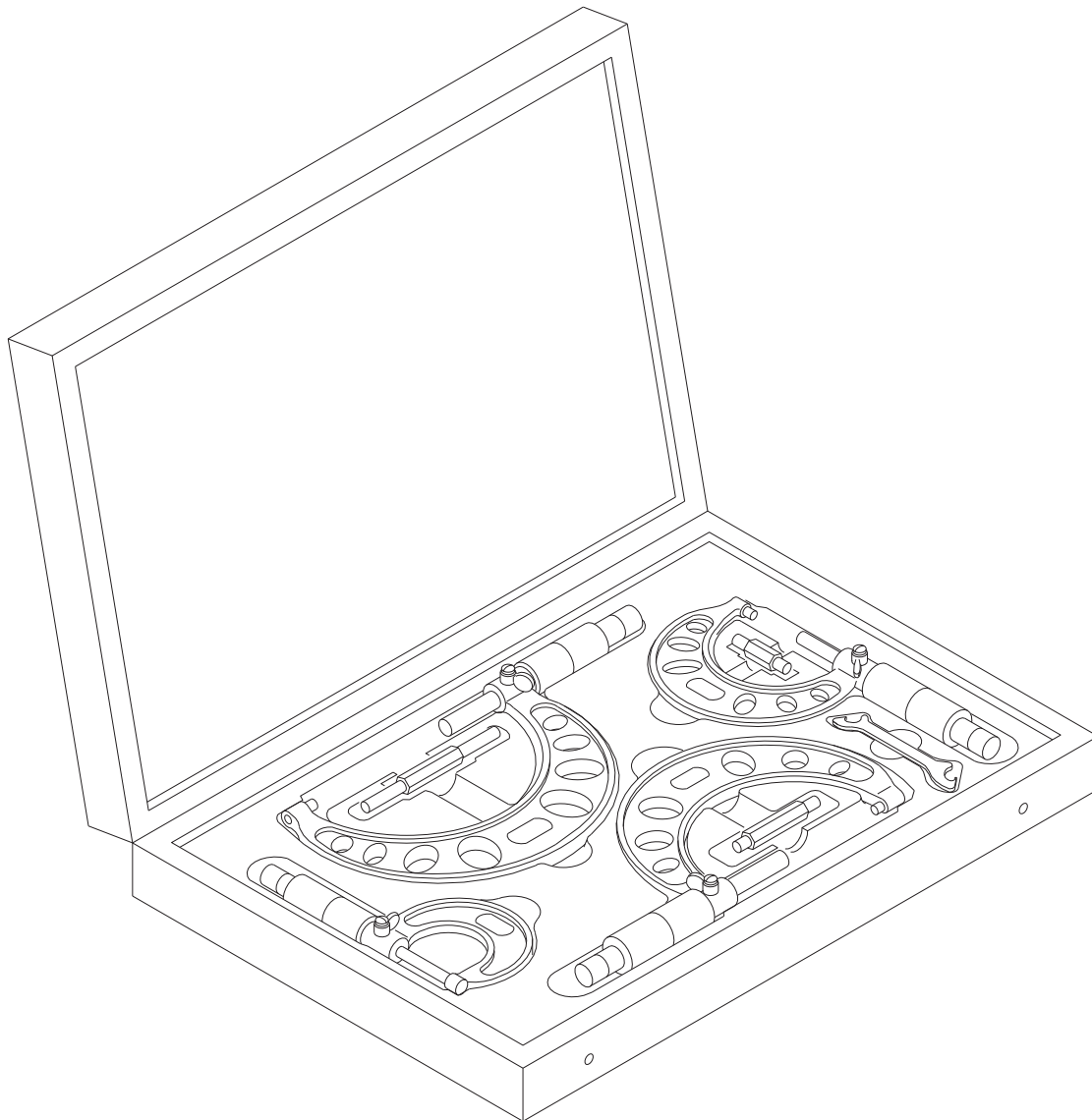
DESCRIPTION: The drain line is used to drain oil from tail gear box and intermediate gear box into container to prevent splashing or spilling.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1019
SA

FIGURE C-34. INTERMEDIATE/TAIL GEAR BOX DRAIN LINE, H538A-3



DESCRIPTION: The micrometers are used for obtaining precise measurements of an object.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS:

FREQUENCY

Micrometers must be calibrated every 12 weeks regardless of being used or not.

NOTE

If a micrometer is dropped or knocked against a hard object, it must be recalibrated before it is used again.

EQUIPMENT REQUIRED

- Gage Block Set, Hoke-style, 0.05–4.0–inch $\pm$ 0.000010–inch (or equivalent).

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SA

FIGURE C-35. MICROMETER SET, 0 - 4-INCH, PMF114 (SHEET 1 OF 2)

- Gage Block Set, Hoke-style, 5.0–20.0–in., ± 0.000010 –in. (or equivalent).
- Measuring Rods, 1.0–11.0–in., ± 0.000010 –in. Browne & Sharp #655 (or equivalent).
- Measuring Rods, 12.0–16.0–in., ± 0.000010 –in. Starrett #234 (or equivalent).

CLEANING MATERIALS

- Isopropyl Alcohol, Item 72, Appendix D
- Machinery Towel, Item 211, Appendix D
- Soap and Water

CALIBRATION PROCEDURES

Cleaning / Inspection

1. Clean spindle and anvil using Isopropyl Alcohol, Item 72, Appendix D. Wipe dry using Machinery Towel, Item 211, Appendix D.
2. Check that ratchet screw and thimble move freely.
3. Check spindle and anvil surfaces for damage. NONE ALLOWED.

Calibration

1. Loosen ratchet screw and rotate thimble until zero is indicated on scale.

NOTE

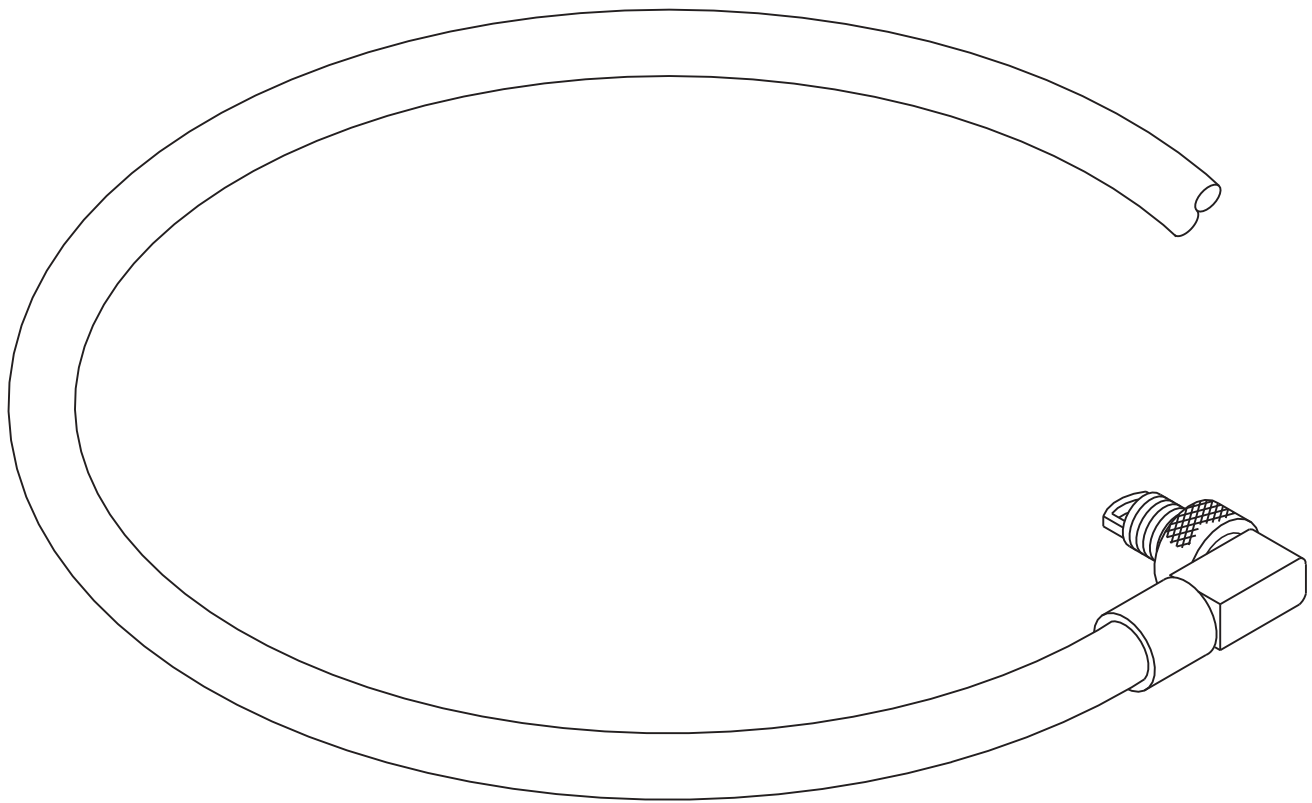
Since the actual micrometer adjustment of all test instruments is limited to one in., an additional gage block must be used when calibrating test instruments larger than one in. For example, an additional three-in. block must be used when calibrating a four-in. test instrument.

2. Calibrate the test instruments using the 0.0625, 0.125, 0.25, 0.5, and 1.0–in. gaging blocks. Measurements must be within tolerance given in Table 1. If tolerances cannot be achieved, adjust instrument and recalibrate.

TABLE 1	
INSTRUMENT RANGE	ACCEPTABLE TOLERANCE
0–1–in.	0.0002–in.
1–2–in.	0.0002–in.
2–3–in.	0.0003–in.
3–4–in.	0.0003–in.
4–5–in.	0.0003–in.
5–6–in.	0.0003–in.
6–7–in.	0.0004–in.
7–8–in.	0.0004–in.
8–9–in.	0.0004–in.
9–10–in.	0.0005–in.
10–11–in.	0.0005–in.
11–12–in.	0.0005–in.
12–18–in.	0.0008–in.
18–20–in.	0.001–in.

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SA

FIGURE C-35. MICROMETER SET, 0 - 4-INCH, PMF114 (SHEET 2 OF 2)



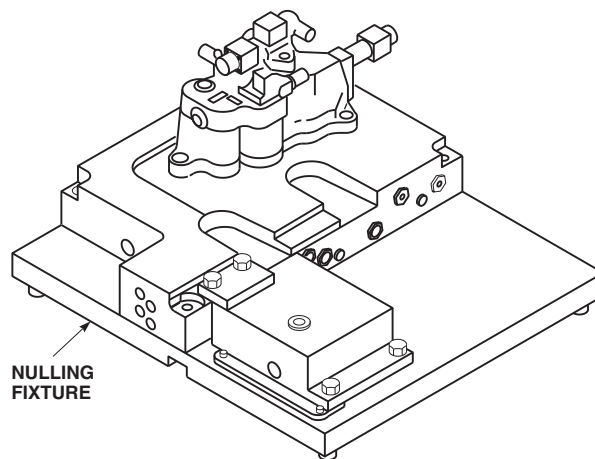
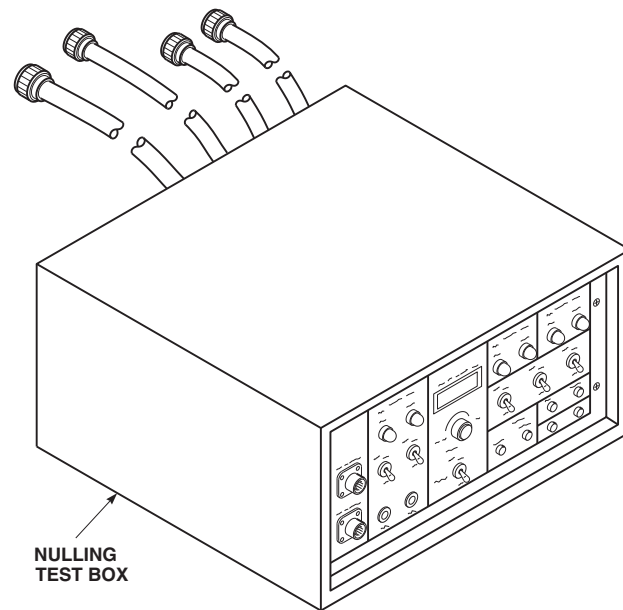
DESCRIPTION: The drain line is used to drain oil from main transmission into containers preventing splashing or spilling oil.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1022
SA

FIGURE C-36. MAIN GEAR BOX DRAIN LINE, D-730-L



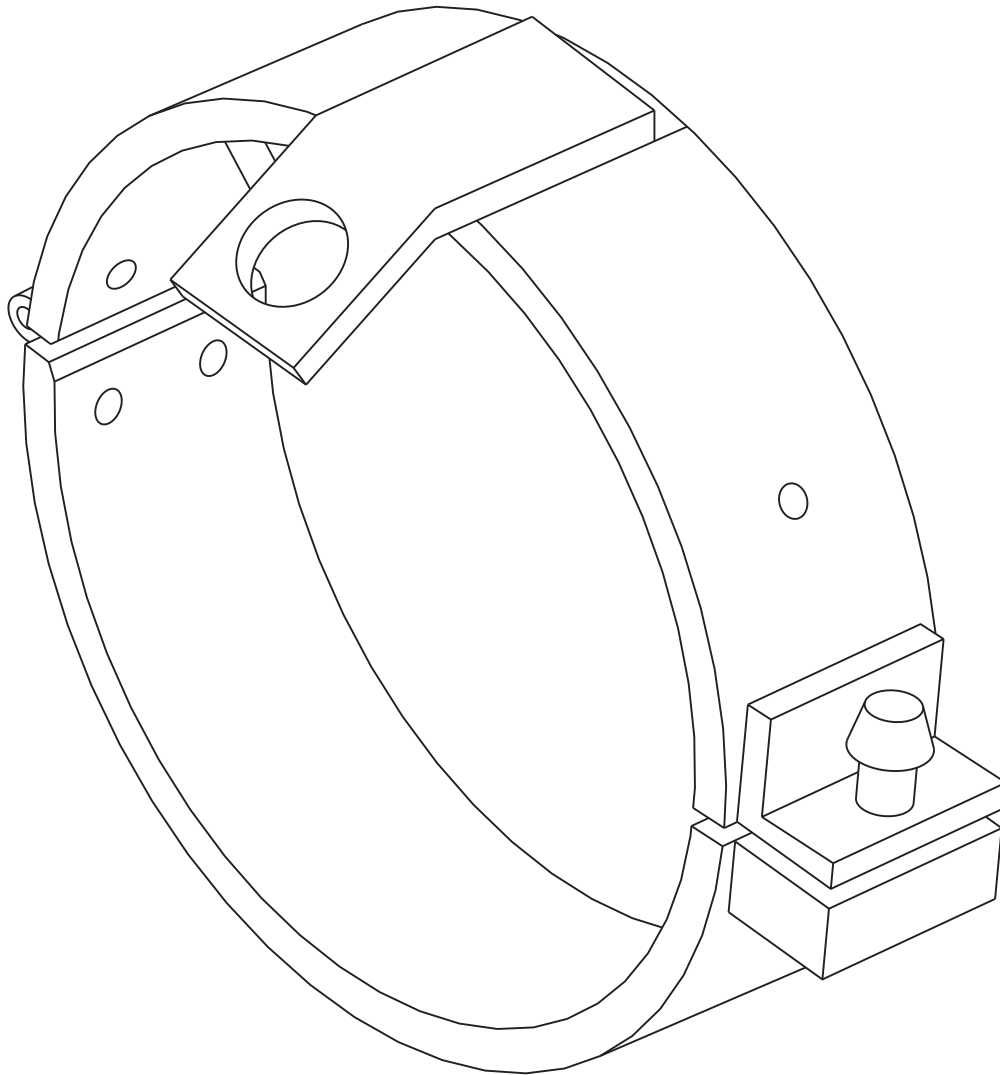
DESCRIPTION: The nulling fixture is used to operationally test pilot assist module, roll trim, pitch trim and yaw boost servos after repair.

POWER REQUIREMENTS: The nulling fixture operates on 115 volts AC, single phase, 60 Hz, 2 amp and 28 volt DC, 5 amps. Also needed is hydraulic power at a rate of 6 GPM, at 3000 psi.

CALIBRATION REQUIREMENTS: Not Applicable

FB1131
SA

FIGURE C-37. NULLING FIXTURE, 70700-20675-041



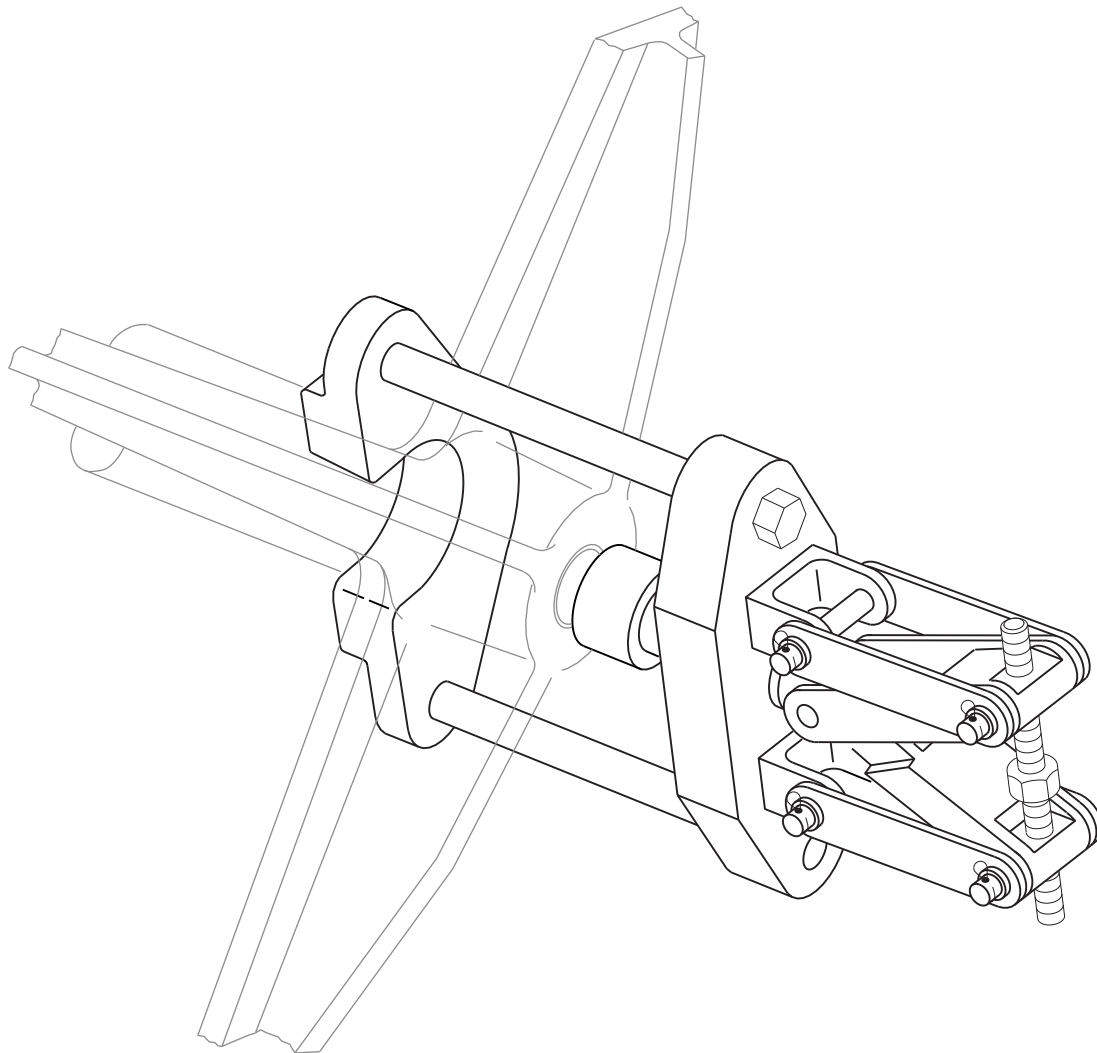
DESCRIPTION: The photocell bracket is used in balancing engine output shafts. The bracket is attached to forward support tube assembly, to provide a location to install a photocell sensor to measure shaft rotational speed.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

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SA

FIGURE C-38. PHOTOCCELL BRACKET, 70700-20114-044



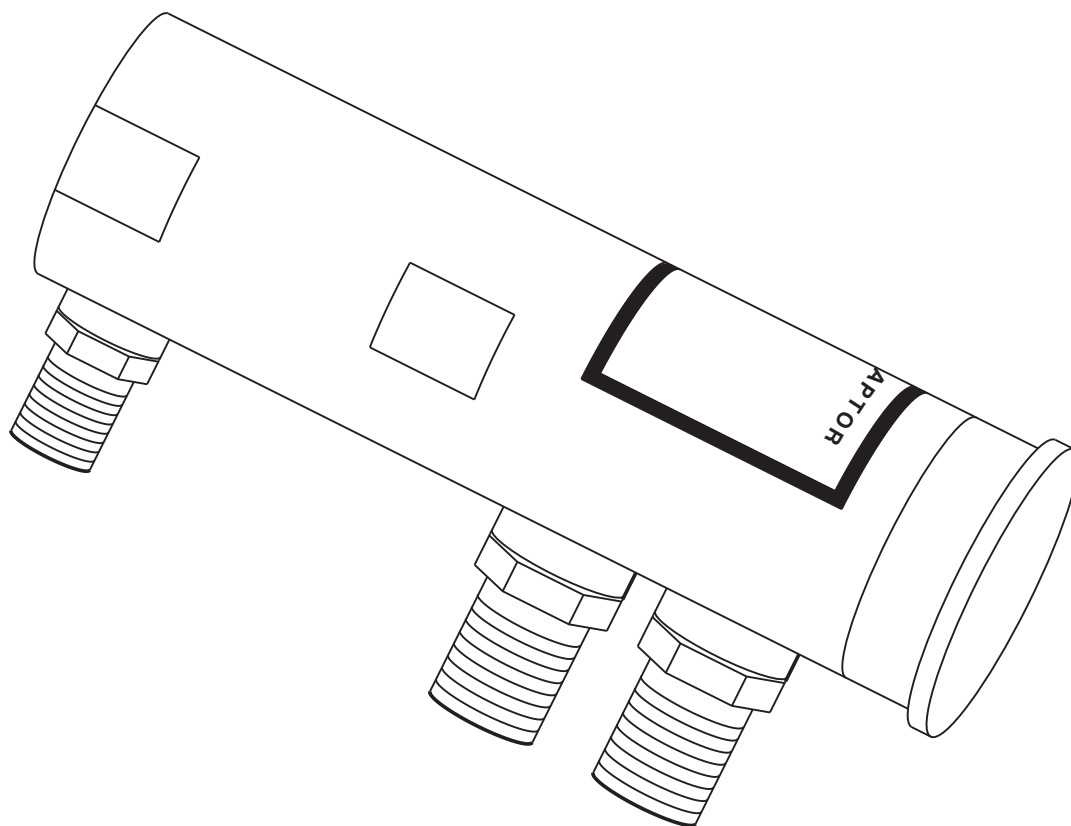
DESCRIPTION: The pitch beam puller is a mechanical puller, used to remove pitch beam from pitch change shaft on tail gear box.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1132
SA

FIGURE C-39. PITCH BEAM PULLER, 70700-77389-041



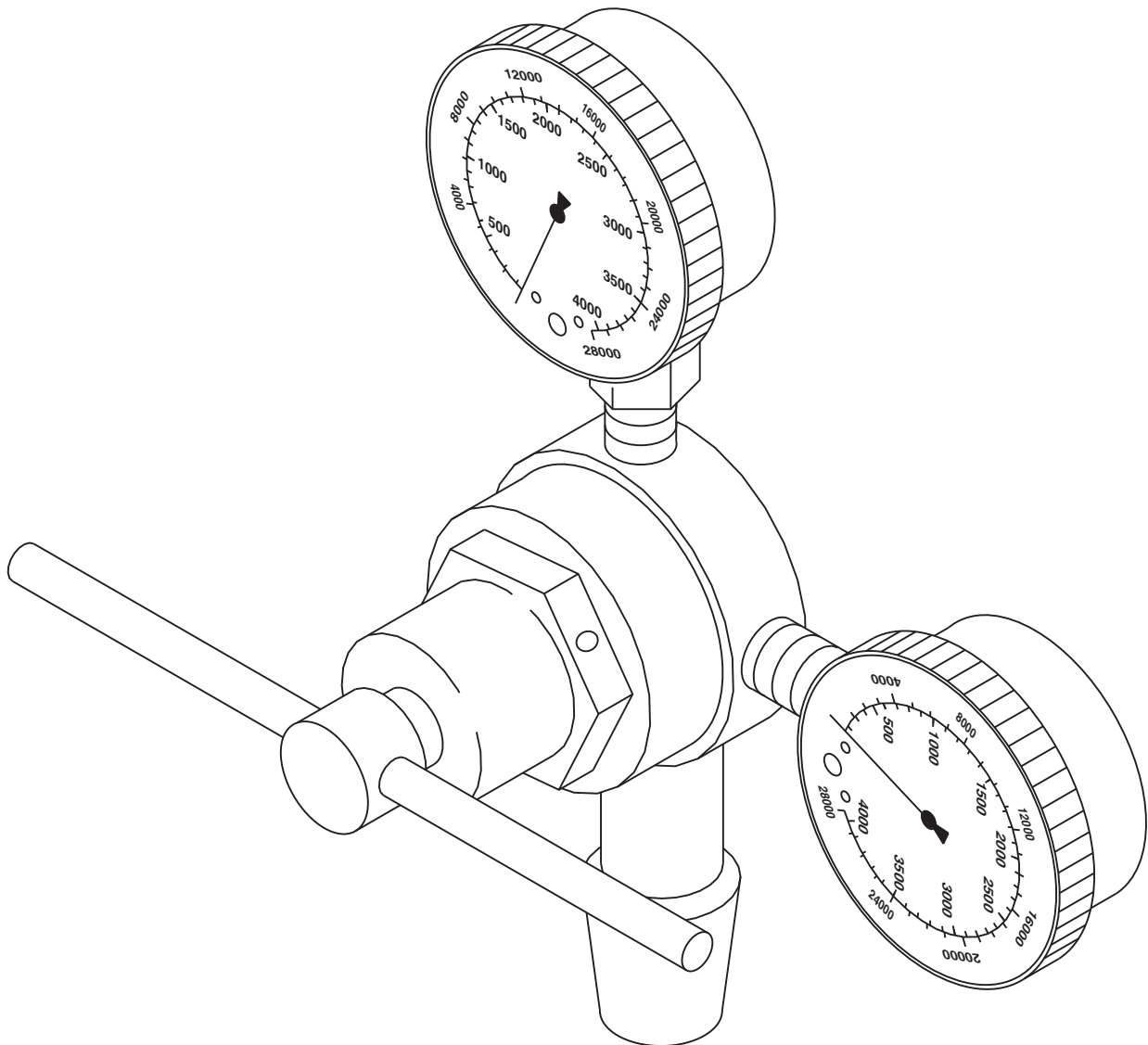
DESCRIPTION: The pitot pressure adapter consists of a pressure sleeve that conforms to the contour of pitot / static heads, with replaceable ring seals to provide air tightness when pressure / temperature test set is installed.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

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SA

FIGURE C-40. PITOT PRESSURE ADAPTER, 884DB



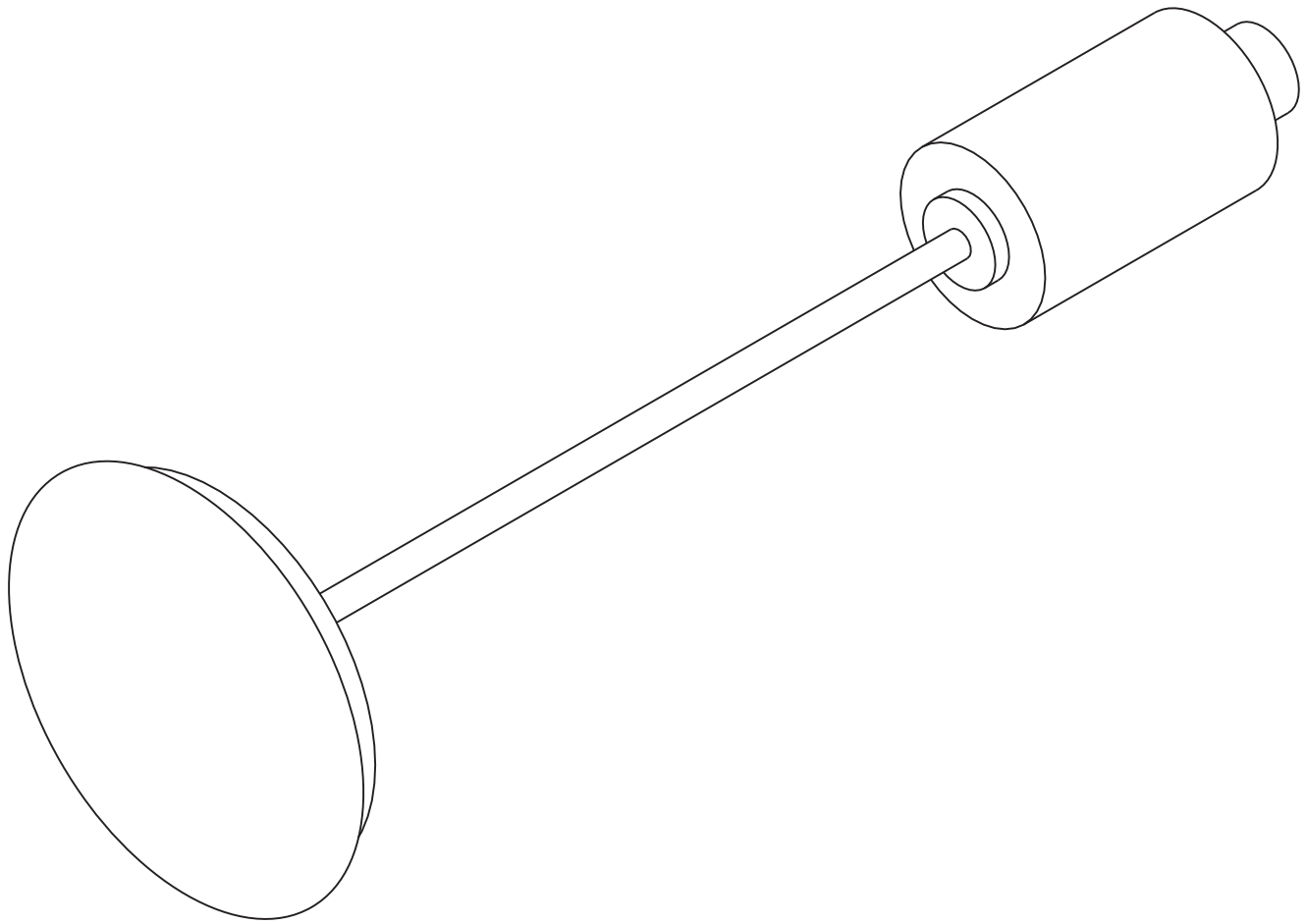
DESCRIPTION: The pressure regulator is used to read servicing pressures when servicing helicopter shock struts, tires, and hydraulic reservoirs.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Annually.

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FIGURE C-41. PRESSURE REGULATOR, 14-6804-6000



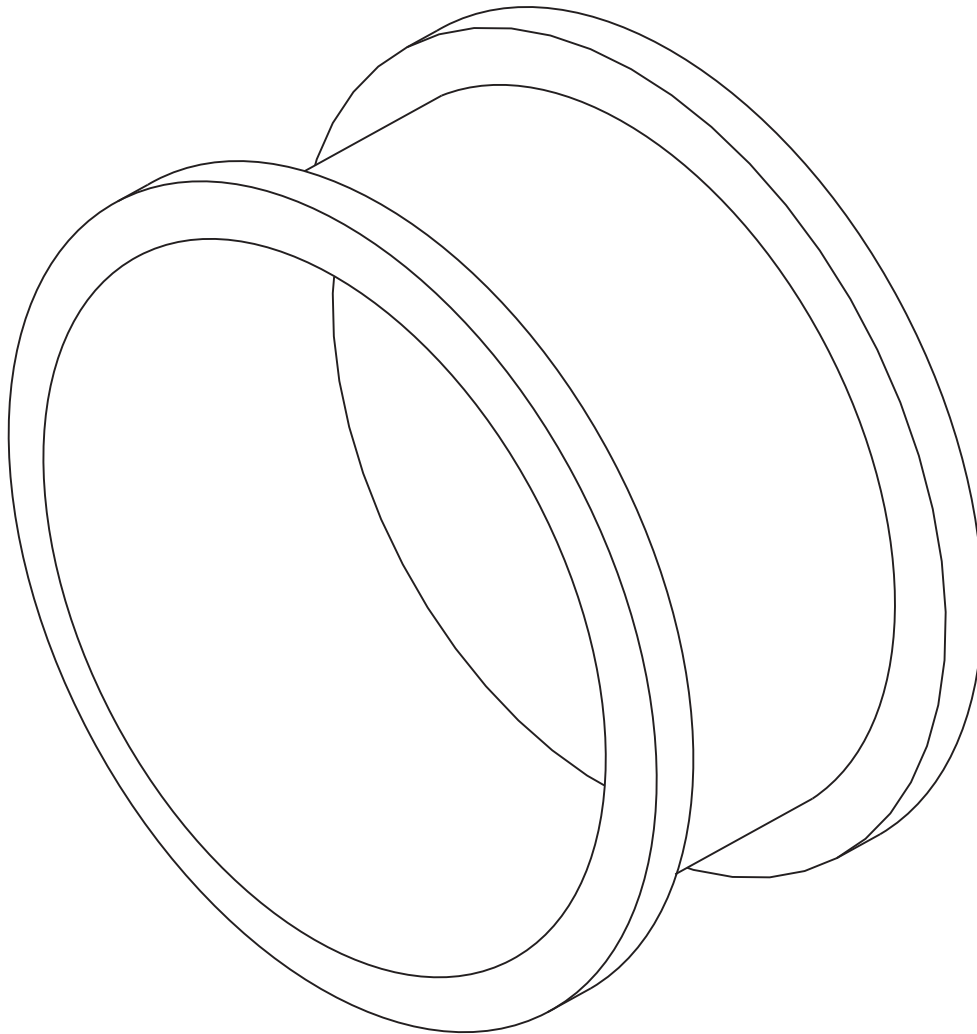
DESCRIPTION: The APU combustor puller is designed to be used with combustor puller adapter, ST9314 to prevent damage to combustor section during separation of APU combustor.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

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SA

FIGURE C-42. APU COMBUSTOR PULLER, ST 91125



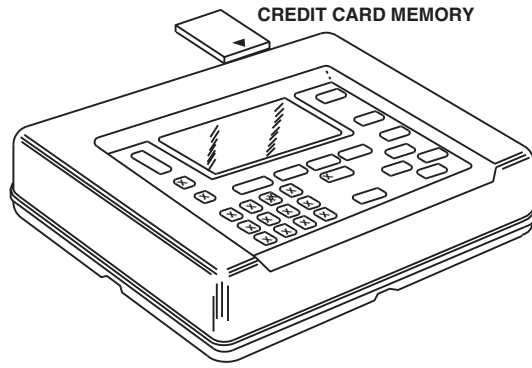
DESCRIPTION: The APU combustor adapter is designed to be used with APU combustor puller, ST 91125 to prevent damage to combustor section during separation of APU combustor.

POWER REQUIREMENTS: Not Applicable

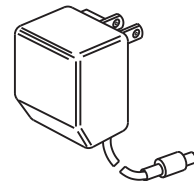
CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-43. APU COMBUSTOR ADAPTER, ST 93014

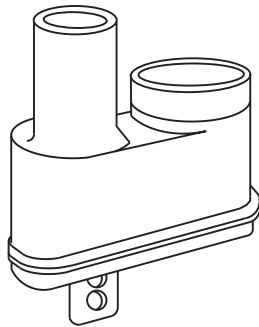


CREDIT CARD MEMORY

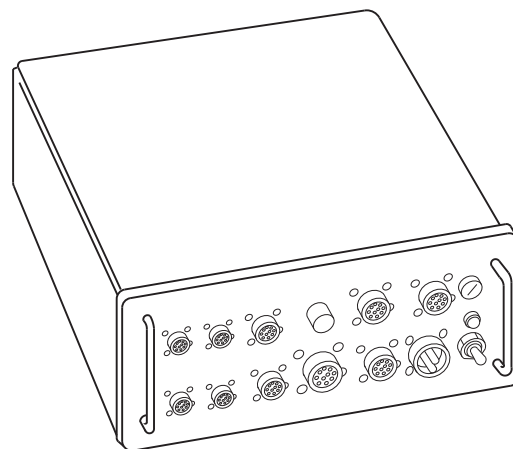


BATTERY CHARGER

CONTROL AND DISPLAY UNIT (CADU)



UNIVERSAL TRACKING DEVICE (UTD)



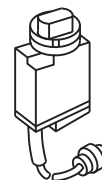
DATA ACQUISITION UNIT (DAU)



ACCELEROMETER



MAGNETIC RPM SENSOR



OPTICAL RPM SENSOR

DESCRIPTION: The RADS-AT is a portable test set, weighing less than 25 pounds, which contains sophisticated measurement technology that operates with a minimum of in-flight control, using fast parallel data acquisition techniques to reduce flight test time. The RADS-AT utilizes a diagnostic programming language in an OS-9 environment to provide a high level, easy to use method of performing rotor vibration analysis. The automatic

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SA

FIGURE C-44. RADS-AT VIB ANALYZER, 29313100 (SHEET 1 OF 2)

DESCRIPTION: (CONT)

blade tracking is a universal tracking device which can be used in daylight or at night, it contains a data acquisition unit (DAU) which processes the tracker and vibration signals, a handheld control and display unit (CADU), to control data acquisition, display measurements and analysis results, print reports, and transfer data to or receive data from an off-line computer.

POWER REQUIREMENTS: 17-36 VDC (DAU), 12 VDC (CADU)

CALIBRATION REQUIREMENTS:**FREQUENCY**

The RADS-AT vib analyzer must be calibrated every 24 weeks regardless of being used or not.

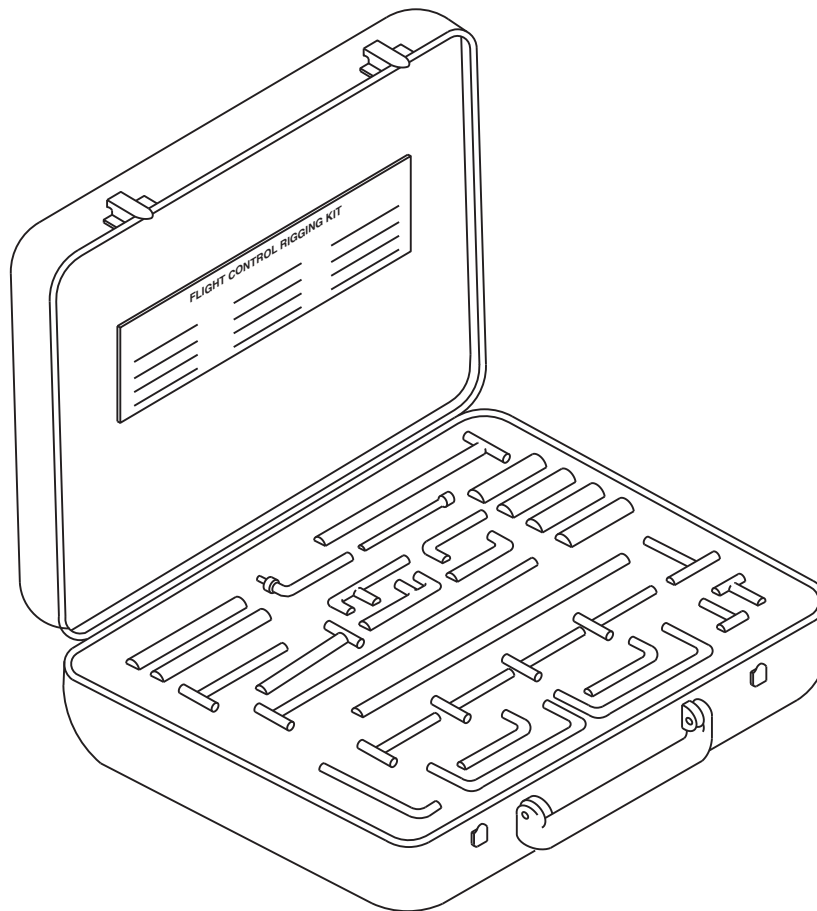
CALIBRATION PROCEDURES

Refer to manufacturer's maintenance manual for calibration procedures.

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FIGURE C-44. RADS-AT VIB ANALYZER, 29313100 (SHEET 2 OF 2)

Change 13**C-75**



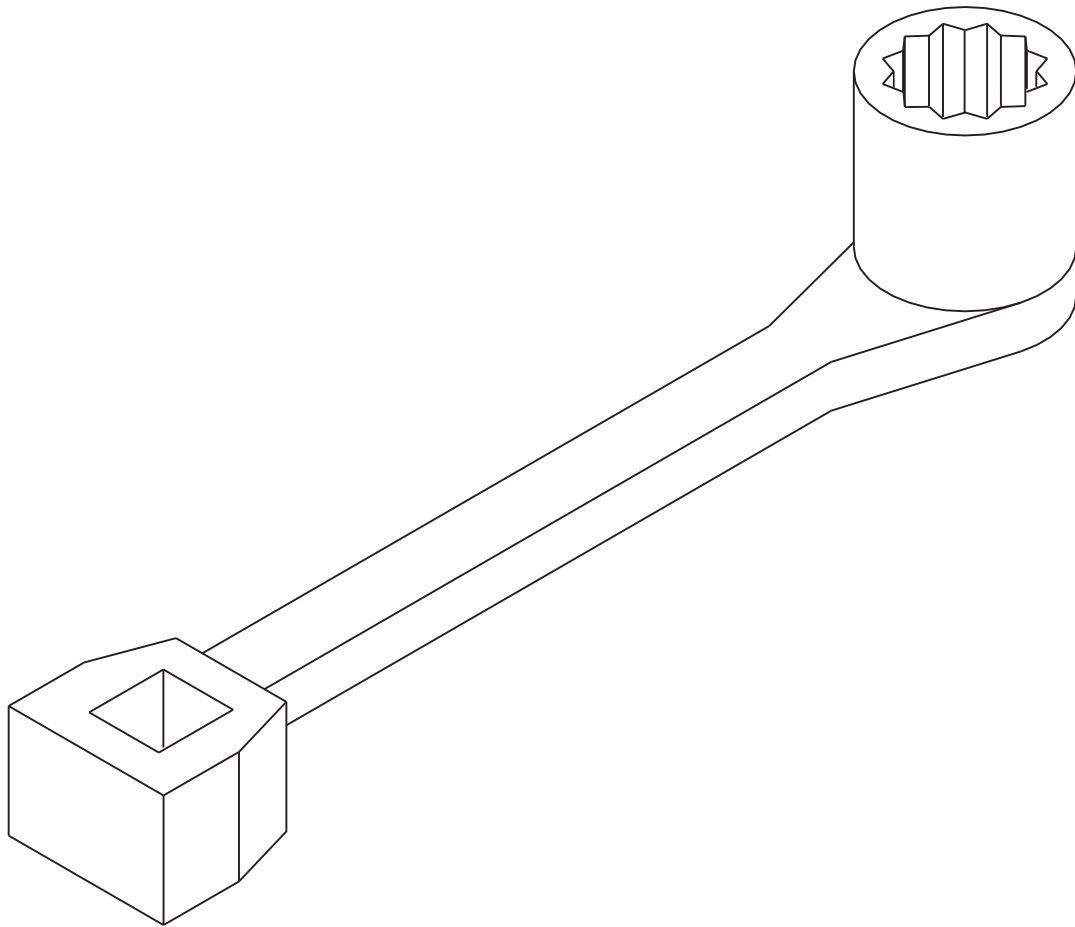
DESCRIPTION: The rigging set is used to hold the flight control system at a predetermined position to ensure proper adjustment of controls. The rigging set contains rig pins with red flags attached to ensure removal of all pins and blocks from flight control system.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1027
SA

FIGURE C-45. FLIGHT CONTROL RIGGING SET, 70700-20389-042



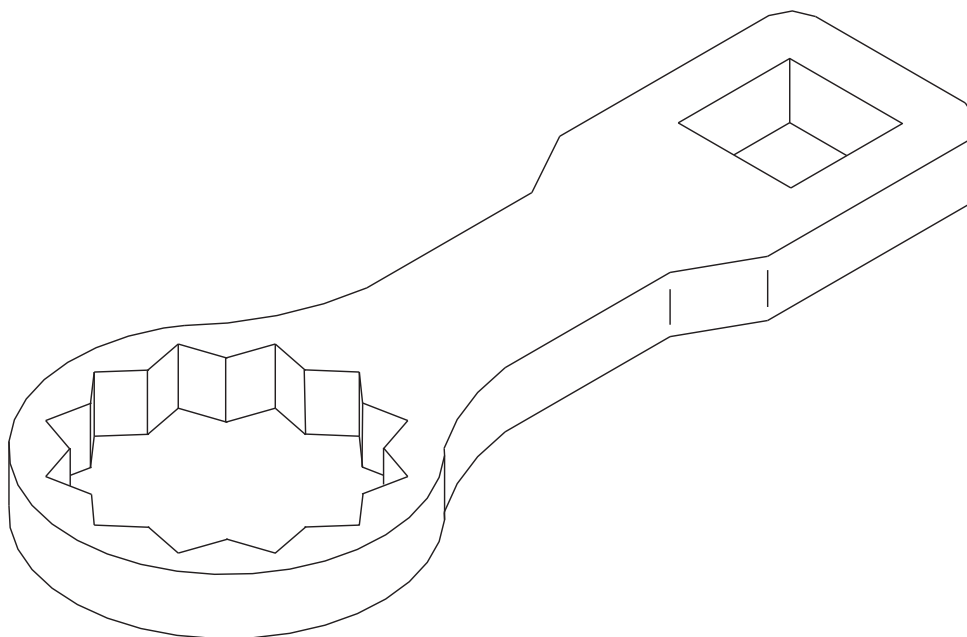
DESCRIPTION: The rotor brake wrench is used to check required torque on mounting nuts, rotor brake to main module, without disassembling a major portion of the rotor brake assembly.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FIGURE C-46. ROTOR BRAKE WRENCH, 70700-77117-041

FB1028
SA



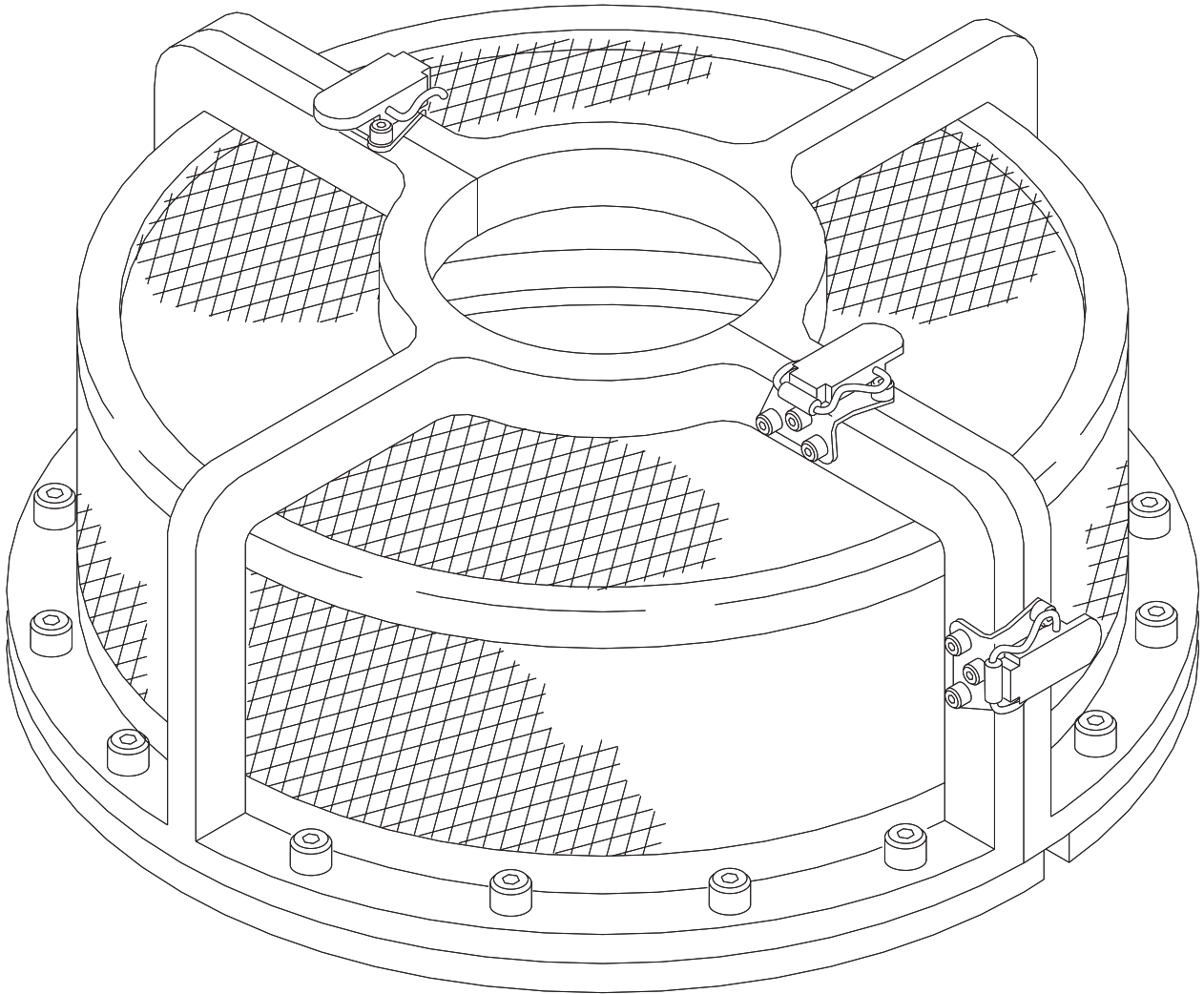
DESCRIPTION: The main rotor head wrench is a special wrench for torquing the rotor head bolts to 1000 inch-pounds of torque, which exceeds the recommended torque limits of standard crowfoot wrench use.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1029A
SA

FIGURE C-47. MAIN ROTOR HEAD WRENCH, 70700-20210-101



DESCRIPTION: The engine inlet screen is used when the engine inlet is removed to expose output shaft when performing shaft balance. The screen assembly is clamped to front of engine to prevent ingestion of foreign objects into engine during run up and balancing of engine output shaft.

POWER REQUIREMENTS: Not Applicable

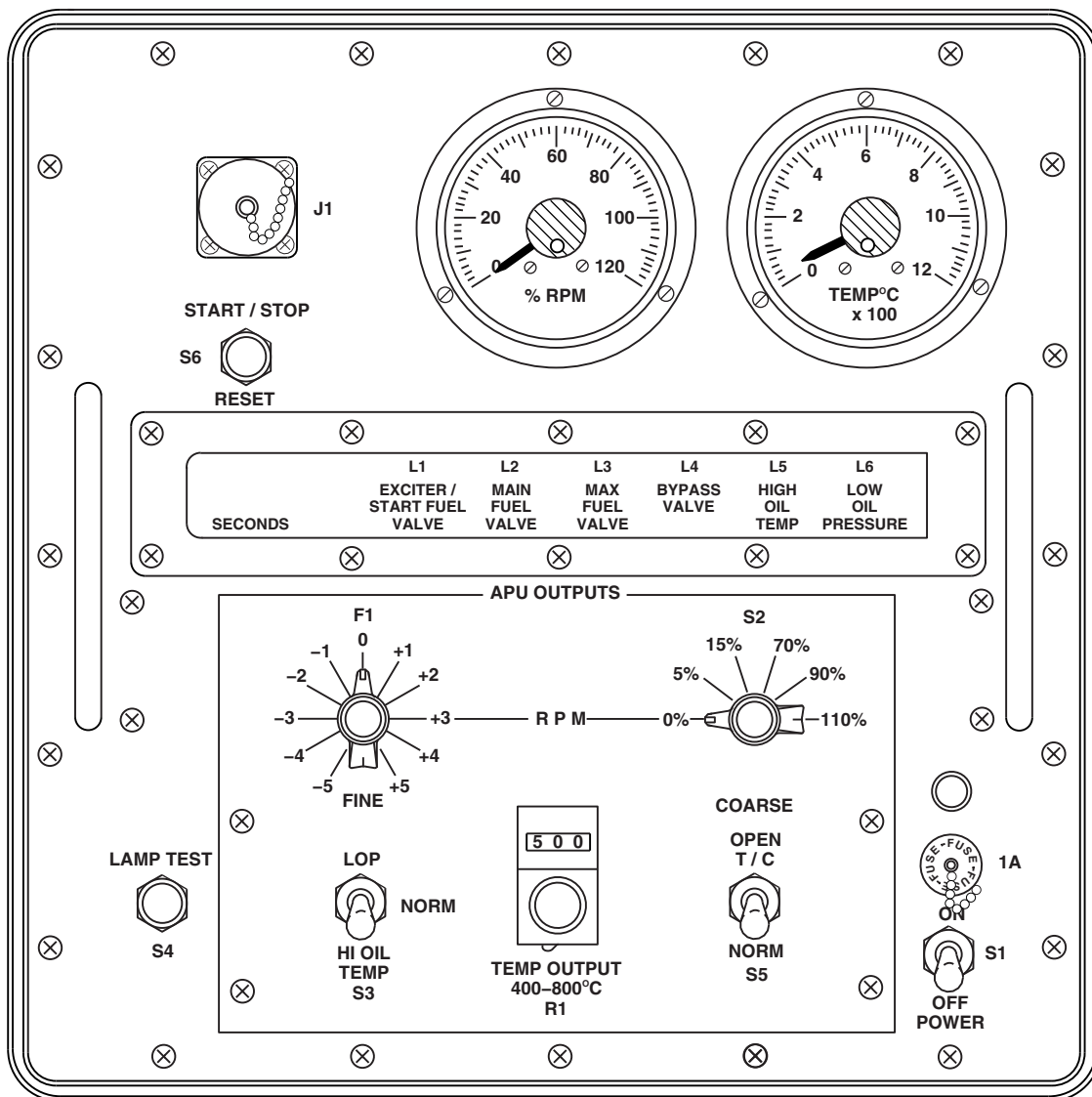
CALIBRATION REQUIREMENTS: Not Applicable

BEFORE-AND-AFTER USE INSPECTION:

1. Inspect screen for general condition and overall damage.
2. Inspect screen for distortion, delamination, and corrosion.
3. Inspect bolts for security and looseness.
4. Inspect latches for damage and proper function.
5. NO DAMAGE ALLOWED. If damage is evident, repair any damage or replace screen prior to next use.

FB4782
SA

FIGURE C-48. ENGINE INLET SCREEN, 70700-20222-044



DESCRIPTION: The APU simulator test set temp / speed, simulates the auxiliary power unit (APU) when statically testing the electronic sequencing unit (ESU) of the helicopter. The test set provides selectable frequency, temperature output signals, contacts to simulate low oil pressure, high oil temperature and open thermo-couple conditions. Six lamps (L1-L6) monitor the closing of six switches in the ESU. The test set also monitors APU temperature and RPM during dynamic testing of the APU.

POWER REQUIREMENTS: 28 volts DC, 1 amp

CALIBRATION REQUIREMENTS:

FREQUENCY

APU simulator test set must be calibrated every 24 weeks regardless of being used or not.

FB1134_1
SA

FIGURE C-49. SIMULATOR TEMP/SPEED APU TEST SET, H296B-1 (SHEET 1 OF 6)

CALIBRATION REQUIREMENTS: (CONT)**EQUIPMENT REQUIRED**

- Frequency Generator, Wavetek 130, 0 to 6K Hz (para 5-8), $\pm 0.05\%$ of setting for 10 minutes
- Frequency Counter, General Radio Co. 1192, dc to 32 megaHz, ± 1 count
- Oscilloscope, Hewlett-Packard Co. 130C, sweep: 0.1 ms / cm $\pm 3\%$, vertical: 1v / cm $\pm 3\%$
- Digital Multimeter, Data Technology Corp. 370, 100 mvdc, $\pm 0.003\%$ rdng $\pm 0.004\%$ fsc, 100.000 ohms, $\pm 0.006\%$ rdng $\pm 0.004\%$ fsc
- Ice-Bath Reference Junction, Howell Instruments BH14106, $\pm 0.25^\circ\text{C}$
- Voltage Reference, General Resistance, 0 to 50 mvdc, $\pm 0.0025\%$ of setting $+5\text{uv}$

CALIBRATION PROCEDURE**Inspect**

1. Inspect test set for physical damage, dirt, loose, and broken knobs. Clean and repair as required.

CALIBRATION**Initial Switch Positions**

1. Turn power switch to off, FINE RPM switch to 0, COARSE RPM switch to 0%, OPEN T / C-NORM switch to NORM, and LOP-HI OIL TEMP switch to NORM.

Functional Checks

1. Continuity Tests. Connect a VOM between pins N and K of receptacle J1. VOM shall show continuity when switch S3 is in NOR or HI OIL TEMP positions and shall show an open circuit when switch is in LOP position.
2. Connect VOM between pins N and M of J1. VOM shall show continuity when S3 is in NORM or LOP positions and shall show open circuit when S3 is in HI OIL TEMP position.
3. Use VOM and test cable schematics in Section VI to check cable continuity.
4. Using a 28 VDC power supply rated 1.5 amps or more, apply 28 VDC to terminals shown in Table 1. Corresponding lamps shall light.

Table 1. Lamp Test Table

RECEPTACLE J1 PIN		LAMP	S3 POSITION
+ 28 VDC	28 VDC RTN		
S	T	L1	NORM
P	T	L2	NORM
R	T	L3	NORM
V	W	L4	NORM
b&c&N	T	L5	HI OIL TEMP
b&c&N	T	L6	LOP

5. Power Up Tests. Connect 28 VDC power supply to J1, N(+) and T(-). Also jumper +28 VDC to pins b and c. Connect a jumper (see note) between J1-B and J1-a.

NOTE:

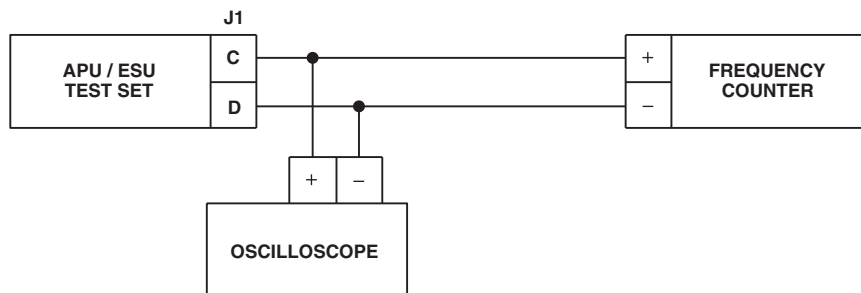
Jumper should be 1-inch or less in length.

6. Turn POWER switch on. Power lamp shall light.
7. Press LAMP TEST switch. Lamps L1-L6 shall light.
8. Momentarily remove 28 VDC from J1, pin b. L5 shall light.
9. Momentarily remove 28 VDC from J1, pin c. L6 shall light.

FB1134_2B
SA**FIGURE C-49. SIMULATOR TEMP/SPEED APU TEST SET, H296B-1 (SHEET 2 OF 6)**

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION (CONT)****Accuracy Checks**

1. **Timer Accuracy.** Observe the second hand of a watch and press Start / Stop-Reset switch to start timer. Press switch again to stop timer after 95 seconds have elapsed on watch. Timer shall read 95 ± 3 seconds. Press switch again to reset timer. All timer display segments shall be operative.
2. Remove jumper from J1-B to J1-a and connect it from J1-B to J1-X. See note, step 4, power up test.
3. Repeat step 1.
4. **Frequency Output Accuracy.** Make frequency output test setup as in view 1.

**View 1. Frequency Output Test Setup**

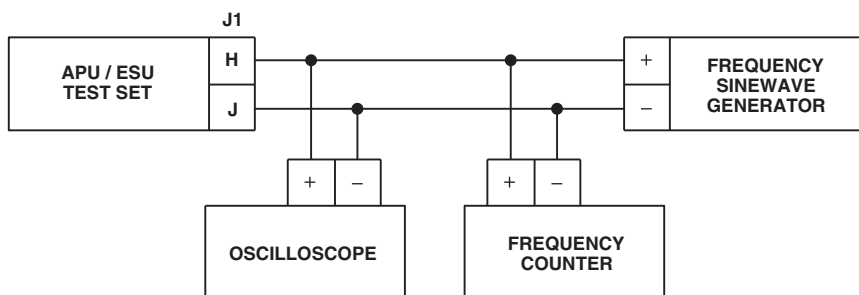
5. Check output frequencies of Table 2. (4666 Hz = 100% RPM) against the switch positions. Output voltage at 70% rpm shall be at least 8 volts peak-to-peak.
6. Remove jumper from J1-B to J1-X and connect it from J1-B to J1-a. See note, step 4, power up test.
7. Check output frequencies of Table 2 (4800 Hz = 100% RPM) against the switch positions. Output voltage at 70% rpm shall be at least 8 volts peak-to-peak.
8. **Frequency Input Accuracy.** Jumper J1-Z to J1-Y. See note, step 4, power up test.
9. Disconnect frequency output test setup from test set and make frequency input test setup as in View 2.
10. Check %RPM meter accuracy (4800 Hz = 100% RPM) per Table 3. Lightly tap meter before taking a reading to minimize pointer friction.

Table 2. Frequency Output Test Table

COARSE SWITCH S2	FINE SWITCH F1	OUTPUT FREQUENCY 4666 Hz = 100% RPM (Hz $\pm$ TOL)	OUTPUT FREQUENCY 4800 Hz = 100% RPM (Hz $\pm$ TOL)
0%	any position	0 $\pm$ 0.00	0 $\pm$ 0.00
5%	0	233.3 $\pm$ 0.47	240 $\pm$ 0.48
5%	+5	466.6 $\pm$ 0.93	480 $\pm$ 0.96
5%	-4	46.66 $\pm$ 0.09	48 $\pm$ 0.096
5%	-5	46.66 $\pm$ 0.09	48 $\pm$ 0.096
15%	0	699.9 $\pm$ 1.40	720 $\pm$ 1.44
70%	0	3266.2 $\pm$ 6.53	3360 $\pm$ 6.72
90%	0	4199.4 $\pm$ 8.40	4320 $\pm$ 8.64
110%	0	5132.6 $\pm$ 10.27	5280 $\pm$ 10.56
110%	-5	4899.3 $\pm$ 9.80	5040 $\pm$ 10.08
110%	-4	4945.96 $\pm$ 9.89	5088 $\pm$ 10.18
110%	-3	4992.62 $\pm$ 9.99	5136 $\pm$ 10.27
110%	-2	5039.28 $\pm$ 10.08	5184 $\pm$ 10.37
110%	-1	5085.94 $\pm$ 10.17	5232 $\pm$ 10.46
110%	+1	5179.26 $\pm$ 10.36	5328 $\pm$ 10.66
110%	+2	5225.92 $\pm$ 10.45	5376 $\pm$ 10.75
110%	+3	5272.58 $\pm$ 10.55	5424 $\pm$ 10.85
110%	+4	5319.24 $\pm$ 10.64	5472 $\pm$ 10.94
110%	+5	5365.9 $\pm$ 10.73	5520 $\pm$ 11.04

FB1134_3A
SA**FIGURE C-49. SIMULATOR TEMP/SPEED APU TEST SET, H296B-1 (SHEET 3 OF 6)**

CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION (CONT)
Accuracy Checks (cont)

View 2. Frequency Input Test Setup

11. Remove jumper from J1–Z to J1–Y.
12. Check % RPM meter accuracy (4666 Hz = 100% RPM) per Table 3. Lightly tap meter before taking a reading to minimize pointer friction.

Table 3. Frequency Input Test Table

FREQUENCY 4800 Hz = 100% RPM (3V P-P MIN)	FREQUENCY 4666 Hz = 100% RPM (3V P-P MIN)	% RPM METER (% RPM $\pm$ 2% RPM)
0	0	0
480	466.6	10
960	933.2	20
1440	1399.8	30
1920	1866.4	40
2400	2333.0	50
2880	2799.6	60
3360	3266.2	70
3840	3732.8	80
4320	4199.4	90
4800	4666.0	100
5280	5132.6	110

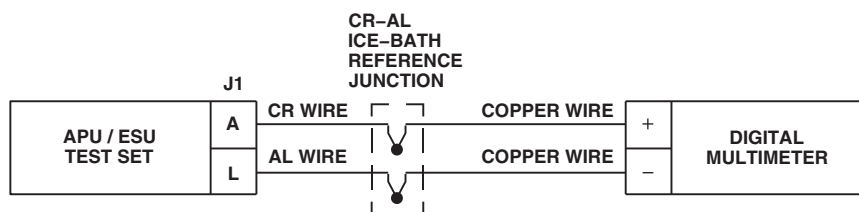
13. Temperature Output Accuracy. Disconnect frequency input test setup from test set and make temperature output test setup as in View 3.
14. Use Table 4 to check the temperature output voltages against the TEMP OUTPUT dial settings.

FB1134_4
SA

FIGURE C-49. SIMULATOR TEMP/SPEED APU TEST SET, H296B-1 (SHEET 4 OF 6)

CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION (CONT)
Accuracy Checks (cont)

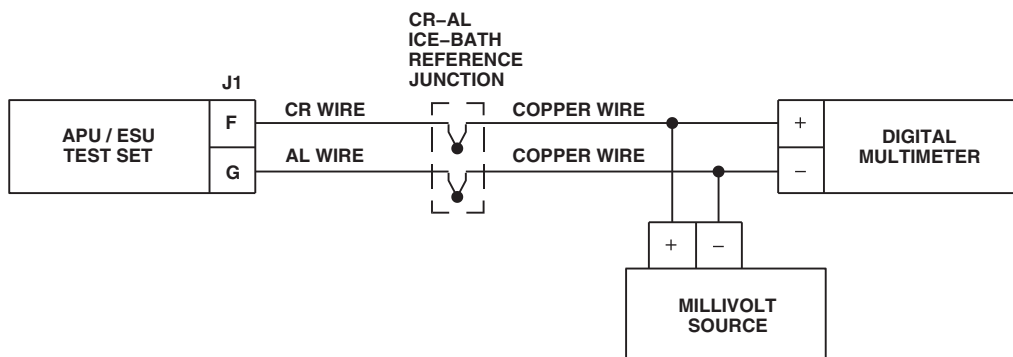


View 3. Temperature Output Test Setup

Table 4. Temperature Output Test Table

TEMP OUTPUT (°C)	TEMPERATURE OUTPUT (MVDC ± 0.21)
400	16.40
500	20.65
600	24.91
700	29.14
800	33.30

15. Momentarily position switch S5 to OPEN T / C position. Digital multimeter shall display 0 mvdc (open circuit).
16. Temperature Input Accuracy. Disconnect temperature output test setup from test set and make temperature input test setup as in View 4.



View 4. Temperature Input Test Setup

FB1134_5
SA

FIGURE C-49. SIMULATOR TEMP/SPEED APU TEST SET, H296B-1 (SHEET 5 OF 6)

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION (CONT)****Accuracy Checks (cont)**

17. Check TEMP °C x 100 meter accuracy per Table 5. Lightly tap meter before taking a reading to minimize pointer friction.

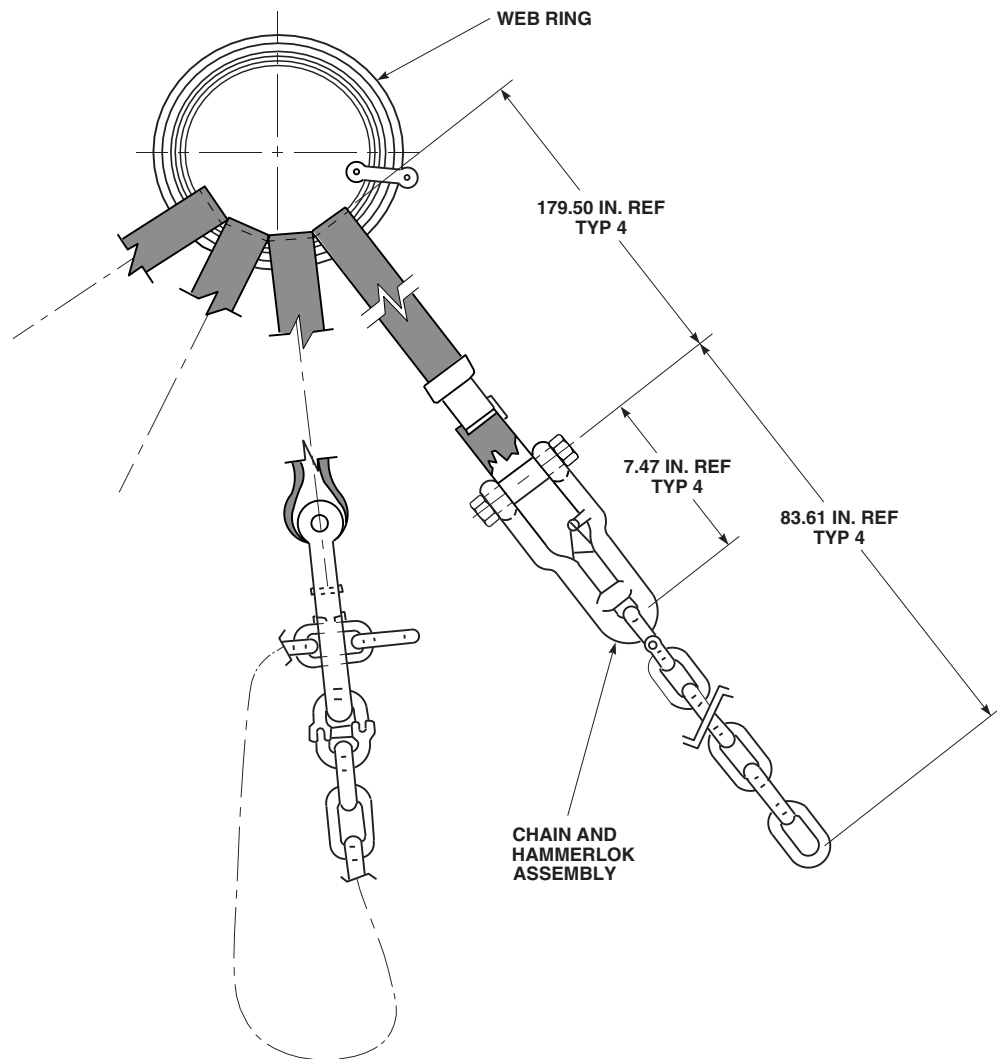
Table 5. Temperature Input Test Table

MILLIVOLT OUPUT (MVDC)	TEMP °C METER (°C ± 20 °C)
0.00	0
4.10	100
8.13	200
12.21	300
16.40	400
20.65	500
24.91	600
29.14	700
33.30	800
37.36	900
41.31	1000
45.16	1100
48.89	1200

18. Set all POWER switches to OFF and disconnect the test set-up.

19. Clean and secure test equipment per prescribed lab practice and affix the appropriate calibration label.

FB1134_6
SA**FIGURE C-49. SIMULATOR TEMP/SPEED APU TEST SET, H296B-1 (SHEET 6 OF 6)**



DESCRIPTION: The cargo sling assembly is used to transport an external load of cargo or equipment. The cargo sling assembly has a load capacity of 15000 pounds.

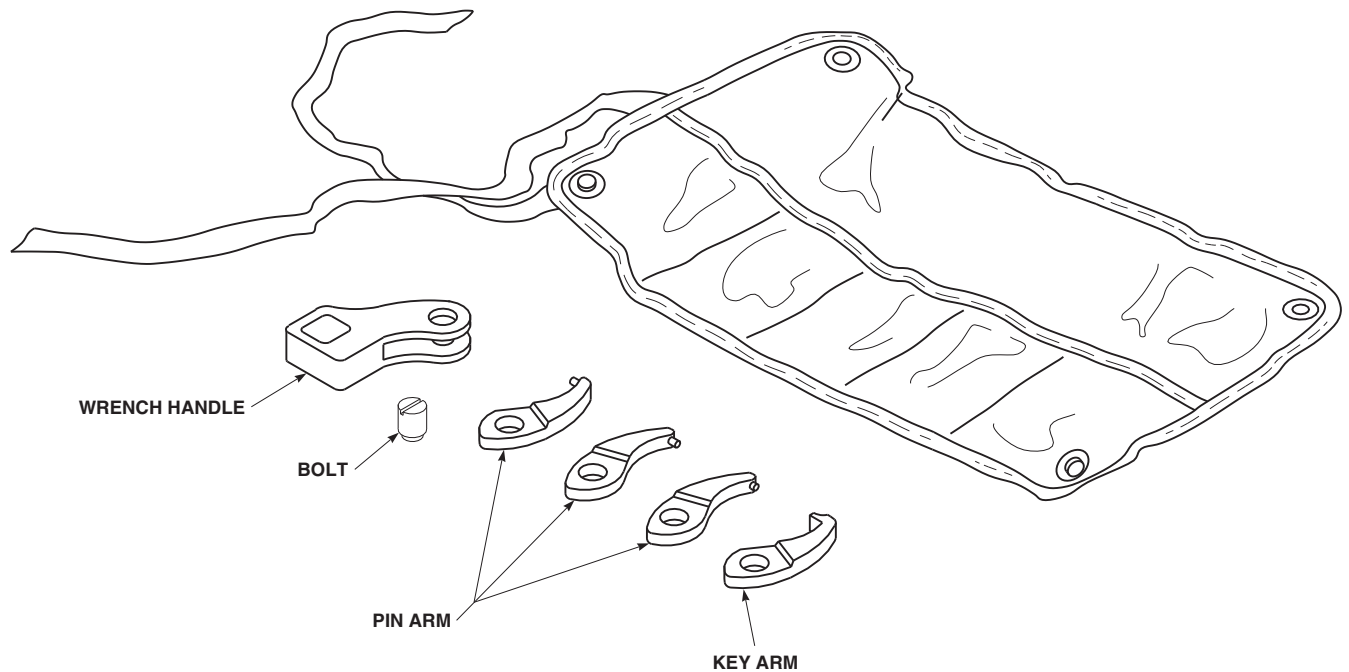
POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1135A
SA

FIGURE C-50. CARGO SLING ASSEMBLY, 3900061 OR XB-4-20-16

AN PART NO.	ITEM	PIN DIMENSION	
		LENGTH ± .005	DIA ± .003
AN8514-1	COMPLETE SET (AN8514-2 TO AN8514-7 INCL)		
AN8514-2	WRENCH HANDLE		
AN8514-3	BOLT		
AN8514-4	.09 PIN ARM	.060	.089
AN8514-5	.12 PIN ARM	.120	.121
AN8514-6	.19 PIN ARM	.190	.183
AN8514-7	KEY ARM		



DESCRIPTION: The spanner wrench set is used on main gear box and main rotor head to remove bearing seal retaining nuts.

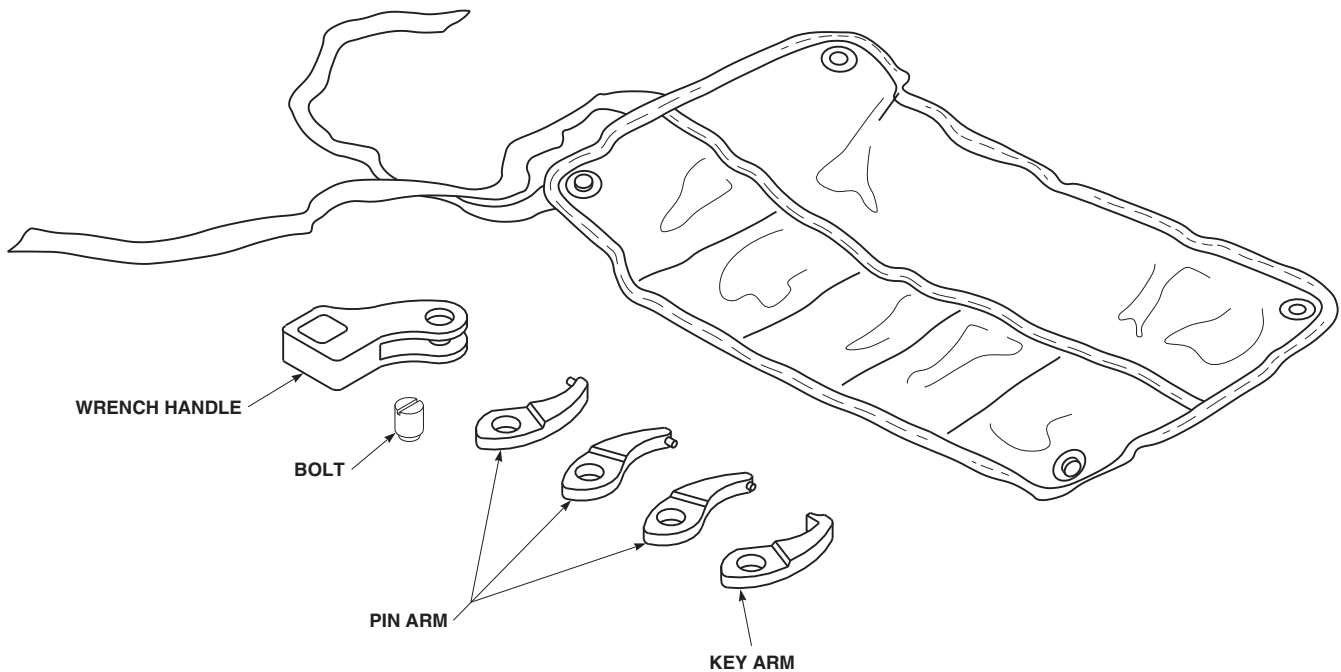
POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1031
SA

FIGURE C-51. SPANNER WRENCH SET, AN8514-1

AN PART NO.	ITEM	PIN DIMENSION	
		LENGTH ±.005	DIA ±.003
AN8515-1	COMPLETE SET (AN8515-2 TO AN8515-7 INCL)		
AN8515-2	WRENCH HANDLE		
AN8515-3	BOLT		
AN8515-4	.16 PIN ARM	.160	.152
AN8515-5	.25 PIN ARM	.190	.246
AN8515-6	.31 PIN ARM	.250	.308
AN8515-7	KEY ARM		



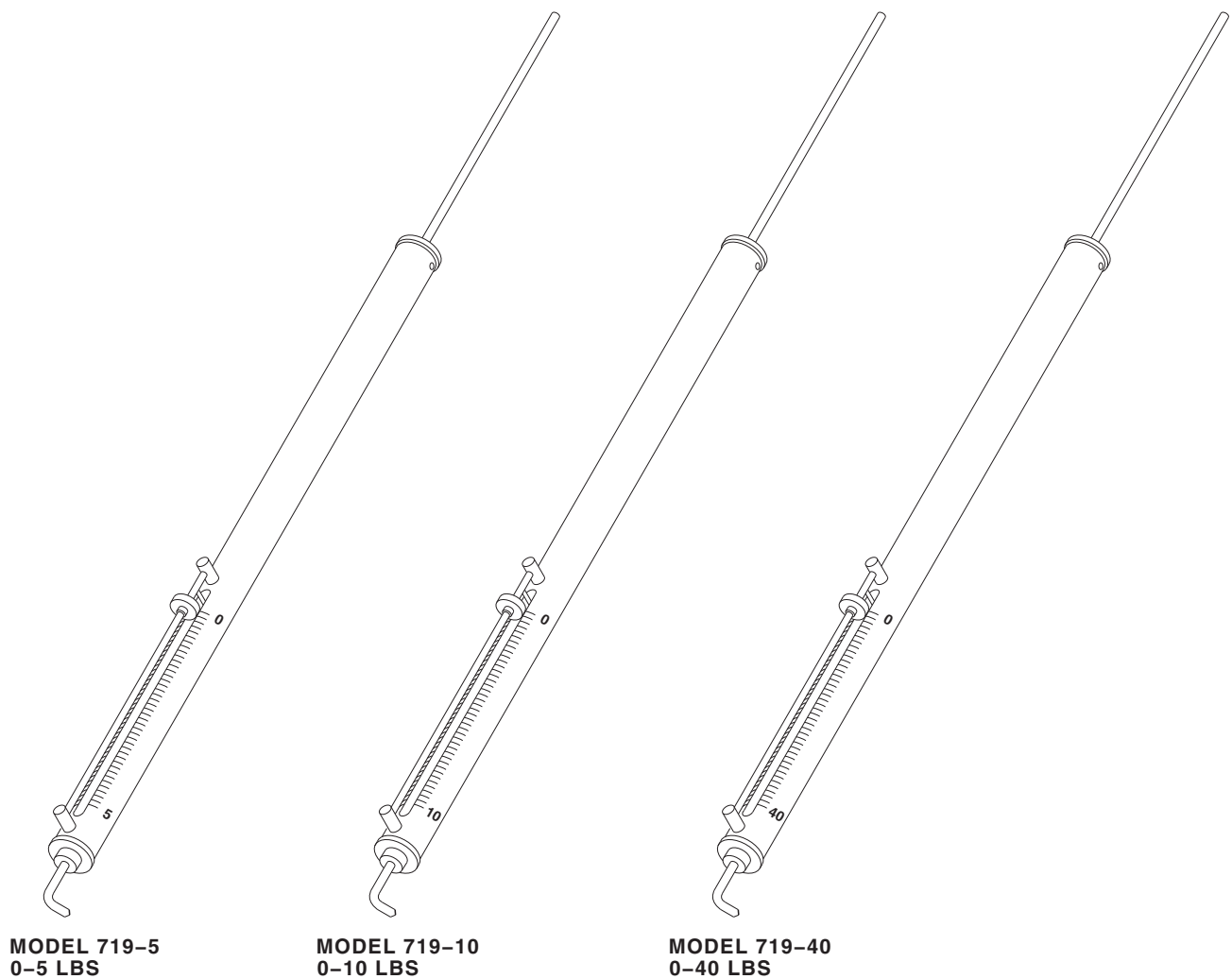
DESCRIPTION: The spanner wrench set is used on main gear box and main rotor head to remove bearing seal retaining nuts.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1032
SA

FIGURE C-52. SPANNER WRENCH SET, AN8515-1



DESCRIPTION: The spring testers are portable gages in a variety of sizes, the three described have capacity of 0-5 lbs in graduations of 1 oz., 0-10 lbs in graduations of 2 oz., and 0-40 lbs in graduations of 8 oz. The spring testers are adapted to a variety of uses.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS:

FREQUENCY

Spring testers must be calibrated every 27 weeks regardless of being used or not.

FB1035_1
SA

FIGURE C-53. SPRING TESTERS, 719-5, 719-10, 719-40 (SHEET 1 OF 2)

CALIBRATION REQUIREMENTS: (CONT)

EQUIPMENT REQUIRED

- Dead Weights $\pm .01$ LBS.

INSPECTION

Inspect spring tester for any obvious damage, dents, nicks, or missing parts. Check push rod for binding; scale graduations for clear readability.

CALIBRATION

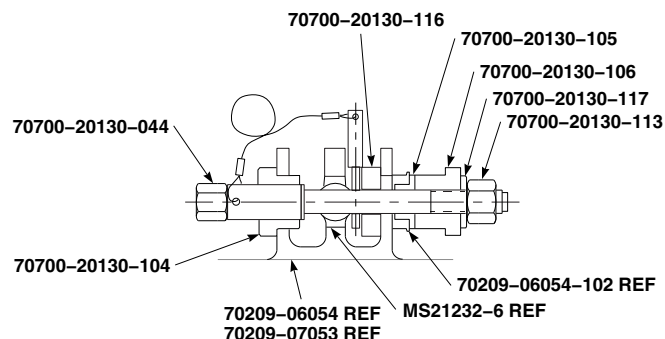
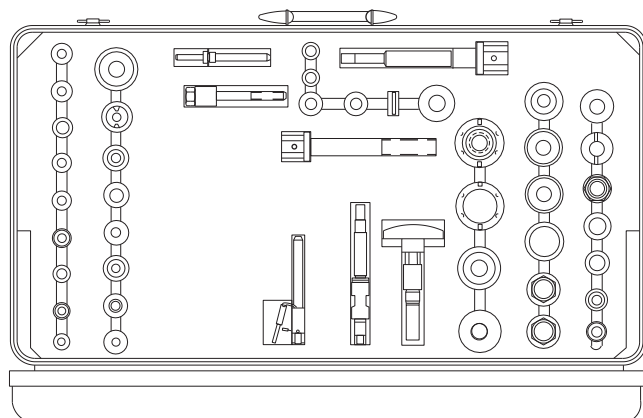


Do not load spring tester past its operating range.

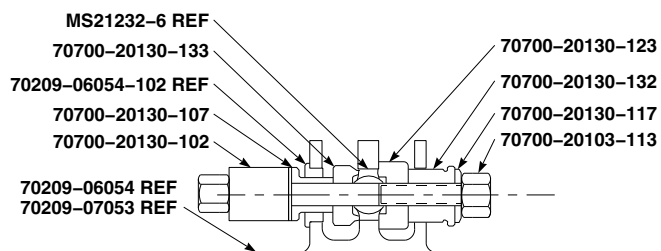
1. Operate spring tester through entire scale range, checking for any binding.
2. Attach dead weights to spring tester and check scale range at five points throughout scale. Scale shall not deviate more than one minor graduation from the dead weight nominal value. Adjust as required.
3. Adjust spring tester by use of knurled end cap on spring tester. Recheck calibration.

FB1035_2
SA

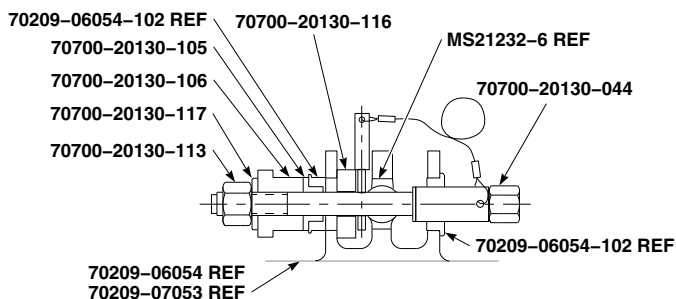
FIGURE C-53. SPRING TESTERS, 719-5, 719-10, 719-40 (SHEET 2 OF 2)



**APPLICATION DIAGRAM REF
DUAL BUSHING INSTALLATION 70209-06054-102**



**APPLICATION DIAGRAM REF
(BEARING STAKING MS21232-6
ONE BUSHING REMOVED)**



**APPLICATION DIAGRAM REF
(SINGLE BUSHING INSTALLATION 70209-06054-102)**

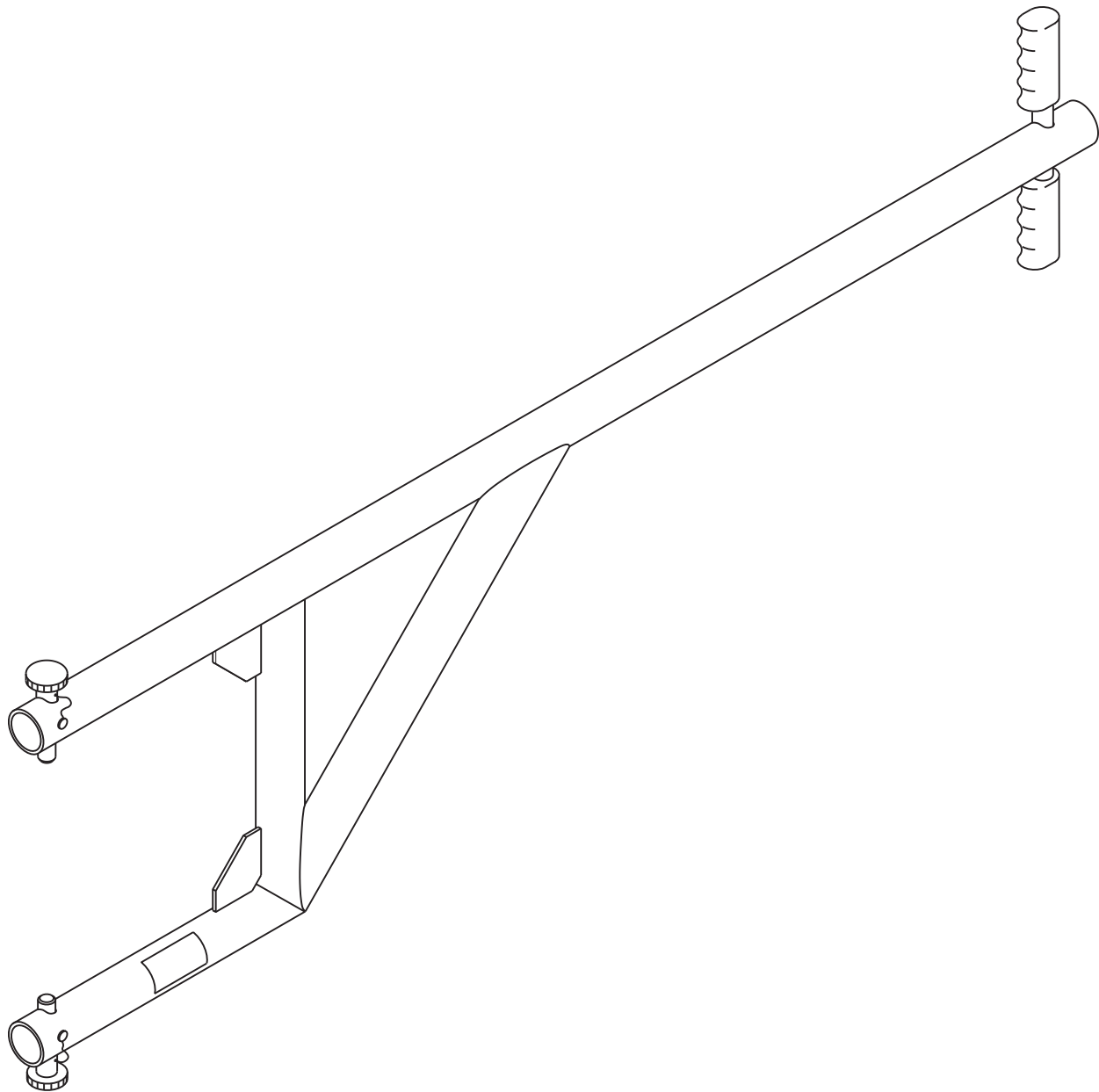
DESCRIPTION: The staking tool kit is used to remove and install bushings in stabilator fittings. The kit contains cutting tools for removing bearings and roll staking tools for installing bearings.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1137
SA

FIGURE C-54. STAKING TOOL KIT, STABILATOR FITTINGS, 70700-20129-041



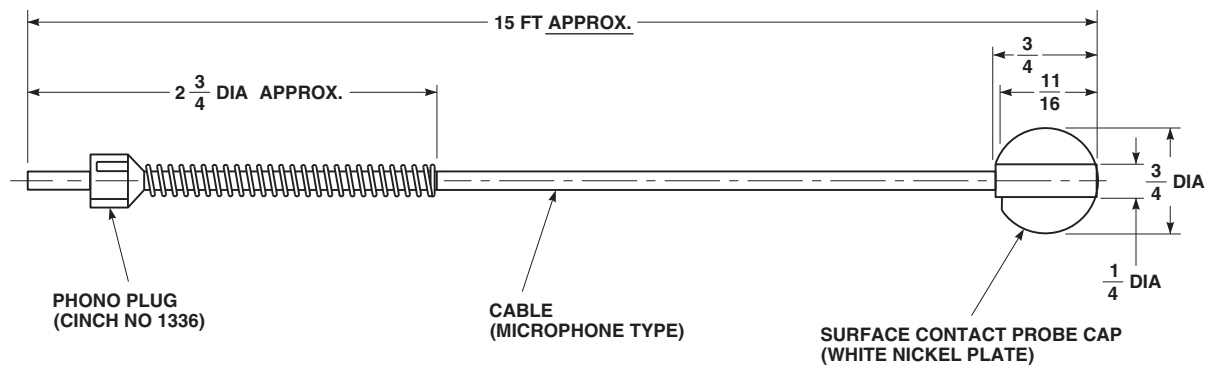
DESCRIPTION: The steering bar is used by the ground handling crew as a means of maneuvering the helicopter. The steering bar is constructed of welded aluminum tubing with tee handle.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1138
SA

FIGURE C-55. STEERING BAR, 70700-20374-041



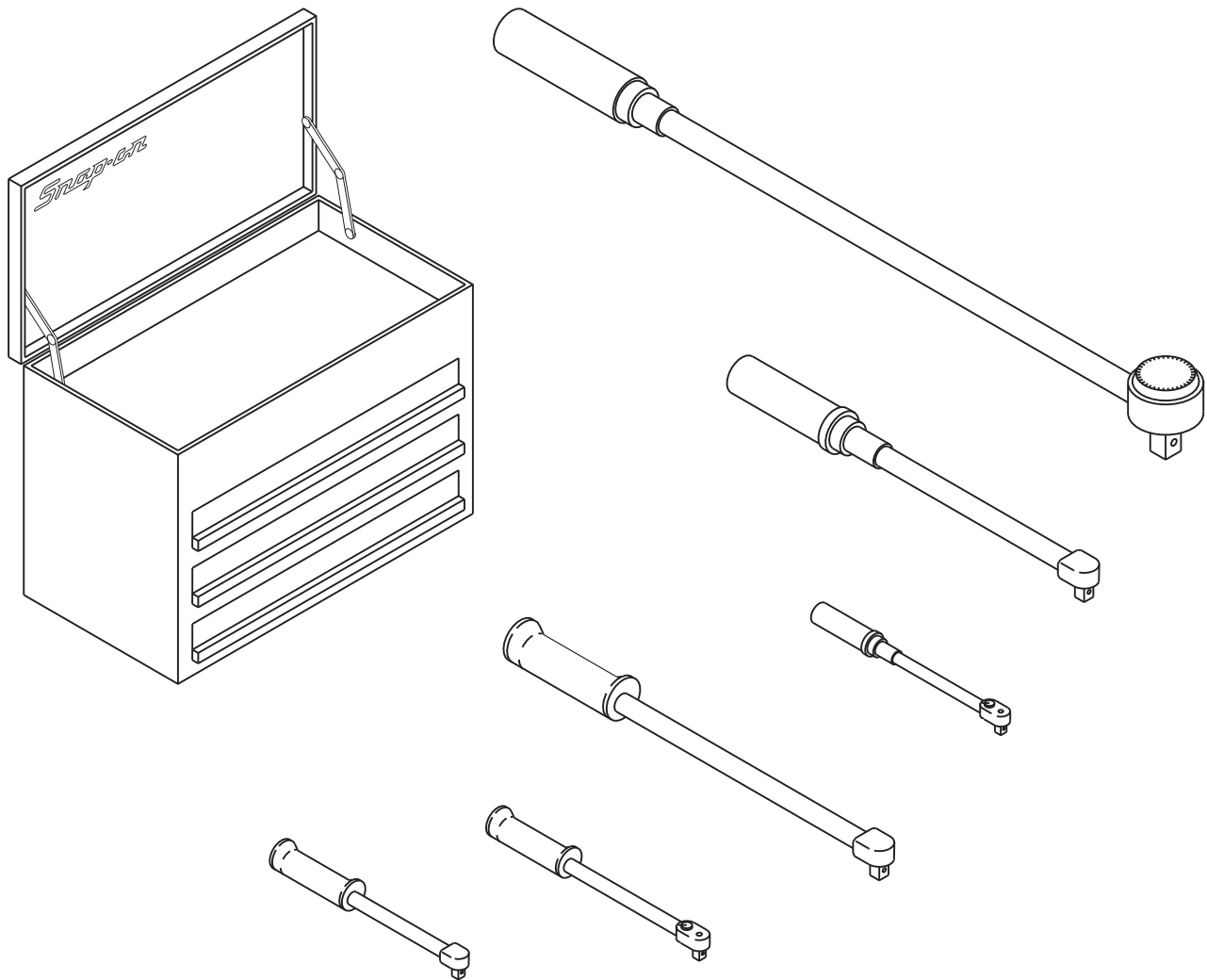
DESCRIPTION: The surface probe is used to determine if engine anti-ice and windshield anti-ice are operative within designed temperature limits. The engine inlet cycles between 100°F and 130°F minimum to 196°F maximum in operation. The windshield cycles in low mode 84°F to 110°F, high mode 90°F to 125°F.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1139
SA

FIGURE C-56. SURFACE PROBE, 00790



DESCRIPTION: The torque wrench kit will support all torque requirements to maintain the helicopter.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS:
FREQUENCY

Torque wrenches will be calibrated every 12 weeks regardless of being used or not.

EQUIPMENT REQUIRED

- Model 10 Torque Wrench Tester, Chatillon, or similar equipment, provided it has required measuring capabilities.

FB1036_1
SA

FIGURE C-57. TORQUE WRENCH (SHEET 1 OF 2)

CALIBRATION REQUIREMENTS: (CONT)**CLEANING MATERIALS**

- Isopropyl Alcohol, Item 72, Appendix D
- Machinery Towel, Item 211, Appendix D

CALIBRATION PROCEDURES**Cleaning / Inspection**

1. Clean torque wrench using isopropyl alcohol, Item 72, Appendix D. Wipe dry with machinery towel, Item 211, Appendix D.
2. Inspect torque wrench for any defects or damage. NONE ALLOWED.

Calibration

1. Set up torque wrench tester to zero.
2. Select five equally spaced calibration points on the torque wrench including zero and full scale. Record these values on a calibration work sheet.

NOTE

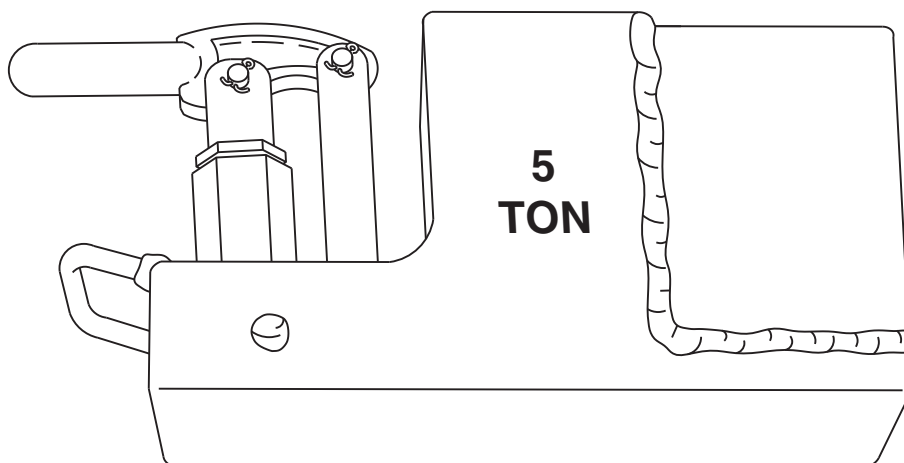
Acceptable tolerance is $\pm 3\%$ of calibration setting on torque wrench as shown in calibration work sheet example.

CALIBRATION DATA SHEET TORQUE WRENCH/DRIVER			
RANGE: 50-in. lbs			
ft lbs			
CALIBRATION SETTING	ACTUAL READING	ACCEPTANCE TOLERANCE	ADJUSTED VALUE
10		9.7–10.3	
20		19.4–20.6	
30		29.1–30.9	
40		38.8–41.2	
50		48.5–51.5	

EXAMPLE CALIBRATION WORK SHEET

3. Attach torque wrench to appropriate input on torque tester.
4. Pull torque wrench in a clockwise direction until torque wrench indicates first pre-selected calibration point. Record actual readings on calibration work sheet.
5. Remove torque wrench from torque tester and verify torque wrench zero. Adjust torque wrench to zero if required and note adjustment on calibration work sheet.
6. If torque wrench has been adjusted to zero, repeat steps 3 through 6.
7. Check remaining torque wrench calibration points and record on calibration work sheet.
8. Install calibration label on torque wrench after calibration acceptance, identified by acceptance stamp, date of calibration, and scheduled calibration due date.

FK2214_2A
SA**FIGURE C-57. TORQUE WRENCH (SHEET 2 OF 2)**



REGENT MODEL NUMBER	VERTICAL CAPACITY (TONS)	MINIMUM CLOSED HEIGHT (INCHES)	HYDRAULIC LIFT (INCHES)	SCREW EXTENSION (INCHES)	MAXIMUM EXTENDED HEIGHT (INCHES)	NET WEIGHT (LBS)	CRATED WEIGHT (LBS)	CUBIC FEET CRATED
1926-010	5	5.5	9	3	17.5	26	37	1.0

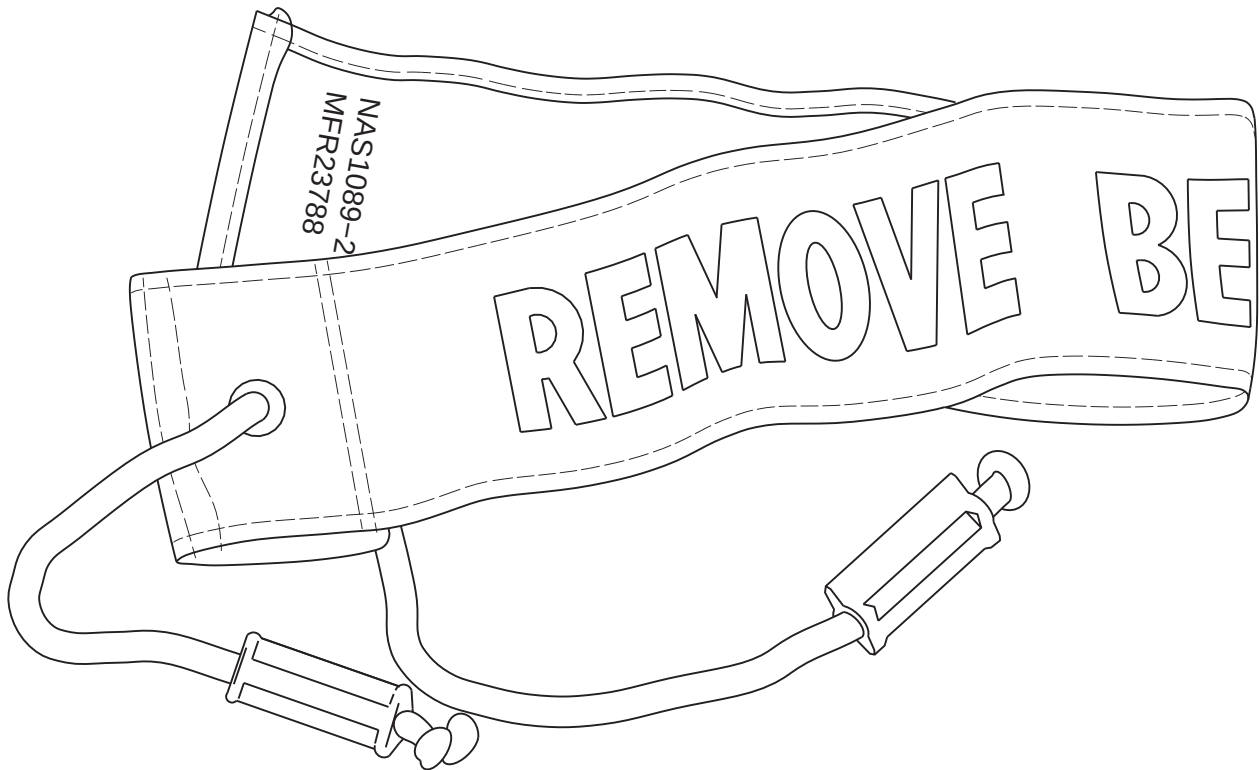
DESCRIPTION: The tail wheel jack is a hand carried jack, used for removal and replacement of tail landing gear and tail wheel assemblies.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1037
SA

FIGURE C-58. TAIL WHEEL JACK, 1926-10



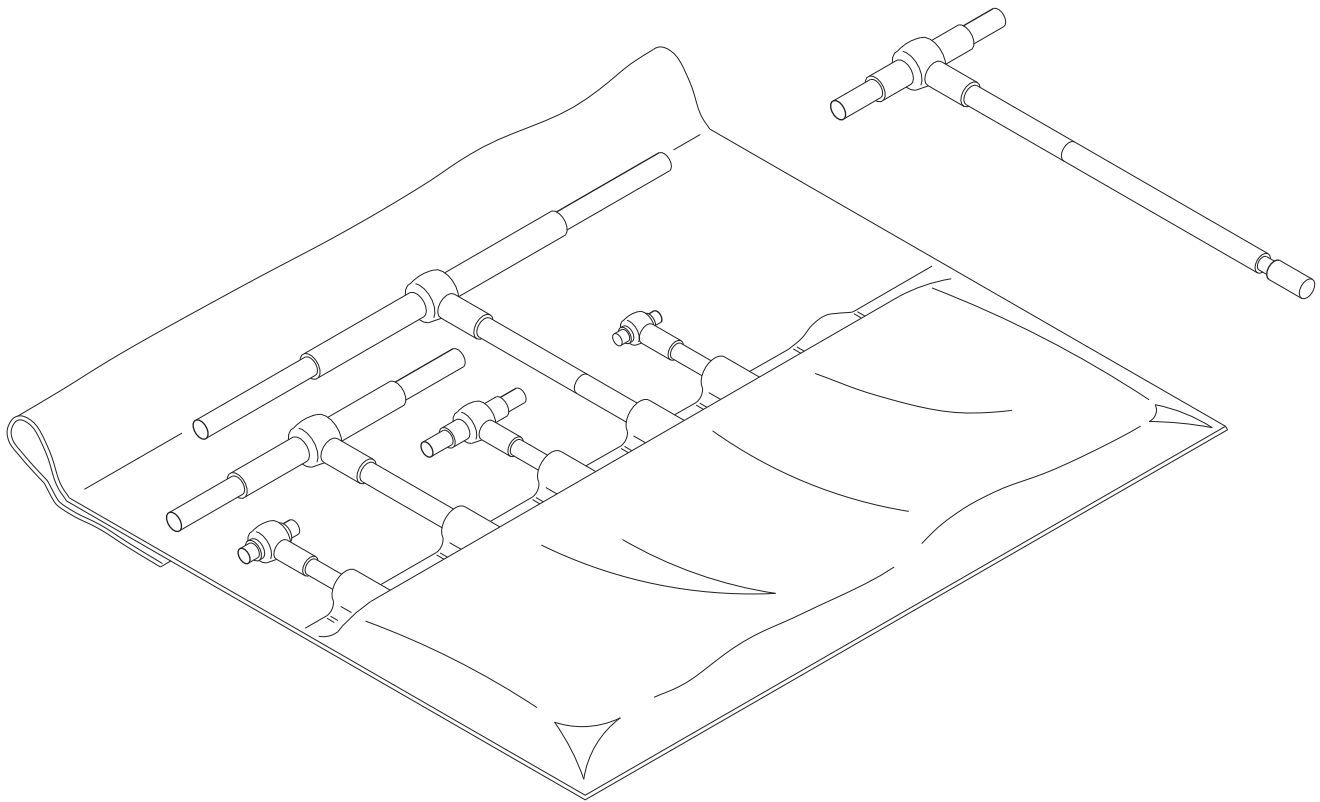
DESCRIPTION: The lockout block is composed of two phenolic blocks connected by a 16-inch rope knotted at each end, with a red warning flag to remove before flight. The lockout block is used to retain tail rotor spring pressure when rigging tail rotor system.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1038
SA

FIGURE C-59. TAIL ROTOR LOCKOUT BLOCKS, 70700-20463-041



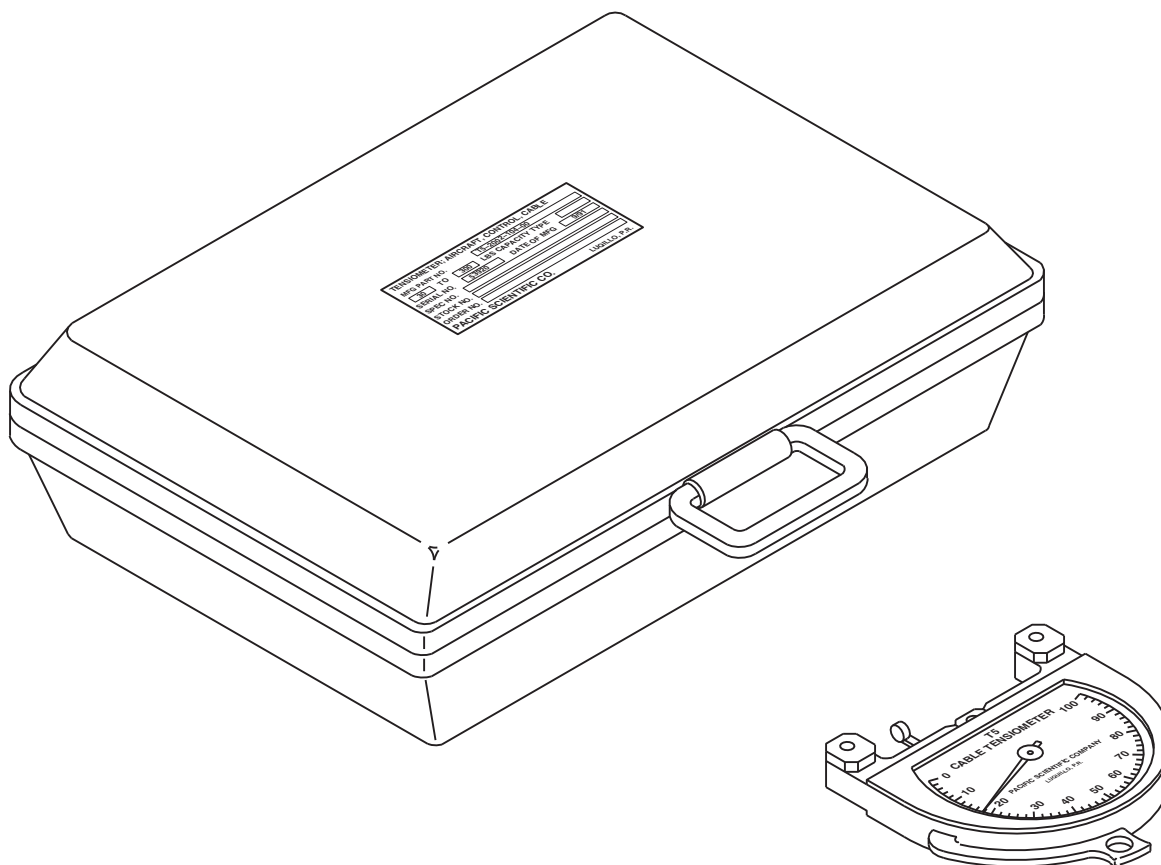
DESCRIPTION: The telescoping gage set is used for accurate measurements of inside diameters on flight controls, main, and tail rotor head components. The gage set has a measuring range of 5/16 inch to 6 inches and a measurable depth of up to 5 inches. Final hole size is obtained by measuring the contacts of the gage using micrometer or vernier calipers.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1039
SA

FIGURE C-60. TELESCOPING GAGE SET, PMF119



DESCRIPTION: The tensiometer is a small compact unit designed to determine tension on flight control and tail rotor cables when rigging helicopter, or when cables are disconnected for maintenance.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS:

FREQUENCY

Tensiometer shall be calibrated every 6 weeks regardless of being used or not.

EQUIPMENT REQUIRED

- Morehouse Dead Weight Calibrating Machine or similar equipment, provided it has required measuring capability.
- 3/32 inch Test Cable
- 3/16 inch Test Cable
- 7/16 inch Test Cable

FB1040_1
SA

FIGURE C-61. TENSIONER, T5-2002-104-00 (SHEET 1 OF 2)

CALIBRATION REQUIREMENTS: (cont)

CLEANING MATERIALS

- Isopropyl Alcohol, Item 72, Appendix D
- Machinery Towel, Item 211, Appendix D

CALIBRATION PROCEDURES

Cleaning / Inspection

1. Clean tensiometer with isopropyl alcohol, Item 72, Appendix D. Wipe dry with machinery towel, Item 211, Appendix D.
2. Inspect tensiometer for obvious damage, nicks, broken glass and full indicator range without skipping or binding.

Calibration

1. Make sure temperature in area of calibration performance is within 68°F to 73°F. Calibration equipment should stabilize for 24 hour period.

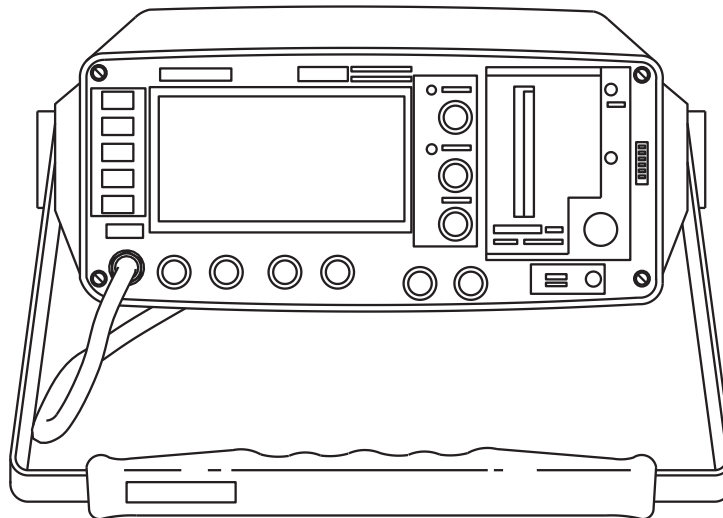
NOTE

Do not exceed tensiometer range when calibrating. Only one size cable is required for calibration of tensiometer.

2. Select test cable to match riser available with tensiometer and install test cable in dead weight calibrator.
3. Check tensiometer with dead weight calibrator set at four points. 50 lbs, 100 lbs, 150 lbs and 200 lbs.
4. Attach tensiometer to test cable and check cable tension, refer to tensiometer calibration table enclosed with tensiometer. Compare values specified at 50 lbs, 100 lbs, 150 lbs, and 200 lbs for size test cable used. Values specified shall agree with actual tensiometer indication within ± 5 counts on tensiometer.
5. If values are not as specified, adjust tensiometer as required and repeat steps 3 and 4.

FK2215_2B
SA

FIGURE C-61. TENSIO METER, T5-2002-104-00 (SHEET 2 OF 2)



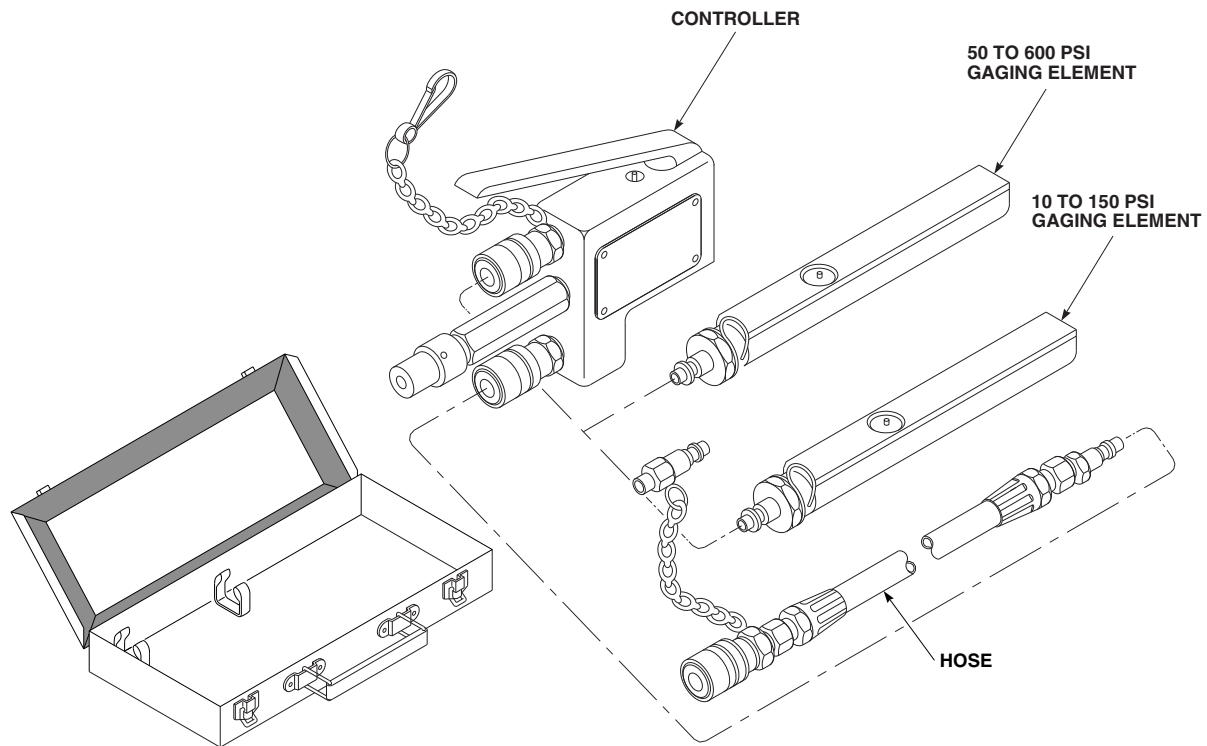
DESCRIPTION: The reflectometer is designed to check faults in metallic cables such as opens, shorts, crimps, and other defects in metallic cables to lengths of 50,000 feet. Using a process similar to radar, electrical pulses transmitted down cables under test, reflect pulses back to reflectometer, allowing user to determine nature of cable fault.

POWER REQUIREMENTS: Internal battery 12-volt, external ac power 115 / 230 volts.

CALIBRATION REQUIREMENTS: Not Applicable

FB1140
SA

FIGURE C-62. TIME DOMAIN REFLECTOMETER CABLE TESTER, 1503C



DESCRIPTION: The inflator kit is a remote-controlled, direct-reading pneumatic inflator used on helicopter tires, shock struts, and accumulators having pneumatic pressure requirements of 10 to 600 psi.

POWER REQUIREMENTS: 500 psi Nitrogen Gas Tank

CALIBRATION REQUIREMENTS:

FREQUENCY

Inflator kit shall be calibrated every 6 weeks regardless of being used or not.

FB1041_1
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FIGURE C-63. TIRE INFLATOR, M85352/1 (SHEET 1 OF 4)

CALIBRATION REQUIREMENTS: (CONT)**EQUIPMENT REQUIRED**

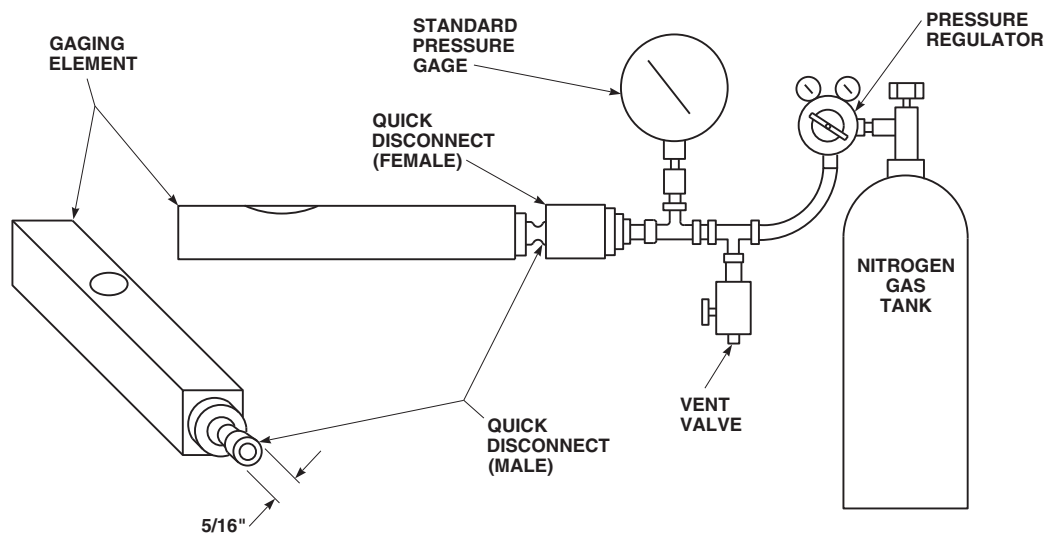
- Nitrogen Gas Tank, minimum pressure 500 psi.
- Pressure Regulator, adjustable to 200 psi.
- Inline Pressure Gage, 0–200 psi range.
- Quick Disconnects, male and female.
- Pneumatic Hose, Adapters, Vent valve, and Plugs as required.

CALIBRATION PROCEDURES**INSPECTION**

- Check gaging elements for obvious damage, broken viewing window, inoperative quick disconnects.
- Check that pressure relief hole on adjusting cylinder is not blocked or restricted.
- Check hoses for damage to quick disconnects, cuts or damage to hose.
- Clean and repair as required.

CALIBRATION

1. Set up test equipment as shown in figure below for calibration of gaging elements.

**CALIBRATION SETUP FOR GAGING ELEMENT****NOTE:**

Make sure all pressure is set to zero and make sure all test equipment controls are set to proper position before making any connections or applying pressure to items being calibrated.

FB1041_2
SA

FIGURE C-63. TIRE INFLATOR, M85352/1 (SHEET 2 OF 4)

CALIBRATION PROCEDURES: (CONT)

CALIBRATION: (CONT)

2. Connect high range 50 to 600 psi gaging element to quick disconnect after pressure gage on hose.
3. Make sure pressure regulator is closed. Open valve on nitrogen tank. Tank pressure on regulator gage shall read above 500 psi. If below 500 psi, replace tank.
4. Make sure vent valve is closed. Slowly open regulator while observing pressure on gaging element, pressure shall not exceed 200 psi on gaging element or standard pressure gage. Open vent valve to release pressure.
5. Open pressure regulator slowly, to bring pressure reading on standard pressure gage to first actual reading listed in Table 1. If system is over-pressurized, open vent valve to lower pressure below value in Table 1. Close vent valve, and open regulator slowly to bring pressure reading on gage to first actual reading listed in Table 1.

TABLE 1			
LOW RANGE GAGING ELEMENT (10 TO 150 PSI)		HIGH RANGE GAGING ELEMENT (50 TO 600 PSI)	
ACTUAL	TOLERANCE	ACTUAL	TOLERANCE
10 PSI	8 TO 12 PSI	60 PSI	54 TO 66 PSI
30 PSI	28 TO 32 PSI	100 PSI	94 TO 106 PSI
50 PSI	48 TO 52 PSI	120 PSI	114 TO 126 PSI
70 PSI	68 TO 72 PSI	140 PSI	134 TO 146 PSI
100 PSI	96 TO 104 PSI	160 PSI	154 TO 166 PSI
130 PSI	126 TO 134 PSI	180 PSI	174 TO 186 PSI
150 PSI	146 TO 154 PSI	200 PSI	194 TO 206 PSI

6. Check pressure on standard pressure gage and on gaging element. Tap both gages with finger to reduce any mechanical friction in gages.
7. With desired pressure readings on standard gage and gaging element, record readings. Repeat procedure for remaining values in Table 1.
8. When check is complete, close regulator and tank valves. Open vent valve, and remove gaging element.
9. Install low range gaging element 10 to 150 psi onto test equipment and repeat steps 1 through 8 using values in Table 1.

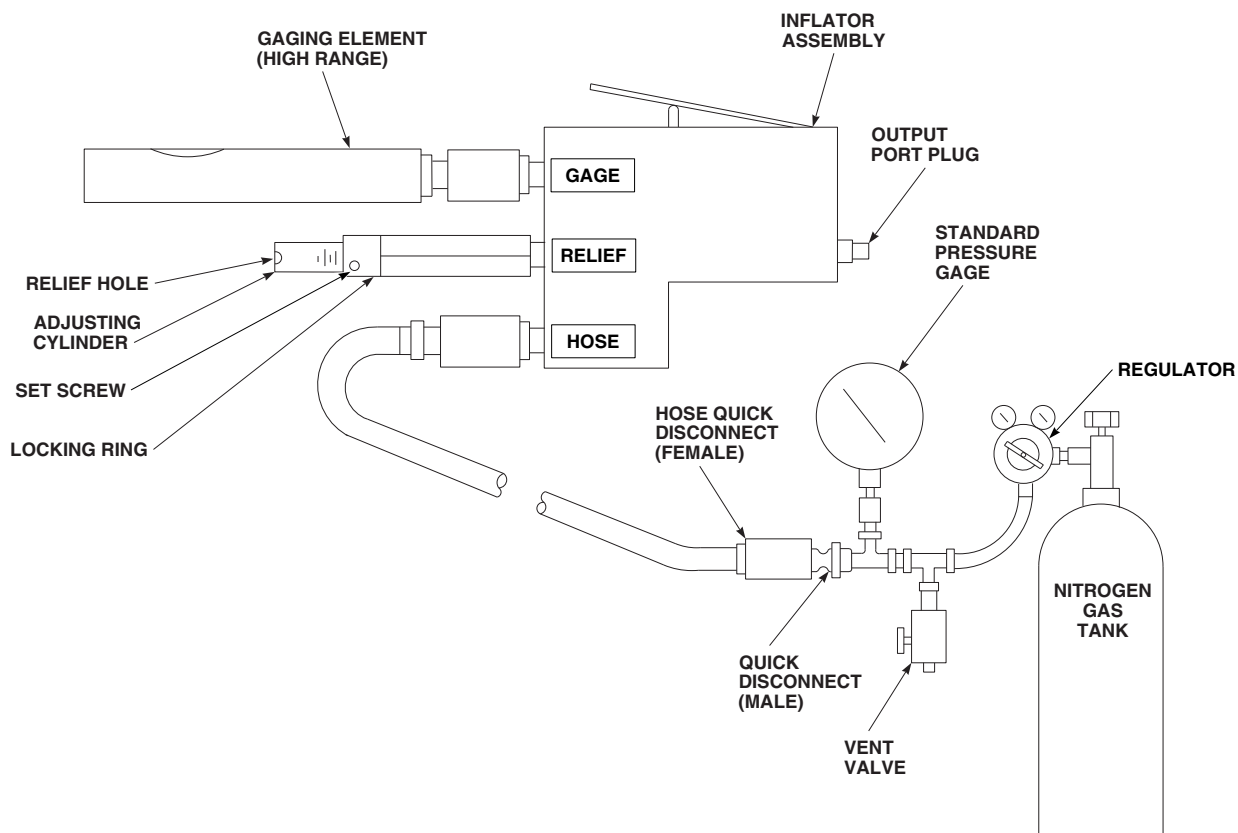
FB1041_3
SA

FIGURE C-63. TIRE INFLATOR, M85352/1 (SHEET 3 OF 4)

CALIBRATION PROCEDURES: (CONT)

ADJUSTMENT AND CALIBRATION OF RELIEF VALVE

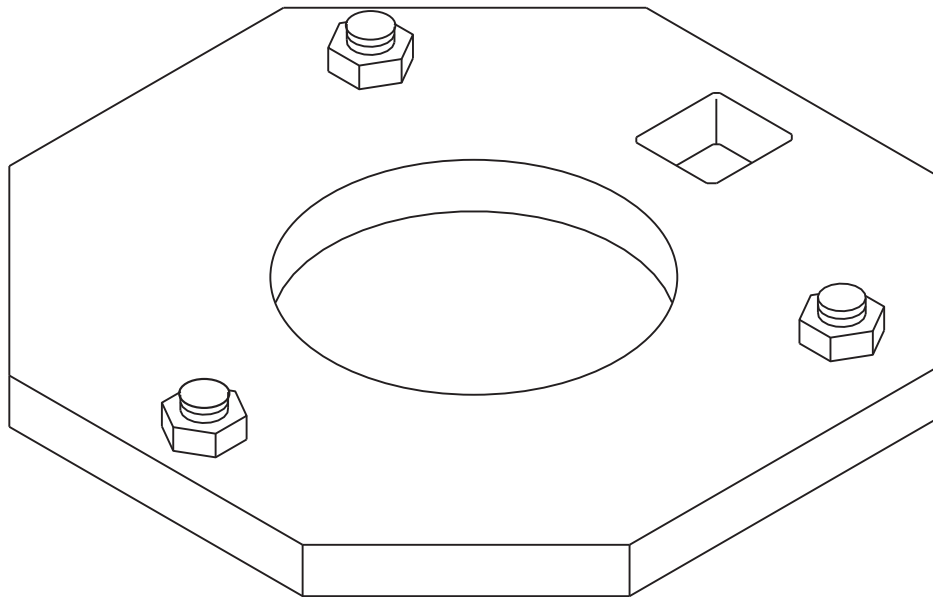
1. Set up test equipment as shown in figure below for adjustment and calibration of inflator assembly relief valve.



2. Remove adapter from output side of inflator assembly and install plug. Install high range gaging element, 50 to 600 psi, to inflator assembly.
3. Close vent valve and open valve on nitrogen tank. Open pressure regulator until 200 psi is read on standard pressure gage and gaging element.
4. Using proper hex head wrench, loosen allen head set screw and relief valve locking ring. Screw relief valve adjusting cylinder in or out, until valve relief hole begins to leak pressure, tighten set screw on locking ring.
5. Open vent valve and release pressure. Close vent valve and retest valve for pressure leakage at the same valve as in step 4.
6. Open vent valve to release pressure, remove all test equipment.
7. Install limited use calibration sticker, stating calibration limited to 200 psi maximum pressure.

FB1041_4A
SA

FIGURE C-63. TIRE INFLATOR, M85352/1 (SHEET 4 OF 4)



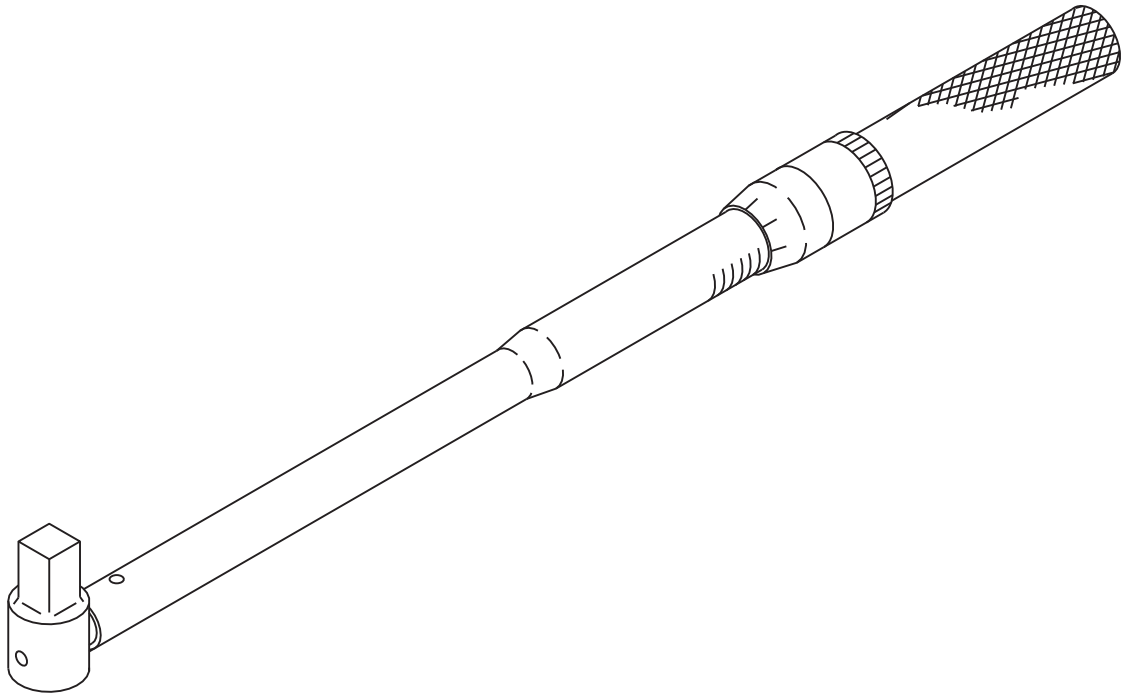
DESCRIPTION: The torque reactor is a machined 0.500 inch steel plate, 6.12 inches square. A 2.670-inch diameter hole thru center of reactor provides access for 70700-20687-101 wrench to reach nut. There are three equally spaced holes that mate with hole pattern on flange. The torque reactor is used to remove and install the nut that retains the flange against shoulder of input or output shafts.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1042
SA

FIGURE C-64. TORQUE REACTOR, 70700-20688-041



DESCRIPTION: The torque wrench is used to torque pylon attach bolts. The torque wrench is a click type wrench with a torque range of 700 to 1600 inch-pounds in 10-pound graduations.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS:

FREQUENCY

Torque wrenches will be calibrated every 24 weeks regardless of being used or not.

EQUIPMENT REQUIRED

- Model 10 torque wrench tester, Chatillon, or similar equipment, provided it has required measuring capabilities.

CLEANING MATERIALS

- Isopropyl Alcohol, Item 72, Appendix D
- Machinery Towel, Item 211, Appendix D

FB1043_1B
SA

FIGURE C-65. TORQUE WRENCH, PYLON FOLD, 28420 (SHEET 1 OF 2)

CALIBRATION REQUIREMENTS: (cont)

CALIBRATION PROCEDRES

Cleaning / Inspection

1. Clean torque wrench using isopropyl alcohol, Item 72, Appendix D. Wipe dry with machinery towel, Item 211, Appendix D.
2. Inspect torque wrench for any defects or damage. **NONE ALLOWED.**

Calibration

1. Set up torque wrench tester to zero.
2. Select five equally spaced calibration points on the torque wrench including zero and full scale. Record these values on a calibration work sheet.

NOTE

Acceptable tolerance is $\pm 3\%$ of calibration setting on torque wrench as shown in calibration work sheet example.

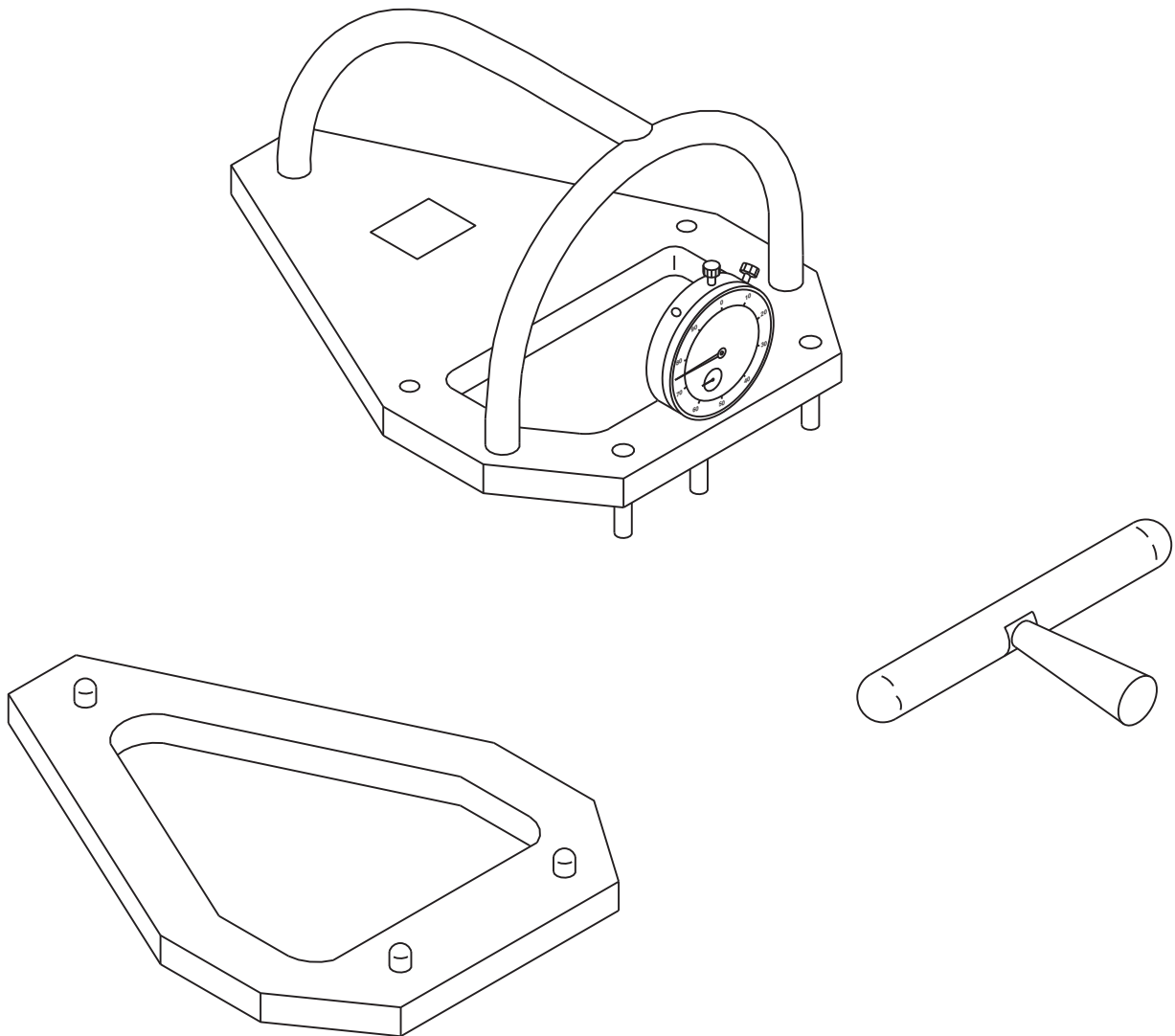
CALIBRATION DATA SHEET TORQUE WRENCH/DRIVER			
RANGE: 50–in. lbs			
ft lbs			
CALIBRATION SETTING	ACTUAL READING	ACCEPTANCE TOLERANCE	ADJUSTED VALUE
10		9.7–10.3	
20		19.4–20.6	
30		29.1–30.9	
40		38.8–41.2	
50		48.5–51.5	

EXAMPLE CALIBRATION WORK SHEET

3. Attach torque wrench to appropriate input on torque tester.
4. Pull torque wrench in a clockwise direction until torque wrench indicates first pre-selected calibration point. Record actual readings on calibration work sheet.
5. Remove torque wrench from torque tester and verify torque wrench zero. Adjust torque wrench to zero if required and note adjustment on calibration work sheet.
6. If torque wrench has been adjusted to zero, repeat steps 3 through 5.
7. Check remaining torque wrench calibration points and record on calibration work sheet.
8. Install calibration label on torque wrench after calibration acceptance, identified by acceptance stamp, date of calibration, and scheduled calibration due date.

FB1043_2C
SA

FIGURE C-65. TORQUE WRENCH, PYLON FOLD, 28420 (SHEET 2 OF 2)



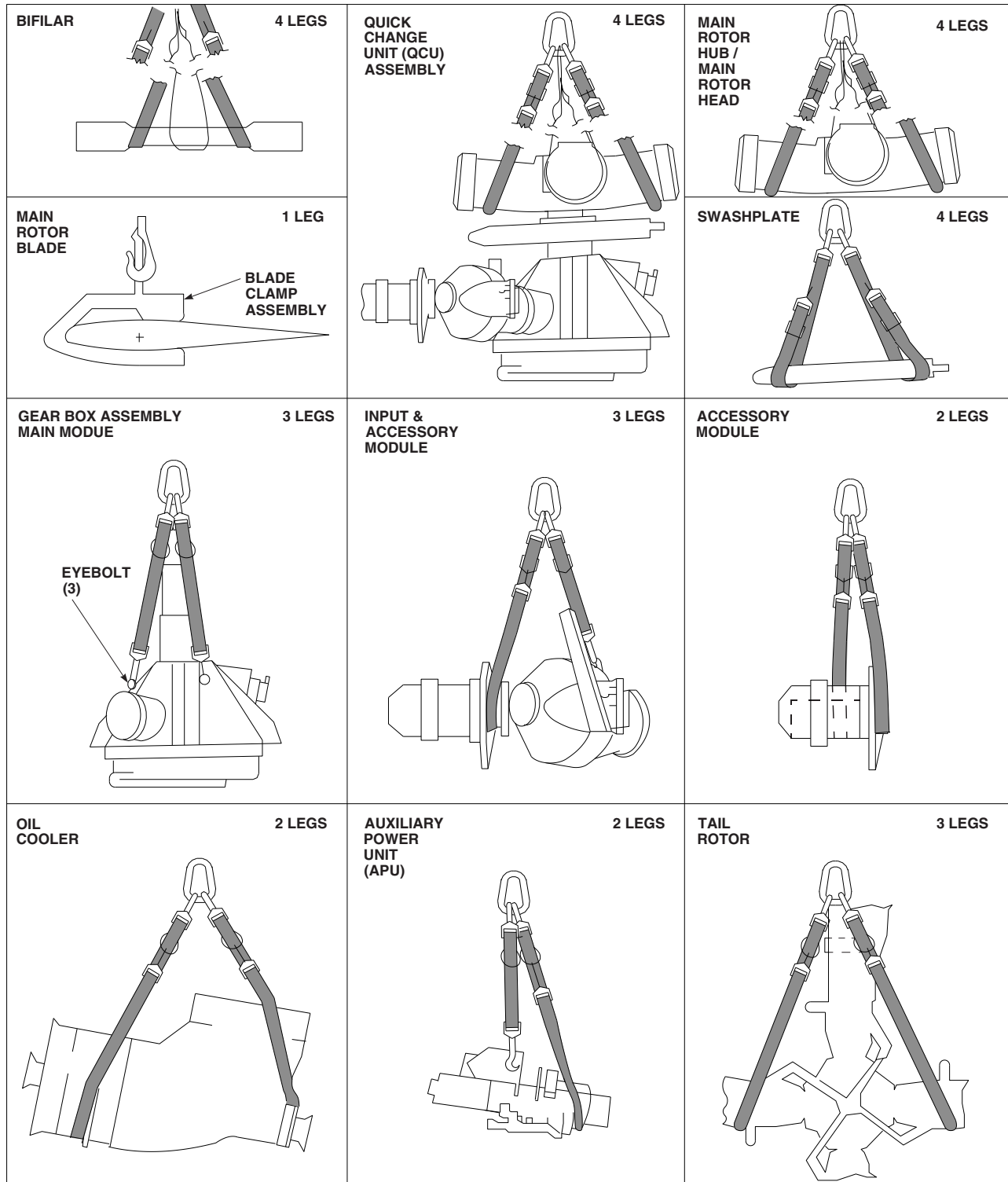
DESCRIPTION: The trim tab adjustment set is required to adjust the trailing edge trim tab when setting main rotor blade pretrack.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB1044
SA

FIGURE C-66. TRIM TAB ADJUSTMENT SET, 70700-20308-041



FB1141_1A
SA

FIGURE C-67. UNIVERSAL HOISTING SLING ASSEMBLY, 70700-20320-045 (SHEET 1 OF 2)

DESCRIPTION: The universal hoisting sling assembly is used to remove and install components on helicopters. The universal hoisting sling assembly is adaptable to items being lifted by removing one or more straps (legs) to adjust for the different components.

POWER REQUIREMENTS: Not Applicable

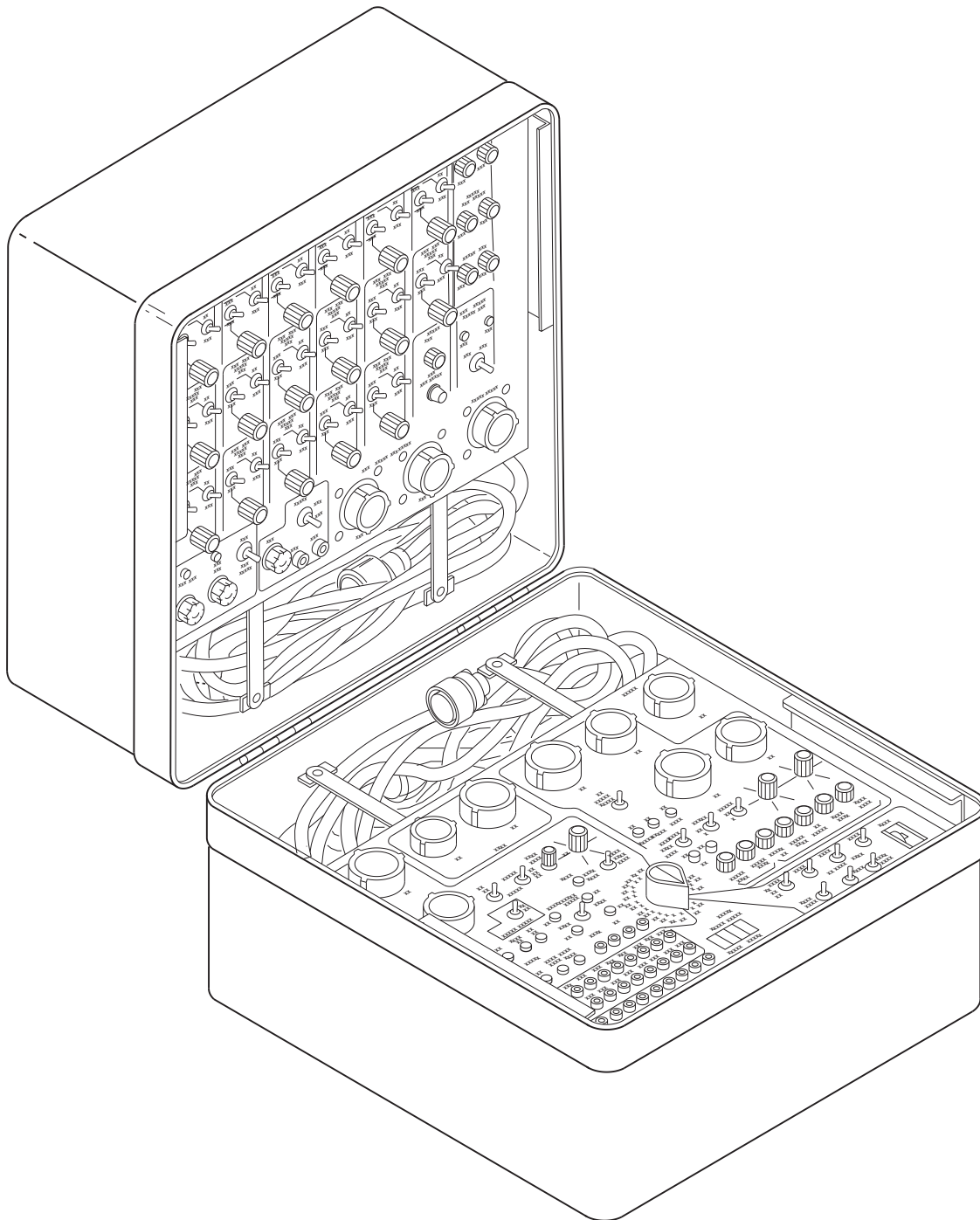
CALIBRATION REQUIREMENTS: Not Applicable

FB1141_2A
SA

FIGURE C-67. UNIVERSAL HOISTING SLING ASSEMBLY, 70700-20320-045 (SHEET 2 OF 2)

Change 13

C-111



DESCRIPTION: The VIDS bench test set is a two part instrument comprised of a simulator and a unit tester. The simulator is primarily a system tester. The simulator provides the power, switches, variable resistors and indicators to operate and test the VIDS. The switches and variable resistors mounted to the front panel allow for operator selection and control of the simulated sensor signal outputs normally provided by helicopter engine sensors. The outputs of the VIDS that normally provide warning information to the aircraft annunciator panel are displayed on the simulator.

An interconnect cable to the unit tester routes power and LAMP TEST parameters to the unit tester. By the same interconnect cable, AC excitation signals are routed to the simulator.

FK2216_1
SA

FIGURE C-68. VIDS BENCH TEST SET, 100-601165-000 (SHEET 1 OF 2)

DESCRIPTION: (CONT)

The unit tester provides power, inputs, switches, controls, indicators, and a digital monitor to operate and test each unit of the VIDS independently. A test point field on the unit tester front panel permits measurement of power supply and regulated voltages.

POWER REQUIREMENTS: 115 VAC, 400 Hz ± 5 Hz
28 VDC, ± 0.5 VDC

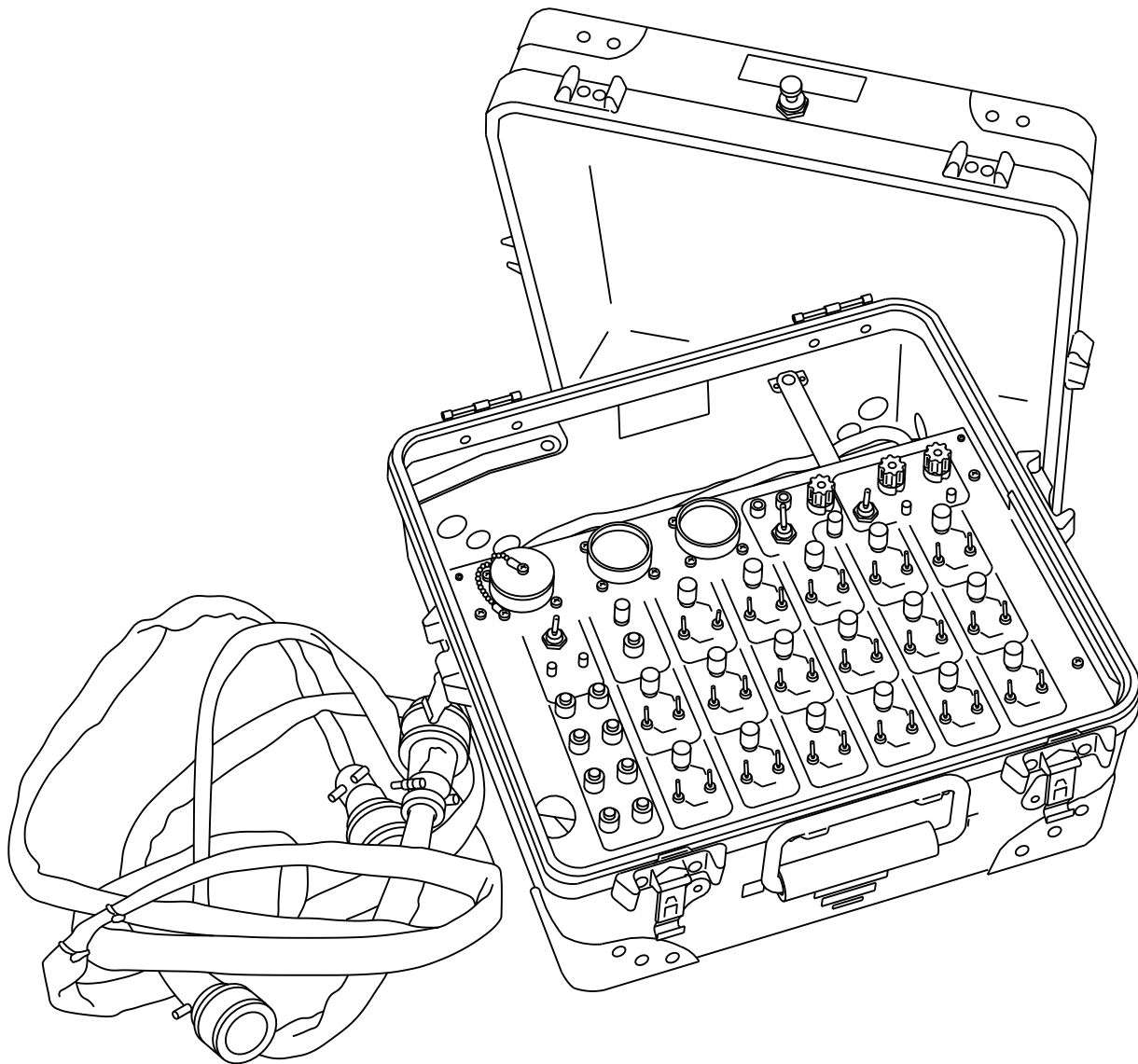
CALIBRATION REQUIREMENTS:**FREQUENCY**

The VIDS bench test set must be calibrated every 24 weeks regardless of being used or not, using same calibration procedure as in Figure 69, VIDS test set.

FB1136_2
SA

FIGURE C-68. VIDS BENCH TEST SET, 100-601165-000 (SHEET 2 OF 2)

Change 13**C-113**



DESCRIPTION: The VIDS line test set provides the necessary power, simulated signals, and signal control in order to operate and test the Vertical Instrument Display System (VIDS). It also provides the VIDS with simulated signals for all indicators.

POWER REQUIREMENTS: 115 Volts AC ± 1.0 , Single phase 400 ± 5.0 Hz
28 Volt DC ± 0.5

FB1046_1
SA

FIGURE C-69. VIDS LINE TEST SET, 100-601164-000 (SHEET 1 OF 12)

CALIBRATION REQUIREMENTS:**FREQUENCY**

The VIDS line test set must be calibrated every 24 weeks regardless of being used or not.

EQUIPMENT REQUIRED

- Hewlett Packard 5300 Series Counter, frequency .001%
- Fluke 8500 or 8800 Series Digital Multimeter, DCV 0.01%, ACV 1%, OHMS 0.1%
- North Atlantic 225 Phase Angle Voltmeter (PAV), phase sensitive nulls @ 400 Hz, voltage 1%
- Gertsch RT7 Ratotrans, 400 Hz ratio 0.001%
- Ectron 1100 Thermocouple Simulator / Calibrator, 40 mV nominal 0.05% CH / AL thermocouple
- Sikorsky TS-1028 400 Hz Filter or CMS T-750477 Oil Pressure Excitation Test Box, Simulate sensor
- Thermocouple lead wire Ch to Cu, A1 to Cu, approximate 4' length
- Variac 400 Hz, adjust voltage
- Sikorsky TS-1058 VIDS Test Set, provide connections
- Sikorsky TCDC-005 Test Cable, provide bench 28 VDC
- Sikorsky TC400-013 Test Cable, provide bench 115V, 400 Hz
- Oscilloscope Monitor, waveforms only
- DC Power Supply adjustable 5 VDC with 25 mA current limit, lamp test
- Cables and adaptors as required, make connections

CALIBRATION PROCEDURES**INSPECT**

Check test set for damaged and missing knobs, switches, dirt or any physical damage.

CALIBRATION

Connect the VIDS TEST SET power cables to bench 28 VDC and 115V 400 Hz power using TCDC-005 Test Cable and TC400-013 Test Cable respectively.

Set VIDS TEST SET INPUT POWER to ON position and then note 115 VAC and 28 VDC indicator lamps illuminate.

Connect TS-1058 VIDS TEST SET to TEST SET No. 1 connector with VIDS TEST SET to SDC cable.

Press VIDS TEST SET LAMP TEST and then note the nine (9) WARNING lamps and two (2) SUPPLY OVERLOAD lamps illuminate.

Connect the powered equipment to bench power, set POWER to ON position and then allow at least a thrity (30) minute warmup.

ROTOR SPEED

1. Connect COUNTER and OSCILLOSCOPE inputs to VIDS TEST SET SIGNAL bnc connector.
2. Set VIDS TEST SET ROTOR SPEED controls:
 - a. NOR / CAL to CAL
 - b. HI / LO to HI
 - c. variable to full CW
3. Set VIDS TEST SET SIGNAL switch to 1 position.
4. Set VIDS TEST SET ROTOR SPEED controls and note outputs are within specified tolerance of Table 1.

FB1046_2
SA

FIGURE C-69. VIDS LINE TEST SET, 100-601164-000 (SHEET 2 OF 12)

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURE (CONT)**
ROTOR SPEED (CONT)**TABLE 1**

NOR/CAL	HI/LO	VARIABLE	COUNTER (Hz)
CAL	HI	full CW	11,245.1 to 11,247.1
CAL	LO	full CW	0 (no output)
NOR	LO	full CW	12,200 to 18,000
NOR	LO	full CCW	0 (no output)

5. Leave set-up for next test.

ENGINE % RPM #1 and #2

1. Set VIDS TEST SET SIGNAL switch to 2 position.
2. Set VIDS TEST SET ENGINE % RPM #1 controls:
 - a. NOR / CAL to CAL
 - b. HI / LO to HI
 - c. variable to full CW
3. Set VIDS TEST SET ENGINE % RPM #1 controls and note outputs are within specified tolerance of Table 2.

TABLE 2

NOR/CAL	HI/LO	VARIABLE	COUNTER (Hz)
CAL	HI	full CW	1,332.5 to 1,334.5
CAL	LO	full CW	0 (no output)
NOR	LO	full CW	1,830 to 2,030
NOR	LO	full CCW	0 (no output)

4. Set VIDS TEST SET SIGNAL to position 3.
5. Repeat from step (2) for ENGINE % RPM #2.
6. Leave set-up for next test.

GAS GEN SPEED #1 and #2

1. Set VIDS TEST SET SIGNAL switch to 4 position.
2. Set VIDS TEST SET GAS GEN SPEED #1 controls:
 - a. NOR / CAL to CAL
 - b. HI / LO to HI
 - c. variable to full CW
3. Set VIDS TEST SET GAS GEN SPEED #1 controls and note outputs are within specified tolerance of Table 3.

FB1046_3
SA

FIGURE C-69. VIDS LINE TEST SET, 100-601164-000 (SHEET 3 OF 12)

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURE (CONT)**
GAS GEN SPEED #1 and #2 (CONT)**TABLE 3**

NOR/CAL	HI/LO	VARIABLE	COUNTER (Hz)
CAL	HI	full CW	2,134.3 to 2,136.3
CAL	LO	full CW	0 (no output)
NOR	LO	full CW	2,400 to 2,480
NOR	LO	full CCW	0 (no output)

4. Move cable from VIDS TEST SET No. 1 and then reconnect to #2.

5. Repeat from Step (2) for GAS GEN SPEED #2.

6. Remove the COUNTER and OSCILLOSCOPE from the set-up.

TORQUE #1 and #2

1. Set VIDS TEST SET SIGNAL switch to 5 position.

2. Connect DIGITAL MULTIMETER input to VIDS TEST SET SIGNAL bnc.

3. Set VIDS TEST SET TORQUE #1 controls:

a. NOR / CAL to CAL

b. HI / LO to HI

c. variable to full CW

4. Set VIDS TEST SET TORQUE #1 controls and note outputs are within specified tolerance of Table 4.

TABLE 4

NOR/CAL	HI/LO	VARIABLE	DIGITAL MULTIMETER (DCV)
CAL	HI	full CW	3.6963 to 3.7037
CAL	LO	full CW	-1 to +1 mV
NOR	LO	full CW	5.4150 to 5.8150
NOR	LO	full CCW	-3 to +3 mV

5. Set VIDS TEST SET SIGNAL to 6 position.

6. Repeat from Step (3) for TORQUE #2.

7. Leave set-up for the next test.

FUEL QUANTITY #1 and #2

1. Move VIDS TEST SET cable from No. 2 to No. 1 connector.

2. Set VIDS TEST SET SIGNAL switch to 7 position.

FB1046_4
SA**FIGURE C-69. VIDS LINE TEST SET, 100-601164-000 (SHEET 4 OF 12)**

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURE (CONT)****FUEL QUANTITY #1 and #2 (CONT)****3. Set VIDS TEST SET FUEL QUANTITY #1 controls:**

- a. NOR / CAL to CAL
- b. HI / LO to HI
- c. variable to full CW

4. Set VIDS TEST SET FUEL QUANTITY #1 controls and note outputs are within specified tolerance of Table 5.**TABLE 5**

NOR/CAL	HI/LO	VARIABLE	DIGITAL MULTIMETER (DCV)
CAL	HI	full CW	6.120 to 6.130
CAL	LO	full CW	-1 to +1 mV
NOR	LO	full CW	7.630 to 8.030
NOR	LO	full CCW	-10 to +10 mV

5. Move VIDS TEST SET cable from No. 1 to No. 2 connector.**6. Repeat from Step (3) for FUEL QUANTITY #2.****7. Leave set-up for the next test.****ENGINE OIL TEMP #1 and #2****1. Move VIDS TEST SET cable from No. 2 to No. 1 connector.****2. Set VIDS TEST SET SIGNAL switch to 8 position.****3. Set VIDS TEST SET ENGINE OIL TEMP #1 controls:**

- a. NOR / CAL to CAL
- b. HI / LO to HI
- c. variable to full CW

4. Set VIDS TEST SET ENGINE OIL TEMP #1 controls and note outputs are within specified tolerance of Table 6.**TABLE 6**

NOR/CAL	HI/LO	VARIABLE	DIGITAL MULTIMETER (OHMS)*
CAL	HI	full CW	150.2 to 151.0
CAL	LO	full CW	75.3 to 75.9
NOR	LO	full CW	170.0 to 190.0
NOR	LO	full CCW	73.6 to 77.6

* Compensate for lead resistance.

5. Move VIDS TEST SET cable from No. 1 to No. 2 connector.**6. Repeat from Step (3) for ENGINE OIL TEMP #2.****7. Leave set-up for the next test.**FB1046_5
SA**FIGURE C-69. VIDS LINE TEST SET, 100-601164-000 (SHEET 5 OF 12)**

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURE (CONT)**
MAIN TRANSMISSION OIL TEMP

1. Set VIDS TEST SET SIGNAL switch to 9 position.
2. Set VIDS TEST SET MAIN TRANSMISSION OIL TEMP controls:
 - a. NOR / CAL to CAL
 - b. HI / LO to HI
 - c. variable to full CW
3. Set VIDS TEST SET MAIN TRANSMISSION OIL TEMP controls and note outputs are within specified tolerance of Table 7.

TABLE 7

NOR/CAL	HI/LO	VARIABLE	DIGITAL MULTIMETER (OHMS)*
CAL	HI	full CW	234.16 to 234.96
CAL	LO	full CW	86.70 to 87.30
NOR	LO	full CW	270.0 to 290.0
NOR	LO	full CCW	84.0 to 90.0

* Compensate for lead resistance.

ENGINE OIL PRESS #1 and #2

1. Set VIDS TEST SET controls:
 - a. SIGNAL to OFF
 - b. ENG / XSMN to ENG
2. Set VIDS TEST SET ENGINE OIL PRESS #1 controls:
 - a. NOR / CAL to CAL
 - b. HI / LO to HI
 - c. variable to full CW
3. Connect the test set-up shown in View A.
4. Adjust the VARIAC for approximately 10 VAC Digital Multimeter indication.
5. Set PAV to INPHASE and AUTO ranging modes.
6. Adjust the RATIOTRANS as required for PAV INPHASE null indication and note setting is within 0.48467 and 0.48667.
7. Set PAV to QUAD and then note reading is less than 42 mV.
8. Set VIDS TEST SET ENGINE OIL PRESS #1 HI / LO to LO.
9. Set PAV to INPHASE and adjust the RATIOTRANS as required for PAV null indication and note setting is within 0.59751 and 0.59951.
10. Set PAV to QUAD and then note reading is within -148 and -178 mV.
11. Set VIDS TEST SET ENGINE OIL PRESS #1 CAL / NOR to NOR.

FB1046_6
SA**FIGURE C-69. VIDS LINE TEST SET, 100-601164-000 (SHEET 6 OF 12)**

CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION PROCEDURE (CONT) ENGINE OIL PRESS #1 and #2 (CONT)

12. Set PAV to INPHASE and adjust the RATIOTRANS as required for PAV null indication and note setting is within 0.39900 and 0.40100.
13. Set VIDS TEST SET ENGINE OIL PRESS #1 variable to full CCW.
14. Set PAV to INPHASE and adjust the RATIOTRANS as required for PAV null indication and note setting is within 0.59751 and 0.59951.
15. Move VIDS TEST SET cable from No. 1 to No. 2 connector.
16. Repeat from Step (4) for ENGINE OIL PRESSURE #2.
17. Leave set-up for the next test.

TRANSMISSION OIL PRESSURE

1. Set VIDS TEST SET ENG / XSMN switch to XSMN position.
2. Set VIDS TEST SET TRANSMISSION OIL PRESSURE controls:
 - a. NOR / CAL to CAL
 - b. HI / LO to HI
 - c. variable to full CW
3. Set PAV to INPHASE and AUTO ranging modes.
4. Adjust the RATIOTRANS as required for PAV INPHASE null indication and note setting is within 0.46015 and 0.46215.
5. Set PAV to QUAD and then note reading is less than 42 mV.
6. Set VIDS TEST SET TRANSMISSION OIL PRESSURE HI / LO to LO.
7. Set PAV to INPHASE and adjust the RATIOTRANS as required for PAV null indication and note setting is within 0.59751 and 0.59951.
8. Set PAV to QUAD and then note reading is within -148 and -178 mV.
9. Set VIDS TEST SET TRANSMISSION OIL PRESSURE CAL / NOR to NOR.
10. Set PAV to INPHASE and adjust the RATIOTRANS as required for PAV null indication and note setting is within 0.39900 and 0.40100.
11. Set VIDS TEST SET TRANSMISSION OIL PRESSURE variable to full CCW.
12. Set PAV to INPHASE and adjust the RATIOTRANS as required for PAV null indication and note setting is within 0.59751 and 0.59951.

WARNING LAMPS

1. Connect VIDS TEST SET to connector No. 1.
2. Set VIDS TEST SET LAMPS switch to ON and note listed lamps illuminate:
 - a. LOW OIL PRESS #1
 - b. HI OIL TEMP #1
 - c. LO ROTOR SPEED
 - d. ENG OUT No. 1
 - e. HI TGT #1

FB1046_7A
SA

FIGURE C-69. VIDS LINE TEST SET, 100-601164-000 (SHEET 7 OF 12)

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURE (CONT)**
WARNING LAMPS (CONT)

3. Move VIDS TEST SET cable from No. 1 to No. 2 connector.
4. Repeat Step (2) for #2 lamps.

TURBINE GAS TEMP #1 AND #2

1. Set VIDS TEST SET INTEGRAL LIGHTING switch to INT position.
2. Connect OSCILLOSCOPE and Digital Multimeter input across VIDS TEST SET ILL binding posts.
3. Hold VIDS TEST SET ILL toggle switch up and then note OSCILLOSCOPE display of a symmetrical and noise free sine wave of 11.3 to 17.0 Vpp amplitude.
4. Release the VIDS TEST SET ILL switch.
5. Connect test set-up shown in View B.
6. Set VIDS TEST SET TURBINE GAS TEMP #1 controls:
 - a) NOR / CAL to CAL
 - b) HI / LO to HI
 - c) variable to full CW
7. Set VIDS TEST SET TURBINE GAS TEMP #1 controls, measure output and note value is within specified tolerance of Table 8.

TABLE 8

NOR/CAL	HI/LO	VARIABLE	DIGITAL MULTIMETER (mVDC)
CAL	HI	full CW	33.69 to 33.89
CAL	LO	full CW	-0.05 to +0.05
NOR	LO	full CW	41.3 to 51.3
NOR	LO	full CCW	-0.15 to +0.15

8. Move VIDS TEST SET cable from No. 1 to No. 2 connector.
9. Repeat Step 6 for #2.

VOLTAGE MEASUREMENTS

1. On initial checks or for troubleshooting perform the measurements of APPENDIX A.

CONTINUITY MEASUREMENTS

1. On initial checks or for troubleshooting perform the measurements of APPENDIX B.

OVERLOAD LAMPS

1. On initial checks or for troubleshooting perform the measurements of APPENDIX C.

Set all POWER to OFF.

Disconnect the set-up.

FB1046_8
SA

FIGURE C-69. VIDS LINE TEST SET, 100-601164-000 (SHEET 8 OF 12)

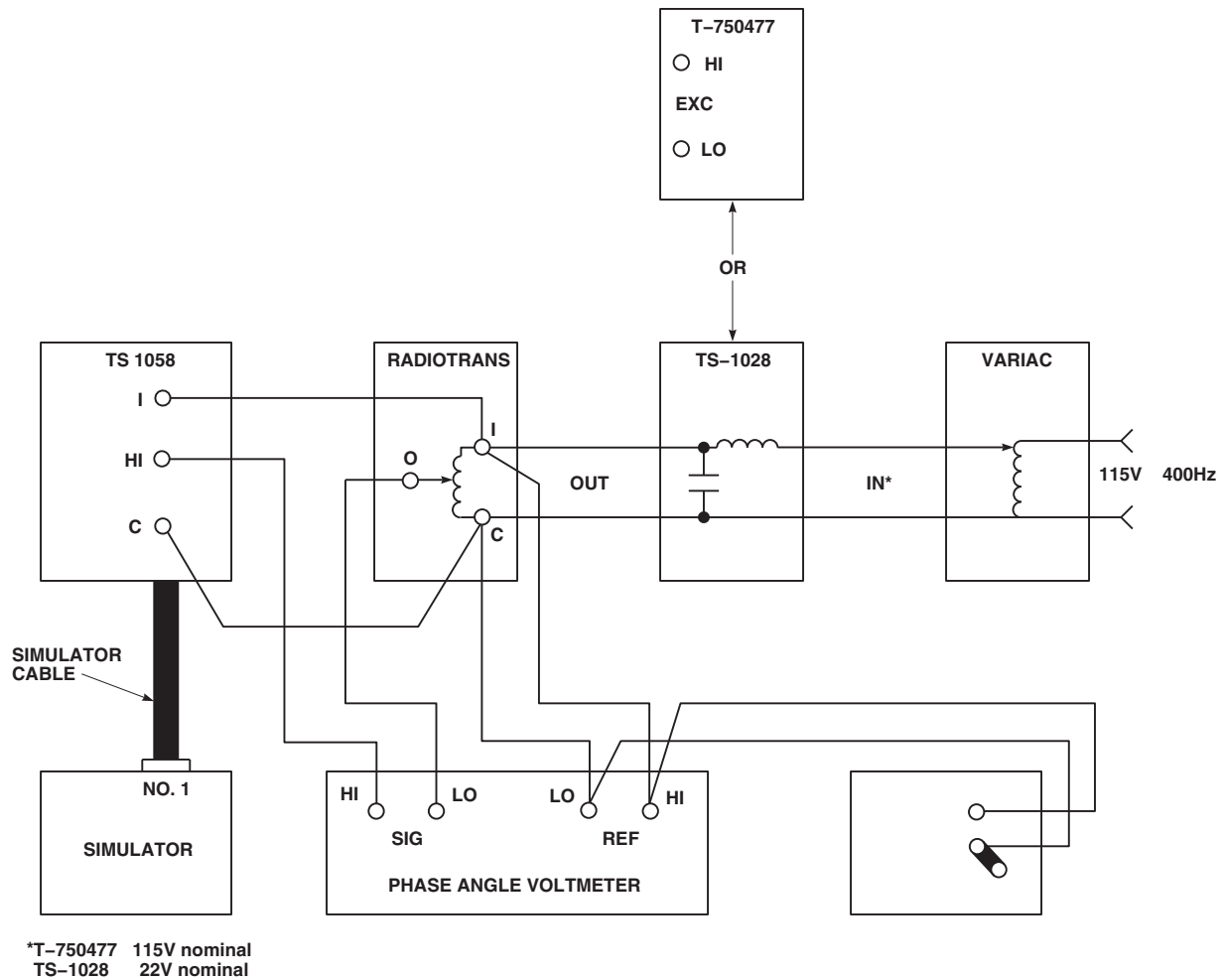
CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION PROCEDURE (CONT)
OVERLOAD LAMPS (CONT)

Secure all test equipment.

Apply "CALIBRATED" status label.

If VIDS TEST SET failed calibration, return to manufacturer.

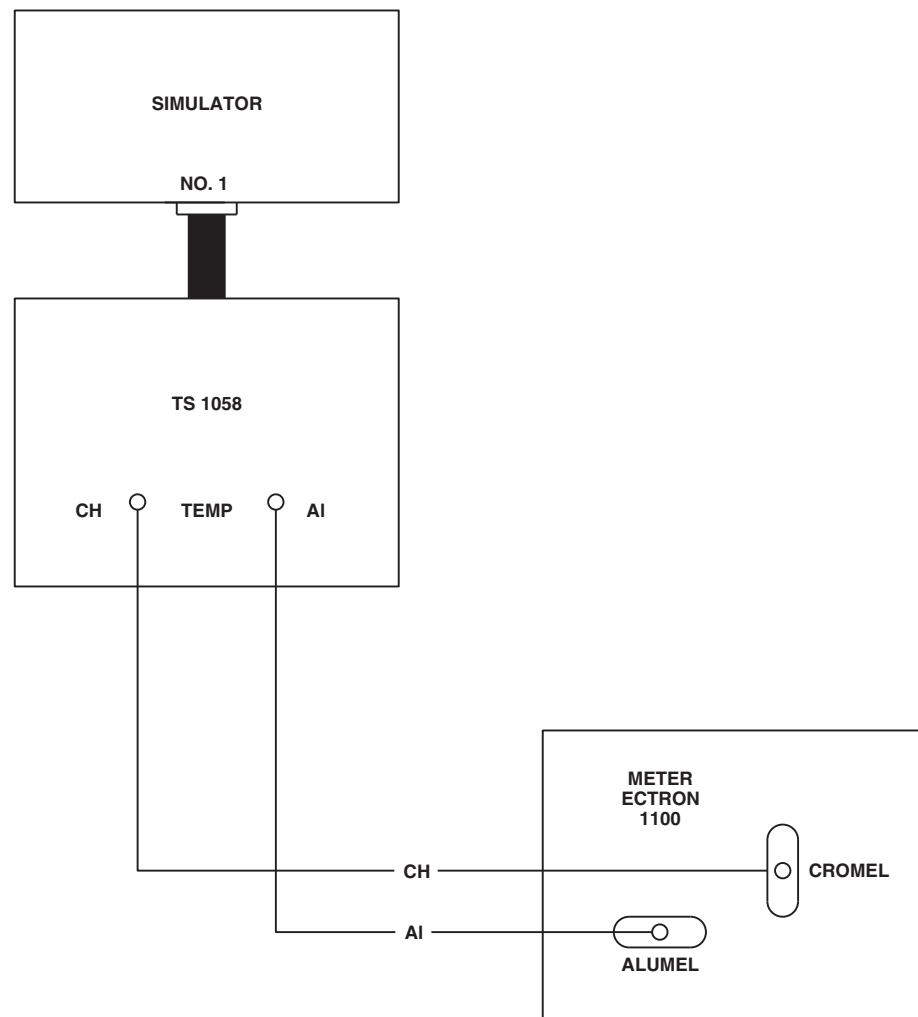


VIEW A
ENGINE OIL PRESSURE SET-UP

FB1046_9
 SA

FIGURE C-69. VIDS LINE TEST SET, 100-601164-000 (SHEET 9 OF 12)

CALIBRATION REQUIREMENTS: (CONT)
CALIBRATION PROCEDURE (CONT)



VIEW B
TURBINE GAS TEMPERATURE SET-UP

FIGURE C-69. VIDS LINE TEST SET, 100-601164-000 (SHEET 10 OF 12)

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CALIBRATION REQUIREMENTS: (CONT)
CALIBRATION PROCEDURE (CONT)

CONNECTIONS*		
HI	LO	MEASURE
P3-V	No. 1-EE	26 to 30 VDC (LAMP TEST depressed)
No. 1-AA	No. 1-BB	26 to 30 VDC
No. 2-AA	No. 2-BB	26 to 30 VDC
P3-M	P3-L	26 to 30 VDC
P3-M	P3-K	26 to 30 VDC
No. 1-CC	No. 1-DD	110 to 120 VAC
No. 2-CC	No. 2-DD	110 to 120 VAC
P3-P	P3-N	110 to 120 VAC**
No. 1-FF	No. 1-HH	4 to 6 VAC
No. 1-GG	No. 1-HH	4 to 6 VAC
No. 2-FF	No. 2-GG	4 to 6 VAC
No. 2-FF	No. 2-HH	4 to 6 VAC
P3-R	P3-S	4 to 6 VAC

Set INTEGRAL LIGHTING to INT.

* P3 is INTERCONNECT

** POWER-ON (0 VAC when POWER-SIM only)

APPENDIX A
VOLTAGE MEASUREMENTS

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SA

FIGURE C-69. VIDS LINE TEST SET, 100-601164-000 (SHEET 11 OF 12)

CALIBRATION REQUIREMENTS: (CONT)
CALIBRATION PROCEDURE (CONT)

CONNECTIONS*		
HI	LO	CONDITIONS FOR CONTINUITY
No. 1-EE	P3-U	LAMP TEST depressed
No. 1-p	No. 1-EE	SIMULATOR-OFF ROTOR OVERSPEED RESET depressed
No. 2-p	No. 2-EE	SIMULATOR-OFF ROTOR OVERSPEED RESET depressed
P3-c	No. 2-j	- - - - -
P3-d	No. 2-W	- - - - -
P3-g	No. 2-H	- - - - -
P3-h	No. 2-G	- - - - -
P3-i	No. 1-G	- - - - -
P3-j	No. 1-H	- - - - -
P3-k	No. 1-i	- - - - -
P3-m	No. 1-W	- - - - -
P3-n	No. 2-j	- - - - -
P3-v	No. 2-K	- - - - -
P3-w	No. 2-J	- - - - -

* P3 is INTERCONNECT

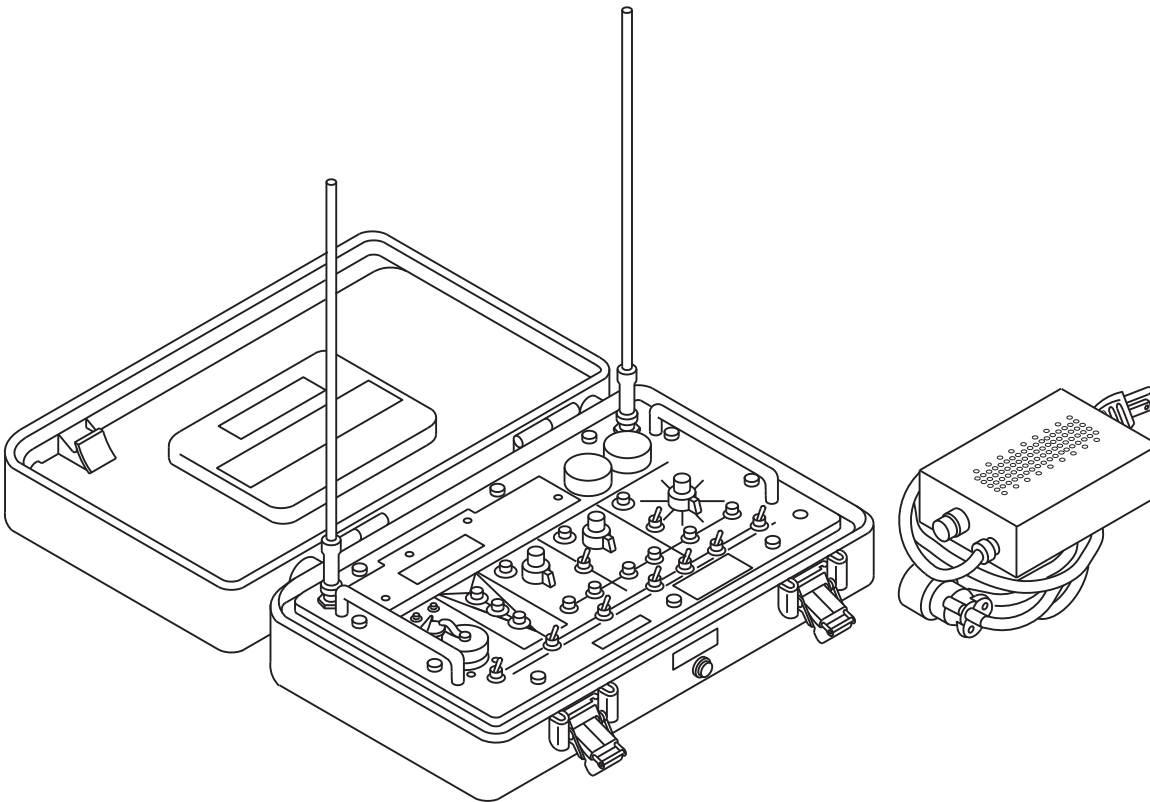
APPENDIX B
CONTINUITY MEASUREMENTS

APPENDIX C
OVERLOAD LAMPS

1. Connect POWER SUPPLY, set for 5 VDC with 25 mA current limit, across No. 1 pins U and EE (Io).
2. Note LAMP SUPPLY OVERLOAD No. 1 illuminates.
3. Press OVERLOAD switch to the left and note lamp extinguishes.
4. Repeat from (1) for No. 2 pins and pressing the switch to the right to extinguish the lamp.

FB1046_12
SA

FIGURE C-69. VIDS LINE TEST SET, 100-601164-000 (SHEET 12 OF 12)



DESCRIPTION: The VOR / ILS / MB / RAMP TEST SET, 972Q-4 provides outputs that allow checking of the VOR, ILS, and MB (marker beacon) avionic systems while they are installed in the helicopter.

POWER REQUIREMENTS: 115 volt AC or 230 volt AC, and 8 volt DC rechargeable battery.

CALIBRATION REQUIREMENTS:

FREQUENCY

VOR / ILS / MB ramp test set must be calibrated every 48 weeks regardless of being used or not.

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SA

FIGURE C-70. VOR/ILS/MB RAMP TEST SET, 972Q-4 (SHEET 1 OF 11)

CALIBRATION REQUIREMENTS: (CONT)**EQUIPMENT REQUIRED**

- Hewlett Packard 8902A Measuring Receiver no direct substitute
- Hewlett Packard 11722A or 11792A Sensor used with item 1
- Aircraft Radio Type H16 Standard Course Checker VOR bearing 0.1 deg
- Sikorsky TS-2000 VOR Test Box
- Dranetz 305 / 3007 Phasemeter 30 Hz phase 0.1 deg
- Sikorsky TS-1034 Antenna Coupler couple antenna RF to item 1
- Fluke 8000A Dmm VDC 0.1% VAC 0.5%
- Sikorsky TS-6442 Power Supply 15 vdc for item 4
- Khron Hite 6900 Distortion Analyzer audio frequency distortion

CALIBRATION PROCEDURES**INSPECTION**

- Inspect Test Set / Battery Charger for physical damage, (switches, antenna's, etc.), and repair as required.

CALIBRATION

1. Set all TEST SET POWER switches to ON (battery operation).

NOTE:

GREEN BATTERY lamp shall be illuminated for V+ AND V- positions of the CHECK switch.

For TEST SETS with lighted GLIDE SLOPE, LOC and VOR VAR buttons only, depress and note flashing indicator. Depress to set OFF after test.

2. Set all TEST SET POWER switches to OFF.

- Connect test set-ups as shown in Views A or B and View C.

NOTE:

View C set-up is used for VOR module only.

- Set the TEST SET ATTEN to 0 db position.

NOTE:

TEST SET operation from either internal batteries or BATTERY CHARGER is acceptable. Re-charge batteries as required after use.

MKR BCN MODULE

1. Connect TEST SET J1 (MKR BCN) output to SENSOR with a short cable.
2. Connect RECEIVER MODULATION OUTPUT to DISTORTION ANALYZER input.
3. Set PWR and MKR BCN power switch in the ON position.
4. Press on RECEIVER:
 - a. (BLUE) , (AUTOMATIC OPERATION)
 - b. (FREQ) , (7), (5), (MHz)
5. Press RECEIVER (RF POWER) and LOG / LIN for dBm scaling.
6. Note reading is -20dBm minimum.
7. Depress RECEIVER (FREQ) button.

FB1047_2
SA

FIGURE C-70. VOR/ILS/MB RAMP TEST SET, 972Q-4 (SHEET 2 OF 11)

CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION PROCEDURES: (CONT)

CALIBRATION (CONT)

MKR BCN MODULE (CONT)

8. Note RECEIVER 74.99625 to 75.00375 MHz indication.
9. Depress and hold TEST SET MKR BCN WHITE button.
10. Press RECEIVER (AM) and (PEAK $\pm$ / 2) buttons and note 90 to 100% indication.
11. Press RECEIVER (SHIFT), (AUDIO FREQ) and note 2940 to 3060 Hz indication.
12. Note DISTORTION ANALYZER distortion indication of 15% maximum.
13. Depress and hold TEST SET MKR BCN BLUE button.
14. Press RECEIVER (AM) button and note 90 to 100% indication.
15. Press RECEIVER (SHIFT), (AUDIO FREQ) and note 392 to 408 Hz indication.
16. Note DISTORTION ANALYZER distortion indication of 15% maximum.
17. Depress and hold TEST SET MKR BCN YELLOW button.
18. Press RECEIVER (AM) button and note 90 to 100% indication.
19. Press RECEIVER (SHIFT), (AUDIO FREQ) and note 1274 to 1326 Hz indication.
20. Note DISTORTION ANALYZER distortion indication of 15% maximum.
21. Set all TEST SET MKR BCN switches to OFF and disconnect SENSOR.

LOC MODULE

1. Connect TEST SET J3 (GS/VOR/LOC) output to SENSOR with a short cable.
2. Connect RECEIVER MODULATION OUTPUT to DISTORTION ANALYZER input.
3. Set PWR and LOC power switch in ON position and FREQ SW to 108.1.
4. Press on RECEIVER:
 - a. (BLUE) , (AUTOMATIC OPERATION)
 - b. (FREQ), (1), (0), (8), (.), (1), (MHz)
5. Press RECEIVER (RF POWER) and LOG/LIN for dBm scaling.
6. Note reading is -10 dBm minimum.
7. Depress RECEIVER (FREQ) button.
8. Note RECEIVER 108.0973 to 108.1027 MHz indication.
9. Set LOC FREQ SW to 108.15 position.
10. Press on RECEIVER if required to tune:
 - a. (FREQ), (1), (0), (8), (.), (1), (5), (MHz)
11. Note RECEIVER 108.1473 to 108.1527 MHz indication.

FB1047_3
SA

FIGURE C-70. VOR/ILS/MB RAMP TEST SET, 972Q-4 (SHEET 3 OF 11)

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURES: (CONT)****CALIBRATION (CONT)****LOC MODULE (CONT)**

12. Set LOC to OC and hold 150 Hz DELETE ON.
13. Press RECEIVER (AM) and (PEAK $\pm$ / 2) buttons and note approximate 20% indication. Record value.
14. Press the RECEIVER (SHIFT), (AUDIO FREQ) and note 89.1 to 90.9 Hz indication.
15. Note DISTORTION ANALYZER indication of 5% maximum.
16. Release 150 Hz DELETE and hold 90 Hz DELETE to ON.
17. Press RECEIVER (AM) button and note approximate 20% indication. Record value.
18. Subtract Step (13) from (17) and note computed value is 0 within 0.5.
19. Press RECEIVER (SHIFT), (AUDIO FREQ) and note 148.5 to 151.5 Hz indication.
20. Note DISTORTION ANALYZER indication of 5% maximum.
21. Press RECEIVER (AM) button.
22. Set LOC COURSE switch, hold DELETE switch ON and note % AM indication differences are within specified tolerances of TABLE 1.

TABLE 1			
STEP	COURSE	DELETE	%AM
1	LEFT	90 Hz	28 Nominal
2	LEFT	150 Hz	12 Nominal
Step 1 minus Step 2 = 13.5 to 17.5			
3	RIGHT	150 Hz	28 Nominal
4	RIGHT	90 Hz	12 Nominal
Step 3 minus Step 4 = 13.5 to 17.5			

23. Press RECEIVER 300 Hz HP AND 3 KHz LP FILTERS to ON (all other filters OFF).
24. Hold 90 Hz and 150 Hz DELETE switches ON.
25. Set 1020 Hz to ON and note 5 to 20% indication.
26. Press RECEIVER (SHIFT), (AUDIO FREQ) and note 995 to 1045 Hz indication (DELETE switches held ON).
27. Note DISTORTION ANALYZER indication of 10% maximum (DELETE switches held ON).
28. Set all TEST SET LOC switches to OFF and disconnect SENSOR.

FB1047_4
SA**FIGURE C-70. VOR/ILS/MB RAMP TEST SET, 972Q-4 (SHEET 4 OF 11)**

CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION PROCEDURES: (CONT)

CALIBRATION (CONT)

GS MODULE

1. Connect TEST SET J3 (GS / VOR / LOC) output to the SENSOR with a short cable.
2. Connect RECEIVER MODULATION OUTPUT to DISTORTION ANALYZER input.
3. Set PWR and GLIDESLOPE power switch in the ON position and FREQ. SW to 334.70.
4. Press on RECEIVER:
 - a. (BLUE), (AUTOMATIC OPERATION)
 - b. (FREQ), (3), (3), (4), (.), (7), (MHz)
5. Press RECEIVER (RF POWER) and LOG / LIN for dBm scaling.
6. Note reading is -20 dBm minimum.
7. Depress RECEIVER (FREQ) button.
8. Note RECEIVER 334.6916 TO 334.7084 MHz indication.
9. Set GLIDESLOPE FREQ SW to 334.55 position.
10. Press on RECEIVER if required to tune:
 - a. (FREQ), (3), (3), (4), (.), (5), (5), (MHz)
11. Note RECEIVER 334.5416 TO 334.5584 MHz indication.
12. Press RECEIVER (RF POWER) and LOG / LIN for dBm scaling.
13. Note reading is -20 dBm minimum.
14. Set GLIDESLOPE to OC and hold 150 Hz DELETE ON.
15. Press RECEIVER (AM) and (PEAK $\pm$ / 2) buttons and note approximate 40% indication. Record value.
16. Press RECEIVER (SHIFT), (AUDIO FREQ) and note 89.1 to 90.9 Hz indication.
17. Note DISTORTION ANALYZER indication of 5% maximum.
18. Release 150 Hz DELETE and hold 90 Hz DELETE to ON.
19. Press RECEIVER (AM) button and note approximate 40% indication. Record value.
20. Subtract Step (15) from (19) and note computed value is 0 within 1.
21. Press RECEIVER (SHIFT), (AUDIO FREQ) and note 148.5 to 151.5 Hz indication.
22. Press RECEIVER (AM) button.

FB1047_5A
SA

FIGURE C-70. VOR/ILS/MB RAMP TEST SET, 972Q-4 (SHEET 5 OF 11)

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURES: (CONT)****CALIBRATION (CONT)****GS MODULE (CONT)**

23. Set GLIDESLOPES COURSE switch, hold DELETE switch ON and note % AM indication differences within specified tolerances of TABLE 2.

TABLE 2			
STEP	COURSE	DELETE	%AM
1	UP	90 Hz	49 Nominal
2	UP	150 Hz	31 Nominal
Step 1 minus Step 2 = 15 to 20			
3	DOWN	150 Hz	49 Nominal
4	DOWN	90 Hz	31 Nominal
Step 3 minus Step 4 = 15 to 20			

24. Set all TEST SET GLIDESLOPE switches to OFF and disconnect SENSOR.

VOR MODULE

1. Connect TEST SET J3 (GS / VOR / LOC) output to SENSOR with a short cable.
2. Connect RECEIVER MODULATION OUTPUT to DISTORTION ANALYZER input.
3. Set PWR and VOR power switch in the ON position and FREQ. SW to 108.00.
4. Press on RECEIVER:
 - a. (BLUE), (AUTOMATIC OPERATION)
 - b. (FREQ), (1), (0), (8), (MHz)
5. Press RECEIVER (RF POWER) and LOG / LIN for dBm scaling.
6. Note reading is -10 dBm minimum.
7. Depress RECEIVER (FREQ) button.
8. Note RECEIVER 107.9973 to 108.0027 MHz indication.
9. Set VOR FREQ SW to 108.05 position.
10. Press on RECEIVER if required to tune:
 - a. (FREQ), (1), (0), (8), (.), (0), (5), (MHz)
11. Note RECEIVER 108.0473 to 108.0527 MHz indication.

FB1047_6A
SA**FIGURE C-70. VOR/ILS/MB RAMP TEST SET, 972Q-4 (SHEET 6 OF 11)**

CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION PROCEDURES: (CONT)

CALIBRATION (CONT)

VOR MODULE (CONT)

12. Press RECEIVER (AM), (PEAK $\pm$ / 2) buttons and 3 KHz LP FILTER to ON.
13. Note indication of 27.0 to 33.0%.
14. Press RECEIVER (SHIFT), (AUDIO FREQ) and note 29.7 to 30.3 Hz indication.
15. Depress and hold DELETE 30 Hz REF and note DISTORTION ANALYZER reading of 7% maximum.
16. Press RECEIVER AM button, 15 KHz LP AND 300 Hz HP FILTERS to ON (all other filters OFF).
17. Note indication of 27.0 to 33.0%.
18. Depress and hold DELETE 30 Hz REF and 30 Hz VAR and then note DISTORTION ANALYZER reading of 3% maximum.
19. Press RECEIVER (SHIFT), (AUDIO FREQ).
20. Press and hold DELETE 30 Hz REF and 30 Hz VAR and note 9860 to 10060 Hz indication of RECEIVER.
21. Press the RECEIVER 300 Hz HP and 3 KHz LP FILTERS to ON (all other filters OFF).
22. Set 1020 Hz to ON and note 970 to 1070 Hz indication.
23. Press RECEIVER (AM) button and note 5 to 15% indication.
24. Set 1020 Hz switch to OFF.
25. Press RECEIVER AM button, and all FILTERS OFF.
26. Leave present set-up for next test.

VOR MODULE BEARING

1. Add VIEW C set-up if not already done.
2. Set STANDARD COURSE CHECKER controls:
 - a. CAL / DEV to center position
 - b. FUNCTION to SET INPUT (RED LINE)
 - c. READOUT to NORM
 - d. COURSE to ZERO
3. Preset STANDARD COURSE CHECKER INPUT pot approximately 3/4 full CW and adjust VOR TEST BOX GAIN and / or STANDARD COURSE CHECKER INPUT pot for "RED LINE" meter reading on COURSE CHECKER.
4. Set STANDARD COURSE CHECKER FUNCTION to NOTE METER READING and note the reading.
5. Set STANDARD COURSE CHECKER FUNCTION to EQUALIZE 9960 and adjust 9960 pot for indication of Step 4.
6. Set FUNCTION to ADJUST PHASE-BAL and adjust PHASE pot to bring meter indication one-half way from present indication toward zero.
7. Set COURSE to 180 and adjust BALANCE pot to bring meter indication one-half way from present indication toward zero.

FB1047_7
SA

FIGURE C-70. VOR/ILS/MB RAMP TEST SET, 972Q-4 (SHEET 7 OF 11)

CALIBRATION REQUIREMENTS: (CONT)**CALIBRATION PROCEDURES: (CONT)****CALIBRATION (CONT)****VOR MODULE BEARING (CONT)**

8. Set COURSE to 0 and repeat from STEP 6 until adjustment is not required.
9. Set STANDARD COURSE CHECKER READOUT to EXT and adjust VOR TEST BOX PHASE control for TEST BOX "CAL PHASE" label reading on the PHASEMETER.
10. Set STANDARD COURSE CHECKER FUNCTION to READ COURSE ERROR.
11. Set VOR BEARING "to" switch and note the PHASEMETER indications are within TABLE 3 tolerances.

TABLE 3

VOR BEARING	PHASEMETER
000	359.3 to 000.7
045	044.0 to 046.0
090	089.0 to 091.0
135	134.0 to 136.0
180	179.0 to 181.0
225	224.0 to 226.0
270	269.0 to 271.0
315	314.0 to 316.0

12. Set STANDARD COURSE CHECKER controls:
 - a. CAL / DEV to CAL
 - b. FUNCTION to EQUALIZE 9960
 - c. 9960 pot to full CW
13. Set VOR BEARING to 0 TO.
14. Adjust VOR TEST BOX GAIN control for exact 1 VAC reading on Dmm.
15. Set STANDARD COURSE CHECKER CAL / DEV to DEV.
16. Record Dmm mVAC indication.
17. Compute Step 16 times TEST BOX label VAC value and note result is 900 to 1020.

NOTE:

Result is p-p deviation in Hz of 9960 Hz carrier.

18. Set all TEST SET VOR switches to OFF and disconnect SENSOR.

FB1047_8

FIGURE C-70. VOR/ILS/MB RAMP TEST SET, 972Q-4 (SHEET 8 OF 11)

CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION PROCEDURES: (CONT)

CALIBRATION (CONT)

RF OUTPUT LEVEL

1. Connect TEST SET J3 (GS / VOR / LOC) output to SENSOR with a short cable.
2. Set PWR and LOC power switch in the ON position and FREQ switch to 108.1.
3. Press on RECEIVER:
 - a. (BLUE), (AUTOMATIC OPERATION)
 - b. (FREQ), (1), (0), (8), (.), (1), (MHz)
4. Press RECEIVER (RF POWER) and LOG / LIN for dBm scaling.
5. Note reading is -10 dBm minimum.
6. Press on RECEIVER:
 - a. (SHIFT), (TUNED RF LEVEL)
 - b. (RATIO)
7. RECEIVER display should be 0.000 REL nominal.

NOTE:

Allow time for RECEIVER to display result. If RECAL indication is displayed press CALIBRATE button.

8. Step TEST SET ATTN (0-10 dB /) from 0 to 10 and note display agrees with setting within 0.2 dB / step.
9. Set TEST SET ATTN to 0.
10. Step TEST SET ATTN (0-100 dB /) from 0 to 100 and note display agrees with setting within 2 dB / step.

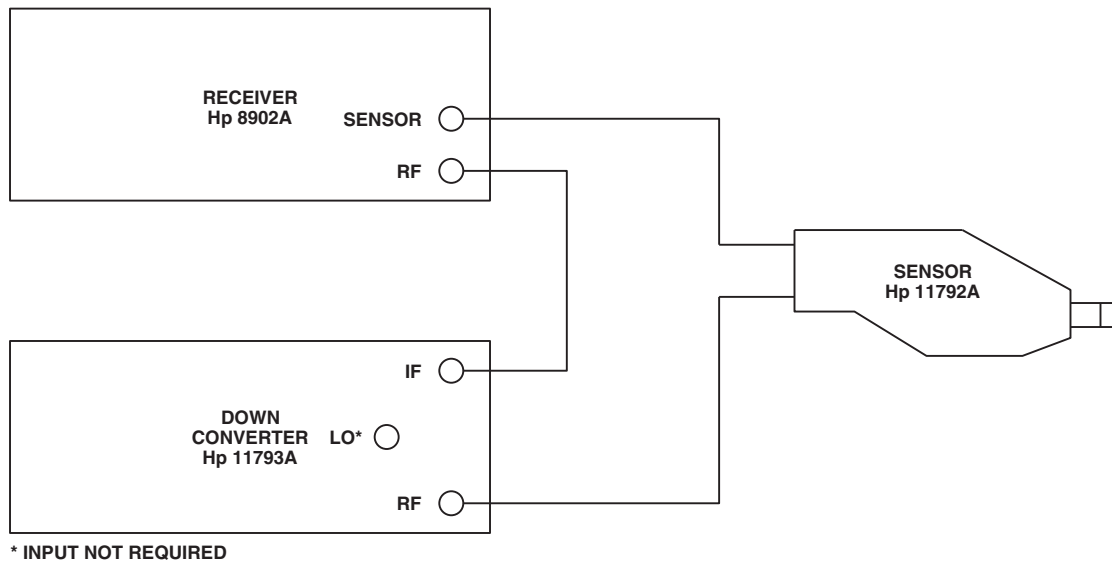
NOTE:

Allow time for RECEIVER to display result at each step. If RECAL indication is displayed press CALIBRATE button.

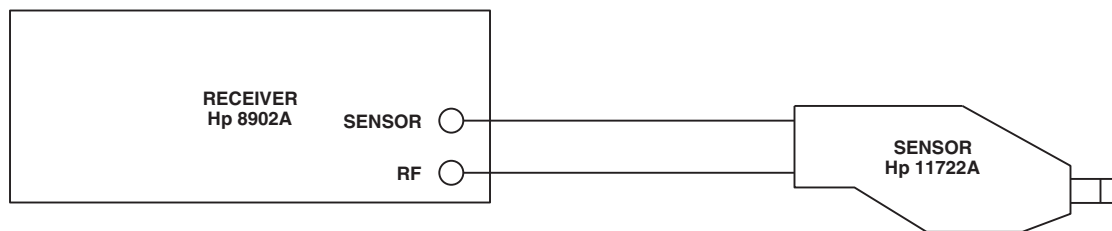
11. Set all TEST SET LOC switches to OFF and disconnect the SENSOR.
12. Set all power to OFF.
13. Secure all test equipment.
14. Apply applicable calibration label.

FB1047_9
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FIGURE C-70. VOR/ILS/MB RAMP TEST SET, 972Q-4 (SHEET 9 OF 11)



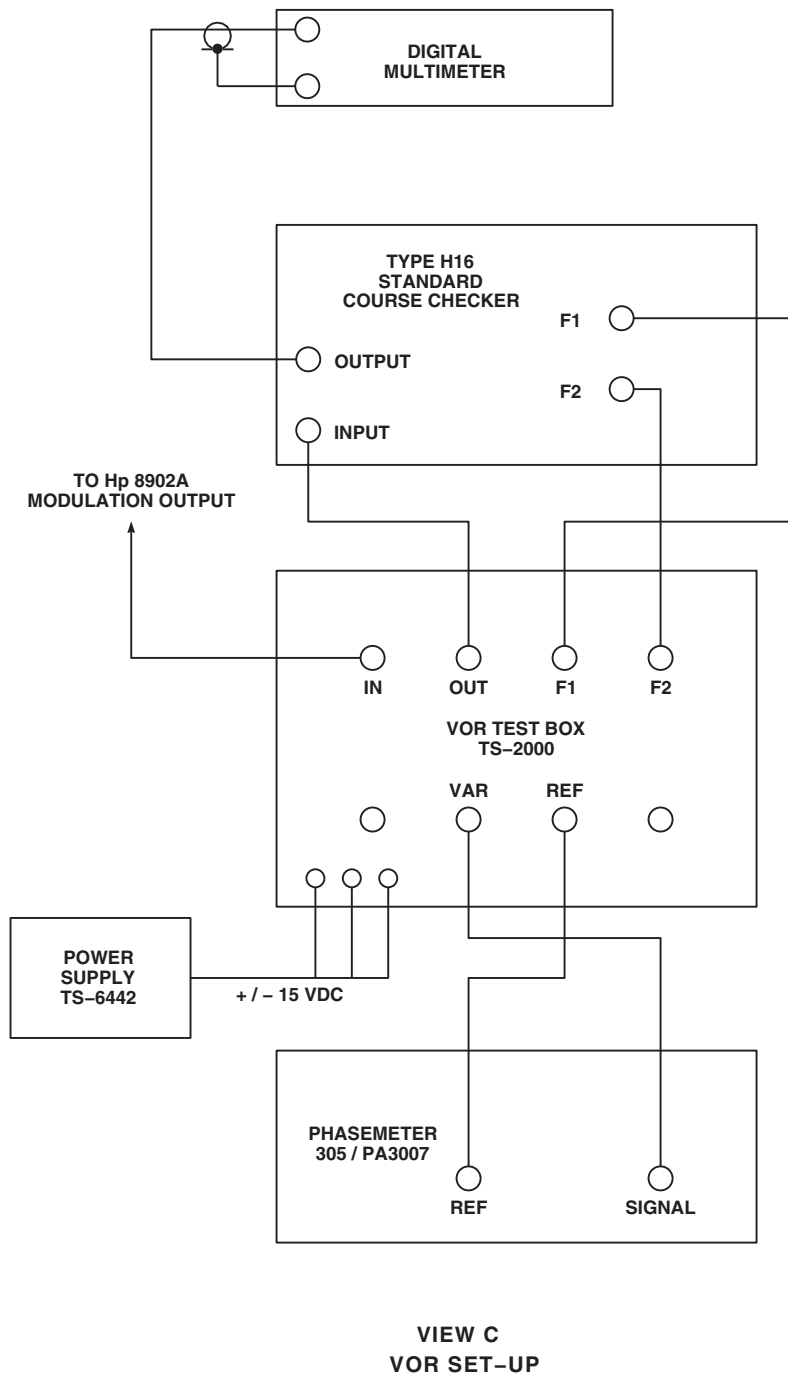
VIEW A
RECEIVER SET-UP



VIEW B
RECEIVER SET-UP

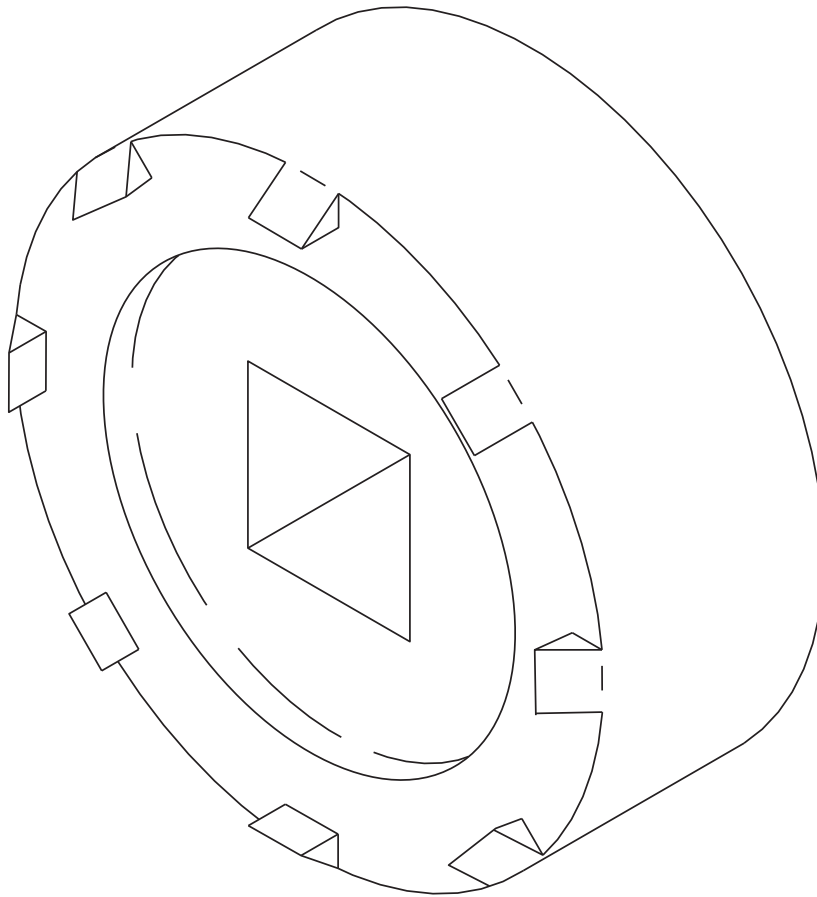
FB1047_10
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FIGURE C-70. VOR/ILS/MB RAMP TEST SET, 972Q-4 (SHEET 10 OF 11)



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FIGURE C-70. VOR/ILS/MB RAMP TEST SET, 972Q-4 (SHEET 11 OF 11)



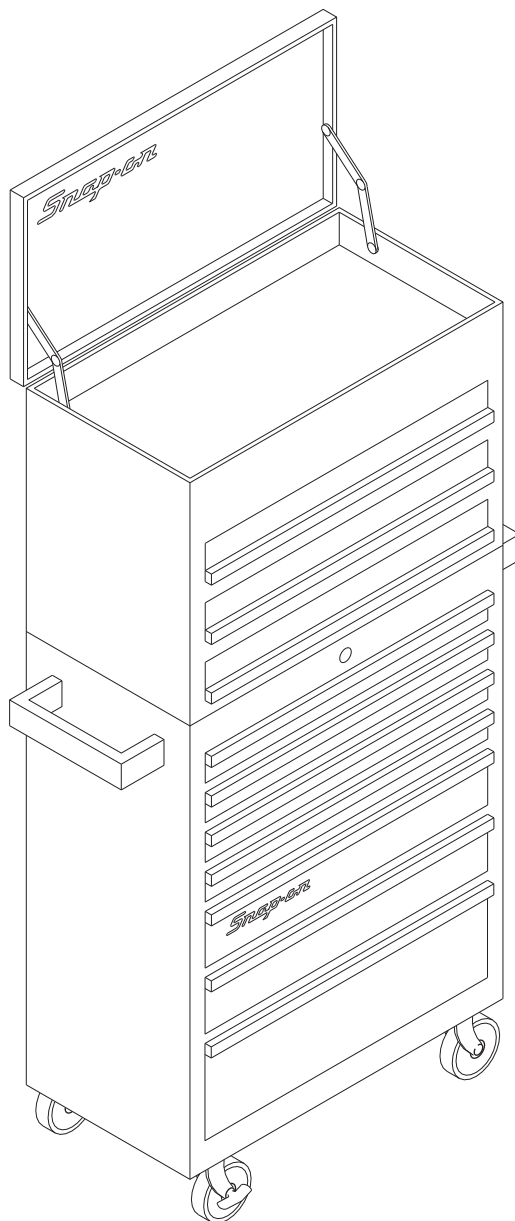
DESCRIPTION: The tail drive flange wrench is used with torque reactor, 70700-20688-102, to remove and install nut that retains the input or output flanges on tail drive shafts, tail gear box input, and rotor brake output flange.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

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FIGURE C-71. TAIL DRIVE FLANGE WRENCH, 70700-20687-102



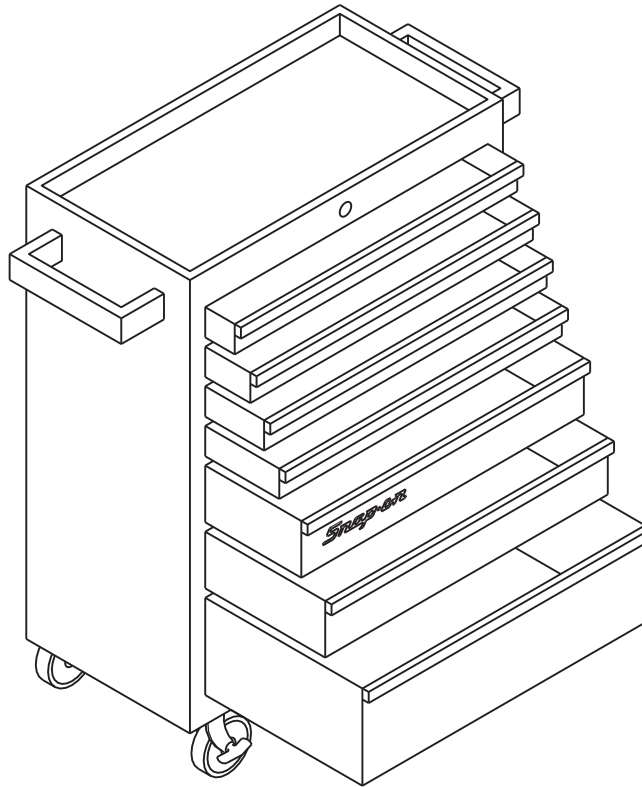
DESCRIPTION: The aircraft mechanic's toolkit contains tools required to support all requirements of the helicopter.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB2072A
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FIGURE C-72. AIRCRAFT MECHANIC'S TOOLKIT



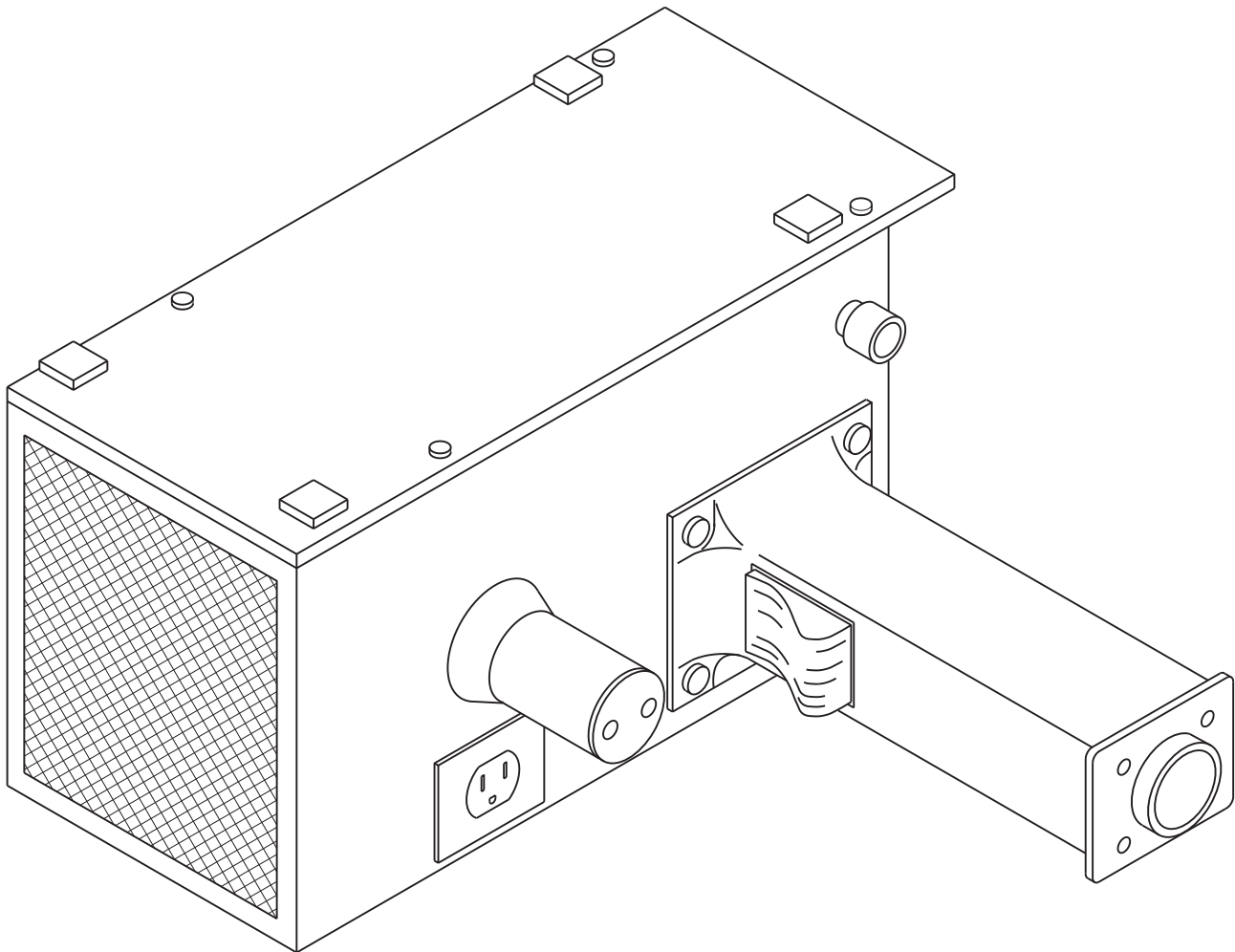
DESCRIPTION: The airframe repairer's toolkit contains tools required to support all requirements to maintain and repair helicopter airframe.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB2073A
SA

FIGURE C-73. AIRFRAME REPAIRER'S TOOLKIT, SIK-AF-92



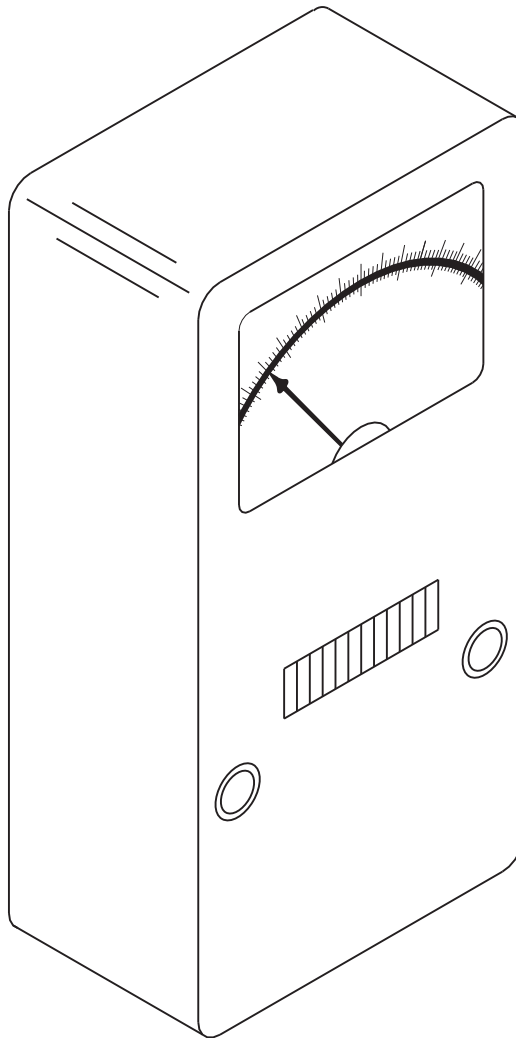
DESCRIPTION: The simulator is a handheld, portable source of pulsed radar frequency energy. Powered by two self-contained rechargeable batteries, a trigger switch on handgrip energizes the simulator.

POWER REQUIREMENTS: Two rechargeable, size D type batteries.

CALIBRATION REQUIREMENTS: Not Applicable

FB2074
SA

FIGURE C-74. SIMULATOR, SM-C-877251



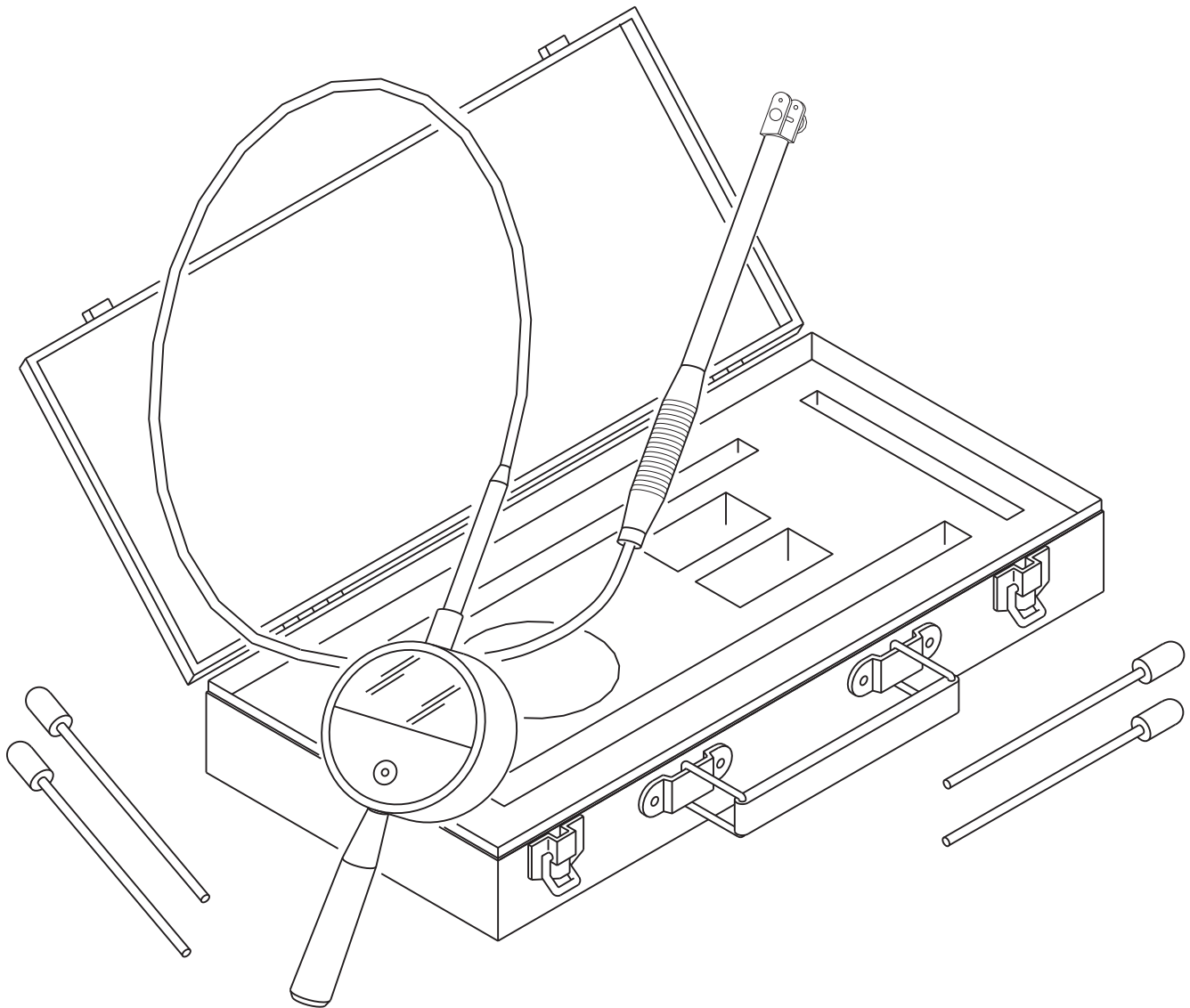
DESCRIPTION: The temperature meter is designed to provide accurate temperature measurements over the range of -50°F to $+70^{\circ}\text{F}$ (-45°C to $+21^{\circ}\text{C}$). A total of three separate thermistor probes can be attached to allow readings from three separate locations up to 150 feet away.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB2075
SA

FIGURE C-75. TEMPERATURE METER, 385-3L



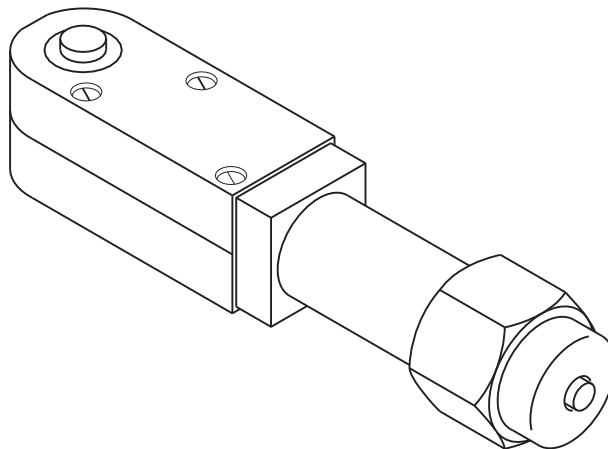
DESCRIPTION: The pyrometer is a handheld, dial type, temperature sensing device. This tool is used to accurately determine main rotor blade temperature on or off the helicopter. It may also be used to measure temperature anywhere on the helicopter where an accurate surface temperature determination is required. The pyrometer must be used with the type 4020 flexible extension arm, and type 4040 thermocouple.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB2076
SA

FIGURE C-76. PYROMETER, 4000A



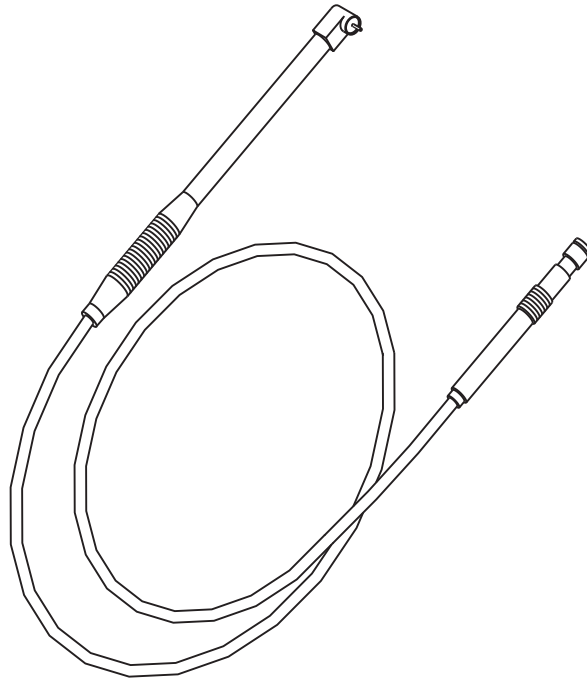
DESCRIPTION: The thermocouple is an accessory for the type 4000A pyrometer. It has a fine wire element in a retractory semi-swivel mounting for automatic self-alignment. A shield is provided to protect the fine wire tip. Use to maximum temperature 1200°F.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB2077
SA

FIGURE C-77. THERMOCOUPLE, TYPE 4040



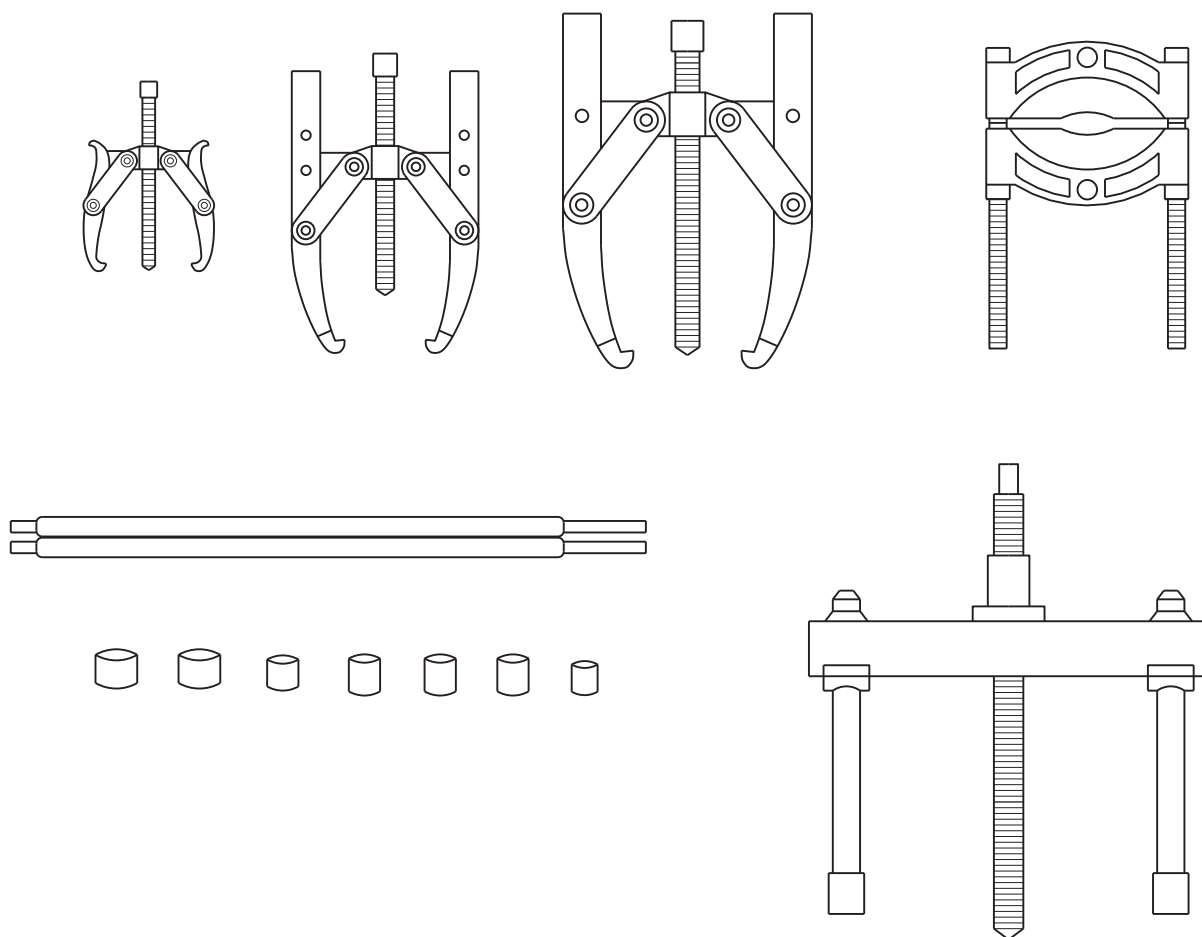
DESCRIPTION: The flexible extension arm is an accessory for type 4000A pyrometer. It has a flexible section, 36 inches long and rigid section 10 inches long. The flexible arm permits placing the thermocouple in hand to reach places and still hold the pyrometer in a convenient reading position.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB2078
SA

FIGURE C-78. FLEXIBLE EXTENSION ARM, TYPE 4020



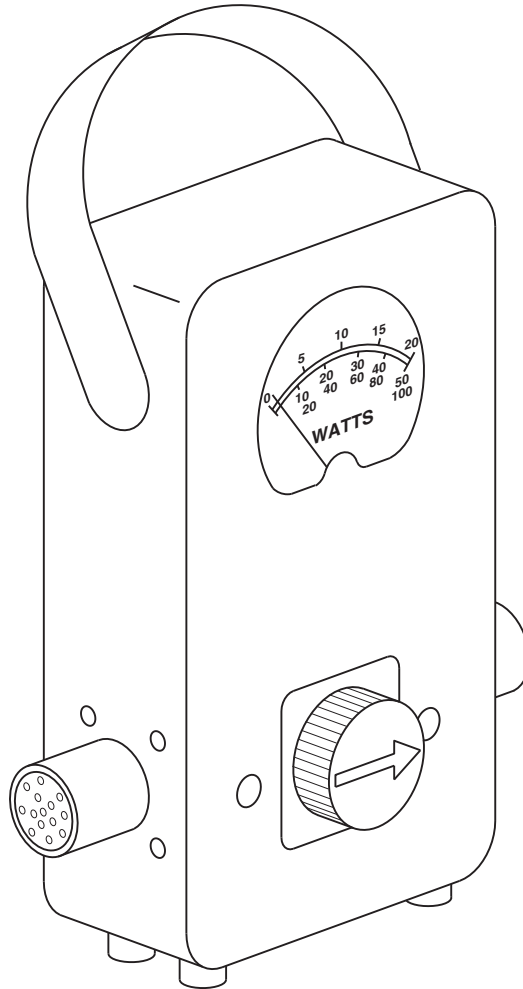
DESCRIPTION: The puller kit is used to remove and replace gears, bearings, wheels and any other press fit parts on the helicopter. Pullers are versatile in use, based on tonnage capacity required.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB2091
SA

FIGURE C-79. PULLER SET, MECHANICAL, 1677



DESCRIPTION: The wattmeter is a portable insertion-type instrument. It accurately measures forward or reflected power in coaxial transmission lines under any load condition.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS:

FREQUENCY

Wattmeter must be calibrated every 12 weeks regardless of being used or not.

FB2101_1
SA

FIGURE C-80. WATTMETER, 43 (SHEET 1 OF 4)

CALIBRATION REQUIREMENTS: (CONT)**EQUIPMENT REQUIRED**

- Bird 43 RF Wattmeter
- Bird 100H Element
50B Element
50C Element
50D Element
50E Element
Calibrated $\pm 3\%$
10 – 50W
10 – 1000 MHz
- Bird 8135 Termination
- Fluke 853A Multimeter
0–30 A DC $\pm 0.5\%$
- Narda 766 Attenuators 3 & 10 dB 20W
- Amplifier Research 50W 1000 RF Power Amplifier
10–1000 MHz 50W CW
- Sikorsky TS 7024 Dummy Element
- Weinschel GS–1 Connector Gage Set
- Current Source 0–30 A DC
- Hewlett Packard 8640b Signal Generator
1 mW 10–1000 Mhz CW

NOTE

Calibration limited to 10–500 MHz and 1000 MHz at 50 watts maximum.

**CALIBRATION PROCEDURE
INSPECTION**

Inspect WATTMETER for physical damage / cleanliness and repair / clean as required.

CALIBRATION

1. Adjust WATTMETER mechanical zero if required.
2. Verify WATTMETER type N connectors are within dimensional tolerances, see View A.
3. Perform calibration section 4, 5, or 6 as applicable.
 - a. Section 4: Bird 43 without element.
 - b. Section 5: Bird 43 with element.
 - c. Section 6: Wattmeter

WATTMETER WITHOUT ELEMENT

1. Connect test set–up shown in View B.
2. Adjust current source for WATTMETER readings of Table 1 and note input current is within tolerance.

TABLE 1

WATTMETER	CURRENT (μ A)
100	29.4 to 30.6
80	26.2 to 27.4
60	21.6 to 22.8
40	16.0 to 17.2
20	9.23 to 10.4

FB2101_2
SA**FIGURE C-80. WATTMETER, 43 (SHEET 2 OF 4)**

CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION PROCEDURES (CONT)

WATTMETER WITH ELEMENT

1. Perform Section 4 with element removed.
2. Perform Section 5 with element installed.

WATTMETER

1. Determine mid-frequency* range of WATTMETER as in note and connect test set-up as shown in View C using applicable equipment.

NOTE

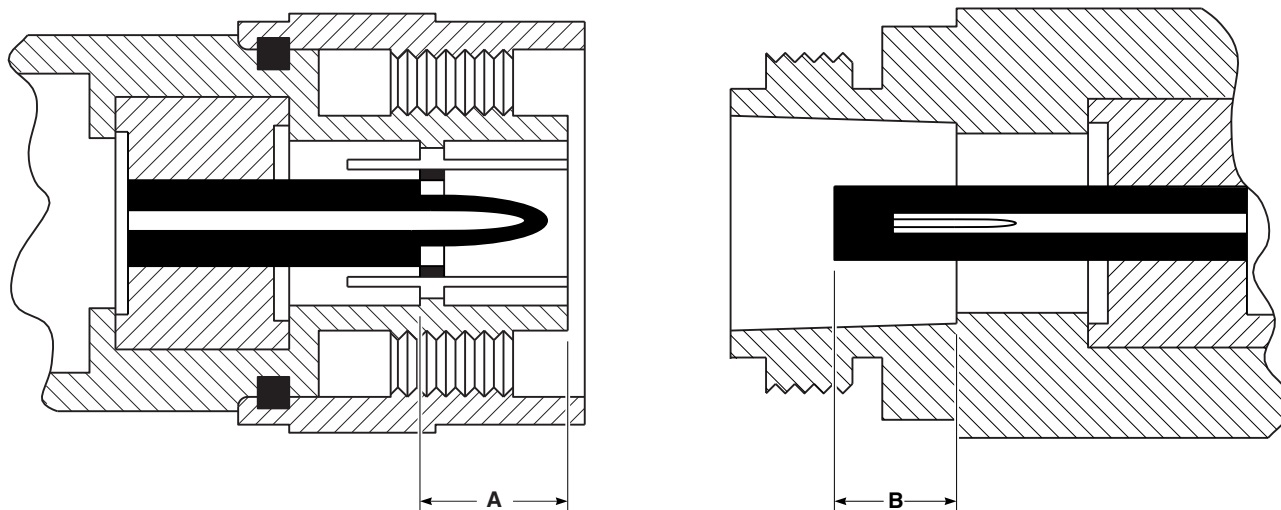
*500 MHz maximum; If frequency range of WATTMETER extends above 1000 MHz but not below, calibrate at 1000 MHz only.

2. Check scale linearity at cardinal points (50W maximum) to $\pm 5\%$ full scale using corrections for WATTMETER and standard wattmeter as required.
3. Check frequency response at low (10 MHz min) mid and high (500 MHz max) ends of frequency range at full scale power (50W Max). Tolerance is $\pm 5\%$ using corrections for WATTMETER and standard wattmeter as required.

NOTE

Check at 3 frequencies 500 MHz and below even if response extends above 500 MHz. If minimum frequency of WATTMETER is 1000 MHz, omit this test.

4. Apply standard calibration label stamped "LIMITED USE".



A INCHES	B INCHES
0.233 ± 0.009	0.197 ± 0.010

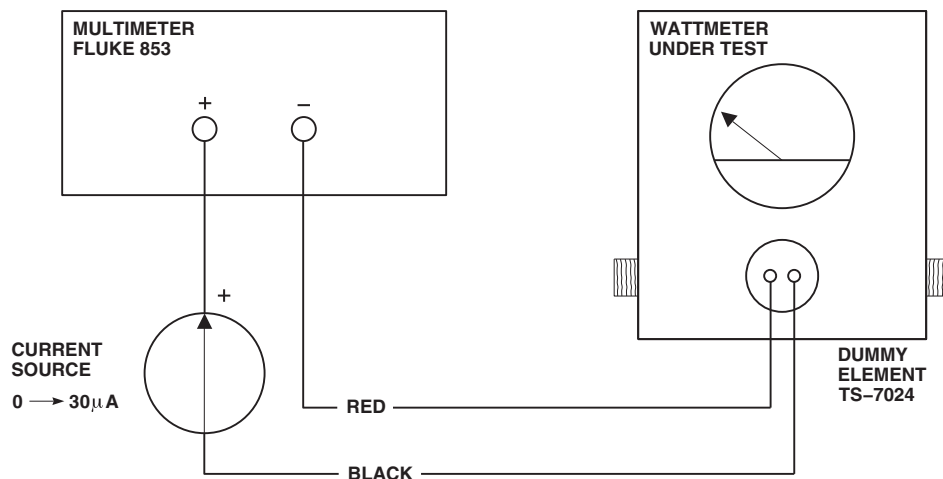
VIEW A
TYPE N CONNECTORS

FB2101_3
SA

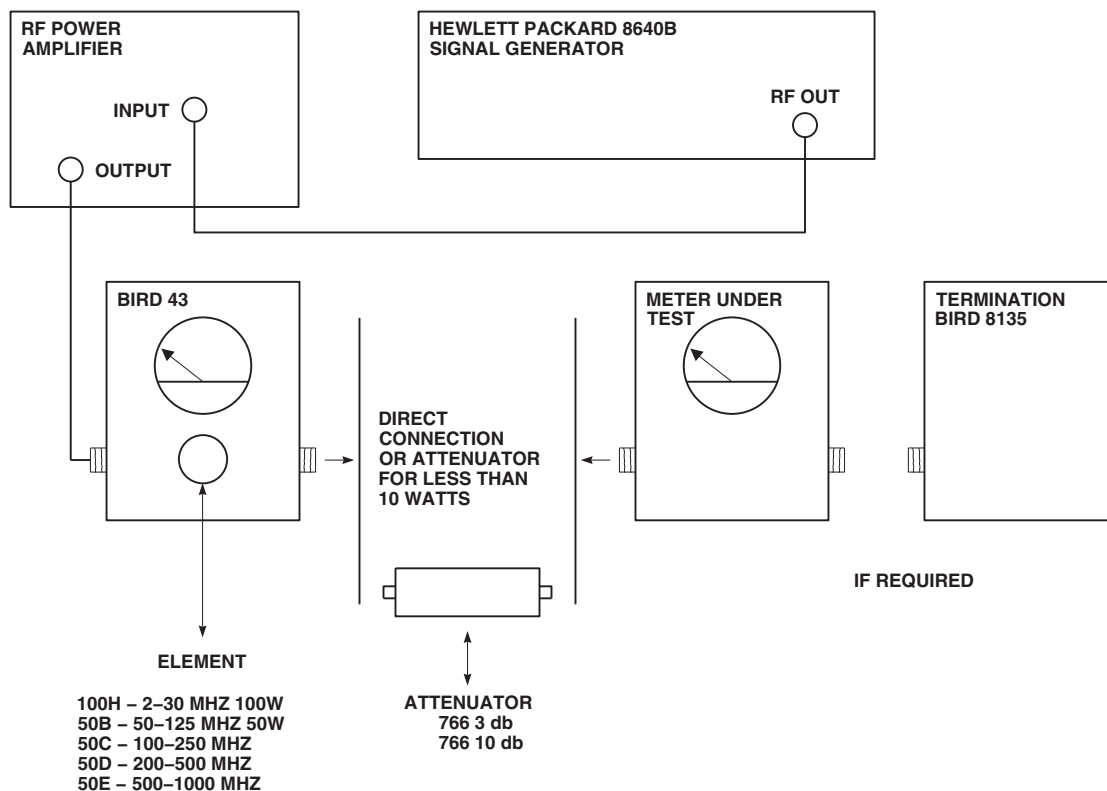
FIGURE C-80. WATTMETER, 43 (SHEET 3 OF 4)

CALIBRATION REQUIREMENTS: (CONT)

CALIBRATION PROCEDURES (CONT)



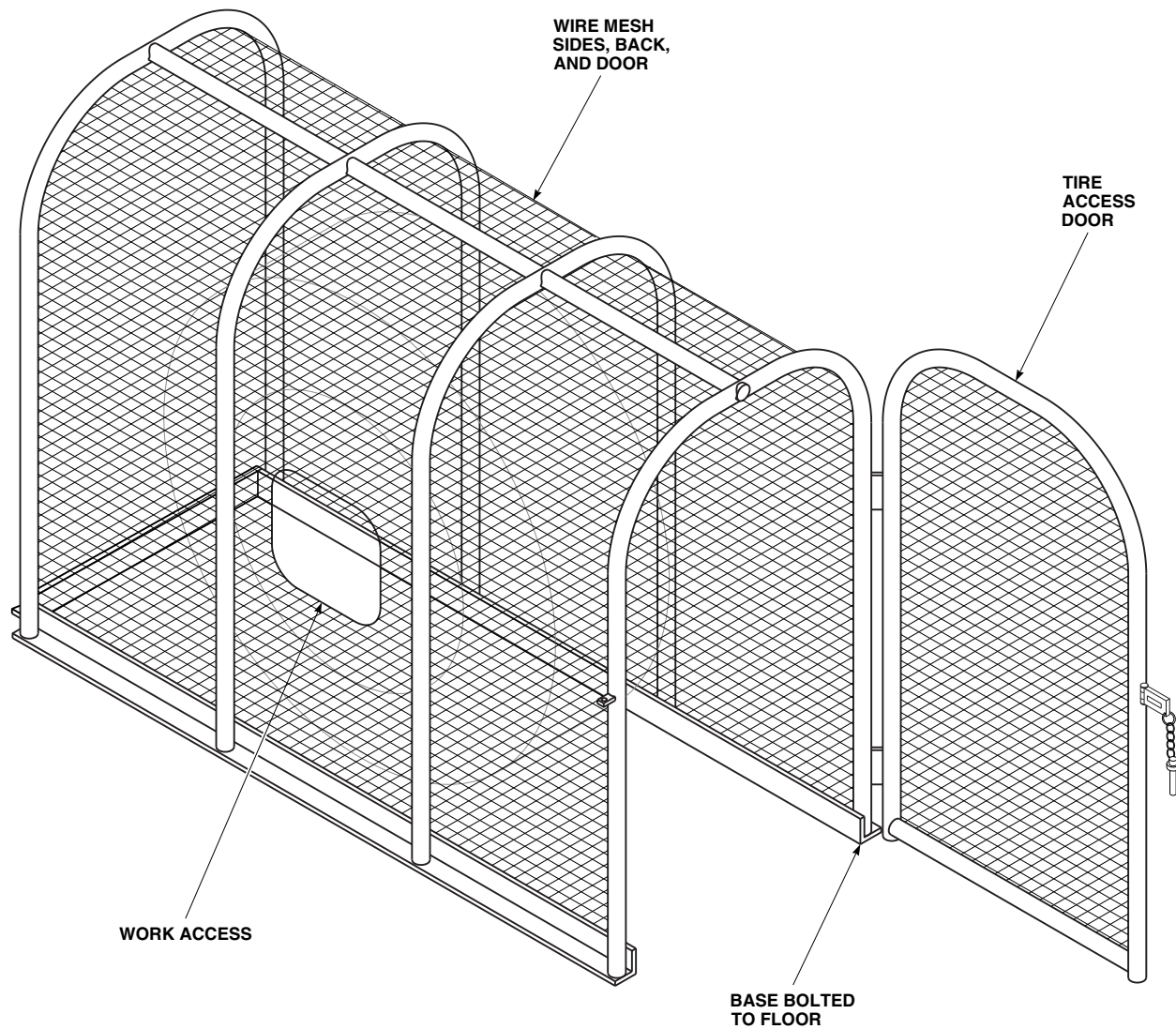
VIEW B



VIEW C

FIGURE C-80. WATTMETER, 43 (SHEET 4 OF 4)

FB2101_4
SA



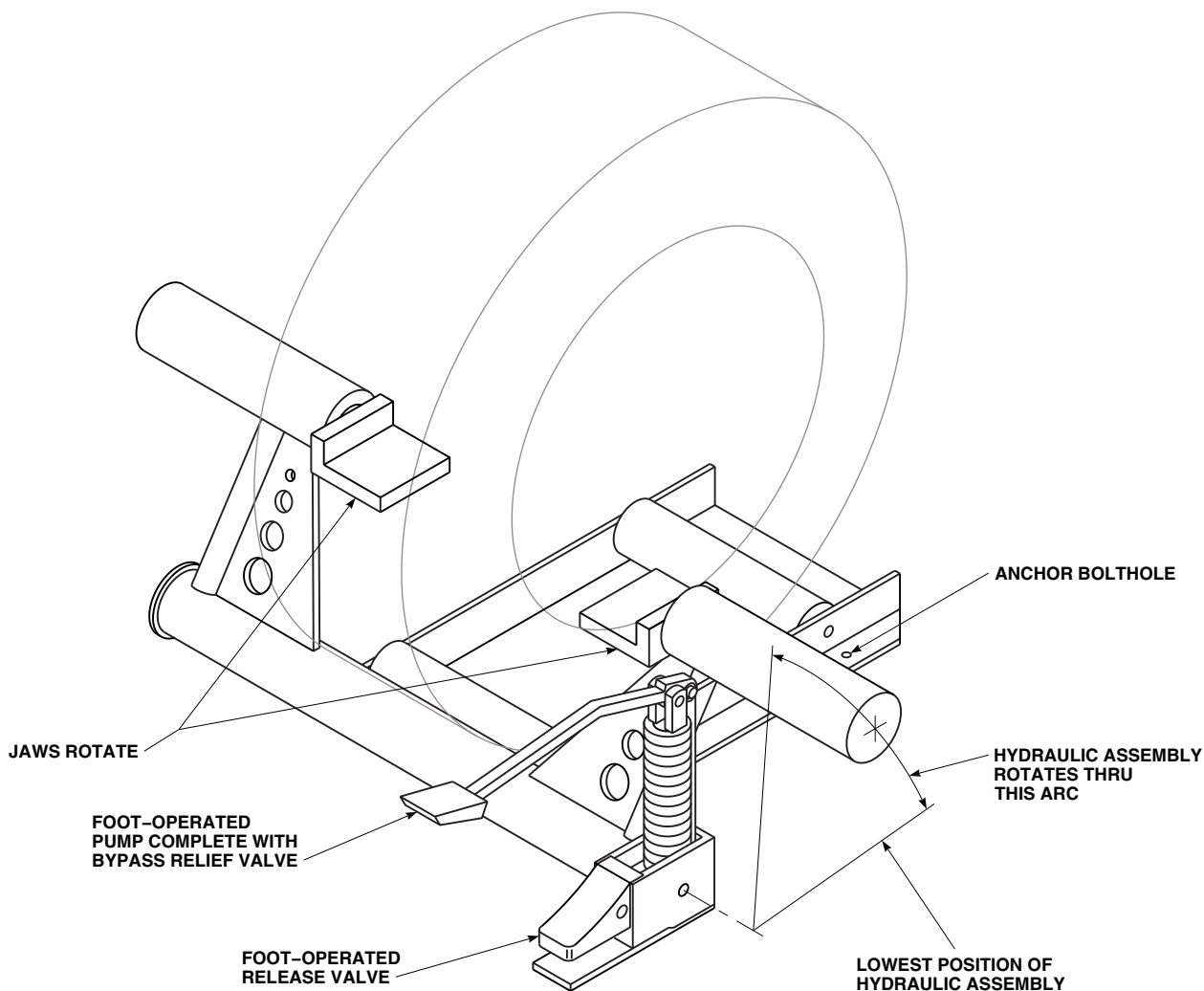
DESCRIPTION: The aircraft tire inflation cage is a metal tubular structure, covered with wire mesh. It has a locking door and a work access to inflate tires. The aircraft tire inflation cage is used to prevent injury to personnel. The aircraft tire inflation cage must be anchored to the floor.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FK1857A
SA

FIGURE C-81. AIRCRAFT TIRE INFLATION CAGE, 7201-010



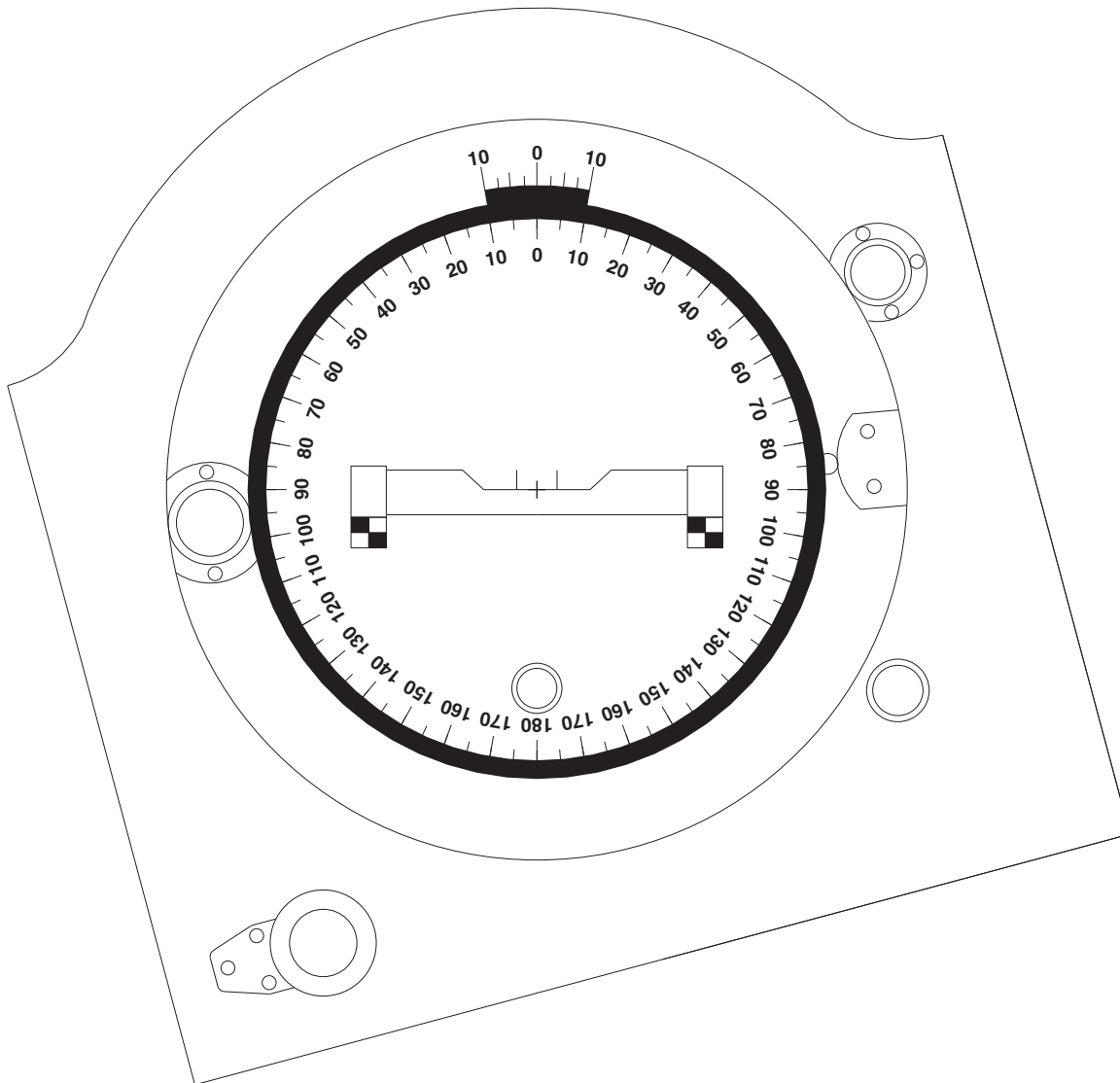
DESCRIPTION: The aircraft tire bead breaker is used to break the tire bead from the rim of a deflated wheel assembly. The aircraft tire bead breaker has a foot-operated hydraulic ram and release valve. It has a breaking capacity of 2000 pounds, on rims that range in size from 6-16-inches and tire widths of 9-inches. The aircraft tire bead breaker must be anchored to the floor.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FK1858B
SA

FIGURE C-82. AIRCRAFT TIRE BEAD BREAKER, 5033-010



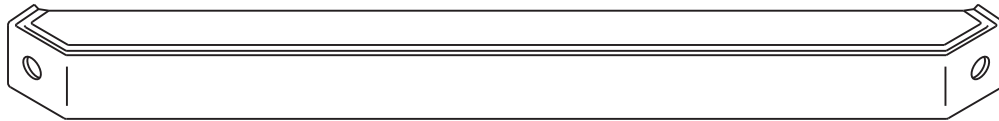
DESCRIPTION: The protractor may be used to measure propeller blade angle, control surface movement, or any other angle. It consists of an aluminum frame in which a steel ring and a disk are mounted. Spirit levels are mounted on both the frame and the disk, and locks are provided for locking the ring to the frame or the disk.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB4081
SA

FIGURE C-83. PROTRACTOR



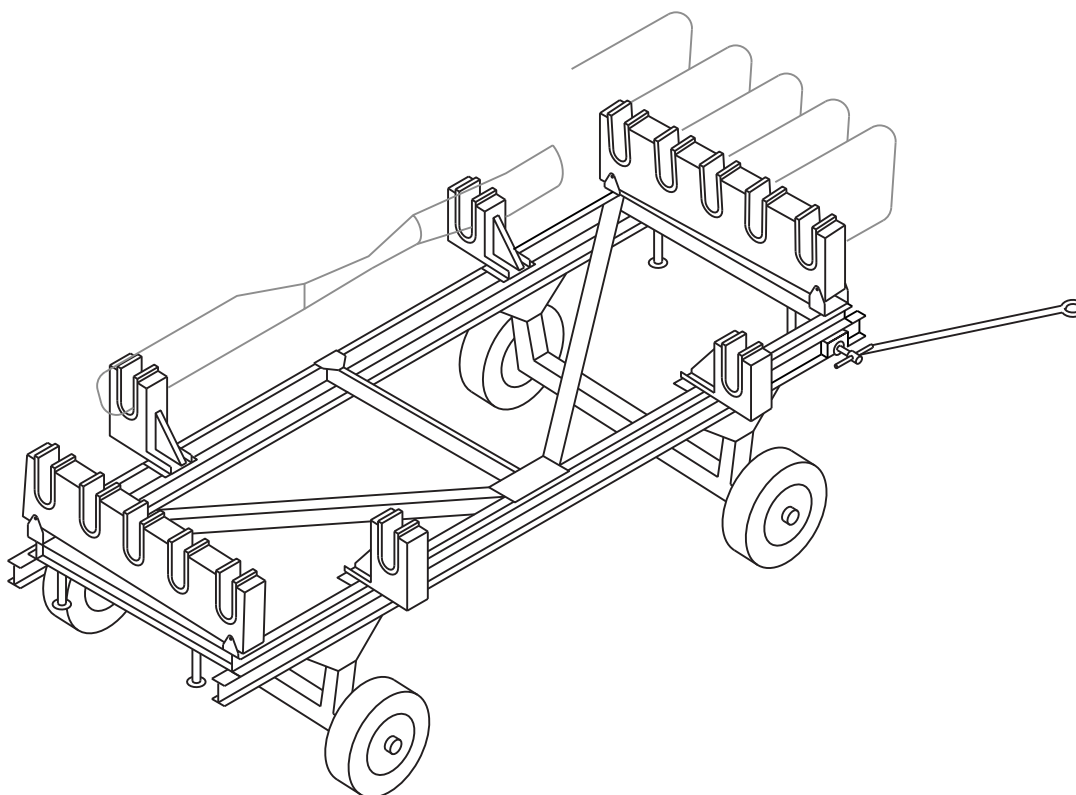
DESCRIPTION: The locking strut is used to secure open the tail rotor pylon during maintenance.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB2482
SA

FIGURE C-84. MAINTENANCE LOCK STRUT, 70700-20385-041



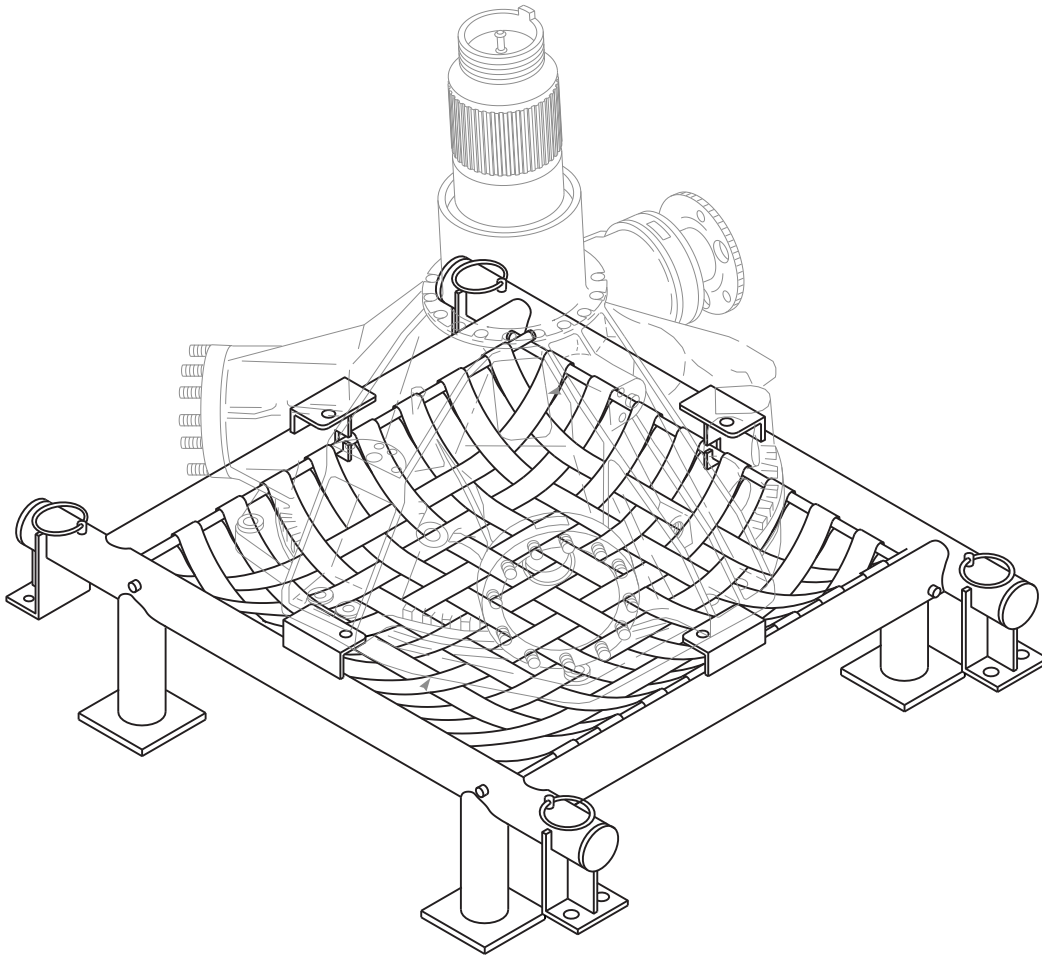
DESCRIPTION: The main and tail rotor blade adapter is used to secure the blades during maintenance.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB2483A
SA

FIGURE C-85. MAIN AND TAIL ROTOR BLADE ADAPTER, 70700-20426-041



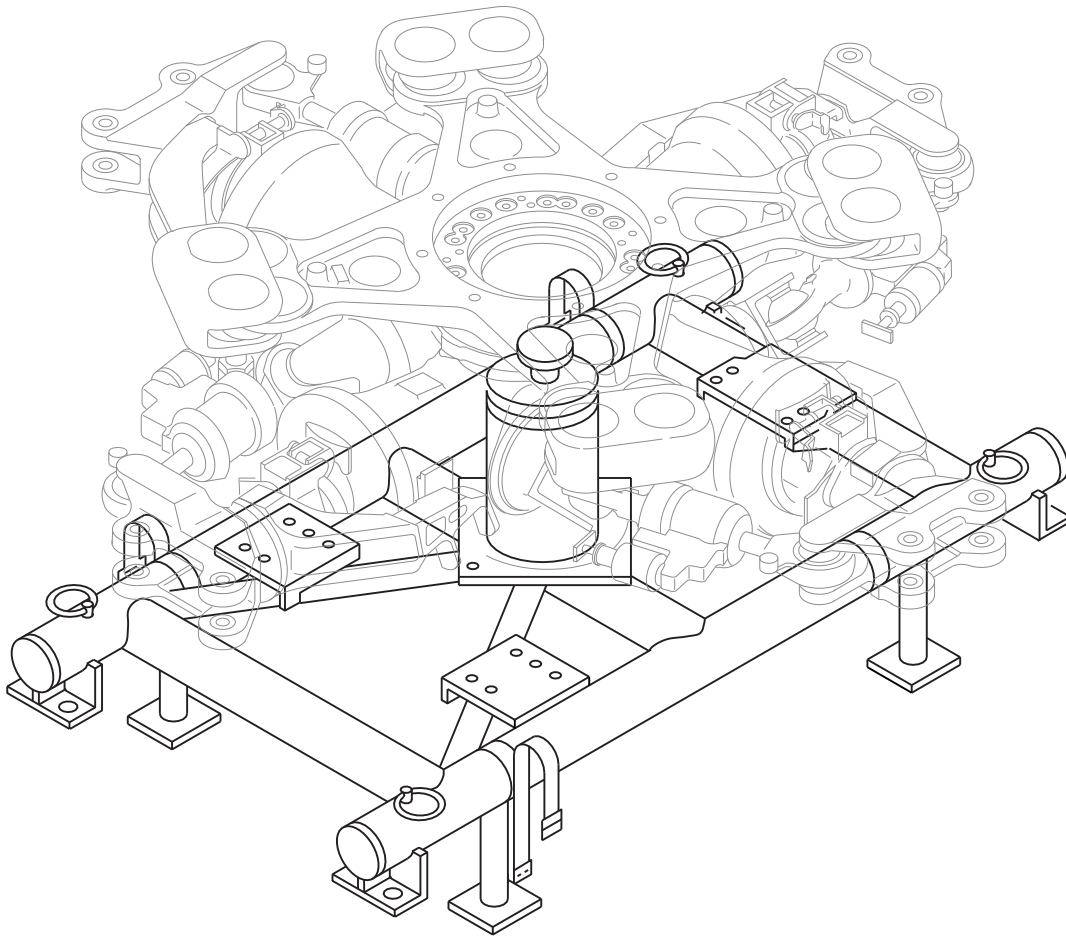
DESCRIPTION: The main gear box (MGB) adapter is used to support MGB during maintenance.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB2484A
SA

FIGURE C-86. MAIN GEAR BOX ADAPTER, 70700-20420-041



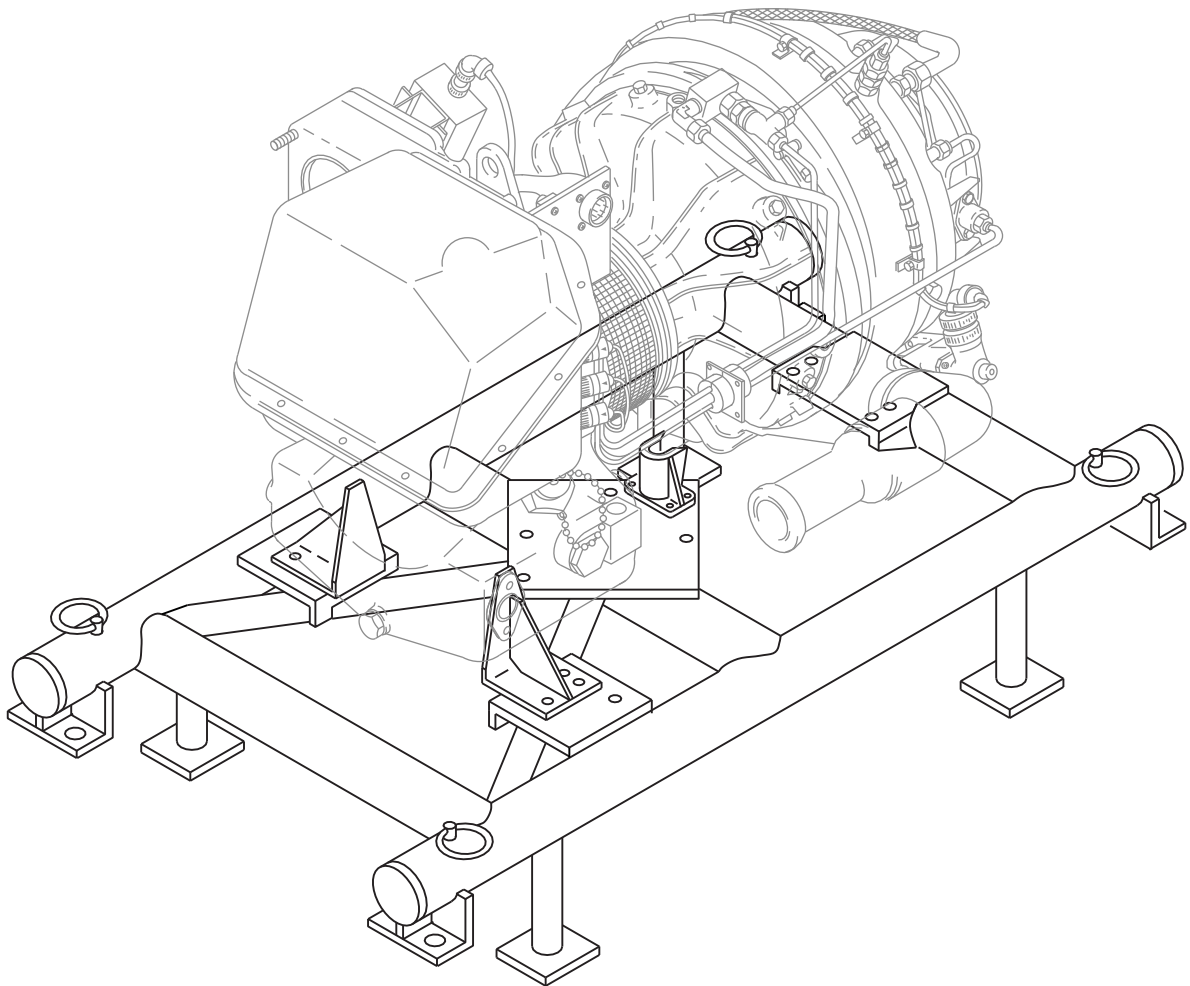
DESCRIPTION: The rotary wing head adapter is used to support the rotary wing head during maintenance.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB2485A
SA

FIGURE C-87. ROTARY WING HEAD ADAPTER, 70700-20421-041



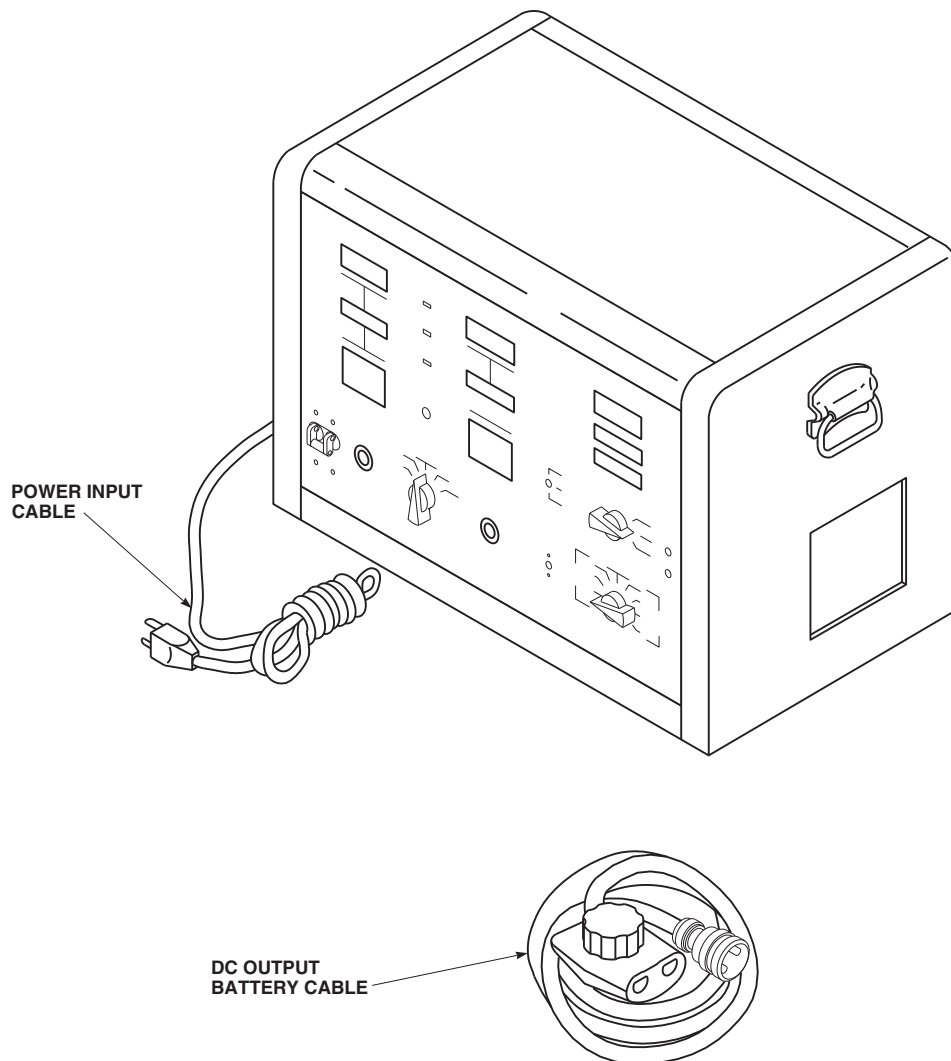
DESCRIPTION: The APU Adapter is used to support the APU during maintenance.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB2486
SA

FIGURE C-88. AUXILIARY POWER UNIT ADAPTER, 70700-20423-041



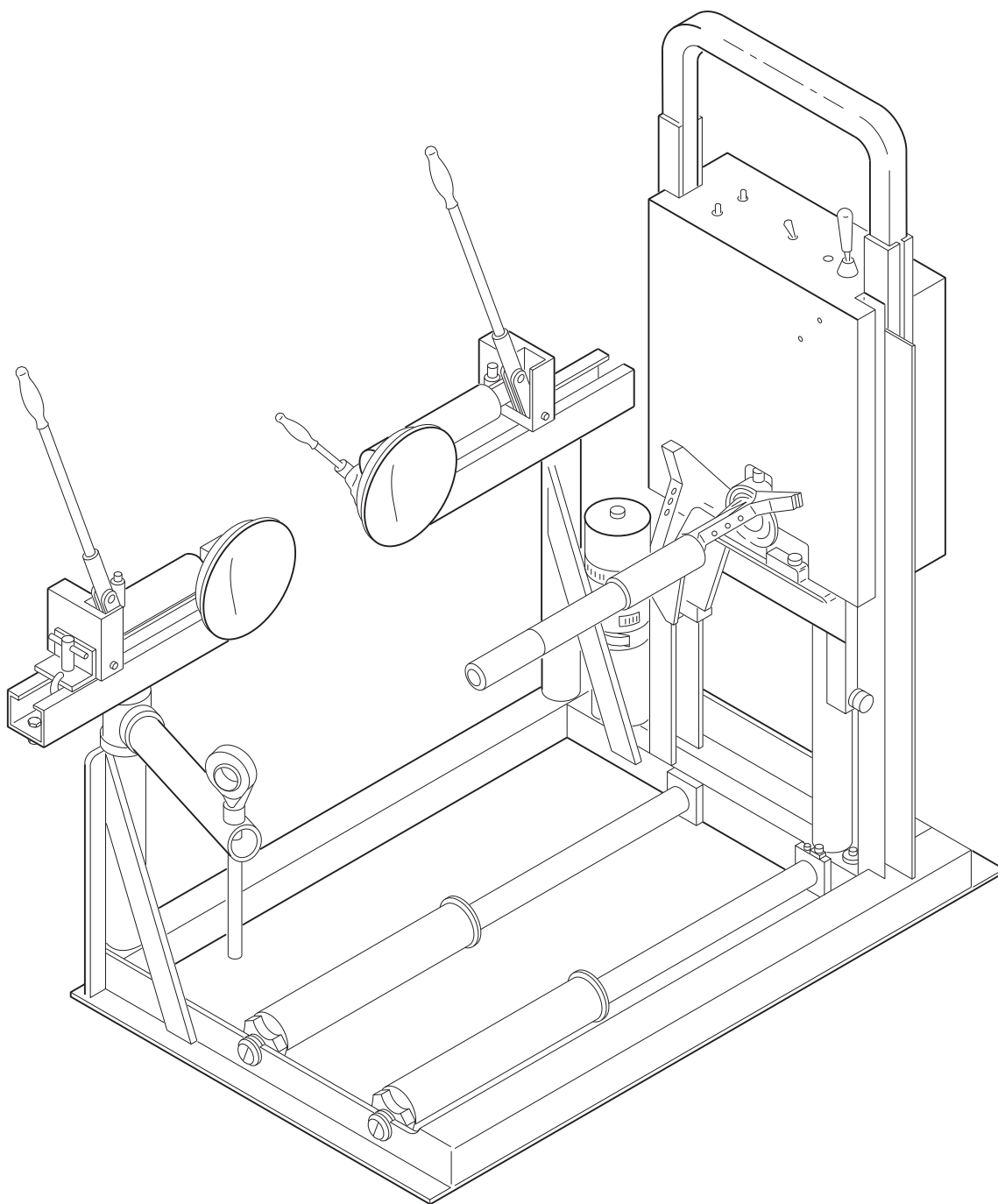
DESCRIPTION: The RF80-K Series Battery Charger / Analyzer consists of a transformer, rectifier, passing regulator circuit, timer programmer, and test discharge load bank. The unit is designed to charge and analyze aircraft batteries.

POWER REQUIREMENTS: This unit operates from a source of 187 to 265 VAC, 47-63 hertz, single phase.

CALIBRATION REQUIREMENTS: See manufacture manual.

FL0403
SA

FIGURE C-89. BATTERY CHARGER/ANALYZER, RF80-K



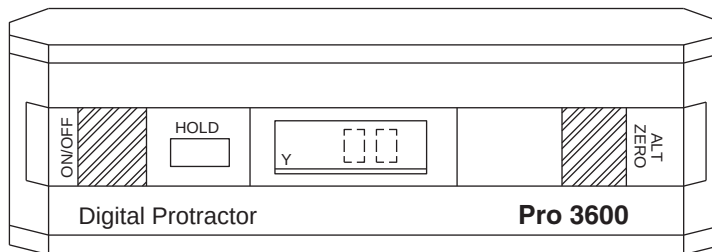
DESCRIPTION: The aircraft tire bead breaker is used to break the tire bead from the rim of a deflated wheel assembly. The aircraft tire bead breaker has two hydraulic hand pumps to break the bead. It has a breaking capacity of 12000 pounds.

POWER REQUIREMENTS: 115 / 230 Volts, 60 Hz, 1 PH, 15 Amps

CALIBRATION REQUIREMENTS: Not Applicable

FB4037B
SA

FIGURE C-90. AIRCRAFT TIRE BEAD BREAKER, LEE-1X



DESCRIPTION: The prop protractor is a digital instrument which provides maintenance personnel immediate digital indication of level, angle or tilt without the need to interpret a bubble or vernier scale. This instrument is used for rigging the flight controls and rotor blades.

POWER REQUIREMENTS: Standard 9 volt battery

CALIBRATION REQUIREMENTS:

FREQUENCY

Accuracy test shall be performed on digital protractor daily.
Digital protractor must be calibrated every 24 weeks regardless of being used or not.

EQUIPMENT REQUIRED

Precision Level
Precision Leveling Plate

CLEANING MATERIALS

Mild Detergent
Machinery Towel, Item 211, Appendix D

CALIBRATION PROCEDURES:

CLEANING / INSPECTION

Clean protractor with mild soap and a damp cloth. Never immerse in water.
Inspect for signs of damage, abuse, nicks, and dents.
Make sure a fresh battery is installed.

NOTE

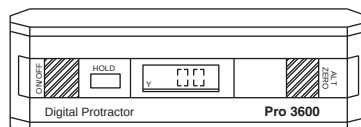
If digital protractor fails accuracy test, digital protractor must be recalibrated using Superset ® procedure.

FB4413_1A
SA

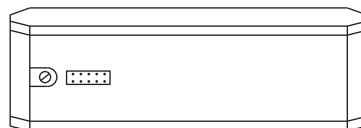
FIGURE C-91. DIGITAL PROPELLER PROTRACTOR, PRO 3600 (SHEET 1 OF 4)

CALIBRATION PROCEDURES: (CONTINUED)**ACCURACY TEST**

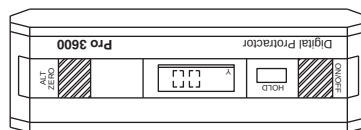
Position the digital protractor with the display facing the operator on a clean, precision leveling plate. Wait 10 seconds and note the angle on the display.



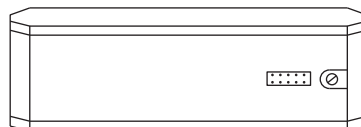
Rotate the digital protractor end-for-end so the display is facing away from operator. Wait 10 seconds and note the angle on the display.



Roll the digital protractor toward operator so the display is facing operator but the lettering on the digital protractor is upside down. Wait 10 seconds and note the angle on the display.



Rotate the digital protractor end-for-end so the display is facing away from operator (the lettering should still be upside down). Wait 10 seconds and note the angle on the display.



If any of the four measurements varies from any of the others by more than 0.1° , calibrate the digital protractor using Superset®.

 FB4413_2A
 SA

FIGURE C-91. DIGITAL PROPELLER PROTRACTOR, PRO 3600 (SHEET 2 OF 4)

CALIBRATION PROCEDURES: (CONTINUED)

SUPERSET®

Turn the digital protractor on and place on a precision leveling plate.

NOTE

Each time the digital protractor is repositioned, wait a minimum of 10 seconds before pressing HOLD to advance to next step.

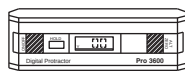
Press and hold the HOLD and ALT ZERO buttons simultaneously. Keep them pressed for approximately three seconds.

Release the buttons when the SUP appears. A 0 within flashing brackets will then appear. These brackets are composed of four horizontal and four vertical segments.

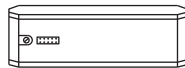
NOTE

As you proceed through the following steps of Superset®, a new segment will hold steady after you complete each step.

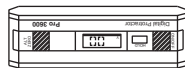
Superset® – Horizontal Settings



Digital protractor faces operator and lettering on face plate is right side up.
Align with an edge or line – wait 10 seconds.
Press HOLD button until [1] appears.



Rotate digital protractor so it faces away from operator and lettering on face plate is still right side up.
Align with an edge or line – wait 10 seconds.
Press HOLD button until [2] appears.



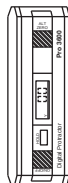
Roll digital protractor so it faces operator and lettering on face plate is upside down.
Align with an edge or line – wait 10 seconds.
Press HOLD button until [3] appears.



Rotate digital protractor so it faces away from operator and lettering on face plate is still upside down.
Align with an edge or line – wait 10 seconds.
Press HOLD button until [4] appears.

FB4413_3
SA

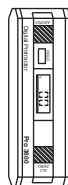
FIGURE C-91. DIGITAL PROPELLER PROTRACTOR, PRO 3600 (SHEET 3 OF 4)

CALIBRATION PROCEDURES: (CONTINUED)**Superset® – Vertical Settings**

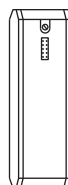
Digital protractor is placed against a vertical surface, faces operator and lettering reads from bottom to top. Align with an edge or line – wait 10 seconds. Press HOLD button until [5] appears.



Rotate digital protractor so it faces away from operator and lettering still reads from bottom to top. Align with an edge or line – wait 10 seconds. Press HOLD button until [6] appears.

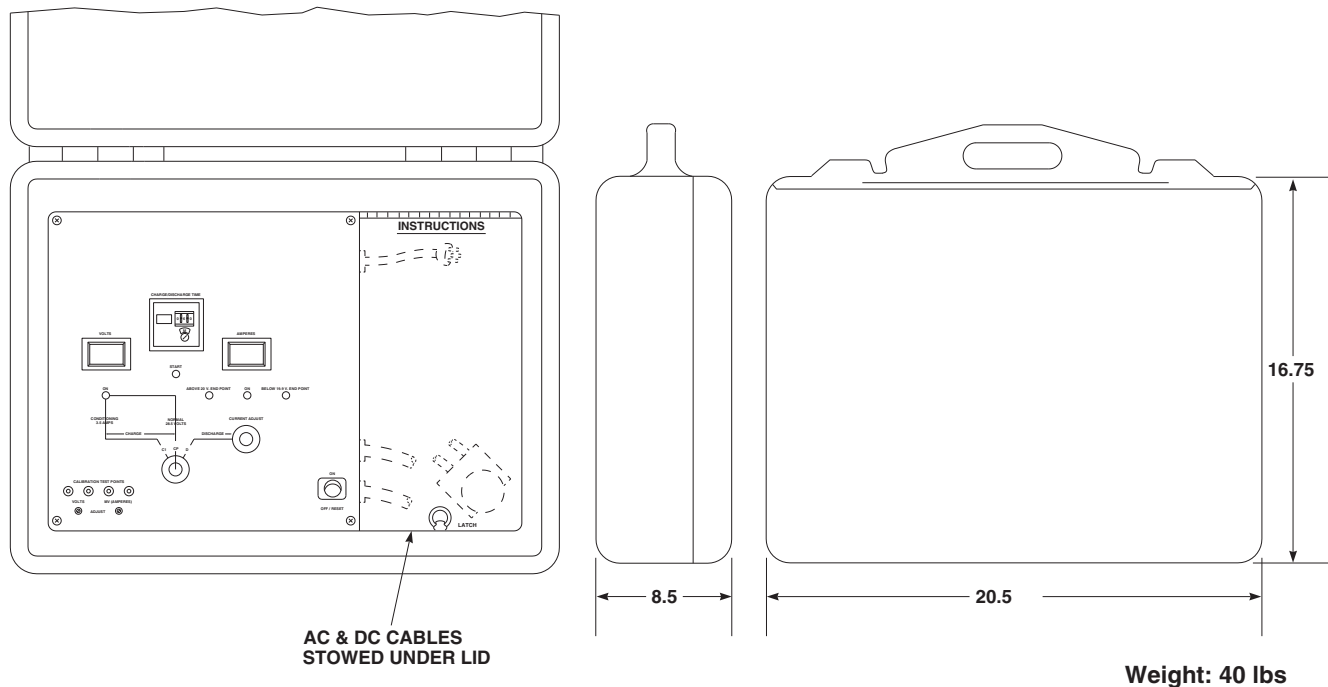


Roll digital protractor so it faces operator and lettering on face plate reads from top to bottom. Align with an edge or line – wait 10 seconds. Press HOLD button until [7] appears.



Rotate digital protractor so it faces away from operator and lettering still reads from top to bottom. Align with an edge or line – wait 10 seconds. Press HOLD button. [8] will very briefly appear, followed immediately by regular display.

FB4413_4A
SA**FIGURE C-91. DIGITAL PROPELLER PROTRACTOR, PRO 3600 (SHEET 4 OF 4)**



DESCRIPTION: This Battery Charger / Analyzer is used for charging / discharging the Valve Regulated Sealed Lead Acid Battery (VRSLAB) at the intermediate level of maintenance.

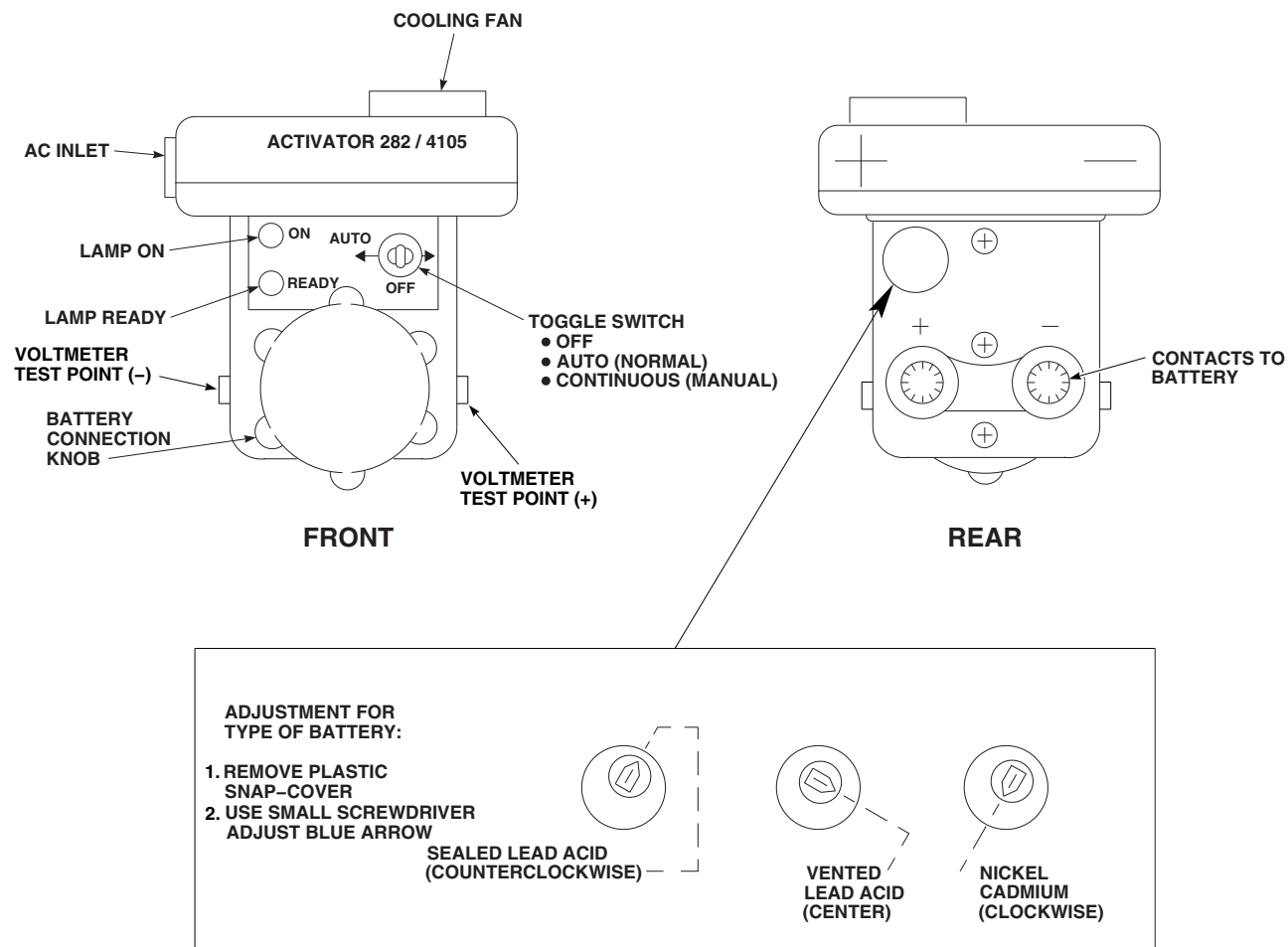
The Charger / Analyzer has full charging and discharging capabilities, an elapsed time counter, voltage and amperage displays, and fan cooled discharged resistors. The Charger / Analyzer is portable and has usage instructions contained within the case.

POWER REQUIREMENTS: This unit operates from a source of 95–135 VAC, 50/60 Hertz, 3 Amperes, or 190–207 VAC, 50/60 Hertz, 1.5 Amperes.

CALIBRATION REQUIREMENTS: Calibration Interval: 24 weeks
Calibration Reference: OEM Manual

FE0837
SA

FIGURE C-92. VRSLAB - BATTERY CHARGER/ANALYZER, 4159



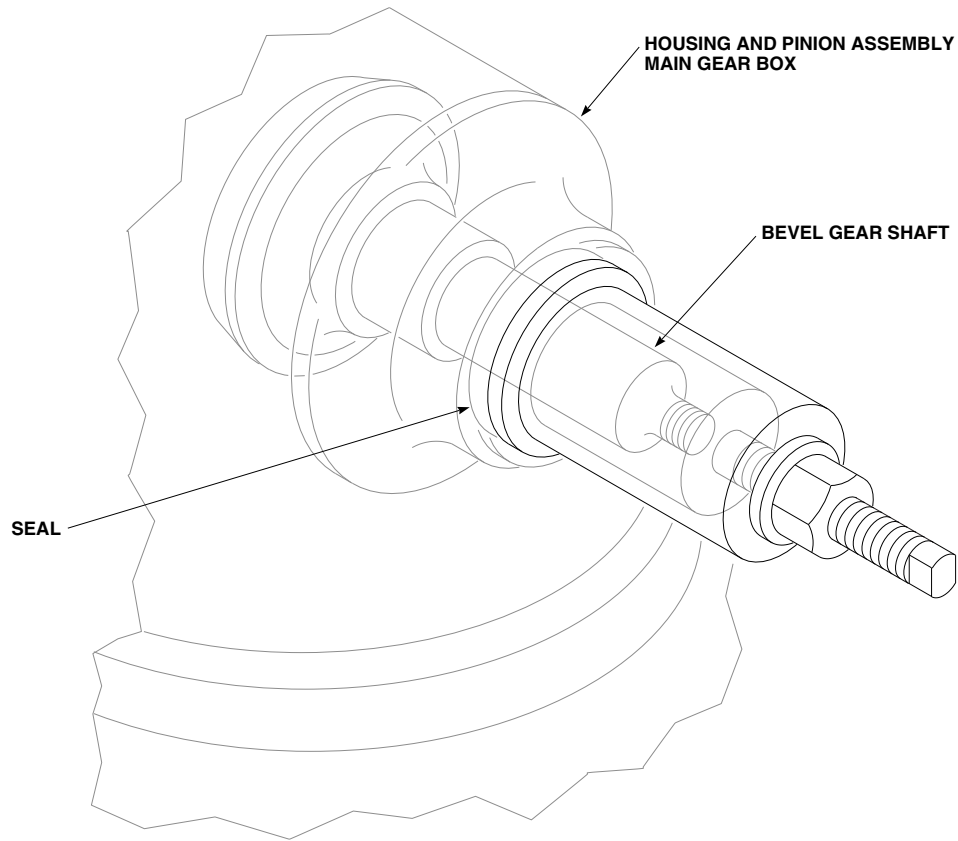
DESCRIPTION: The Battery Charger is a multi-purpose charger. It is capable of charging lead acid vented batteries, sealed lead acid batteries (including Valve Regulated Sealed Lead Acid Battery (VRLAB)), and Nickel Cadmium (NiCAD) batteries.

POWER REQUIREMENTS: Refer to OEM Manual.

CALIBRATION REQUIREMENTS: Refer to manufacturer's product manual for Activator 282 / 4105. Calibration interval: 12 months.

FIGURE C-93. BATTERY CHARGER, 282/4105

FE0838
SA



DESCRIPTION: Used in replacement of the seal in the housing at the tail take-off pinion assembly of a rotor brake equipped main gear box. The seal is a 0.012" interference fit in the housing. The seal has an OD of 3.512". The bevel pinion shaft protrudes approximately three inches thru the seal.

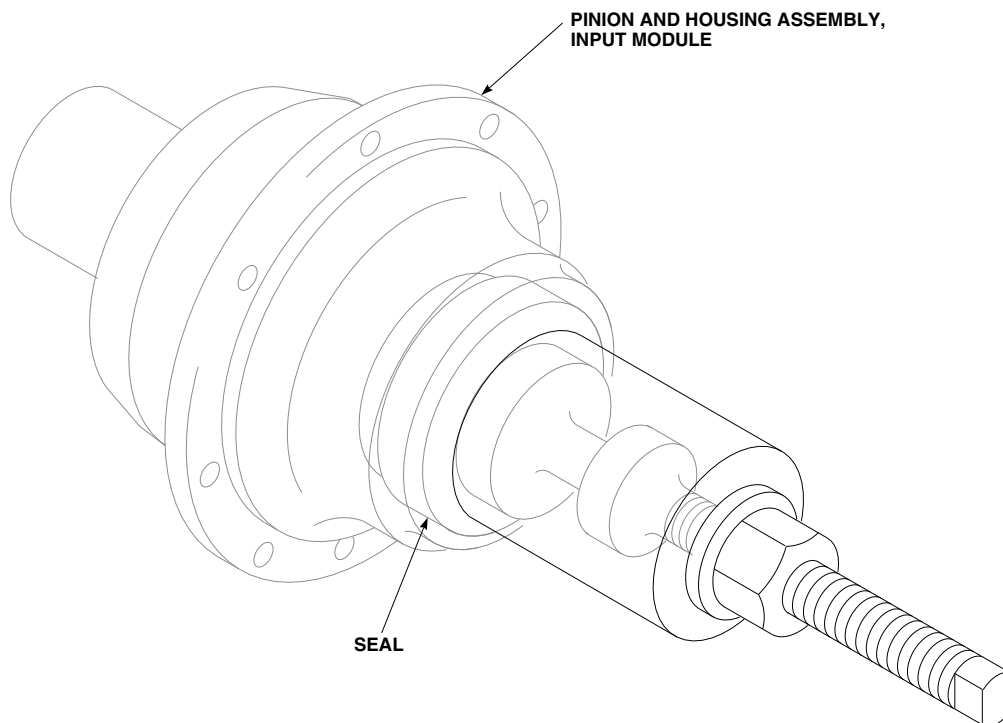
The Seal Installer consists of an outer cylinder and an inner shaft. The diameter of the outer cylinder is designed to mate the seal surface without touching the housing. One end of the inner shaft has internal threads to mate the external threads of the bevel pinion shaft. The opposite end is externally threaded. This tool is used by threading the inner shaft onto the bevel gear shaft then tightening a nut at the opposite end of the inner shaft against the top of the outer cylinder forcing the outer cylinder against the seal, pressing the seal in position in the housing.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB4415C
SA

FIGURE C-94. SEAL INSTALLER, 70700-77308-041



DESCRIPTION: Used in replacement of the seal in the housing at the input module pinion. The seal is a line-to-line fit in the housing assembly and must be pressed in to be seated.

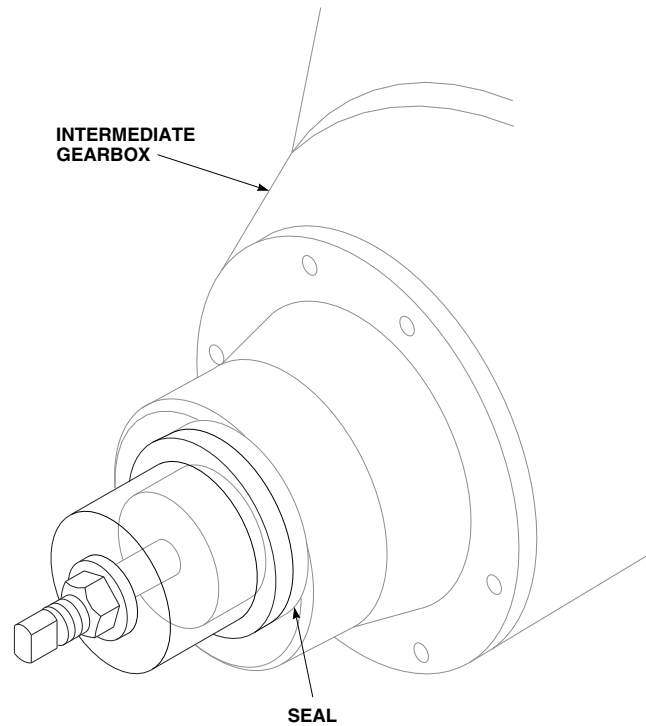
The Seal Installer consists of an outer cylinder and an inner shaft. The diameter of the outer cylinder is designed to mate the seal surface without touching the housing. The length of the cylinder will enable it to pass over the shaft and seat the seal without bottoming out against the end of the shaft. One end of the inner shaft has internal threads to mate the external threads of the end of the pinion shaft. The opposite end of the inner shaft is externally threaded. This tool is used by threading the inner shaft onto the pinion shaft then tightening a nut at the opposite end of the inner shaft against the top of the outer cylinder, forcing the outer cylinder against the seal, seating the seal in the housing.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB4416C
SA

FIGURE C-95. SEAL INSTALLER, 70700-77309-041



DESCRIPTION: Used in replacement of the seals in the intermediate gear box input and output pinion housings, the input pinion housing of the tail gear box, and the tail take-off pinion housing of a non-rotor brake equipped main gear box. The seals are a line-to-line fit in the housing assemblies and must be pressed in to be seated.

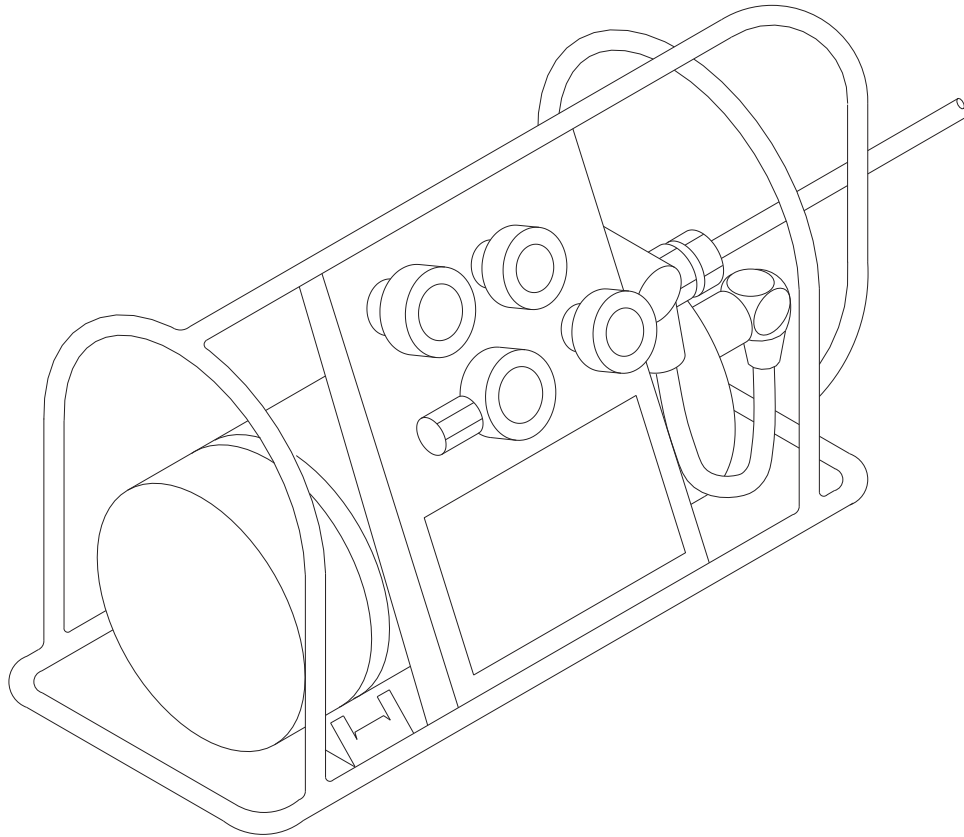
The Seal Installer consists of an outer cylinder and an inner shaft. The diameter of the outer cylinder is designed to mate to the seal face. The length of the cylinder enables it to pass over the longest shaft and seat the seal without bottoming out against the end of the shaft. One end of the inner shaft has internal threads to mate the external threads of the shafts. The opposite end of the inner shaft is externally threaded. This tool is used by threading the inner shaft on to the gear shaft, then tightening a nut at the opposite end of inner shaft against the top of the outer cylinder, forcing the outer cylinder against the seal seating the seal in the housing.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB4417C
SA

FIGURE C-96. SEAL INSTALLER, 70700-77310-041



DESCRIPTION: The portable nitrogen cylinder is utilized for line maintenance servicing of the following components:

Main landing gear shock struts
 Tail landing gear shock strut
 Tail bumper shock strut
 Main rotor accumulator
 APU accumulator

The portable nitrogen cylinder is capable of pressure to 3000 PSI and comes complete with regulator, hose and fittings.

DIMENSIONS:

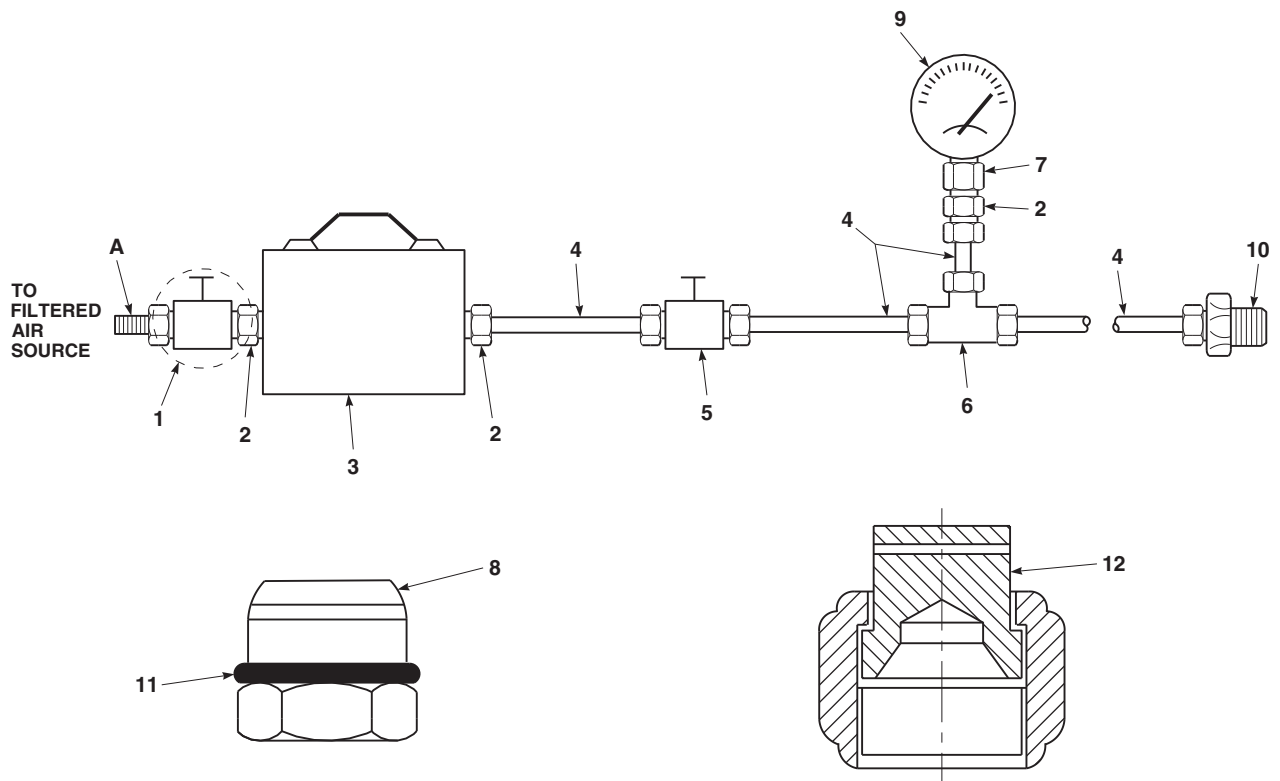
Length:	23"
Width:	17"
Height	14.5"
Weight:	53 lbs

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB4420A
SA

FIGURE C-97. NITROGEN SERVICING UNIT, 1428AS100-1



NO.	NOMENCLATURE	QTY REQUIRED
1	METERING VALVE	1
2	UNION	3
3	VACUUM PUMP	1
4	HOSE OR TUBE ASSEMBLY	5
5	SHUTOFF VALVE	1
6	TEE FITTING	1
7	ADAPTER	1
8	PLUG	5
9	VACUUM PRESSURE GAGE	1
10	REDUCER FITTING	2
11	PACKING	2
12	CAP	2

FB4419_1
SA

FIGURE C-98. FUEL INTEGRITY TEST SET, RJP001 (SHEET 1 OF 2)

NOTES

Item (1) is not required if air source is regulated. If item (1) is needed unscrew air valve (A) from vacuum pump (3) and thread (A) to (1) and connect (1) to (3) via union (2).

An 8" hose assembly (4) and reducer (10) is needed for bleeding crossfeed lines in addition to test setup illustrated.

Plug (8) to be used in sealing inlet adapter and engine fuel feed line.

Packing (11) is not required when plugging engine fuel feed line.

Cap (12) is used to cap prime shutoff valve during line purge and integrity test.

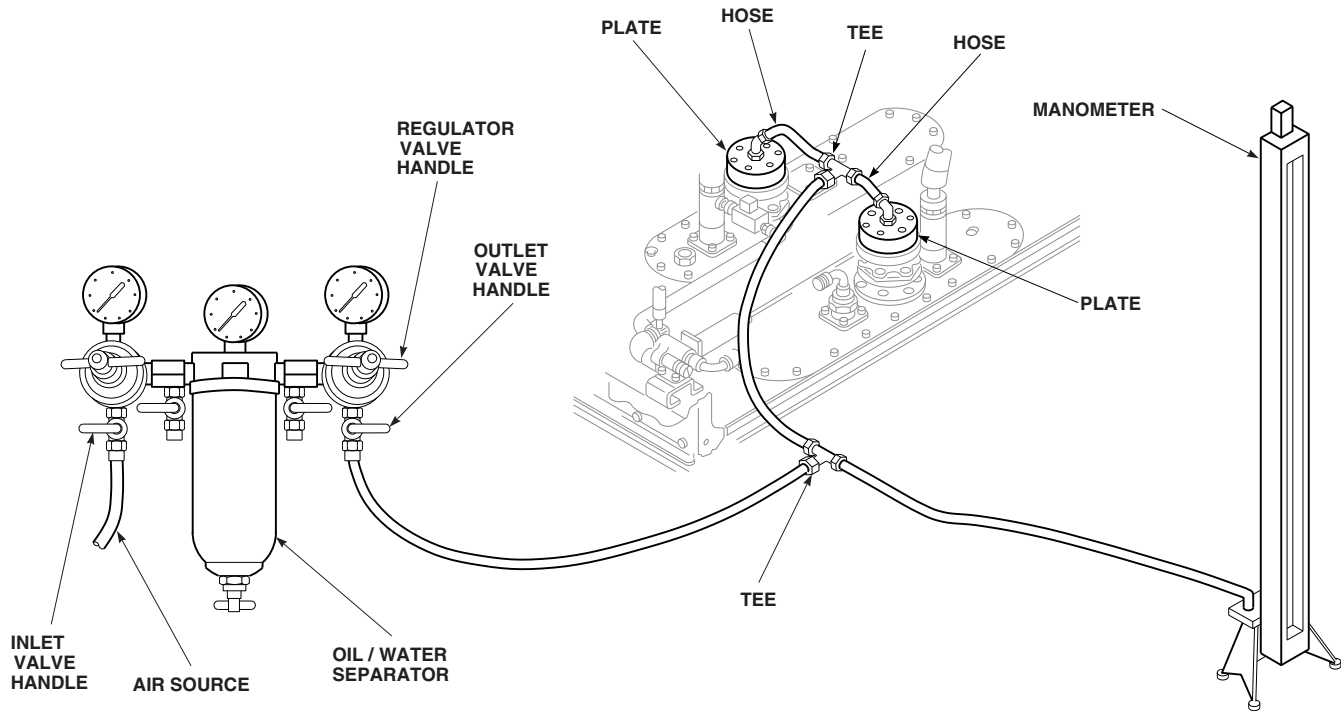
DESCRIPTION: The requirement exists at the organizational level of maintenance to test the integrity of the engine fuel feed system. This system must be subjected to both vacuum (-6 In Hg) and pressure (+30 PSIG) for a designated period of time (5 min) with no leakage. A means to create the vacuum, route the pressure, monitor the test (vac / press), and seal the system during test is needed.

The kit consists of a metering valve for regulating air pressure; a vacuum pump for creating the necessary vacuum; a shutoff valve for sealing the system during testing; a combination vacuum / pressure gage to monitor the test; as well as a variety of fittings, plugs, and hoses for routing and connecting the test equipment to the aircraft. A low pressure air source (50-100 PSI) will be connected to a metering valve and the metered air source to the vacuum pump. From the pump, a shutoff valve will be plumbed and from the shutoff valve a combination vacuum / pressure gage will be tapped into the test line. The test line will be adapted to the engine feed line(s). Various components of this system will be removed and their corresponding lines plugged.

Additionally, the main engine prime shutoff valves must be capped on the prime side of the valve during vacuum testing and fuel line purge. When plugging the crossfeed lines, an 8" hose assembly (low pressure 1/4" fittings) is connected to the opposite engine feed line via a reducer fitting and is used to drain purged fuel from the crossfeed lines into a suitable container. In addition, the discharge fuel hoses for the boost pump must be plugged.

FB4419_2
SA

FIGURE C-98. FUEL INTEGRITY TEST SET, RJP001 (SHEET 2 OF 2)



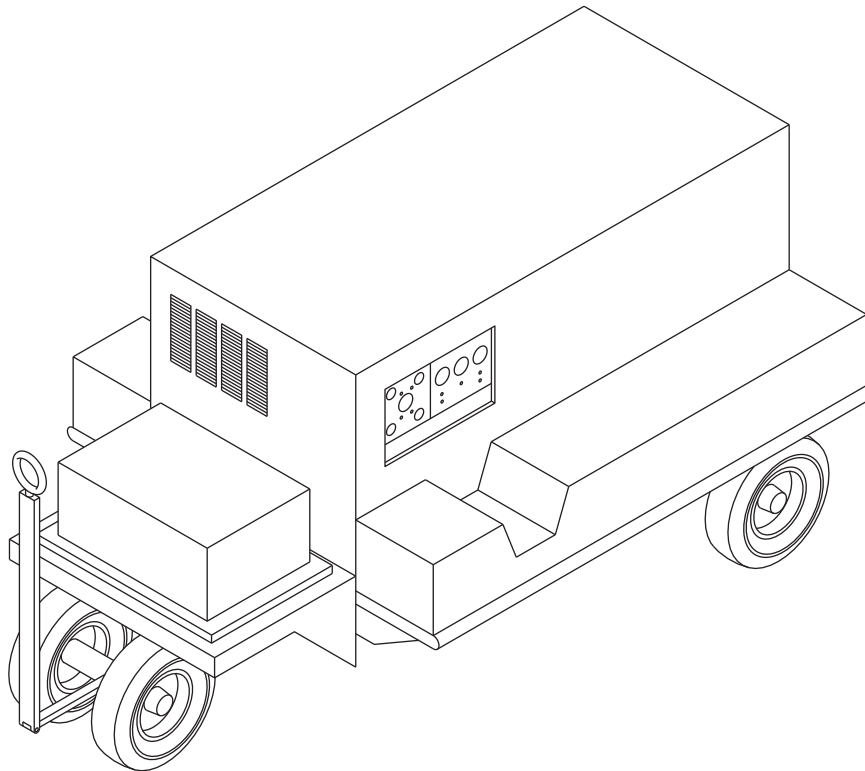
DESCRIPTION: A requirement exists at the 'O' level of maintenance to functionally test the main fuel cells by pressure. In order to accomplish this requirement, a method of capping off fuel cell is required with a way of applying pressure and measuring it.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB4421A
SA

FIGURE C-99. FUEL CELL TEST KIT, RJP002-2



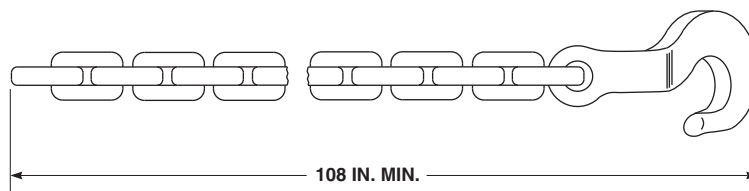
DESCRIPTION: The Generator unit will provide all AC electrical power needed to perform system checks, and troubleshooting of various electrical systems. The Generator unit is used in place of the helicopter APU in ground test.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FB4422
SA

FIGURE C-100. ELECTRICAL GENERATOR, DIESEL-POWERED, 90C24P5-S/A



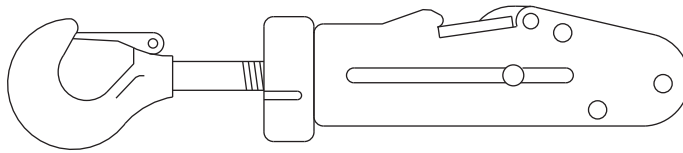
DESCRIPTION: The tiedown chain assembly is used for tying down the helicopter.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FC4111A
SA

FIGURE C-101. TIEDOWN CHAIN ASSEMBLY, 627728A



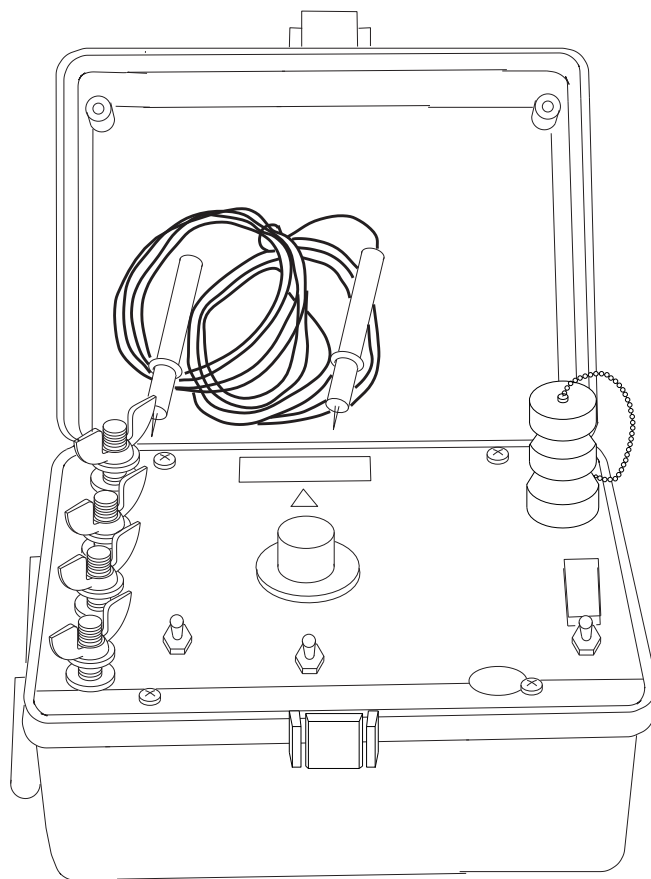
DESCRIPTION: The tiedown tensioner is used to adjust the length of chains in order to remove slack when tying down the helicopter.

POWER REQUIREMENTS: Not Applicable

CALIBRATION REQUIREMENTS: Not Applicable

FC4112A
SA

FIGURE C-102. TIEDOWN TENSIONER, CGU-4/E



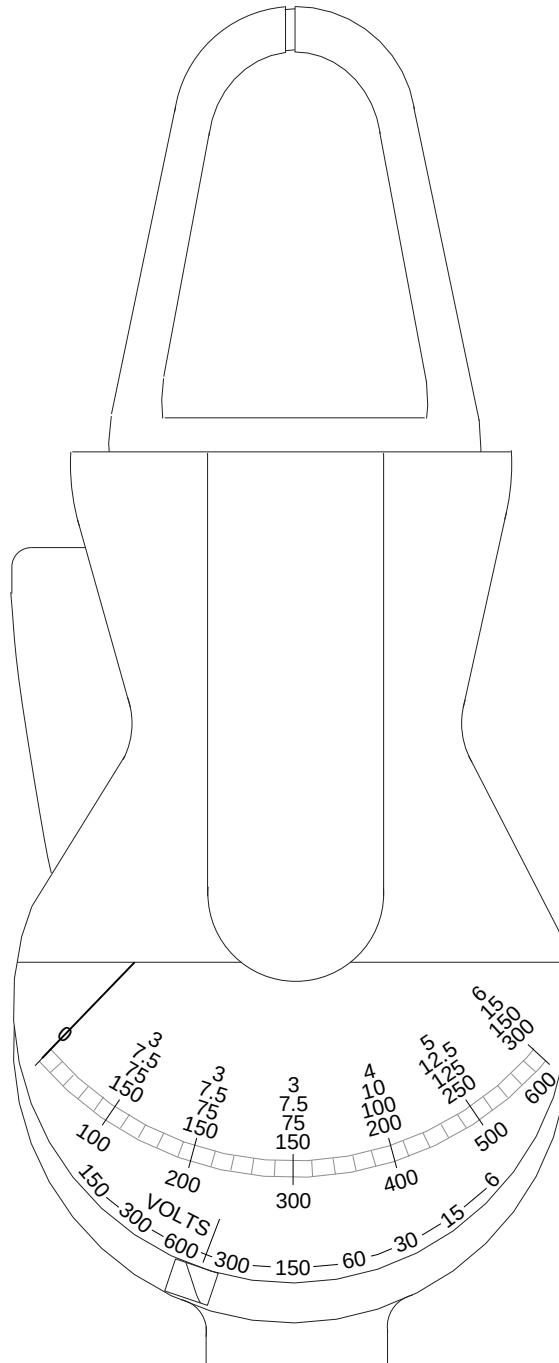
DESCRIPTION: The digital low-resistance ohmmeter is a portable instrument used for measuring resistance in milliohms.

POWER REQUIREMENTS: Rechargeable batteries (Self-contained)

CALIBRATION REQUIREMENTS: 24 weeks

FE0839
SA

FIGURE C-103. DIGITAL LOW-RESISTANCE OHMMETER, 247000



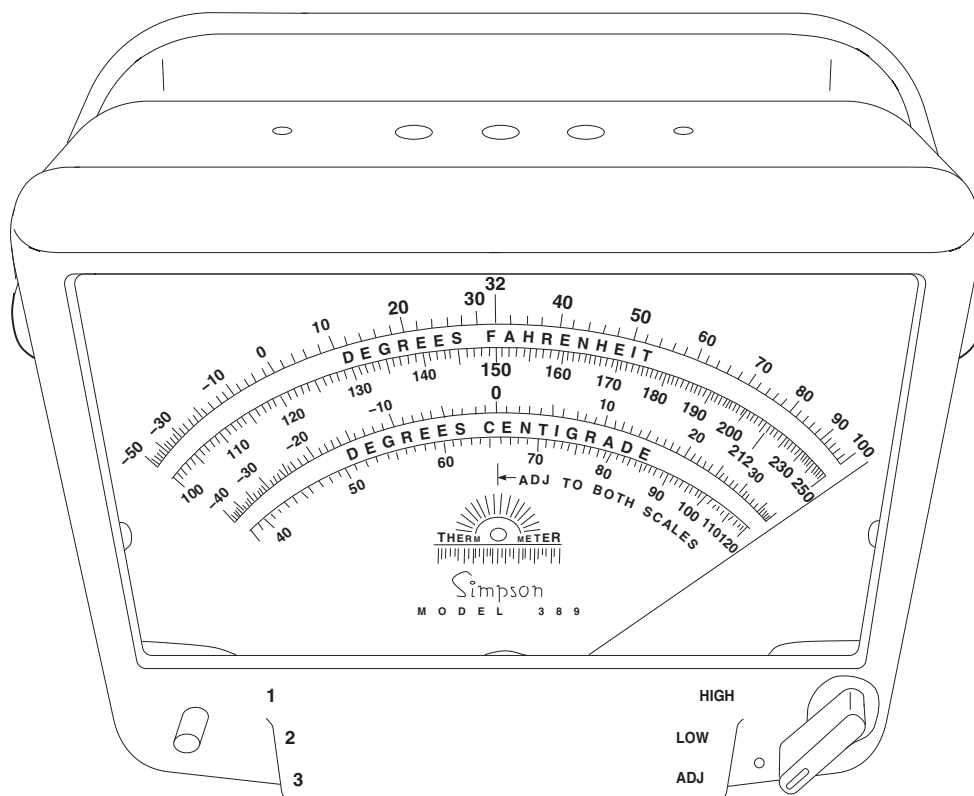
DESCRIPTION: The ammeter is used to measure the flow of electric current in a circuit.

POWER REQUIREMENTS: Not applicable

CALIBRATION REQUIREMENTS: Not applicable

FR0654
SA

FIGURE C-104. AMMETER, CLAMP-ON, 749



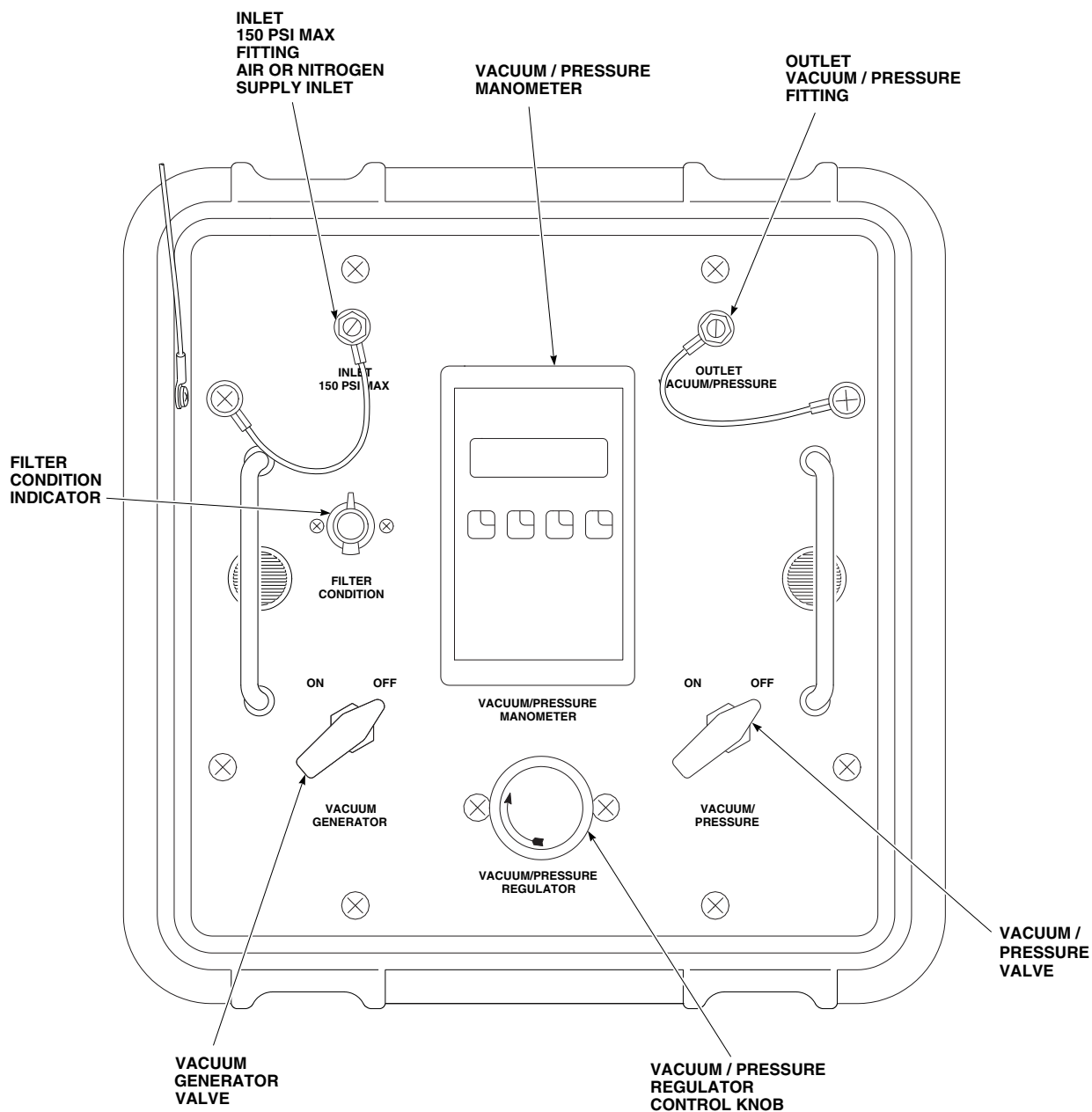
DESCRIPTION: The thermometer is used in conjunction with surface probe to measure windshield surface temperature.

POWER REQUIREMENTS: Not applicable

CALIBRATION REQUIREMENTS: Not applicable

FC2790
SA

FIGURE C-105. THERMOMETER, 389-3L

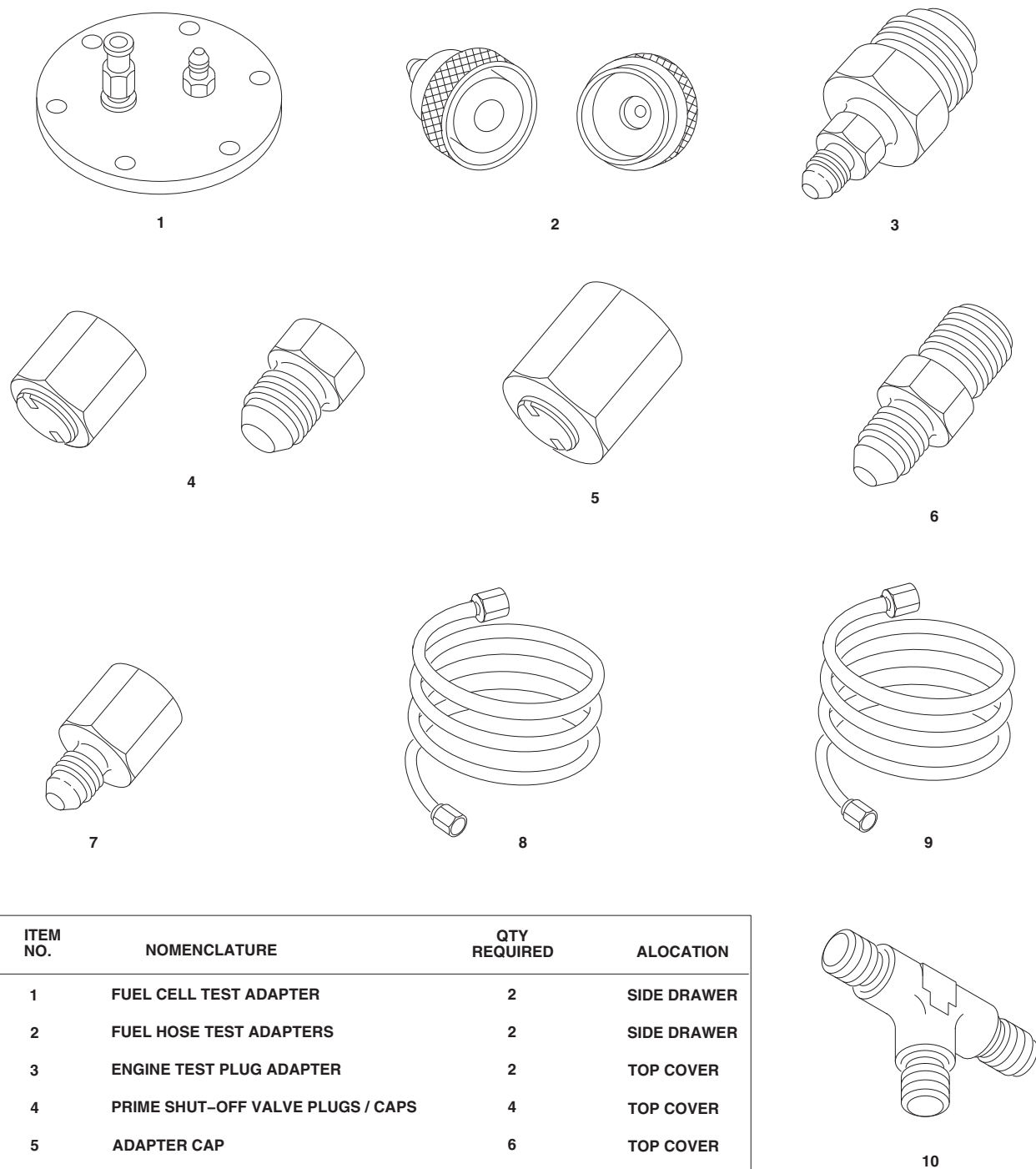


NOTE

STOWED LOCATIONS OF FUEL
INTEGRITY TESTER SK2000FIT
ACCESSORIES.

FE0843_1
SA

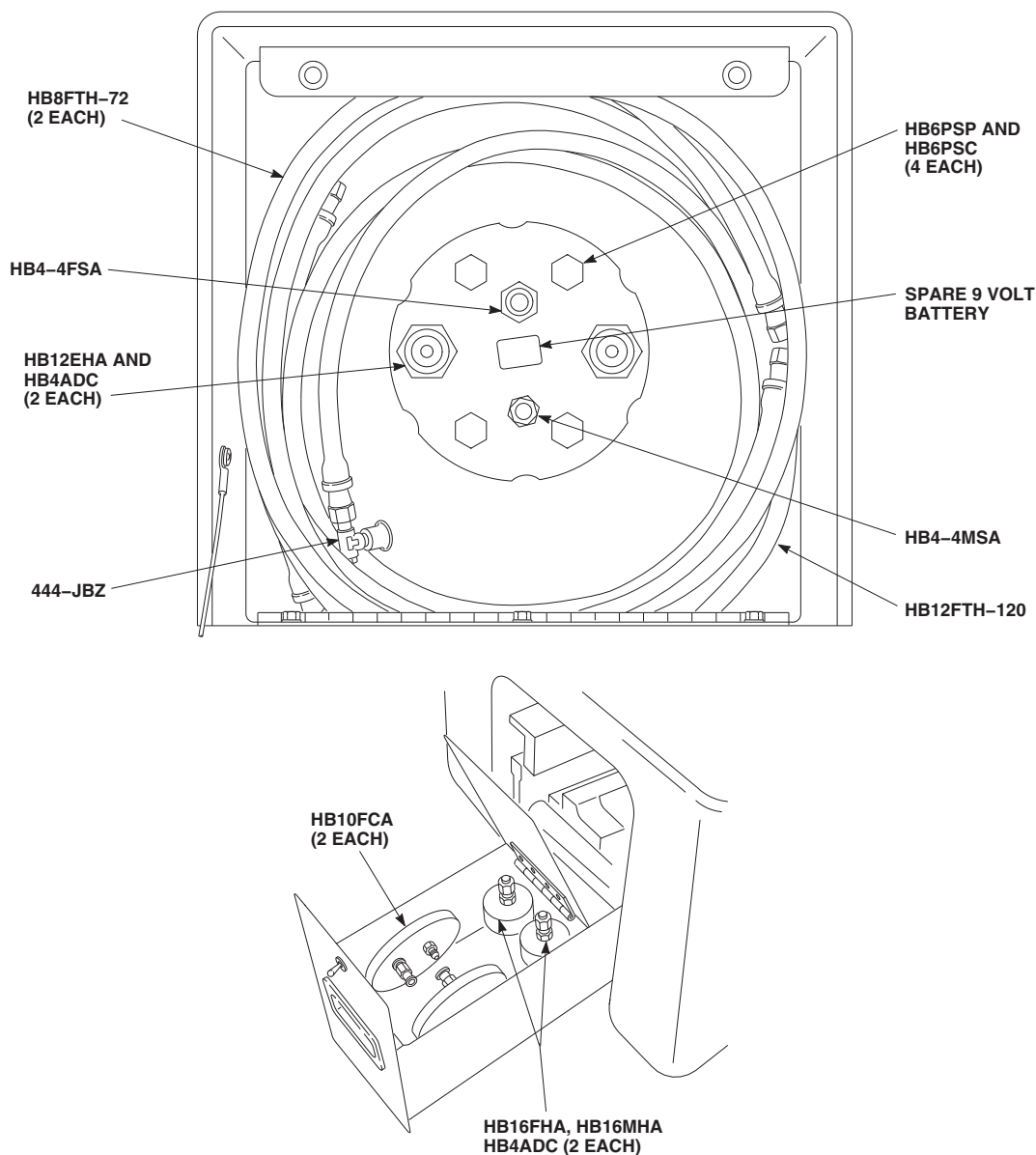
FIGURE C-106. FUEL INTEGRITY TESTER, SK2000FIT (SHEET 1 OF 3)



ITEM NO.	NOMENCLATURE	QTY REQUIRED	ALLOCATION
1	FUEL CELL TEST ADAPTER	2	SIDE DRAWER
2	FUEL HOSE TEST ADAPTERS	2	SIDE DRAWER
3	ENGINE TEST PLUG ADAPTER	2	TOP COVER
4	PRIME SHUT-OFF VALVE PLUGS / CAPS	4	TOP COVER
5	ADAPTER CAP	6	TOP COVER
6	MALE SHOP HOSE ADAPTER	1	TOP COVER
7	FEMALE SHOP HOSE ADAPTER	1	TOP COVER
8	HOSE	2	TOP COVER
9	OUTLET PRESSURE HOSE	1	TOP COVER
10	TEE FITTING	1	TOP COVER

FE0843_2
SA

FIGURE C-106. FUEL INTEGRITY TESTER, SK2000FIT (SHEET 2 OF 3)



DESCRIPTION:

A requirement exists at O-Level maintenance to functionally test the main fuel cells for pressure and vacuum, and to test the integrity of the fuel feed system. In order to accomplish this requirement, a method of capping off the fuel cell is required with a way of applying pressure and measuring it.

POWER REQUIREMENTS: 9 Volt Battery

CALIBRATION REQUIREMENTS: Not Applicable

SEE NOTE

FE0843_3
SA

FIGURE C-106. FUEL INTEGRITY TESTER, SK2000FIT (SHEET 3 OF 3)

Change 13

C-181/(C-182 Blank)

APPENDIX D

EXPENDABLE AND DURABLE ITEMS LIST

SECTION I INTRODUCTION

D-1 SCOPE.

D-1.1 General.

This appendix lists expendable supplies and materials needed to operate and maintain the helicopter.

D-1.2 Description.

WARNING

Observe all cautions and warnings on the containers when using consumable materials. When applicable, wear necessary protective gear during handling and use. If a consumable is flammable or explosive, make certain consumable and its vapors are kept away from heat, spark, and flame. Make certain helicopter is properly grounded and fire fighting equipment is readily available prior to use. For additional information on toxicity, flashpoint, and flammability of chemicals, consult the manufacturer of the consumable.

CAUTION

Some contemporary products contain ingredients that may damage sealants, bushings, and protective coatings. To avoid this hazard it is recommended that only those consumable materials indicated in this appendix be used on the helicopter.

This Appendix is a complete list of consumable materials required for maintenance of the helicopter. Many of these materials are listed by their appropriate United States military or federal specifications. These specifications are generally known throughout the world and products meeting their requirements are usually readily available. In most cases, the specifications listed are identified by only the basic number without reference to any revision letter. Unless otherwise stated, only the latest revision applies, and it is the operator's responsibility to obtain and use only materials meeting the latest revision of each specification. When a specific revision letter is listed for a specification, it is because materials conforming to that particular revision best meet the requirements for the specified use of the consumable; a later or future revision may not meet the needed properties as well, and should not be used until qualified by Sikorsky Aircraft.

In many cases, suitable products by other manufacturers are available and have the properties required by the specification. The commercial products listed for each specification are those that were used by Sikorsky Aircraft in the production of the helicopter at the time the list was prepared. Unless otherwise stated, use of these commercial products is discretionary with the operator, but any other product that is chosen must be qualified to the specification that is listed. The operator may also find that some consumable materials in this list conform to military specifications, but that these military specifications are not called out for them. In such cases it may be assumed that only the products specified in the maintenance instructions are approved and

recommended by Sikorsky Aircraft as having the necessary properties and performance. The consumable materials in this list may also be purchased from Sikorsky Aircraft.

D-1.3 Warnings Applicable to Consumable Materials.

Consult your local safety and health staff concerning any questions regarding hazardous materials, Material Safety Data Sheet(s) (MSDS), personal protective equipment requirements, appropriate handling and emergency procedures, and disposal guidance.

WARNING

Acetic acid, Item 24, is combustible. Keep away from ignition sources (heat, flame). Oxidizer - may increase the flammability of nearby combustibles (wood, paper). When mixing with water, always add acid to water not water to acid. Keep glacial acetic acid off skin, eyes, and clothes. Contact with concentrated solution may cause severe burns. May cause allergic skin reactions in sensitive individuals. Do not breathe vapors. Inhalation may cause serious damage to the lining of the nose, throat, and lungs. Long-term overexposure may cause chronic inflammation of the respiratory tract. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, full-body impervious clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Acetone, Item 25, is flammable and toxic to eyes, skin, and respiratory tract. Avoid repeated or prolonged contact. Use only in well-ventilated areas (or use approved respirator as determined by local safety/industrial hygiene personnel). Keep away from open flames, sparks, hot surfaces, or other sources of ignition. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: protective goggles or face shield, protective gloves.

WARNING

Adhesion promoter, Item 25A, is extremely flammable. Do not use near open flames, near welding areas, or on hot surfaces. Do not smoke when using it, and do not use it where others are smoking. Bond/ground metal containers to prevent ignition of product vapors by static discharge. Dispose of liquid soaked rags in approved metal container. Avoid contact. Prolonged or repeated contact may irritate the eyes and skin. Inhaling product vapors may cause headache, drowsiness, dizziness, nausea, and respiratory irritation. Long-term overexposure without use of protective equipment may cause damage to nervous system and lungs. **FIRST AID:** If product contacts the eyes, flush them immediately with water for at least 10 minutes; seek medical attention. In case of skin contact, wash affected area(s) with soap and water. Remove and launder contaminated clothing before reuse. If overcome by product vapor seek fresh air and possible medical attention. **CONTAINS:** Isopropyl, Toluene, Polyamide Resin. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses/goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive, Item 30, is flammable and irritating to the eyes and skin. Keep container closed; keep sparks, flames, and heat away. Use with proper ventilation. Breathing vapors may cause headaches, dizziness, and nausea. If skin or eye contact occurs, wash immediately with water. If ingested, do not induce vomiting. Seek immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, approved gloves.

WARNING

Adhesive, Item 31, may be moderately irritating to the skin and eyes. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information, and local Occupational Safety and Health (OSH) regulations for appropriate safety precautions. Protection: goggles, gloves.

WARNING

Adhesive, Item 32, may irritate the eyes and skin. Keep adhesive off skin, eyes, and clothes. Prolonged or repeated contact may cause sensitization or allergic skin reaction. Avoid contact with mineral acids. Avoid mixing resin and curing agent in batches greater than one pound; toxic gases may be released by heat build-up. Dispose of resin waste in accordance with local, state, or federal regulations. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, protective gloves, forced ventilation, NIOSH/MSHA-approved respirator, if curing vapors or dust from sanding, milling, or drilling cured product exceeds established exposure limits.

WARNING

Adhesive, Item 33A, may irritate the eyes and skin. Keep adhesive off skin, eyes, and clothes. Prolonged or repeated contact may cause sensitization - allergic skin reaction. Avoid contact with mineral acids. Do not mix resin and curing agent in batches greater than one pound or in batches that will not be used within 20 minutes; toxic gases may be released by heat build-up. Dispose of resin waste in accordance with local, state, or federal regulations. Sanding cured dust may create silica dust, which could damage lung tissue. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, appropriate protective gloves, NIOSH/MSHA-approved respirator, if curing vapors or dust from sanding, milling, or drilling cured product exceeds established exposure limits.

WARNING

Adhesive, Item 34, may irritate the eyes. Prolonged or repeated contact may trigger sensitization which will result in allergic reactions. Contains asbestos, which has been found to cause cancer. Exposure to asbestos should not occur during mixture and use of adhesive, since the asbestos is bound to the adhesive. However, if the cured product is sanded without proper local exhaust ventilation and NIOSH/MSHA-approved toxic particle respirators, exposure by inhalation is probable. Mix resin and curing agent in batches to be used immediately. Stored mixture may exotherm if not used soon after preparation. Do not heat mixed adhesive above 75°F (24°C) unless curing surfaces to be bonded; toxic gases from excessive heat build-up may be released. Keep resin off skin, eyes, and clothes. Avoid breathing vapors. If dry sanding, machining, or drilling is required after curing, NIOSH/MSHA-approved respirator shall be worn. Dispose of resin waste in accordance with local, state, or federal regulations. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, impervious plastic or rubber gloves, good ventilation.

WARNING

Adhesive, Item 35, Part A - May irritate the skin. Prolonged or repeated contact may trigger sensitization which will result in allergic reactions. Part B - Corrosive - May severely burn the eyes and skin on contact. Breathing vapor may cause chest discomfort and respiratory irritation. Contact may trigger skin sensitization followed by allergic reaction. Mixture Parts A and B - Mix resin and curing agent in batches to be used immediately. Stored mixture may exotherm if not used soon after preparation. Do not heat mixed adhesive above 75°F (24°C) unless curing surfaces to be bonded; toxic gases from excessive heat build-up may be released. Avoid contact of epoxy resin with skin, eyes, and clothes. In case of contact with epoxy resin, flush skin or eyes with water and seek medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, impervious plastic or rubber gloves, good ventilation.

WARNING

Adhesive, Item 36, may be moderately irritating to the skin and eyes. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information, and local Occupational Safety and Health (OSH) regulations for appropriate safety precautions. Protection: goggles, gloves.

WARNING

Adhesive, Item 37, is extremely flammable. Do not use near open flames, welding areas, or on hot surfaces. Bond/ground metal containers to prevent ignition through static discharge. Keep containers securely closed when not in use. Product applicators, such as brushes or rags, must be properly disposed or cleaned. Do not smoke when using or use where others are smoking. Avoid contact. Liquid and vapor may cause moderate to severe irritation of the eyes and skin, depending on the duration of exposure. If eye contact occurs, flush eyes with plenty of water for at least 10 minutes; in case of skin contact, wash affected area with soap and water. Prolonged inhalation of vapors is dangerous. Breathing vapor may cause headache, dizziness, nausea, and respiratory irritation. If such symptoms persist, seek fresh air and medical attention. Repeated or extreme overexposure to product vapor may cause nervous system damage. Use product in well-ventilated spaces (explosion-proof ventilation) with proper personal protective equipment. If swallowed, do not induce vomiting; consequent aspiration of product into the lungs may injure lung tissue. CONTAINS: Petroleum Distillate, Methyl Ethyl Ketone, Magnesium Resinate, Polychloroprene, Toluene. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical goggles, approved gloves, protective clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive, Item 38, is a two component system, Part A and Part B. The precautions for each component should be observed when separate or mixed. Use with proper ventilation. Avoid breathing vapors released during heat curing. Curing equipment should be properly vented. Avoid breathing dust from cutting, grinding, or sanding operations. Avoid eye and skin contact. Direct eye contact may cause severe irritation. Contact with the skin may cause moderate irritation, and allergic rash in sensitized individuals. If eye contact occurs, flush immediately with water for at least 10 minutes. If skin contact occurs, wash affected area thoroughly with soap and water. Wash contaminated clothing before reuse. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, approved gloves, protective clothing to prevent skin contact, NIOSH/MSHA-approved respirator, if curing vapors or dust from sanding, milling, or drilling cured product exceed established exposure limits.

WARNING

Adhesive, Item 39, is flammable. Keep container closed; keep sparks, flames, and heat away; keep adhesive off skin, eyes, and clothes. May irritate the eyes and skin. If eye contact occurs, flush with water for 15 minutes and seek medical attention. Do not breathe vapors. Breathing vapor may cause headache, dizziness, and nausea. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, impermeable gloves; good ventilation and/or NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive, Item 40, is composed of resins and hardness or curing agents that may contain hazardous ingredients. Keep adhesive away from strong oxidizing agents and heat. Avoid eye and skin contact. Avoid, inhalation of vapors created during the cure cycle, and dust created by cutting, sanding or grinding. If contact with eyes occur immediately flush eyes with large amounts of water and get immediate medical attention. If it contacts skin, wash skin with soap and large amounts of water. If swallowed do not induce vomiting. Drink two glasses of water and call a physician. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: vented safety glasses with side shields, appropriate gloves, NIOSH/MSHA-approved respirator, if vapor exceeds established exposure limits.

WARNING

Adhesive, Item 41, is composed of resins and hardness or curing agents that may contain hazardous ingredients. Dusts from grinding, sanding, and cutting operations on cured material may irritate the eyes, skin, and respiratory tract. If adhesive contacts eyes, flush immediately with large quantities of water and seek medical attention. If it contacts skin, wash thoroughly with soap and water. Prolonged or repeated contact may cause allergic reaction in susceptible persons. Do not inhale vapors during curing. Use only with adequate ventilation. Wash hands thoroughly after handling. If spilled on clothing, wash contaminated clothing before reuse. If spilled, completely clean up area of spillage. Incinerate properly in accordance with local regulations. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: approved protective safety glasses, protective gloves.

WARNING

Adhesive, Item 42, contains organic solvent and is extremely flammable - do not use near open flames, welding areas, or on hot surfaces. Bond/ground containers during transfer. Do not smoke when using or use where others are smoking. May severely irritate the eyes. Avoid skin contact. May irritate the skin on prolonged or repeated contact. Prolonged breathing of vapors is dangerous. Breathing vapor may cause headache, dizziness, nausea, and respiratory irritation. Long-term overexposure may cause heart, liver, kidney, and blood damage. If swallowed, do not induce vomiting. Use in well-ventilated spaces. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical goggles, impervious gloves, good ventilation and NIOSH/MSHA-approved respirator, particularly in confined areas.

WARNING

Adhesive, Item 44, is a fast curing adhesive and may cause instant skin-to-skin bonding. If skin bonding occurs, soak surfaces in warm, soapy water. Never attempt to separate surfaces by pulling apart. Seek medical attention. Adhesive in eyes will loosen in several hours. If eyelid bonding occurs, wash thoroughly with warm, soapy water and apply gauze pad. Eyelids will open on their own within 1 to 4 days. Do not attempt to force eyelids open. Skin contact may irritate skin. Vapors may irritate eyes and respiratory tract, and may cause asthma-like allergic reactions in some individuals. Keep container closed; keep spark, flames and heat away. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, protective gloves, good ventilation.

WARNING

Adhesive, Item 44A, is combustible. Keep container closed and store in a cool, dry place. Use only in well-ventilated areas. Keep clear of all sources of ignition or sparks during application. Breathing vapors may cause headaches, dizziness, and nausea; avoid prolonged inhalation of vapors. May cause skin and eye irritation. If skin or eye contact occurs, wash immediately with water for at least 15 minutes. If ingested, do not induce vomiting. Seek immediate medical attention. Wash hands thoroughly with soap and water after use. Wash contaminated clothing before reuse. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, approved gloves, good ventilation, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive, Item 46, is flammable. Keep container closed; keep sparks, flames, and heat away; keep adhesive off skin, eyes, and clothes. May irritate the eyes and skin. If eye contact occurs, flush with water for 15 minutes and seek medical attention. Do not breathe vapors. Breathing vapor may cause headache, dizziness, and nausea. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, impermeable gloves, good ventilation and/or NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive, Item 47, is extremely flammable. Vapors may ignite explosively. Keep container closed and store in a cool, dry place. Bond and ground containers of product to prevent ignition through static discharge. Use only in well-ventilated areas. Keep clear of all sources of ignition or sparks during application and curing. Avoid inhaling vapors. Breathing vapors may cause headaches, dizziness, and nausea. Liquid and vapor may irritate the eyes. Prolonged or repeated contact may irritate the skin. May be absorbed through the skin in levels that may affect inner organ systems. If skin or eye contact occurs, wash immediately with water. If ingested, do not induce vomiting. Seek immediate medical attention. Protection: safety glasses or goggles, approved gloves, good ventilation, protective clothing to prevent contact, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits, particularly in confined areas.

WARNING

Adhesive, Item 48, may irritate the eyes. Prolonged or repeated contact may trigger sensitization which will result in allergic reactions. Contains asbestos, which has been found to cause cancer. Exposure to asbestos should not occur during mixture and use of adhesive, since the asbestos is bound to the adhesive. However, if the cured product is sanded without proper local exhaust ventilation and NIOSH/MSHA-approved toxic particle respirators, exposure by inhalation is probable. Mix resin and curing agent in batches to be used immediately. Stored mixture may exotherm if not used soon after preparation. Do not heat mixed adhesive above 75°F (24°C) unless curing surfaces to be bonded; toxic gases from excessive heat build-up may be released. Keep resin off skin, eyes, and clothes. Avoid breathing vapors. If dry sanding, machining, or drilling is required after curing, NIOSH/MSHA-approved respirator shall be worn. Dispose of resin waste in accordance with local, state, or federal regulations. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, impervious plastic or rubber gloves, good ventilation.

WARNING

Adhesive, Item 49, is flammable. Keep container closed. Keep sparks, flames, and heat away. Keep adhesive off skin, eyes, and clothes. May irritate the eyes and skin. Do not breathe vapors. Breathing vapor may cause headache, dizziness, nausea. Long-term overexposure may damage the liver, kidneys, lungs, and nervous system. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, protective gloves, good ventilation, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive, Item 52, as an uncured product may irritate the eyes, skin, nose, and throat. Product releases toxic, irritating acetic acid during application and curing; mechanical ventilation should be used to keep acetic acid mist well below established exposure limits. Keep sealant off skin, eyes, and clothes. Keep sparks, flames, and heat away. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive, Item 53, as an uncured product may irritate the eyes and skin. Avoid contact with the eyes and skin. Uncured product may irritate the eyes and skin. Avoid breathing vapors. Use only in a well-ventilated area. Uncured product may cause respiratory irritation. Product releases irritating acetic acid during application and curing; acetic acid vapor is combustible; do not apply near ignition sources (heat, flame); mechanical ventilation should be used to maintain vapor levels well below established limits. Repeated or prolonged inhalation may result in chronic bronchitis. Do not handle contact lenses until sealant has been cleaned from fingernails and tips; residual silicone may cause severe eye irritation. If vapor irritates eyes or skin, flush affected area immediately with water. For respiratory irritation, seek fresh air and possible medical attention. Do not eat, drink, or smoke in work area. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, rubber gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive, Item 54, as an uncured product may irritate the eyes, skin, nose, and throat. Product releases toxic, irritating acetic acid during application and curing; mechanical ventilation should be used to keep acetic acid mist well below established exposure limits. Keep sparks, flames, and heat away. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive, Item 55, is combustible. Keep sparks, flames, and heat away; keep adhesive off skin, eyes, and clothes. Do not breathe vapors. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, impervious gloves, good ventilation.

WARNING

Adhesive, Item 56, as an uncured product can irritate eyes. If contact with eyes occurs, flush immediately with water for 15 minutes and seek medical attention. May cause mild skin irritation. If skin contact occurs, wipe with dry cloth then wash with soap and water. Individuals who wear contact lenses should thoroughly wash hands prior to handling lenses. Residual silicone may transfer from fingertips to lenses, causing severe eye irritation. Adhesive/sealant may irritate the stomach if swallowed. CAUTION: Product releases toxic, flammable methanol during application and curing; mechanical ventilation designed for flammable vapor should be used to maintain methanol vapor levels well below established exposure limits. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, protective gloves, NIOSH/MSHA-approved respirator, if curing vapors or dust from hot work applications on cured product exceed established exposure limits.

WARNING

Adhesive, Item 57, is combustible. Keep container closed; keep sparks, flames, and heat away. CAUTION: Reacts with water and acids, liberating flammable methyl alcohol. Wash hands thoroughly after use. Keep sealant off eyes, skin, and clothes. Uncured adhesive/sealant can irritate eyes. If contact with eyes occurs, flush immediately with water for 15 minutes and seek medical attention. Prolonged or repeated contact may irritate the skin; should contact with the skin occur, wipe off and flush with water. Do not wear contact lenses when handling. Residual adhesive/sealant may remain on fingers, nails, or cuticles for several days and transfer to lenses, causing severe eye irritation. Do not breathe vapors; inhalation may cause drowsiness and upper respiratory irritation. If irritation persists, seek fresh air and possible medical attention. Long-term overexposure without protective equipment may cause nervous system damage. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, protective gloves, good ventilation, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive, Item 59, is irritating to skin, eyes, nose, and throat. Do not breathe vapors. Do not eat, drink, or smoke in work area. Clean contaminated clothing thoroughly before reuse. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles and/or face shield, rubber gloves, good ventilation or NIOSH/MSHA-approved acid vapor respirator.

WARNING

Adhesive, Item 59A, is irritating to skin, eyes, nose, and throat. Do not breathe vapors. Do not eat, drink, or smoke in work area. Clean contaminated clothing thoroughly before reuse. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles and/or face shield, nitrile gloves, good ventilation or NIOSH/MSHA-approved acid vapor respirator.

WARNING

Adhesive, Item 60, is flammable. Keep container closed and store in a cool, dry place. Use only in well-ventilated areas. Bond and ground metal containers during use and transfer to prevent ignition through static discharge. Keep clear of all sources of ignition or sparks during application and curing. Breathing vapors may cause headaches, dizziness, confusion, and respiratory irritation. Long-term overexposure without protective equipment may cause liver and kidney damage, and may trigger "asthmatic-type" respiratory responses and allergic skin reactions. May cause skin and eye irritation. If skin or eye contact occurs, wash immediately with water for at least 15 minutes. If ingested, do not induce vomiting. Seek immediate medical attention. Wash hands thoroughly with soap and water after use. Launder contaminated clothing before reuse. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, approved gloves, good ventilation, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive, Item 60A, is a highly flammable liquid and vapor and is harmful if swallowed, inhaled, or absorbed through the skin. It will cause severe skin burns, eye damage and may cause respiratory and skin irritation. Wear neoprene, nitrile, or rubber gloves/safety eyewear including safety glasses with side shields and chemical goggles where splashing may occur. If contact is prolonged or repeated, silver shield or butyl rubber gloves are recommended. Use disposable or impervious clothing if work clothing contamination is likely. Keep away from heat, sparks, open flames, hot surfaces, or other sources of ignition. Ground/bond container and receiving equipment. Use explosion-proof electrical, ventilation, and lighting equipment. Use only non-sparking tools. Do not breathe dust, fumes, gas, mist, vapors, or spray. Use only outdoors or in a well-ventilated area. Contains a small amount of dimethylaniline (DMA) which has poor odor warning properties. If exposure limit for DMA is exceeded, an air-supplied respirator is recommended. Otherwise, a NIOSH-approved properly fitted organic vapor, air purifying respirator is recommended. Use a NIOSH-approved chemical/mechanical filter respirator designed to remove a combination of particles and organic vapors if occupational limits are exceeded. Store only in well-ventilated areas. Consult your local safety/industrial hygiene and material SDS for specific requirements about components, reactivity, physical hazards, spill procedures, health hazards, first aid procedures, and PPE. Protection: chemical splashproof goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive, Item 64, is flammable. Keep product away from potential sources of ignition, such as heat, spark, and flame. Product may cause eye, skin and respiratory tract irritation. Long-term exposure may cause headache, nausea, and dermatitis. If eye contact occurs, flush eyes immediately with large amounts of water. If product contacts the skin, wash affected areas with soap and water and remove contaminated clothing. Seek fresh air, if breathing is difficult, and provide oxygen. If swallowed, do not induce vomiting. Give one or two glasses of milk and call for medical assistance. Protection: appropriate gloves safety glasses or goggles. Wash hands thoroughly after use. Accelerator is combustible. Keep away from heat, sparks and open flame. Keep containers tightly closed. **WARNING:** Product contains benzoyl peroxide. If solvents evaporate, dried residue may ignite with heat or friction. Eye and skin contact may cause irritation. Inhaling of product may irritate the respiratory system, causing dryness of the throat, tightness of the chest and shortness of breath. In addition, overexposure to this product may cause nervous system damage, causing headache, dizziness and staggering. If product contacts the skin, wash affected areas with soap and water and remove contaminated clothing. If breathing is difficult, seek fresh air, provide oxygen. If swallowed, do not induce vomiting. Give one or two glasses of milk and call for medical assistance. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, rubber gloves. Wash hands thoroughly after each use.

WARNING

Adhesive, Item 66, is flammable. Keep away from sparks, heat, flame, and other ignition sources. Bond and ground metal containers during transfer to prevent ignition through static discharge. Keep containers closed when not in use. Avoid contact. May irritate the eyes and skin. May be absorbed through the skin in potentially dangerous levels that may affect inner organs. Avoid breathing vapor. Inhalation may cause headache, dizziness, nausea, and respiratory irritation. Long-term overexposure may cause liver, heart, and kidney damage. No eating, drinking, or smoking is allowed where paints are being mixed, handled, or cleaned-up. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive, Item 66E, is irritating to skin, eyes, nose, and throat. Do not breathe vapors. Avoid exposure to air or moisture until ready to use, acetic acid vapors form during curing. Do not eat, drink, or smoke in work area. Clean contaminated clothing thoroughly before reuse. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles and/or face shield, rubber gloves, good ventilation or NIOSH/MSHA-approved acid vapor respirator.

WARNING

Adhesive primer, Item 67, Parts A and B, are flammable. Part A and may irritate the eyes and skin. May cause allergic skin reaction in certain individuals. Breathing vapor may cause headache, dizziness, nausea, respiratory irritation. Long-term overexposure may affect the heart, liver, kidney, and blood. Part B - May irritate the eyes and skin. May cause allergic skin reaction. May be absorbed through the skin in potentially dangerous amounts that may affect inner organ systems. Breathing vapor may cause headache, dizziness, nausea, respiratory irritation. Long-term overexposure may affect the liver, kidney, and blood. Chronic overexposure to the component 2-ethoxyethyl acetate may cause birth defects and male reproductive system changes. Chronic overexposure to component chromates has been found to cause cancer. Mixture Part A & B - Flammable - Keep away from ignition sources (heat, flame). Bond/ground metal containers during transfer to prevent ignition through static discharge. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, impervious gloves, full-body protective clothing, good ventilation, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Adhesive primer, Item 68, is extremely flammable. Keep container closed; keep sparks, flames, and heat away. Bond and ground metal containers during transfer to prevent ignition through static discharge. Keep adhesive primer off skin, eyes, and clothes. Direct contact may irritate the eyes. Upon eye contact, flush immediately with water for 15 minutes. Prolonged or repeated contact may irritate the skin, leading potentially to dermatitis. If adhesive primer contacts the skin, wash with soap and water; remove and launder contaminated clothing. Avoid breathing vapor; inhalation may cause headache, dizziness, nausea, and upper respiratory irritation. If these symptoms persist, seek fresh air and possible medical attention. If swallowed, do not try to vomit; chemical may enter lungs, causing damage. CAUTION: Contains strontium chromate. Inhalation of mists from spray painting or dusts from grinding primed parts may cause cancer. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, gloves, good ventilation, full-body protective clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Denatured alcohol, Item 70, is flammable and toxic to eyes, skin, and respiratory tract. Avoid repeated or prolonged contact. Use only in well-ventilated areas. Keep away from open flames, sparks, or other sources of ignition. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles or face shield, protective gloves, good ventilation or use approved respirator as determined by local safety/industrial hygiene personnel.

WARNING

Isopropyl alcohol, Item 72, is flammable and toxic to eyes, skin, and respiratory tract. Avoid repeated or prolonged contact. Use only in well-ventilated areas. Keep away from open flames, sparks, or other sources of ignition. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles or face shield, protective gloves, good ventilation or use approved respirator as determined by local safety/industrial hygiene personnel.

WARNING

Alodine, Item 73, is a strong oxidizing agent that may ignite combustible material such as sawdust, rags, and paper or organic substances. Keep container closed; keep sparks, flames, and heat away. Keep alodine off skin, eyes, and clothes. May severely burn the eyes and skin on contact. Do not breathe vapors. Breathing dusts or mists may irritate the respiratory tract. Long-term overexposure by breathing mists or absorption through the skin may cause cancer, kidney and liver damage, and ulceration of the nasal septum. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles or face shield, neoprene or polyvinyl gloves, apron, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Antiseize compound, Item 74, is flammable. Do not use near open flames, near welding areas, or on hot surfaces. Do not smoke when using it and do not use it where others are smoking. Metal container must be grounded to maintain electrical continuity. Dispose of liquid-soaked rags in approved metal safety container. Contact with the liquid can cause severe skin and eye irritation. After any prolonged skin contact, wash contacted area with soap and water. If liquid contacts eyes, flush eyes thoroughly with water for 15 minutes. If vapors cause drowsiness, move to fresh air. Get medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: If repeated or prolonged application of aerosol with spray can or brush is likely, wear NIOSH/MSHA-approved respirator, gloves, and goggles.

WARNING

Antiseize compound, Item 75, is combustible. Do not use near open flames, near welding areas, or on hot surfaces. Do not smoke when using it and do not use it where others are smoking. Prolonged or repeated contact may irritate the eyes and skin. After any prolonged skin contact, wash contacted area with soap and water. If liquid contacts eyes, flush eyes thoroughly with water. Dispose of liquid-soaked rag in approved metal safety container. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses, approved gloves.

WARNING

Antiseize compound, Item 76, may irritate the eyes and skin. Avoid prolonged or repeated contact. Vapors from heated product or mists from spray applications may irritate the respiratory tract; as a paste, the product poses minimal inhalation hazard. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses, approved gloves.

WARNING

Assembly fluid, Item 79, may irritate the skin and eyes on contact. If assembly fluid contacts the eyes, flush immediately for 15 minutes. Prolonged or repeated use without hand protection may cause dermatitis. At normal temperatures, assembly fluid poses minimal health hazard by inhalation. If the product is heated or applied as a mist, use of a NIOSH/MSHA-approved respirator may be necessary. Wash hands with soap and water after use. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles or safety glasses, oil-resistant gloves, skin-protective clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Technical chromium trioxide, Item 91, is highly reactive. Do not mix with organic materials or materials that oxidize such as paper and wood. When mixing solutions, add acid to water, not water to acid. Avoid contact with the eyes and skin; contact may cause severe burns and skin ulcers. If any liquid or powder contacts skin, flush affected area with water, and immediately change contaminated clothing. Contaminated clothing must not be laundered at home. If skin ulcers appear, get medical attention. Breathing vapors, mists, or powder may cause severe respiratory irritation. Long-term overexposure by inhalation or absorption through the skin may cause cancer and liver, kidney, and respiratory system damage. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical goggles, approved gloves, apron, long sleeves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Cleaning compound, Item 92, is combustible - Keep cleaning compound away from potential sources of ignition, including heat, spark, and flame. CAUTION: Combustion of product or heat of flame may produce irritating and poisonous gases. Avoid contact. Direct contact may irritate the eyes and skin. In case of contact, flush affected area immediately with plenty of water. Avoid breathing mists or vapors. Inhalation may cause headache, dizziness, nausea, and respiratory irritation. In case of contact, flush affected area immediately with plenty of water. Seek medical attention if irritation persists. Products meeting this specification may have varying component ingredients. Product hazards vary with respect to unique chemical composition. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or chemical splashproof goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Cleaning compound, Item 94, may irritate the eyes and skin. Avoid contact. May be absorbed through the skin in levels that may affect inner organs. Should eye or skin contact occur, flush the affected area immediately with water for about 15 minutes. Seek medical attention if irritation persists. Avoid inhaling vapors, particularly if product is applied to hot surfaces. Breathing vapors may cause headache, dizziness, nausea, and respiratory irritation. NOTE: Severity of exposure symptoms varies with specific product composition and duration of use. Products meeting this specification may have varying component ingredients. Product hazards vary with respect to unique chemical composition. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, approved gloves, full-body protective clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Solvent cleaning compound, Item 99, VAPOR IS HAZARDOUS AND CAN CAUSE DEATH BY ASPHYXIATION IF TOO MUCH IS INHALED. Vapor from one pint of liquid evaporated in a small room is nearly odorless, but immediately dangerous to life or health. In case of spill, warn others and leave the area immediately. When used indoors, do not rely upon oxygen deficiency monitor to warn of dangerous concentrations of Trichlorotrifluoroethane. Have at least two people present at all times with one as observer. Have emergency escape breathing devices available for immediate use. Repeated or prolonged contact with liquid can cause skin and eye irritation. Breathing vapor may cause drowsiness, dizziness, headache, confusion and heart damage. After prolonged skin contact, wash contacted area with soap and water. Remove contaminated clothing. If vapors cause irritation, go to fresh air; get medical attention. Do not enter places where Trichlorotrifluoroethane is stored until ventilated, and air sample verifies that levels of Freon are well below established limits and oxygen concentration is between 19.5% and 22%. Dispose of liquid-soaked rags in approved metal container. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Solvent cleaning compound, Item 99A, is combustible and toxic to eyes, skin, and respiratory tract. Avoid repeated or prolonged contact. Use only in well-ventilated areas. Keep away from open flames, sparks, or other sources of ignition. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles or face shield, protective gloves, good ventilation, approved organic vapor respirator, with dust and mist filter, if exposed to vapor mist.

WARNING

Solvent cleaning compound, Item 99B, is combustible and toxic to eyes, skin, and respiratory tract. Avoid repeated or prolonged contact. Use only in well-ventilated areas. Keep away from open flames, sparks, or other sources of ignition. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles or face shield, protective gloves, good ventilation, approved organic vapor respirator, with dust and mist filter, if exposed to vapor mist.

WARNING

Solvent cleaning compound, Item 99C, may cause slight eye and skin irritation. If eyes become red or have a burning sensation, flush with cool water for 15 minutes. Then seek medical attention. If dermatitis occurs on skin, flush skin with water use good quality hand cream. If irritation persists, consult a physician. If ingested, drink 2 large glasses of water, do not induce vomiting. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses, approved gloves.

WARNING

Solvent cleaning compound, Item 100, is combustible - Keep away from potential sources of ignition, including heat, spark, and flame. CAUTION: Combustion of product or heat of flame may produce irritating and poisonous gases. Avoid contact. Direct contact may irritate the eyes and skin. Certain components maybe absorbed through the skin in potentially dangerous levels that may affect inner organs. In case of contact, flush affected area immediately with plenty of water. Avoid breathing mists or vapors. Inhalation may cause headache, dizziness, nausea, and respiratory irritation. In case of contact, flush affected area immediately with plenty of water. Seek medical attention if irritation persists. Products meeting this specification may have varying component ingredients. Product hazards vary with respect to unique chemical composition. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or chemical splashproof goggles, approved gloves, full-body protective clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Solvent cleaning compound, Item 100A, is combustible and toxic to eyes, skin, and respiratory tract. Avoid repeated or prolonged contact. Use only in well-ventilated areas. Keep away from open flames or other sources of ignition. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles or face shield, protective gloves, good ventilation or use approved respirator as determined by local safety/ industrial hygiene personnel.

WARNING

Coating compound, Item 106, is flammable. Keep product away from potential sources of ignition, such as heat, spark, and flame. Bond/ground metal containers. Keep containers securely closed when not in use. Product applicators, such as brushes and rags must be properly disposed or cleaned. Avoid contact. Direct contact may cause moderate eye irritation. Product may moderately irritate skin. Inhaling product vapors may cause headache, dizziness, nausea, and respiratory irritation. Long-term overexposure to product may cause dermatitis and central nervous system affects. If eye contact occurs immediately flush eyes in a continuous stream for at least 15 minutes. Seek medical attention. In case of skin contact wash thoroughly with soap and water. Seek medical attention if irritation persists. If overcome by product vapors go to fresh air and seek medical assistance. If ingested do not induce vomiting if available drink a glass of milk and seek medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggle or face shield, heavy duty neoprene/polyethylene gloves, protective clothes to prevent skin contact, good ventilation, NIOSH/MSHA-approved respiratory protection, if vapors exceed established exposure limits.

WARNING

Corrosion compound, Item 108, is corrosive. It may burn exposed body tissues on contact. Avoid contact with skin and eyes; do not breathe mists. May contain chemicals that may be absorbed through the skin in dangerous amounts that can affect inner organ systems. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles or face shield, approved gloves, protective clothing as required. Wash hands thoroughly after handling.

WARNING

Corrosion preventive compound, Item 108A, may irritate the eyes. Avoid contact with product. Prolonged or repeated contact may irritate the skin. Long-term use without proper hand protection may cause dermatitis. If splashed on clothing or eyes, remove clothing immediately and flush the eyes and skin with water for 15 minutes. Avoid breathing vapor. Keep containers closed when not in use; use in a well-ventilated area. Inhalation may cause headache, dizziness, nausea, and respiratory irritation. If swallowed, do not try to vomit; chemical may enter the lungs, causing damage; seek immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Corrosion preventive compound, Item 108B, may irritate the eyes. Avoid contact with product. Prolonged or repeated contact may irritate the skin. Long-term use without proper hand protection may cause dermatitis. If splashed on clothing or eyes, remove clothing immediately and flush the eyes and skin with water for 15 minutes. Avoid breathing vapor. Keep containers closed when not in use; use in a well-ventilated area. Inhalation may cause headache, dizziness, nausea, and respiratory irritation. If swallowed, do not try to vomit; chemical may enter the lungs, causing damage; seek immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Corrosion preventive compound, Item 108C, is reactive - strong oxidizer; may enhance the flammability of nearby combustibles. Keep container closed. Keep sparks, flames, and heat away. Keep away from alkaline materials. Corrosive - Burns the eyes and skin on contact. Should skin or eye contact occur, immediately flush with water for 15 minutes. Seek medical attention. Contaminated clothing must be removed immediately and laundered before reuse. Avoid breathing mists. Inhalation may cause severe respiratory irritation, marked by coughing and labored breathing. If these symptoms occur, seek fresh air and medical attention. Long-term overexposure without protective equipment may cause ulceration of the skin and nasal passages and dermatitis. CAUTION: May contain chemicals that may be absorbed through the skin in potentially dangerous levels that may affect inner organs. May contain Chromic Acid - found to cause cancer. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles or face shield, protective gloves and boots, full-body chemical-resistant clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Corrosion preventive compound, Item 109, Item 110, Item 111, and Item 112, is combustible. Keep it away from heat, sparks, and open flames. Do not smoke when using it. Use in a well-ventilated area. Direct contact may severely irritate the eyes. Prolonged or repeated contact may irritate the skin. If splashed on clothing or in eyes, remove clothing immediately and flush skin/eyes with clear water for 15 minutes. Breathing vapor may cause headache, dizziness, nausea, and respiratory irritation. If vapors cause light-headedness, go to fresh air. If liquid is swallowed, do not induce vomiting, aspiration may damage the lungs. Get prompt medical attention. Keep away from spillage. Use absorbent to soak up spilled solution. Dispose of absorbent in accordance with local, state, and federal regulations. Keep solution away from oxygen and strong oxidants. Store in approved metal safety container. Keep containers closed when not in use. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles or face shield, rubber, neoprene, or nitrile gloves, protective neoprene apron.

WARNING

Corrosion preventive compound, Item 113, may irritate the eyes. Avoid contact with corrosion preventive compound. Prolonged or repeated contact may irritate the skin. Long-term use without proper hand protection may cause dermatitis. May be absorbed through the skin in levels that could affect certain "target" organs. If splashed on clothing or eyes, remove clothing immediately and flush the eyes and skin with water for 15 minutes. Avoid breathing vapor. Keep containers closed when not in use; use in a well-ventilated area. Inhalation may cause headache, dizziness, nausea, and respiratory irritation; acute overexposures may cause heart irregularities. If these symptoms occur, seek fresh air and possible medical attention. If swallowed, do not try to vomit; chemical may enter the lungs, causing damage; seek immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, full-body protective clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Corrosion preventive compound, Item 114 and Item 115, is combustible. Keep it away from heat, sparks, and open flames. Do not smoke when using it. Use in a well-ventilated area. Inhalation of vapors is harmful. If splashed on clothing or in eyes, remove clothing immediately and flush skin/eyes with clear water for 15 minutes. If vapors cause light-headedness, move to fresh air. If liquid is swallowed, do not induce vomiting. Get prompt medical attention. Use absorbent to soak up spilled solution. Dispose of absorbent in accordance with local, state, and federal regulations. Keep solution away from oxygen and strong oxidants. Store in approved metal safety container. Keep containers closed when not in use. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles or face shield, oil-impervious gloves, protective apron.

WARNING

Corrosion preventive compound, Item 115A, may irritate the eyes; flush immediately with large amounts of water. Prolonged or repeated contact may cause mild skin irritation; wash contacted area with soap and water. Remove and launder contaminated clothing. Breathing vapors, generated at high temperature, or mists may cause headache, dizziness, and respiratory irritation. If swallowed, do not try to vomit; fluid may be aspirated into lungs, causing damage. Get immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, long sleeves/pant legs, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Corrosion compound, Item 116, is corrosive. It may burn exposed body tissues on contact. Avoid contact with skin and eyes; do not breathe mists. May contain chemicals that may be absorbed through the skin in dangerous amounts that can affect inner organ systems. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles or face shield, approved gloves, protective clothing as required. Wash hands thoroughly after handling.

WARNING

Corrosion resistant coating, Item 117, Item 118, and Item 118A, is a strong oxidizing agent that may ignite combustible material such as sawdust, rags, and paper or organic substances. Keep container closed; keep sparks, flames, and heat away. Keep alodine off skin, eyes, and clothes. May severely burn the eyes and skin on contact. Do not breathe vapors. Breathing dusts or mists may irritate the respiratory tract. Long-term overexposure by breathing mists or absorption through the skin may cause cancer, kidney and liver damage, and ulceration of the nasal septum. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles or face shield, neoprene or polyvinyl gloves, apron, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Damping fluid, Item 121, may mildly irritate the eyes and skin. Minimize contact with damping fluid. In case of eye contact, flush eyes immediately with water. Should prolonged contact with the skin occur, wipe off excess product and flush the skin with water. Remove and launder saturated clothing. Wash hands at shift end and prior to eating, drinking, or smoking. CAUTION: Traces of formaldehyde found to cause cancer and other hazardous decomposition products may be generated at high temperatures. Such high temperature operations may require the use of increased ventilation and/or use of a NIOSH/MSHA-approved respirator. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses, approved gloves.

WARNING

Dry-cleaning solvent, Item 124, is combustible and toxic to eyes, skin, and respiratory tract. Avoid repeated or prolonged contact. Use only in well-ventilated areas. Keep away from open flames or other sources of ignition. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles or face shield, protective gloves, good ventilation or use approved respirator as determined by local safety/industrial hygiene personnel.

WARNING

Dry ice, Item 125, will cause severe frostbite on exposed skin. Avoid contact. Avoid breathing vapor. Prolonged inhalation may cause shortness of breath, nose/throat irritation, watery eyes and headache. Prolonged overexposure may cause coma and death. If solid carbon dioxide contacts skin, immediately flush area with lukewarm water. Do not rub affected area. Seek medical attention. If other symptoms of overexposure appear, seek fresh air and possible medical attention. CAUTION: Do not place solid carbon dioxide in sealed containers; heat will sublime ice to form gas, increasing pressure and resulting in explosion. Do not put head or limbs into dry ice containers. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles or face shield, heavy approved gloves, thick full-body protective clothing.

WARNING

Epoxy coating, Item 126A, is flammable. Keep container closed; keep sparks, flames, and heat away. Bond/ground metal containers during transfer to prevent ignition through static discharge. Keep coating off skin, eyes, and clothes. May irritate the eyes and skin. May contain chemicals that may be absorbed through the skin in dangerous amounts that can affect inner organ systems or that may, upon long-term exposure, damage inner "target" organs. Breathing vapor may cause headache, dizziness, nausea, respiratory irritation. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, gloves, forced ventilation or NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Epoxy patch kit, Item 134, is a two component product consisting of an epoxy resin Part A and hardener, Part B. The precautions for each should be observed when separate or mixed. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Epoxy Resin, AA0151, Part A: Direct contact with eyes may cause moderate irritation. Skin contact may cause moderate irritation. Inhalation should not be a hazard due to low volatility. Ingestion should not be a hazard due to low order of toxicity. In case of eye contact, flush with water for 15 minutes holding eyes open, obtain medical attention; in case of skin contact, wash with soap and water and obtain medical attention if irritation persists. In case of inhalation remove to fresh air and obtain medical attention; In case of ingestion, do not induce vomiting and obtain medical advice. Protection: safety goggles, approved gloves, good ventilation. Hardener, AB0151, Part B: Product severely irritates the eyes and skin. Permanent impairment of vision or blindness may occur. Ingestion may cause burns to the mouth and upper gastrointestinal tract. Inhaling vapors will cause irritation and sensitization responses in susceptible individuals such as respiratory distress. In case of eye contact, flush with water for 30 minutes while holding lids open and obtain immediate medical attention. In case of skin contact, flush the area with water, remove contaminated clothing and obtain medical attention. In case of inhalation, remove to fresh air and obtain medical attention if symptoms persist. In case of ingestion, do not induce vomiting, give large quantities of water if conscious and obtain immediate medical attention. Protection: safety goggles, approved gloves, good ventilation.

WARNING

Epoxy Primer, Item 135, is flammable. Do not use near open flames, welding areas, or on hot surfaces. Do not eat, drink, or smoke where primers are being mixed, handled, or cleaned up. Prolonged breathing of vapors or spray mist should be avoided. Avoid prolonged skin contact. Contains chromates; follow approved toxic waste disposal procedures. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: respiratory protection.

WARNING

Etching Solution, Item 136, is flammable. Do not use near open flames, welding areas, or hot surfaces. Bond and ground metal containers during transfer to prevent ignition through static discharge. Keep containers closed when not in use. Dispose of liquid-soaked rags in approved metal container. Avoid contact; contact will cause severe burns to exposed tissue. May be absorbed through the skin in potentially dangerous levels that may affect inner organs. If liquid contacts the eyes or skin, immediately flush the affected area thoroughly with water, and get medical attention. Change contaminated clothing immediately. Avoid breathing vapor. Inhalation may cause fatigue, headache, dizziness, nausea, and upper respiratory irritation. If symptoms appear, seek fresh air and possible medical attention. CAUTION: Reacts with water to form caustic soda. May form explosive peroxide if stored for over six months. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical goggles or face shield, neoprene gloves, full-body protective clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Ethylene Glycol, Item 137, may cause slight eye and skin irritation upon prolonged or repeated contact. Keep container closed; keep sparks, flames, and heat away. Keep ethylene glycol off skin, eyes, and clothes. Breathing vapors or mists of heated or agitated ethylene glycol may cause dizziness and upper respiratory irritation. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles or safety glasses, chemical-resistant gloves, other protective clothing as needed, good ventilation.

WARNING

Grease, Item 143, may cause moderate irritation to eyes. In case of eye contact, immediately flush eyes with water. Wash hands at shift end and prior to eating. CAUTION: Traces of polytetrafluoroethylene found to cause polymer fever and other hazardous decomposition products may be generated at high temperatures. Such high temperatures may require the use of increased ventilation and/or use of a NIOSH/MSHA-approved respirator. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses.

WARNING

Grease, Item 144, is combustible. Keep away from heat, sparks, and flames. Do not apply to hot surfaces; toxic gases may be released. Keep grease off skin, eyes, clothes. Prolonged or repeated contact may irritate the eyes and skin. Long-term use without hand protection may cause dermatitis. Wash hands thoroughly before eating, drinking, and smoking. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses, oil-resistant gloves, other protective clothing as needed.

WARNING

Grease, Item 145, is combustible. Keep away from heat, sparks, and flames. Do not apply to hot surfaces; toxic gases may be released. Do not breathe vapors. Keep grease off skin, eyes, and clothes. Prolonged or repeated contact may irritate the eyes and skin. Long-term use without hand protection may cause dermatitis. Wash hands thoroughly before eating, drinking, and smoking. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses, oil-resistant gloves, other protective clothing as needed, good ventilation.

WARNING

Grease, Item 146, is combustible. Keep away from heat, sparks, and flames. Do not apply to hot surfaces; toxic gases may be released. Keep grease off skin, eyes, clothes. Prolonged or repeated contact may irritate the eyes and skin. Long-term use without hand protection may cause dermatitis. Wash hands thoroughly before eating, drinking, and smoking. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses, oil-resistant gloves, other protective clothing as needed.

WARNING

Grease, Item 147, is a skin and eye irritant. Minimize contact with grease. Prolonged or repeated contact may irritate the eyes and skin. Long-term use without hand protection may cause dermatitis. Product used under normal conditions poses minimal hazard by inhalation. However, vapors produced during high temperature operations may cause headache, dizziness, and upper respiratory irritation. Wash hands thoroughly before eating, drinking, and smoking. Refer to the Material Safety Data Sheet (MSDS) for additional health and safety information. Protection: safety glasses, oil-resistant gloves, other protective clothing as needed, good ventilation.

WARNING

Grease, Item 148, may irritate the eyes and skin. Minimize contact with grease. Long-term use without hand protection may cause dermatitis. Product used under normal conditions poses minimal hazard by inhalation. Wash hands thoroughly before eating, drinking, and smoking. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses, oil-resistant gloves, other protective clothing as needed.

WARNING

Grease, Item 149, is combustible. Keep away from heat, sparks, and flames. Do not apply to hot surfaces; toxic gases may be released. Keep grease off skin, eyes, and clothes. Prolonged or repeated contact may irritate the eyes and skin. Long-term use without hand protection may cause dermatitis. Wash hands thoroughly before eating, drinking, and smoking. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses, oil-resistant gloves, other protective clothing as needed.

WARNING

Grease, Item 150, is a skin and eye irritant. Avoid any skin contact with grease/lubricant material. Prolonged or repeated contact may irritate the eyes and skin. Breathing vapor may irritate the upper respiratory tract. If swallowed, do not induce vomiting; aspiration may damage the lungs. Wash hands thoroughly prior to eating, drinking, or smoking. Do not apply to hot surfaces; toxic gases may be released. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Grease, Item 151, may cause moderate eye irritation. Prolonged or repeated skin contact may cause skin irritation. May cause dermatitis after prolonged contact. Keep grease away from ignition sources (heat, sparks, flame) and strong oxidizers. Store out of direct sunlight in a cool, dry, well-ventilated areas. In case of eye contact flush with water for at least 15 minutes and obtain medical attention. In case of skin contact wash area thoroughly with soap and water. If irritation persists seek medical attention. If inhaled, remove to fresh air, administer oxygen if required, and obtain immediate medical attention. If ingested, obtain immediate medical attention. Do not induce vomiting. Wash with soap and water after handling product. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles or face shields, approved gloves, good ventilation.

WARNING

Grease, Item 151A, is a skin and eye irritant. Avoid any skin contact with grease/lubricant material. Prolonged or repeated contact may irritate the skin; direct contact may irritate the eyes. Inhaling high concentrations of mists or vapors from heated product may cause headache, dizziness, and respiratory irritation. Keep containers closed when not in use. Do not use near heat, sparks, or hot surfaces; toxic gases may be released. Wash hands thoroughly prior to eating, drinking, or smoking. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves.

WARNING

Hydraulic fluid, Item 154, is combustible. Do not use or store near flames, sparks, or hot surfaces. Use only in a well-ventilated area. If hydraulic fluid is decomposed by heat, toxic gases are released. Prolonged contact with liquid or mist can cause dermatitis and severe skin irritation. If there is any prolonged contact with skin, wash contacted area with soap and water. Remove contaminated clothing and launder before reuse. If liquid contacts eyes, flush eyes with water immediately. If fluid is swallowed, do not try to vomit; fluid may enter the lungs and cause severe injury. Get immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: rubber gloves, impervious protective clothing, NIOSH/MSHA-approved respirator, if prolonged contact with mist is likely.

WARNING

Hydraulic fluid, Item 155, if decomposed by heat, will release toxic gases. Inhalation of vapors should be avoided. Prolonged contact with liquid or mist can cause dermatitis and irritation. If there is any prolonged contact with skin, wash contacted area with soap and water. If liquid contacts eyes, flush eyes with water immediately for 15 minutes. Remove saturated clothing. If fluid is swallowed, do not induce vomiting. Get immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: rubber gloves.

WARNING

Insulating compound, Item 157, is flammable. Keep it away from ignition sources (heat, flame). Bond/ground metal containers during mixing or transfer to prevent ignition from static discharge. Keep compound off skin, eyes, and clothes. Direct contact may severely irritate the eyes. May irritate the skin. May cause allergic skin rash in sensitized individuals. Breathing vapor may cause headaches, dizziness, nausea, and respiratory irritation (marked by sore throat, chest discomfort, and difficulty in breathing). Certain individuals may develop "isocyanate sensitization", which will cause them to experience an "asthmatic-type" reaction at levels well below established limits. Long-term overexposure may cause permanent damage to brain, nervous system, kidneys, and lungs. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, neoprene gloves, forced ventilation, NIOSH/MSHA-approved respirator, if vapor exceeds established exposure limits.

WARNING

Insulating compound, Item 158, as an uncured product may irritate the eyes, skin, nose, and throat. Product releases toxic, irritating acetic acid during application and curing; mechanical ventilation should be used to keep acetic acid mist well below established exposure limits. Keep sealant off skin, eyes, and clothes. Keep sparks, flames, and heat away. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Lacquer, Item 182B, is flammable. Keep away from ignition sources such as heat, spark, and flames. Bond/ground metallic containers during use or transfer. Avoid contact; product may cause moderate to severe eye and skin irritation. In case of eye contact, flush eyes immediately with water for 15 minutes. If product contacts the skin, wash affected areas thoroughly with soap and water. Remove contaminated clothing immediately and launder before reuse. Avoid breathing vapors; inhalation may cause headache, dizziness, nausea, and respiratory irritation. Seek fresh air and possible medical attention if such symptoms persists. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Lacquer, Item 182C, is flammable. Keep away from potential sources of ignition, including heat, spark, and flame. Bond and ground metal containers to prevent ignition through static electrical discharge. Keep containers tightly closed, in a cool, dry area when not in use. Avoid contact. Direct contact may irritate the eyes and skin, particularly when prolonged or repeated. Avoid breathing vapors and mists. Inhalation may cause headache, dizziness, nausea, and respiratory irritation. In case of contact, flush affected areas immediately with water. Seek medical attention if irritation persists. NOTE: Covers a series of acrylic-nitrocellulose camouflage lacquers, ranging in color specification. May contain components that may, upon long-term use without proper protective equipment, cause nervous system damage, cancer, and reproductive effects. Certain components may be absorbed through the skin in levels that may affect inner organs. Products meeting this specification may have varying component ingredients. Product hazards vary with respect to unique chemical composition. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles; approved gloves; full-body protective clothing; NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Lacquer, Item 183, Item 184, and Item 185, is flammable. Keep away from potential sources of ignition, including heat, spark, and flame. Bond and ground metal containers to prevent ignition through static electrical discharge. Keep containers tightly closed, in a cool, dry area when not in use. Avoid contact. Direct contact may irritate the eyes and skin, particularly when prolonged or repeated. Avoid breathing vapors and mists. Inhalation may cause headache, dizziness, nausea, and respiratory irritation. In case of contact, flush affected areas immediately with water. Seek medical attention if irritation persists. NOTE: Covers a series of acrylic-nitrocellulose camouflage lacquers, ranging in color specification. May contain components that may, upon long-term use without proper protective equipment, cause nervous system damage, cancer, and reproductive effects. Certain components may be absorbed through the skin in levels that may affect inner organs. Products meeting this specification may have varying component ingredients. Product hazards vary with respect to unique chemical composition. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles; approved gloves, full-body protective clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Lacquer, Item 186, Item 187, and Item 188, is flammable. Keep away from ignition sources such as heat, spark, and flames. Bond/ground metallic containers during use or transfer. Avoid contact; product may cause moderate to severe eye and skin irritation. In case of eye contact, flush eyes immediately with water for 15 minutes. If product contacts the skin, wash affected areas thoroughly with soap and water. Remove contaminated clothing immediately and launder before reuse. Avoid breathing vapors; inhalation may cause headache, dizziness, nausea, and respiratory irritation. Seek fresh air and possible medical attention if such symptoms persists. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Leak detection fluid, Item 189, is a mild skin and eye irritant. If eye contact occurs, flush with water. If eye irritation persists, seek medical attention. Wash hands with soap and water after use. If ingested, induce vomiting and seek medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses, approved gloves.

WARNING

Lubricant, Item 200, if applied to hot surfaces, will release toxic gases. Avoid contact with lubricant material. Direct eye contact and prolonged or repeated skin contact may cause mild irritation. Heavy mists or vapors generated by high temperatures may cause headache, dizziness, and respiratory irritation. Wash hands thoroughly prior to eating, drinking, or smoking. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Solid film lubricant, Item 201, is flammable. At high temperatures, it can decompose into a toxic substance. Keep container closed; keep sparks, flames, and heat away. Keep solid film lubricant off skin, eyes, and clothes. May irritate the eyes and skin. Do not breathe vapors. Breathing mists may cause headache, dizziness, nausea, respiratory irritation. Methylene chloride, a major component, has been found to cause cancer. May contain chemicals found to cause target organ and reproductive effects upon chronic overexposure. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, neoprene gloves, impervious clothing, forced ventilation, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Lubricating oil, Item 202, is combustible. Keep away from potential sources of ignition, such as heat, spark, and flame. Keep containers securely closed when not in use. Prolonged or repeated contact may irritate the skin. Liquid or vapor may irritate the eyes. Inhaling product vapors may cause headache, dizziness, nausea, and respiratory irritation. Product contains components that may be absorbed through the skin, thus contributing to the overall effects of overexposure to the product. Prolonged overexposure to product without proper personal protective equipment may cause cancer. Flush eyes thoroughly with water for at least 15 minutes. If ingested, provide water and seek medical attention. Wipe excess product from skin, then wash thoroughly with soap and water. Seek medical attention if irritation persists. If overcome by product vapor or mist, seek fresh air and possible medical assistance. Launder soiled clothing after use. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, approved gloves, full-body protective clothing, NIOSH/MSHA-approved respiratory protection, if vapors exceed established exposure limits.

WARNING

Lubricating oil, Item 203, may irritate the eyes and skin if prolonged or repeated contact occurs. If contact with skin is prolonged, wash area with soap and water. If product contacts eyes, flush eyes with water immediately. Remove and launder saturated clothing. Caution: Traces of benzene, found to cause cancer, may be generated at high temperatures. Such high temperature operations may require the use of increased ventilation and/or use of a NIOSH/MSHA-approved respirator. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses, approved gloves.

WARNING

Lubricating oil, Item 204A, may irritate skin if prolonged or repeated contact occurs. Liquid or mist may irritate the eyes. If liquid contacts eyes flush eyes with water immediately. Long-term exposure without proper hand protection may cause dermatitis. If there is any prolonged contact with skin, wash contacted area with soap and water. Remove saturated clothing. Breathing vapors generated at high temperatures or mists may cause headache, dizziness, and respiratory irritation. If fluid is swallowed, do not try to vomit; fluid may be aspirated into lungs, causing damage. Get immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, NIOSH/MSHA-approved respirator, if oil mists exceed established exposure limits.

WARNING

Lubricating oil, Item 205, may irritate the eyes and skin if prolonged or repeated contact occurs. Long-term use without hand protection may cause dermatitis. Breathing mists may cause respiratory irritation. If there is any prolonged contact with skin, wash area with soap and water. Remove saturated clothing. If solution contacts eyes, flush eyes with water immediately. If oil is swallowed, do not try to vomit; aspiration may damage lungs. Get immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, NIOSH/MSHA-approved respirator, if oil mists exceed established exposure limits.

WARNING

Lubricating oil, Item 205A, may irritate the eyes and skin if prolonged or repeated contact occurs. Long-term use without hand protection may cause dermatitis. Breathing mists may cause respiratory irritation. If there is any prolonged contact with skin, wash area with soap and water. Remove saturated clothing. If solution contacts eyes, flush eyes with water immediately. If oil is swallowed, do not try to vomit; aspiration may damage lungs. Get immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, NIOSH/MSHA-approved respirator, if oil mists exceed established exposure limits.

WARNING

Lubricating oil, Item 206, may irritate the eyes and skin if prolonged or repeated contact occurs. If there is any prolonged contact with skin, wash area with soap and water. If solution contacts eyes, flush eyes with water immediately. Remove saturated clothing. Breathing vapor may irritate the upper respiratory tract. If oil is swallowed, do not try to vomit, aspiration may damage the lungs. Get immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, NIOSH/MSHA-approved respirator, if oil mists exceed established exposure limits.

WARNING

Lubricating oil, Item 207, may irritate the eyes and skin if prolonged or repeated contact occurs. Long-term use without hand protection may cause dermatitis. Breathing mists may cause respiratory irritation. If there is any prolonged contact with skin, wash area with soap and water. Remove saturated clothing. If solution contacts eyes, flush eyes with water immediately. If oil is swallowed, do not try to vomit; aspiration may damage lungs. Get immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, NIOSH/MSHA-approved respirator, if oil mists exceed established exposure limits.

WARNING

Lubricating oil, Item 208, may irritate the eyes and skin if prolonged or repeated contact occurs. Long-term use without hand protection may cause dermatitis. Breathing mists may cause respiratory irritation. If there is any prolonged contact with skin, wash area with soap and water. Remove saturated clothing. If solution contacts eyes, flush eyes with water immediately. If oil is swallowed, do not try to vomit; aspiration may damage lungs. Get immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, NIOSH/MSHA-approved respirator, if oil mists exceed established exposure limits.

WARNING

Lubricating oil, Item 209, is combustible. Keep away from ignition sources (heat, flame). Keep container closed. Keep lubricating oil off skin, eyes, and clothes. Direct contact may severely irritate the eyes. Prolonged or repeated contact may irritate the skin. Do not breathe vapors. Breathing mists may cause headache, dizziness, nausea, and respiratory irritation. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, neoprene or polyvinyl gloves, impervious clothing, good ventilation, NIOSH/MSHA-approved respirator, if oil mists exceed established exposure limits.

WARNING

Methyl ethyl ketone, Item 217, is flammable. Do not use near open flames, near welding areas, or on hot surfaces. Do not smoke when using it, and do not use it where others are smoking. Contact with liquid or vapor can cause skin and eye irritation, dermatitis, and drowsiness. If there is any prolonged skin contact, wash contacted area with soap and water. Remove solvent-saturated clothing. If vapors cause drowsiness, move to fresh air. If irritation persists, get medical attention. Dispose of liquid-soaked rags in approved metal container. When storing, metal containers of solution must be grounded to maintain electrical continuity. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: when handling liquid at air-exhausted workbench, wear approved goggles and gloves; when handling liquid or liquid-soaked cloth in open unexhausted area, wear chemical splashproof goggles and approved gloves.

WARNING

Methyl isobutyl ketone, Item 218, is flammable, and irritating to eyes, skin, nose, and throat. Keep container closed; keep sparks, flames, and heat away. Keep methyl isobutyl ketone off skin, eyes, and clothes. Wash contacted skin with soap and water. If solvent contacts eyes, flush them with clean water and get immediate medical help. Do not breathe vapors. Breathing vapor or mists may cause headache, dizziness, and nausea. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, impervious gloves and clothing, good ventilation, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Molybdenum disulfide, Item 219, may irritate the eyes and skin if prolonged or repeated contact occurs. Avoid any skin contact with grease material. Breathing vapor may irritate the upper respiratory tract. If swallowed, do not induce vomiting, aspiration may damage the lungs. Wash hands thoroughly prior to eating, drinking, or smoking. Do not apply to hot surfaces; toxic gases may be released. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Nitric acid, Item 220, is reactive. Keep away from organic or combustible materials (wood, paper). May react with metals to form flammable hydrogen gas. When mixing with water, always add acid to water not water to acid. Keep off eyes, skin, and clothes. It is corrosive. May severely irritate or burn the eyes and skin. Do not breathe mists. Inhalation may cause headache and nausea and severe respiratory irritation marked by coughing and labored breathing. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, full-body impervious clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Nitrogen, Item 221, is a non-toxic inert gas that may displace the air used for breathing and cause asphyxiation. Use nitrogen in a well-ventilated area. Symptoms of oxygen deficiency may include dizziness, weakened speech, and loss of coordination. However, asphyxiation can occur without warning signs. A positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use. Compressed gas cylinder must be stored upright and firmly secured. Valve protection caps must be used to protect stored cylinders. Empty and full cylinders must be segregated. Do not heat compressed gas cylinders to increase the discharge rate. Caution: Nitrogen in a liquid state can cause skin burns and frostbite. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: face shield, cryogenic gloves, full-body protective clothing, safety shoes.

WARNING

Heat resistant aluminum paint, Item 221A, is flammable. Keep product away from heat, sparks, and open flame. Keep containers tightly closed when not in use. Long-term contact may cause drying, cracking and irritation of the skin. May react with skin and cause rash, scaling or blistering. Overexposure to product without use of proper personal protective equipment may cause nervous system damage. If overcome by vapors remove to fresh air, and obtain medical attention. If skin contact occurs, flush with water. If eye contact occurs, flush immediately with large amounts of water and seek medical attention, if ingested, do not induce vomiting, keep person warm and get medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, protective gloves, NIOSH/OSHA-approved respiratory protection.

WARNING

Polyurethane paint, Item 222, Item 222A, Item 223, Item 224, Item 225, Item 226, Item 227, and Item 227A, is flammable. Keep container closed; keep away from ignition sources (sparks, flames, heat). Bond and ground metal containers during transfer to prevent ignition through static discharge. Keep off eyes, skin, and clothes. May irritate the eyes and skin. May cause allergic skin reactions in sensitive individuals. Avoid breathing vapor. Inhalation may cause headache, dizziness, and respiratory irritation. Prolonged exposure may cause "asthmatic-type" reactions. Certain individuals may develop "sensitization", causing them to react adversely to vapor levels well below established exposure limits. Long-term overexposure to some solvents has been linked to brain and nervous system damage. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, long sleeve and long leg clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Polyurethane paint, Item 228, is flammable. Do not use near open flames, welding areas, or on hot surfaces. Bond/ground metal containers during mixing or transfer to prevent ignition through static discharge. Do not eat, drink, or smoke where paints are being mixed, handled, or cleaned up. Contains isocyanate compounds. Certain individuals may develop isocyanate sensitization, which will cause them to experience an asthmatic-type reaction at levels well below established limits. Avoid prolonged skin contact. After use, wash hands before eating or smoking. Breathing vapor may cause headache, dizziness, nausea, respiratory irritation. Long-term overexposure may cause allergic skin response, and delayed effects involving the blood, gastrointestinal, nervous and reproductive systems. May contain chromates, which have been found to cause cancer. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, long sleeve and long leg clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Paint remover, Item 230, may severely irritate or burn the eyes and skin. Keep paint remover off skin, eyes, and clothes. May be absorbed through the skin in potentially dangerous levels that may affect inner organs. Avoid breathing vapor. Inhalation may cause headache, dizziness, and nausea. Long-term overexposure may injure the lungs, pancreas, liver, and kidney. Contains components found to cause cancer. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, neoprene gloves, full-body protective clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits. Gloves should be changed frequently.

WARNING

Paint remover, Item 231, is combustible. Use paint remover only with adequate ventilation. Do not use it near welding area, near open flame, or on hot surfaces. Corrosive: Contact may cause severe burns on exposed tissue. If spilled on clothing, change immediately; wash clothes before wearing again. Do not breathe vapors. Breathing vapor may cause headache, dizziness, nausea, respiratory irritation. Frequent replacement of gloves during stripping operations may be necessary. May contain chemicals that may be absorbed through the skin in potentially dangerous amounts that could affect inner organ systems. Chronic overexposure to certain chemicals may cause liver and kidney damage, and cancer. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles and face shield to protect the skin from contact, approved neoprene or polyvinyl gloves, apron, boots, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Parting compound, Item 233, is extremely flammable. Do not use near open flames, near welding areas, or on hot surfaces. Do not smoke when using it and do not use it where others are smoking. Bond/ground metal containers to prevent ignition of product vapors through static discharge. Dispose of liquid soaked rags in approved metal safety container. Avoid contact. Direct contact may severely irritate or burn the eyes. May irritate the skin, particularly upon prolonged or repeated contact. Inhaling product vapors may cause headache, dizziness, nausea, and irregular heart beat. Long-term overexposure without proper protective equipment may cause liver, kidney, and nervous system damage, and blood defects. FIRST AID: If product contacts eyes, flush eyes thoroughly with lukewarm water for 15 minutes; seek immediate medical attention. CONTAINS: Methylene Chloride (found to cause cancer), Propane, Isobutane. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles or face shield, approved gloves, protective clothing, NIOSH/MSHA-approved respiratory protection (air-supplied), if product vapor levels exceed established exposure limits.

WARNING

Petrolatum, Item 234, may irritate the eyes and skin if prolonged or repeated contact occurs. Use in a well-ventilated area. Avoid eye and skin contact. Do not breathe vapors. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, full-body protective clothing, NIOSH/MSHA-approved respirator, if oil mists exceed established exposure limits.

WARNING

Polyurethane coating, Item 240, is flammable. Keep container closed; keep away from ignition sources (sparks, flames, heat). Bond and ground metal containers during transfer to prevent ignition through static discharge. Keep off eyes, skin, and clothes. May irritate the eyes and skin. May cause allergic skin reactions in sensitive individuals. Avoid breathing vapor. Inhalation may cause headache, dizziness, and respiratory irritation. Prolonged exposure may cause "asthmatic-type" reactions. Certain individuals may develop "sensitization", causing them to react adversely to vapor levels well below established exposure limits. Long-term overexposure to some solvents has been linked to brain and nervous system damage. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, long sleeve and long leg clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Polyurethane coating, Item 240A, is flammable. Keep polyurethane coating away from potential sources of ignition, including heat, spark, and open flame. Store containers in a cool, dry area when not in use. Bond and ground metal containers to prevent ignition through static electrical discharge. Avoid eye and skin contact. Direct contact may cause moderate to severe irritation, particularly with prolonged or repeated use. Certain components may be absorbed through the skin in potentially dangerous levels that may affect inner organs. May cause skin sensitization, whereby exposure to minimal amounts of product result in allergic skin reactions. Avoid breathing vapors or mists. Inhalation may cause headache, dizziness, nausea and respiratory irritation. May trigger immediate or delayed "asthmatic-type" reactions. In case of contact, flush affected area immediately with plenty of water. Seek medical attention if irritation persists. Seek fresh air and medical attention if allergic reactions occur. Product may contain chemicals that may damage internal "target" organs upon long-term overexposure without proper personal protective equipment. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: approved gloves; safety goggles, full-body protective clothing; NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Polyurethane coating, Item 241, is flammable. Do not use near open flames, welding areas, or on hot surfaces. Bond/ground metal containers during mixing or transfer to prevent ignition through static discharge. Do not eat, drink, or smoke where paints are being mixed, handled, or cleaned up. Contains isocyanate compounds. Certain individuals may develop isocyanate sensitization, which will cause them to experience an asthmatic-type reaction at levels well below established limits. Avoid prolonged skin contact. After use, wash hands before eating or smoking. Breathing vapor may cause headache, dizziness, nausea, respiratory irritation. Long-term overexposure may cause allergic skin response, and delayed effects involving the blood, gastrointestinal, nervous and reproductive systems. May contain chromates, which have been found to cause cancer. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved protective gloves, long sleeve and long leg clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Primer, Item 254, is flammable. Keep container closed and store in a cool, dry place. Use only in well-ventilated areas. Bond and ground metal containers during use and transfer to prevent ignition through static discharge. Keep clear of all sources of ignition or sparks during application and curing. Breathing vapors may cause headaches, dizziness, confusion, and respiratory irritation. Long-term overexposure without protective equipment may cause liver and kidney damage, and may trigger "asthmatic-type" respiratory responses and allergic skin reactions. May cause skin and eye irritation. If skin or eye contact occurs, wash immediately with water for at least 15 minutes. If ingested, do not induce vomiting. Seek immediate medical attention. Wash hands thoroughly with soap and water after use. Launder contaminated clothing before reuse. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, approved gloves, and good ventilation, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Primer, Item 257 and Item 258, is flammable. Do not use near open flames, near welding areas, or on hot surfaces. Do not eat or smoke when using it, and do not use it where others are smoking. Contact with liquid or vapor can cause skin or eye irritation, dizziness, and headache. Prolonged overexposure can result in kidney and liver damage. After prolonged skin contact, wash contacted area with soap and water. Flush eyes for 15 minutes, seek medical attention. If vapors cause dizziness, go to fresh air. If irritation persists, get medical attention. Dispose of liquid-soaked rags in approved metal container. Contains zinc chromates which are listed as carcinogens under OSHA. Follow approved toxic waste disposal procedures. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: when handling small quantities (less than 1 gallon), wear eye protection, approved gloves, and apron; when handling large quantities of liquid, (greater than a gallon), at unexhausted workbench, wear approved goggles, gloves, apron, long sleeves, respirator.

WARNING

Primer coating, Item 259, is flammable - Keep away from ignition sources (heat, sparks, flame) and strong oxidizers. Store out of direct sunlight in cool, dry, well-ventilated non-confined areas; ventilation systems must be explosion-proof and grounded. Do not store above 120°F (49°C). Closed containers may explode when exposed to extreme heat. If cans rupture, extinguish all ignition sources and ventilate. May cause severe irritation to eyes. Prolonged contact without proper skin protection may cause pain, numbness and burns. Prolonged inhalation may cause respiratory irritation, temporary nervous system impairment. Overexposure may cause headache, dizziness, giddiness, and irritability. Ingestion may cause lung damage/death. Digestive system irritation with nausea, vomiting, nervous system impairment. In case of eye contact flush with large volumes of water for at least 15 minutes, obtain medical attention. In case of skin contact flush area thoroughly with soap and water. If irritation persists seek medical attention. If inhaled, remove to fresh air, obtain medical attention. If ingested, do not induce vomiting, obtain immediate medical attention. Wash with soap and water after handling product. Launder soiled clothing and rags after use. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles/face shields, full-body protective clothing, approved gloves, good ventilation, NIOSH/MSHA-approved respirator, if airborne levels exceed established exposure limits.

WARNING

Sealing compound, Item 272, may irritate skin or produce allergic skin reactions and "asthmatic-type" respiratory responses in susceptible individuals if prolonged or repeated contact occurs; effects may be delayed. May be absorbed through the skin in levels that may affect inner organ systems. Direct eye contact may cause severe irritation. In case of skin contact, wash area thoroughly with soap and water; if eye contact occurs, flush immediately with water for at least 15 minutes. Seek immediate medical attention. Use with proper ventilation. Vapors may irritate the nose and throat. Long-term use without protective equipment may cause liver and kidney damage, blood changes, and reproductive disorders. Keep container closed in a cool, dry place. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, approved gloves, protective clothing to prevent skin contact, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Sealing compound, Item 273 and Item 274, is combustible. Keep container closed and store in a cool, dry place. Use only in well-ventilated areas. Keep clear of all sources of ignition or sparks during application. Breathing vapors may cause headaches, dizziness, and nausea; avoid prolonged inhalation of vapors. May cause skin and eye irritation. If skin or eye contact occurs, wash immediately with water for at least 15 minutes. If ingested, do not induce vomiting. Seek immediate medical attention. Wash hands thoroughly with soap and water after use. Launder contaminated clothing before reuse. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, approved gloves, good ventilation, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Sealing compound, Item 275, may irritate the eyes and skin. Keep container closed; keep sparks, flames, and heat away. Keep sealing compound off skin, eyes, and clothes. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles or safety glasses, impervious gloves, good ventilation.

WARNING

Sealing compound, Item 276, Item 277, Item 278, Item 279, Item 280, Item 281, Item 282, and Item 283, is combustible - do not use near open flames, near welding areas, or on hot surfaces. Keep containers closed when not in use. Avoid contact with eyes and skin. Liquid may be irritating to eyes. Repeated or prolonged contact with skin may result in dermatitis. Inhalation of product vapors may cause headache, dizziness, nausea, and respiratory irritation. Vapor may be irritating to eyes. If ingested, do not induce vomiting; seek medical attention. If eye contact occurs, flush them in a continuous stream of water for at least fifteen minutes. Seek medical attention. In case of skin contact, wipe affected areas with water and wash with soap and water. If irritation persists, seek medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical goggles, approved gloves.

WARNING

Sealing compound, Item 284, is flammable. Do not use near open flames, welding areas, or on hot surfaces. Do not smoke when using or where others are smoking. Avoid skin contact. May irritate the eyes and skin. Breathing vapor may cause headache, dizziness, and nausea. Use respirator in confined areas. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles or safety glasses, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Sealing compound, Item 285 and Item 286, may irritate the eyes and skin if prolonged or repeated contact occurs. Avoid skin and eye contact with thread locking sealant. If any liquid contacts skin or eyes, immediately flush affected area thoroughly with water. Wash hands thoroughly after handling. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, protective rubber or plastic gloves.

WARNING

Sealing compound, Item 287 and Item 288, can irritate skin and cause burns. Avoid contact with skin, eyes, and clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information.

WARNING

Sealing compound, Item 290 and Item 291, is a two part sealing compound mixture consisting of a base compound and an accelerant. The following warning summarizes health and physical hazards of the product as a mixture. Minimize contact. Prolonged or repeated contact may irritate the eyes and skin. Liquid or vapor may irritate the eyes. Inhaling product vapors may cause headache, dizziness, nausea, and narcosis. Product contains components that may be absorbed through the skin, thus contributing to the overall effects of overexposure to the product. Prolonged overexposure to product without proper personal protective equipment may cause muscular weakness, insomnia, and nervous system damage. Flush eyes thoroughly with water for at least 15 minutes. Wipe excess product from skin, then wash thoroughly with soap and water. Seek medical attention if irritation persists. If overcome by product vapor or mist, seek fresh air and possible medical assistance. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, approved gloves.

WARNING

Sealing compound, Item 292, can irritate skin and cause burns. Avoid contact with skin, eyes, and clothing. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information.

WARNING

Sealing compound, Item 293A, may irritate the eyes and skin if prolonged or repeated contact occurs. Avoid skin and eye contact with thread locking sealant. If any liquid contacts skin or eyes, immediately flush affected area thoroughly with water. Wash hands thoroughly after handling. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, protective rubber or plastic gloves.

WARNING

Sealing compound, Item 295, is combustible. Keep sealing compound away from potential sources of ignition, such as heat, spark, and flame. Keep containers securely closed when not in use. Prolonged or repeated contact may irritate the skin. Liquid or vapor may irritate the eyes. Inhaling product vapors may cause headache, dizziness, nausea, and respiratory irritation. Product contains components that may be absorbed through the skin, thus contributing to the overall effects of overexposure to the product. Prolonged overexposure to dust of cured product without proper personal protective equipment may cause cancer. Flush eyes thoroughly with water for at least 15 minutes. If ingested, provide water and seek medical attention. Wipe excess product from skin, then wash thoroughly with soap and water. Seek medical attention if irritation persists. If overcome by product vapor or mist, seek fresh air and possible medical assistance. Launder soiled clothing after use. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, approved gloves, full-body protective clothing, NIOSH/MSHA-approved respiratory protection, if airborne levels exceed established exposure limits.

WARNING

Sealing compound, Item 295A, Parts A and B, are flammable. Part A - May irritate the eyes and skin. May cause allergic skin reaction in certain individuals. Breathing vapor may cause headache, dizziness, nausea, respiratory irritation. Long-term overexposure may affect the heart, liver, kidney, and blood. Part B - May irritate the eyes and skin. May cause allergic skin reaction. May be absorbed through the skin in potentially dangerous amounts that may affect inner organ systems. Breathing vapor may cause headache, dizziness, nausea, respiratory irritation. Long-term overexposure may affect the liver and kidney. Mixture Part A & B - Flammable - Keep away from ignition sources (heat, flame). Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, impervious gloves, full-body protective clothing, good ventilation, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Sealing compound, Item 296 and Item 296A, is a skin and eye irritant. Adequate ventilation required during curing. Prolonged or repeated exposure may irritate the eyes and skin. If skin or eye contact occurs, wash immediately with water for at least 15 minutes. If ingested, seek immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety glasses or goggles, approved gloves.

WARNING

Sealing compound, Item 297, is flammable. Keep product away from potential ignition sources such as heat, spark, and flame. Bond/ground metal containers. Keep container closed. Direct contact may cause mild skin irritation and moderate to severe eye irritation. Inhalation of product vapor may cause headache, dizziness, and impaired motor coordination. Long-term overexposure without proper protective equipment may damage the liver. CAUTION: Product safety and health hazards may vary according to manufacturer and manufacturer product code, since different compositions can conform to the specification. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: splashproof goggles or safety glasses, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Sealing compound, Item 301A, is extremely flammable. Keep away from ignition sources (heat, sparks, flame) and strong oxidizers. Keep all containers closed in a cool, dry place when not in use. Use only in well-ventilated non-confined areas; ventilation systems must be explosion-proof and grounded. May irritate the eyes and skin. Prolonged contact without proper skin protection can cause dermatitis. Prolonged inhalation may cause headaches, dizziness, respiratory irritation, drowsiness and nausea. In case of eye contact, flush with water for at least 15 minutes and obtain medical attention. In case of skin contact, flush area thoroughly with soap and water. If irritation persists seek medical attention. If inhaled, remove to fresh air, obtain immediate medical attention. If ingested, obtain immediate medical attention. Wash with soap and water after handling product. Launder soiled clothing and rags after use. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles/face-shields, approved gloves, full-body protective clothing, good ventilation, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Sealing compound, Item 302A, is a two component product consisting of an epoxy resin, Part A and hardener, Part B. The precautions for each should be observed when separate or mixed. Do not mix batches greater than 1 pound to prevent excessive heat build-up with the release of toxic gases. Part A - Contact: Direct contact with eyes causes irritation. Skin contact may cause irritation and allergic skin reaction. Harmful if inhaled. Harmful if swallowed. In case of eye contact, flush with water; obtain medical attention if irritation persists. In case of skin contact, wash with soap and water and obtain medical attention if irritation persists. If swallowed, dilute by giving two glasses of water, obtain medical attention. If inhaled, remove from area to fresh air get immediate medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, approved gloves, protective clothing, good ventilation, NIOSH/MSHA-approved respirator. Part B - Product causes severe eye and skin burns. Contact: In case of eye contact, flush with water for 15 minutes while holding lids open and obtain medical attention. In case of skin contact, wash area with soap and water, remove contaminated clothing and obtain medical attention. If swallowed, dilute by giving two glasses of water, obtain medical attention. In case of inhalation, remove to fresh air and obtain medical attention. Wash with soap and water after handling product. Launder soiled clothing and rags after use. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: safety goggles, approved gloves, protective clothing, good ventilation, NIOSH/MSHA-approved respirator.

WARNING

Sealing compound primer, Item 304A, is combustible - do not use near open flames, near welding areas, or on hot surfaces. Keep containers closed when not in use. Avoid contact with eyes and skin. Liquid may be irritating to eyes. Repeated or prolonged contact with skin may result in dermatitis. Inhalation of product vapors may cause headache, dizziness, nausea, and respiratory irritation. Vapor may be irritating to eyes. If ingested, do not induce vomiting; seek medical attention. If eye contact occurs, flush them in a continuous stream of water for at least fifteen minutes. Seek medical attention. In case of skin contact, wipe affected areas with water and wash with soap and water. If irritation persists, seek medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical goggles, approved gloves.

WARNING

Sealing compound, Item 305, and Item 306, is combustible - do not use near open flames, near welding areas, or on hot surfaces. Keep containers closed when not in use. Avoid contact with eyes and skin. Liquid may be irritating to eyes. Repeated or prolonged contact with skin may result in dermatitis. Inhalation of product vapors may cause headache, dizziness, nausea, and respiratory irritation. Vapor may be irritating to eyes. If ingested, do not induce vomiting; seek medical attention. If eye contact occurs, flush them in a continuous stream of water for at least fifteen minutes. Seek medical attention. In case of skin contact, wipe affected areas with water and wash with soap and water. If irritation persists, seek medical attention. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical goggles, approved gloves.

WARNING

Silicone compound, Item 309, may irritate the eyes, skin, nose, and throat if prolonged or repeated contact occurs. Keep sparks, flames, and heat away. Keep grease off skin, eyes, and clothes. Do not breathe vapors. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles or safety glasses, protective gloves, other protective clothing as needed, good ventilation.

WARNING

Toluene, Item 339, is flammable. Do not use solution near welding areas, near open flames, or on hot surfaces. Do not smoke, and do not use it where others are smoking. Dispose of liquid-soaked rags in approved metal container. Store solvent in approved and grounded metal safety container. Bond/ground metal containers during transfer to prevent ignition from static discharge. May severely irritate the eyes on contact. May irritate the skin. Repeated exposure can cause dermatitis, and temporary tingling sensation in fingers. If any liquid contacts skin, flush affected area thoroughly with water. Immediately remove solvent-saturated clothing. Breathing vapor may cause headache, dizziness, nausea. If these symptoms occur, seek fresh air. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical goggles, approved (PVA) polyvinyl alcohol gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Trichloroethane, Item 341, may irritate the eyes and skin if prolonged or repeated contact occurs. Avoid contact. Skin irritation is heightened by liquid trapped against the skin from contaminated clothing. May be absorbed through the skin in levels that may affect inner organs. Long-term exposure without proper hand protection may result in dermatitis. After prolonged skin contact, wash affected area with soap and water. Remove contaminated clothing. Get medical attention. Avoid inhaling vapor. Breathing vapor may cause narcotic effects (headache, dizziness, and nausea); severe acute exposure may cause heart damage. If vapors cause irritation, go to fresh air. Dispose of liquid-soaked rags in approved metal container. No smoking in area. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: chemical splashproof goggles, approved gloves, full-body impervious clothing, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

WARNING

Trichloroethane, Item 342, may irritate the eyes and skin if prolonged or repeated contact occurs and may be heightened by liquid trapped against the skin from contaminated clothing. After prolonged skin contact, wash contacted area with soap and water. Remove contaminated clothing. Get medical attention for severe skin and eye irritation. May be absorbed through the skin in levels that may affect inner organ systems. Breathing vapor may cause narcotic effects (headache, dizziness, and nausea) heart damage (following severe acute exposure). If these symptoms occur, seek fresh air. Dispose of liquid-soaked rags in approved metal container. No eating, drinking, or smoking in area. Refer to the product Material Safety Data Sheet (MSDS) for specific component and associated health hazard information. Protection: goggles, approved gloves, NIOSH/MSHA-approved respirator, if vapors exceed established exposure limits.

D-1.4 Explanation of Columns.

- a. Column (1) - Item Number.

NOTE

Expendable supplies and materials with no National Stock Number (NSN) listed may be purchased from the manufacturer indicated by the five-digit code.

- b. Column (2) - National Stock Number. This is the NSN assigned to the item; use it to request or requisition the item.
- c. Column (3) - Description. Indicates the Federal item name and, if required, a description to identify the item. The second line for each item indicates the part number. The last line for each item indicates the Commercial and Government Entity (CAGE) in parentheses, if applicable.
- d. Column (4) - Unit of Measure (U/M) / Unit of Issue (U/I). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two- or three-character alphabetical abbreviation (e.g., ea, lb, pr, cyl, lbs). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

SECTION II EXPENDABLE AND DURABLE ITEMS LIST

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
1	9320-01-247-7735	Abrasion Resistant Tape SS9538-002 (CAGE 78286)	rl
1A	5350-00-246-0331	Abrasive Cloth ANSI B74.18, Type 1, Class 1, 40- Grit (CAGE 80204)	sh
2	5350-00-192-5047	Abrasive Cloth ANSI B74.18, Type 1, Class 1, 80- Grit (CAGE 80204)	sh
3	5350-00-161-9066	Abrasive Cloth ANSI B74.18, Type 1, Class 1, 100- Grit (CAGE 80204)	sh
4	5350-00-192-5050	Abrasive Cloth ANSI B74.18, Type 1, Class 1, 150- Grit (CAGE 80204)	sh
5	5350-00-192-9316	Abrasive Cloth ANSI B74.18, Type 1, Class 1, 220- Grit (CAGE 80204)	sh
6	5350-00-161-9715	Abrasive Cloth ANSI B74.18, Type 1, Class 1, 240- Grit (CAGE 80204)	sh
7	5350-00-229-3081	Abrasive Cloth ANSI B74.18, Type 1, Class 1, 280- Grit (CAGE 80204)	sh
8	5350-00-246-0330	Abrasive Cloth ANSI B74.18, Type 1, Class 1, 320- Grit (CAGE 80204)	sh
9	5350-00-271-5950	Abrasive Cloth ANSI B74.18, 30-, 40-, 60-, 80-, 100-, 120-Grit (Assorted Pack) (CAGE 80204)	sh

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
9A	5350-00-856-5700	Abrasive Cloth ANSI B74.18, Type 1, Class 1, 400- Grit (CAGE 80204)	sh
10	5350-00-221-0872	Abrasive Cloth ANSI B74.18, No. 320 (CAGE 80204)	sh
11	5350-00-584-4660	Abrasive Cloth ANSI B74.18, No. 80 (CAGE 80204)	ea
12	5350-00-584-4653	Abrasive Cloth ANSI B74.18, No. 180 (CAGE 80204)	ea
13	5350-00-584-4654	Abrasive Cloth ANSI B74.18, No. 220 (CAGE 80204)	ea
14	5350-00-967-5089	Abrasive Mat A-A-58054, 280 - 400-Grit (CAGE 58536)	sh
14A	3460-01-289-1062	Abrasive Pad Scotch-Brite 7448 (CAGE 27293)	sh
15	5350-00-721-8115	Abrasive Paper ANSI B74.18, 120-Grit (CAGE 80204)	sh
16	5350-00-721-8116	Abrasive Paper ANSI B74.18, 150-Grit (CAGE 80204)	sh
17	5350-00-224-7209	Abrasive Paper ANSI B74.18, 220-Grit (CAGE 80204)	sh
17A	5350-00-224-7207	Abrasive Paper ANSI B74.18, 240-Grit (CAGE 80204)	sh
18	5350-00-224-7202	Abrasive Paper ANSI B74.18, 360-Grit (CAGE 80204)	sh
19	5350-00-221-0882	Abrasive Paper ANSI B74.18, 120-Grit (CAGE 80204)	sh

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
20	5350-00-186-8819	Abrasive Paper ANSI B74.18, 220-Grit (CAGE 80204)	sh
21		Deleted (Refer to Item 1)	
22	5345-01-193-6709	Abrasive Wheel ST-90-ALO-382 (CAGE 08659)	ea
23		Deleted (Refer to Item 25A)	
*24	6810-00-275-1215	Acetic Acid A-A-55829 (CAGE 58536)	bt
*25	6810-00-184-4796	Acetone ASTM D 329 (CAGE 81346)	5 gal
*25A	6850-01-326-1607	Adhesion Promoter No. 86A (CAGE 52152)	pt
26		Deleted (Refer to Item 182B)	
27		Deleted (Refer to Item 182C)	
28		Deleted (Refer to Item 30)	
29		Deleted (Refer to Item 66H)	
*30	8040-01-419-8062	Adhesive Dapcotac 3300 (CAGE 58093)	kt
*31	8040-00-839-4919	Adhesive EC1099 (CAGE 76381)	qt
*32	8040-01-163-3481	Adhesive EA9309.3NA (CAGE 04347)	kt
33		Deleted (Refer to Item 32)	
*33A	8040-01-446-7381	Adhesive EA9359.3 (CAGE 05972)	kt
*34	8040-00-016-8662	Adhesive EA 934NA (CAGE 33564)	kt

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*35	8040-00-463-7042	Adhesive EA 956 (CAGE 33564)	kt
*36	8040-00-858-9799	Adhesive EC1099 (CAGE 76381)	kt
*37	8040-00-273-8717 8040-00-165-8614	Adhesive 1300L (CAGE 1A9T3)	pt qt
*38	8040-00-181-7548 8040-00-123-6954 8040-00-959-1854	Adhesive EC1751 A/B (CAGE 52152)	2 oz pt qt
*39	8040-00-152-0063	Adhesive EC2126 (CAGE 94960)	2 oz
*40	8040-00-180-6161	Adhesive EC2214 (CAGE 04963)	5 gal
*41	8040-00-145-0432	Adhesive EC2216 (CAGE 04963)	kt
*42	8040-00-390-7959	Adhesive EC847 (CAGE 04963)	qt
42A	8040-00-185-5631	Adhesive FM37 (CAGE 07542)	bx
42B		Adhesive KS0004 (KE4238/HD3475) (CAGE 04347)	kt
43	8040-00-849-5196	Adhesive MIL-A-81236 (CAGE 81349)	qt
43A	8040-00-530-4820	Adhesive 7526F (CAGE 65313)	pt
*44	8040-01-284-3984	Adhesive 380 (CAGE 05972)	oz

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*44A	8030-00-180-6222	Adhesive 60931 (CAGE 05972)	bt
44B	8040-01-090-9320	Adhesive 42061 (Loctite 420) (CAGE 05972)	pt
45	8040-01-339-6818	Adhesive Loctite Primer 704 (CAGE 05972)	gal
*46	8040-00-515-2250	Adhesive MMM-A-1617 (CAGE 81348)	qt
*47	8040-00-714-8223	Adhesive MMM-A-121 (CAGE 81348)	tu
*48	8040-00-152-0017 8040-00-152-0028	Adhesive MMM-A-132, Type 1, Class 3 (CAGE 81348)	2.5 oz 6 oz
*49	8040-00-266-7429	Adhesive Pliobond, No. 20 (CAGE 34897)	pt
50		Deleted (Refer to Item 105A)	
51	8040-00-526-1910	Adhesive PS18 (CAGE 95696)	kt
*52	8030-00-225-4548	Adhesive RTV102 (CAGE 01139)	ca
*53	8040-00-902-3871	Adhesive RTV106 (CAGE 01139)	kt
*54	8040-00-522-3429	Adhesive RTV118 (CAGE 01139)	kt
*55	8040-01-481-1516	Adhesive RTV133 (CAGE 01139)	ca

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*56	8040-00-118-2695	Adhesive RTV162 (CAGE 01139)	kt
*57	8040-00-144-9774 8040-00-145-0020	Adhesive RTV3145 (CAGE 71984)	10.3 oz 3 oz
57A		Deleted (Refer to Item 66E)	
58	8040-01-146-2656	Adhesive SL-5 (CAGE 15674)	200 yd
*59	8040-01-203-1443	Adhesive A-A-3097, Type 1, Class 2 (CAGE 58536)	oz
*59A	8040-01-140-0954	Adhesive A-A-3097, Type II, Class 3 (CAGE 58536)	oz
*60	8040-01-160-9551	Adhesive Versilok 204/Accelerator 4 (CAGE 30676)	3 oz
*60A		Adhesive 3003505 (CAGE 30676)	10 oz
61		Deleted (Refer to Item 37)	
62		Deleted (Refer to Item 271A)	
63	8040-01-180-4988	Adhesive 416 (CAGE 05972)	bt
63A		Adhesive 1357 (3M ID 62-1368-8536-5) (CAGE 76381)	gal
*64	8040-01-170-3599	Adhesive Versilok 506/Accelerator 4 (CAGE 30676)	3 oz
64A		Adhesive Curing Accelerator 3004043 (CAGE 30676)	qt
65	8040-01-129-2559	Adhesive 82C18 (CAGE 56221)	pt

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*66	8040-01-355-6366	Adhesive EA 9203 (CAGE 33564)	gal
66A	8040-00-148-9849	Adhesive Epocast 50A (CAGE 99384)	kt
66B	8040-00-843-7873	Adhesive Epon 815 (CAGE 86961)	kt
66C	8040-01-046-2944	Adhesive 1210A/B (CAGE 99384)	kt
66D	8030-00-086-1505 8040-00-822-6430	Adhesive Epon 828 (CAGE 54527)	pt qt
*66E	8040-01-010-8758 8040-00-843-0802	Adhesive, Clear RTV732 (CAGE 71984)	10.3 oz 3 oz
66F		Adhesive Magnobond 6380 (CAGE 22121)	kt
66G	8040-00-084-4338	Adhesive Hardener 9615A (CAGE 02684)	kt
66H	8040-01-151-4258	Adhesive Primer Chemlok 7701 (CAGE 30676)	gal
*67	8040-00-065-6578	Adhesive Primer EC 1945 A/B (CAGE 04963)	qt
*68	8040-01-192-2491	Adhesive Primer EC-3917 (CAGE 04963)	qt
68A	8040-01-181-7201	Adhesive, Thermofit S-1009 (CAGE 06090)	kt
68B	8040-01-498-3919	Adhesive Primer 94 (CAGE 04963)	gal

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
69	7930-00-267-5588	Aircraft Wax MIL-W-18723 (CAGE 81349)	gal
*70	6810-00-577-4889	Alcohol, Denatured 27 CFR 21.35 (CAGE 0MUS3)	qt
71	6810-00-264-5906	Alcohol, Ethyl A-A-59282 (CAGE 58536)	pt
*72	6810-00-983-8551 6810-00-286-5435	Alcohol, Isopropyl TT-I-735 (CAGE 81348)	32 oz gal
*73	8030-00-779-4699	Alodine, Chemical MIL-C-5541, Kit-120 (CAGE 84063)	kt
73A	5920-01-520-6122	Aluminum Mesh Screen SS9615 (CAGE 78286)	sh
73B	8030-00-292-1102	Antiseize Compound A-A-59313 (CAGE 58536)	cn
*74	8030-00-597-5367	Antiseize Compound MIL-A-907 (CAGE 81439)	2.5 lbs
*75	8030-01-044-5034	Antiseize Compound AMS 2518 (CAGE 81343)	lb
*76	8030-00-087-8630	Antiseize Compound MIL-PRF-83483 (CAGE 81349)	lb
77	8030-00-889-5285	Antiseize Compound 8001 (CAGE 78976)	tu
78	6515-00-303-8250	Applicator GG-A-616 (CAGE 81348)	pkg
*79	9150-00-159-5012	Assembly Fluid Assembly Fluid 1 (CAGE 56385)	tu

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
80	8135-00-282-0565	Barrier Material MIL-PRF-131 (CAGE 81349)	rl
80A	1680-01-337-2890	Breather Material Airweave N-10 (CAGE 53912)	rl
80B		BPS LifeGuard Repair Kit	kt
80C		BPS Non-Skid Top Coat Repair Kit	kt
81	8315-01-244-7225	Braid, Textile S8999-7 (CAGE 59364)	ea
82	5977-01-101-9857	Brush 287511 (CAGE 99932)	ea
83	7920-00-205-2401	Brush MIL-B-43871 (CAGE 81349)	ea
84	7920-00-514-2417	Brush, Acid A-A-289 (CAGE 58536)	ea
85	8070-00-224-8022	Brush, Artist H-B-118 (CAGE 81348)	ea
86	8020-00-263-3866	Brush, Paint H-B-420 (CAGE 81348)	6 ea
87	8530-00-290-2920	Brush, Tooth A-A-123 (CAGE 58536)	bx
87A	5999-00-280-3499	Cap, Electrical MS25274-2 (CAGE 96906)	10 ea
87B	6850-00-306-9596	Brush Plating Solution, Cadmium SPS 5070 (CAGE 11924)	cn
88		Deleted (Refer to Item 160C)	
89		Deleted (Refer to Item 64)	

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
90	8305-00-267-3015	Cheesecloth CCC-C-440 (CAGE 81348)	yd
*91	6810-00-264-6517	Chromium Trioxide, Technical A-A-55827 (CAGE 58536)	5 lb cn
*92	6850-00-181-7280	Cleaning Compound Actusol T776 (CAGE 72008)	55 gal
93	6850-00-527-2426	Cleaning Compound AMS 1640 (CAGE 81343)	5 gal
*94	6850-01-390-7811	Cleaning Compound MIL-PRF-87937 (CAGE 81349)	5 gal
95	6850-00-209-7947	Cleaning Compound O-C-1889 (CAGE 81348)	gal
96	6850-01-215-4776	Cleaning Compound Spray "Clean" (CAGE 65290)	gal
97	6850-00-181-7115	Cleaning Compound T-WD 602 (CAGE 88559)	5 gal
97A	7930-01-306-8369	Cleaning Compound 13005 (CAGE 1Z575)	bt
98	6850-00-224-6663	Cleaning Compound, Solvent MIL-PRF-372 (CAGE 81349)	gal
*99	6850-00-105-3084	Cleaning Compound, Solvent CRC 2016 (CAGE Z2542)	cn
*99A	6850-01-371-8048 6850-01-375-5554 6850-01-375-5553 6850-01-375-5555	Cleaning Compound, Solvent Electron (CAGE 0WU71)	15 oz cn gal 6 gal 55 gal
*99B	6850-01-411-8815 6850-01-412-0026 6850-01-412-0028	Cleaning Compound, Solvent Positron (CAGE 0WU71)	gal 6 gal 55 gal

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*99C	6850-01-443-9519	Cleaning Compound, Solvent Shopmaster RC (CAGE 0YG51)	qt
*100	6850-01-248-9828	Cleaning Compound, Solvent MIL-PRF-85570 (CAGE 81349)	cn
*100A	6850-00-264-9038	Cleaning Compound, Solvent MIL-PRF-680 (CAGE 81348)	5 gal
101		Deleted (Refer to Item 97A)	
102	7920-00-044-9281	Cloth, Cleaning A-A-59323 (CAGE 58536)	bx
102A	7920-00-165-7195	Cloth, Cleaning A-A-59323 (CAGE 58536)	bx
102B	8305-01-100-9061	Cloth, Coated Fluorpeel No. 3 (CAGE 07512)	rl
103	8305-00-641-5603	Cloth, Coated MIL-C-8068 (CAGE 81349)	yd
104	8305-01-102-7912	Cloth, Nylon MIL-C-20696, Type 1, Class 3 (CAGE 81349)	yd
105	8305-00-082-6135	Cloth, Satin MIL-C-9084 (CAGE 81349)	yd
105A	8030-00-575-5985	Coating Compound PR-420 (CAGE 83574)	pt
*106	8030-00-082-2425	Coating Compound MIL-C-8514 (CAGE 81349)	kt
106A	6850-00-616-9019	Coating Compound, Black Oxide MIL-C-13924 (CAGE 81349)	50 lbs

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
106B	8010-01-054-7229	Coating Kit, Rain Erosion Resisting M331/M201 (CAGE 30676)	kt
107		Deleted (Refer to Item 209A)	
*108	6850-00-656-1292	Corrosion Compound MIL-C-10578 (CAGE 81349)	5 gal
*108A	8030-01-386-3877	Corrosion Preventive Compound Fluid Film Liquid A (CAGE 0RA06)	gal
*108B	8030-01-381-7311	Corrosion Preventive Compound Fluid Film Liquid AR (CAGE 0RA06)	gal
*108C	8030-01-512-2416	Corrosion Preventive Compound AMS-M-3171, Type VI (CAGE 81343)	kt
*109	8030-00-244-1297	Corrosion Preventive Compound MIL-C-16173, Class 1, Grade 2 (CAGE 81349)	gal
*110	8030-00-062-6950 8030-00-231-2345 8030-00-244-1299	Corrosion Preventive Compound MIL-C-16173, Class 1, Grade 1 (CAGE 81349)	qt gal 5 gal
*111	8030-00-837-6557 8030-00-244-1296	Corrosion Preventive Compound MIL-C-16173, Class 1, Grade 3 (CAGE 81349)	pt gal
*112	8030-00-062-5866 8030-00-526-1605	Corrosion Preventive Compound MIL-C-16173, Class 1, Grade 4 (CAGE 81349)	gal 5 gal
*113	8030-01-041-1596	Corrosion Preventive Compound MIL-C-85054, Type 1 (CAGE 81349)	pt
113A	8030-01-347-0979	Corrosion Preventive Compound MIL-DTL-85054, Type 1, Class 134A (CAGE 81349)	cn
*114	8030-00-938-1947	Corrosion Preventive Compound MIL-C-81309, Type 2, Class 2 (CAGE 81349)	16 oz

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*115	8030-00-546-8637	Corrosion Preventive Compound MIL-C-81309, Type 3, Class 2 (CAGE 81349)	16 oz
*115A	8030-00-285-1570	Corrosion Preventive Compound MIL-C-11796, Class 3 (CAGE 81349)	35 lbs
*116	6850-00-926-5298	Corrosion Removing Compound MIL-C-10578 (CAGE 81349)	15 gal
116A	6850-00-550-5565	Corrosion Removing Compound A-A-59260 (CAGE 58536)	500 lbs
*117	8030-00-065-0957	Corrosion Resistant Coating MIL-C-5541, Class 3 Alodine 600 (CAGE 81439)	qt
*118	8030-00-142-9272 8030-00-811-3723 8030-00-823-8039	Corrosion Resistant Coating MIL-C-5541, Class 1A Alodine 1200S (CAGE 81349)	pt bt gal
*118A	8030-01-018-2838	Corrosion Resistant Coating MIL-C-5541 (CAGE 81349)	bt
119	8320-01-362-5829	Cotton Swabs 6003-0019 (CAGE 17794)	pkg
120	8030-00-839-1442	Curing Agent (CAGE 17794)	cn
*121	9150-00-269-8246	Damping Fluid DC200-100SCTK (CAGE 71984)	cn
121A	6810-00-995-4804	Diethylenetriamine A-A-59162 (CAGE 58536)	pt
121B		Deleted (Refer to Item 99C)	
122	7930-00-764-5066	Dishwashing Compound P-D-410 (CAGE 81348)	qt

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
123	6810-00-682-6867	Distilled Water ASTM D 1193 (CAGE 81346)	gal
123A	9150-01-528-5624	Dry Lubricant MS-122AD (CAGE 18598)	16 oz
*124	6850-00-274-5421 6850-00-285-8012	Dry-Cleaning Solvent MIL-PRF-680, Type 2 (CAGE 81348)	5 gal 55 gal
*125	6830-01-011-7848	Dry Ice BB-C-104 (CAGE 81348)	10 lb
125A	8010-01-030-7250	Epoxy Coating 17564-4B2 (CAGE 17564)	kt
126		Deleted (Refer to Item 221B)	
*126A	8010-01-419-1142	Epoxy Coating Kit MIL-PRF-22750 (CAGE 81349)	kt
126B	8010-01-416-6556	Epoxy Coating Kit MIL-PRF-23377 (CAGE 81349)	kt
127		Deleted (Refer to Item 302A)	
128		Deleted (Refer to Item 182A)	
129		Deleted (Refer to Item 66A)	
130		Deleted (Refer to Item 66B)	
131		Deleted (Refer to Item 302B)	
132		Deleted (Refer to Item 66C)	
133		Deleted (Refer to Item 66G)	
133A		Deleted (Refer to Item 66D)	
*134	8040-00-061-8303	Epoxy Patch Kit EPK 0151 (CAGE 04347)	kt
*134A	8010-01-218-7354	Epoxy Primer MIL-PRF-85582 (CAGE 81349)	kt

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*135	8010-00-082-2450	Epoxy Primer Coating Kit MIL-PRF-23377 (CAGE 81349)	kt
135A	8010-00-264-8866	Epoxy Primer Coating Kit MIL-P-53030 (CAGE 81349)	kt
*136	6850-00-431-8662	Etching Solution Tetra-Etch (CAGE 17217)	cn
*137	6810-00-006-4205	Ethylene Glycol ASTM E 1119 (CAGE 81346)	gal
137A	8315-00-006-9835	Fastener Tape, Hook A-A-55126 (CAGE 58536)	yd
137B	8315-00-006-9836	Fastener Tape, Pile A-A-55126 (CAGE 58536)	yd
137C	8315-00-935-0505	Fastener Tape, Pile A-A-55126 (CAGE 58536)	yd
138	1615-01-126-9445	Fiberglass Repair Kit 70072-15001-011 (CAGE 78286)	ea
138A		Fiberglass Ski Repair Kit L20500-200 (CAGE 17564)	kt
139	4020-00-240-2142	Fibrous Cord A-A-55622 (CAGE 58536)	1200 ft rl
139A	8030-00-195-4831	Filler, Metal Surface Dent 01125 (CAGE 10054)	ea
139B		Deleted (Refer to Item 141A)	
140	8305-00-641-5606	Flannel Cloth CCC-C-458 (CAGE 81348)	yd

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
141	8010-00-958-8147	Fluorescent Paint A-A-713, Color: No. 38905 (CAGE 81348)	pt
141A	4210-01-056-8343 4210-01-139-4972	Foam Liquid, Fire Extinguishing MIL-F-24385 (CAGE 81349)	5 gal
141B	1560-01-305-7909	Fuel Tank Parts Kit 052M001-501 (CAGE 59297)	kt
142	1560-01-305-7912	Fuel Tank Parts Kit 052M004-501 (CAGE 59297)	kt
*143	9150-01-040-1423	Grease FS-3451 (CAGE 71984)	3 oz tu
*144	9150-00-754-2595	Grease MIL-G-21164 (CAGE 81349)	1.75 lbs
*145	9150-00-985-7246 9150-00-985-7247 9150-00-985-7248	Grease MIL-PRF-23827 (CAGE 81349)	1.75 lbs 6.5 lbs 35 lbs
*146	9150-00-141-6770	Grease MIL-G-25013 (CAGE 81349)	1.75 lbs
*147	9150-00-616-9020	Grease MIL-G-25537 (CAGE 81349)	1.75 lbs
*148	9150-01-584-4299	Grease A-A-59173 (CAGE 58536)	oz
*149	9150-00-944-8953 9150-00-145-0268	Grease MIL-PRF-81322 (CAGE 81349)	1.75 lb cn 5 lb cn
*150	9150-00-408-9635	Grease MIL-G-81827 (CAGE 81349)	1.75 lb cn
*151	9150-01-018-8960	Grease AMS-G-4343 (CAGE 0U583)	ca

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*151A	9150-00-663-1770	Grease 630AA (CAGE 73219)	6 lbs
151B	9150-01-444-2469	Grease AA-100 (CAGE 64856)	ca
152	5325-00-074-3301	Grommet, Nonmetallic MS21266-2N (CAGE 96906)	ea
152A	5325-00-926-1394	Grommet, Nonmetallic MS21266-3N (CAGE 96906)	ea
153	8520-00-527-9942	Hand Cleaner P-H-31, Type 1, Class 1 (CAGE 81348)	pt
*154	9150-00-252-6383 9150-00-223-4134	Hydraulic Fluid MIL-PRF-5606 (CAGE 81349)	qt gal
*155	9150-00-149-7432	Hydraulic Fluid MIL-PRF-83282 (CAGE 81349)	gal
155A	9150-00-698-2382	Hydraulic Fluid, Automatic Transmission Dexron II (CAGE 24617)	qt
156	7690-01-368-2663	Identification Marker HM200-300 (CAGE 94858)	pkg
*157	5970-01-029-7961	Insulating Compound MIL-I-46058 (CAGE 81349)	cn
*158	5970-01-100-4464	Insulating Compound RTV102 (CAGE 01139)	2.8 oz
159	5970-01-363-8394	Insulating Compound RTV-3140 (CAGE 71984)	qt
160	5970-00-900-9372	Insulating Varnish 1201 (CAGE 08000)	cn

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
160A	5970-01-356-5954	Insulation Sleeving MIL-I-631 (CAGE 81349)	36 in
160B	5970-01-072-0014	Insulation Sleeving, Boot MS3117-11AC (CAGE 96906)	ea
160C	5970-00-484-2821	Insulation Sleeving, Electrical M23053/8-009-C (CAGE 81349)	ea
160D	5970-00-729-2966	Insulation Sleeving PVC105-11 (CAGE 81349)	in
161	5970-00-899-6651	Insulation Sleeving, Heat-Shrinkable M22129-02-N (CAGE 81349)	ft
162	5970-00-812-2969	Insulation Sleeving, Heat-Shrinkable M23053/5-104-0 (CAGE 81349)	ft
163	5957-01-088-0413	Insulation Sleeving, Heat-Shrinkable M23053/1-202-0 (CAGE 81349)	ft
164	5970-00-740-2971	Insulation Sleeving, Heat-Shrinkable M23053/5-107-9 (CAGE 81349)	ft
165	5970-00-983-7970	Insulation Sleeving, Heat-Shrinkable M23053/5-105-5 (CAGE 81349)	ft
166		Insulation Sleeving, Heat-Shrinkable M23053/16-75-5 (CAGE 81349)	ft
167	5970-00-787-2310	Insulation Sleeving, Heat-Shrinkable M23053/5-101-0 (CAGE 81349)	ft
168		Deleted (Refer to Item 162)	
169	5970-00-812-2967	Insulation Sleeving, Heat-Shrinkable M23053/5-108-0 (CAGE 81349)	ft
170		Deleted (Refer to Item 160A)	

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
171	5970-00-221-5316	Insulation Sleeving, Heat-Shrinkable MIL-I-631 (CAGE 81349)	ft
172	5970-00-899-6660	Insulation Sleeving, Heat-Shrinkable M22129-20-N (CAGE 81349)	ft
173		Deleted (Refer to Item 219A)	
174		Deleted (Refer to Item 160B)	
175	5970-00-146-1122	Insulation Sleeving, Heat-Shrinkable SS7072G0125W010 (CAGE 78286)	ft
176		Deleted (Refer to Item 180)	
177	5970-00-812-2974	Insulation Sleeving, Heat-Shrinkable M23053/5-103-0 (CAGE 81349)	ft
178	5970-00-781-6832	Insulation Sleeving, Heat-Shrinkable M23053/5-114-0 (CAGE 81349)	ft
179	5970-01-158-3818	Insulation Sleeving, Heat-Shrinkable M23053/11-130-C (CAGE 81349)	ft
180	5970-01-028-6789	Insulation Sleeving, Heat-Shrinkable MS3109-11AC (CAGE 96906)	ft
181	5970-00-832-4298	Insulation Tape A-A-59474 (CAGE 58536)	rl
182	5970-00-881-3657	Insulation Tape MIL-I-15126 (CAGE 81349)	rl
182A	5970-00-226-9577	Insulating Compound, Electrical Epocast 4-H-A/946 (CAGE 99384)	kt
*182B	8010-01-042-4196	Lacquer MIL-L-46159 (CAGE 81349)	cn
*182C	8010-00-066-9430	Lacquer MIL-PRF-81352 (CAGE 81349)	gal

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*183	8010-00-082-2479	Lacquer MIL-L-19538 Color: Black (CAGE 81349)	qt
*184	8010-00-527-2888	Lacquer MIL-L-19538 Color: Olive Drab (CAGE 81349)	gal
*185	8010-00-083-6588	Lacquer MIL-L-19538, Class 1, X34089 (CAGE 81349)	5 gal
*186	8010-00-083-6588	Lacquer MIL-L-46159 (CAGE 81349)	16 oz
*187	8010-01-016-1488	Lacquer MIL-L-46159, Type 1 Color: Olive Drab (CAGE 81349)	pt
*188	8010-01-042-4196	Lacquer MIL-L-46159, Type 2 Color: Olive Drab (CAGE 81349)	16 oz
*189	6850-00-935-4068	Leak Detection Fluid 372 (CAGE 03530)	4 oz
190	6640-00-290-0146	Litmus Paper MS36253-2 (CAGE 96906)	vial
191	6640-00-290-0147	Litmus Paper MS36253-1 (CAGE 96906)	vial
192		Deleted (Refer to Item 285 or Item 286)	
193	9525-00-221-2650	Lockwire MS20995C20 (CAGE 96906)	1 lb sp
194	9505-01-054-2676	Lockwire MS20995C32 (CAGE 96906)	1 lb sp

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
194A	9505-01-499-6879	Lockwire MS20995C47 (CAGE 96906)	1 lb sp
195	9525-01-047-6455	Lockwire MS20995CY20 (CAGE 96906)	1 lb sp
196	9525-00-618-0257	Lockwire MS20995NC20 (CAGE 96906)	1 lb sp
197	9525-00-803-3044	Lockwire MS20995NC32 (CAGE 96906)	5 lb sp
198	9525-00-990-7799	Lockwire MS20995NC40 (CAGE 96906)	1 lb sp
199	9525-00-409-1866	Lockwire MS20995NC47 (CAGE 96906)	1 lb sp
199A		Deleted	
199B		Deleted (Refer to Item 123A)	
199C	9150-01-106-7078	Lubricant Molykote III (CAGE 94499)	cn
*200	2640-00-476-3144	Lubricant, Inner Tube MIL-C-5024 (CAGE 81349)	gal
200A	6850-01-441-2633	Lubricant, Seal L-001 (CAGE 04171)	tu
200B		Lubricant, Solid Film MIL-L-8937, Type II (CAGE 81349)	gal
*201	9150-01-260-2534	Lubricant, Solid Film MIL-L-23398 (CAGE 81349)	16 oz
201A		Deleted (Refer to Item 200A)	
201B	6850-01-260-8055	Lubricant, Water Displacing MIL-L-87177, Type I (CAGE 81349)	cn

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*202	9150-00-263-3490	Lubricating Oil MIL-PRF-7870 (CAGE 81349)	cn
*203	9150-00-543-7220	Lubricating Oil DOD-L-25681 (CAGE 81349)	lb
204	9150-00-292-9687	Lubricating Oil MIL-PRF-14107 (CAGE 81349)	5 gal
*204A	9150-00-753-4937	Lubricating Oil SAE J 1899 (CAGE 81343)	55 gal
*205	9150-00-985-7099	Lubricating Oil MIL-PRF-23699 (See Note) (CAGE 81349)	qt
*205A	9150-01-311-5640	Lubricating Oil MIL-PRF-6085 (CAGE 81349)	qt
*206	9150-01-209-2684	Lubricating Oil DOD-L-85734 (CAGE 81349)	qt
*207	9150-00-273-2388	Lubricating Oil MIL-PRF-6081 (CAGE 81349)	qt
*208	9150-00-782-2627	Lubricating Oil MIL-PRF-7808 (CAGE 81349)	qt
*209	9150-00-231-6689	Lubricating Oil MIL-PRF-32033 (CAGE 81349)	qt
209A	9150-00-664-4449	Lubricating Oil, Refrigerant Compressor ED45263-106 (CAGE 64959)	gal
210		Deleted (Refer to Item 151A)	
211	7920-00-260-1279	Machinery Towel DDD-T-541 (CAGE 81348)	50 ea bx

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
211A	1560-00-450-3622	Maintenance Kit, Window A-A-52686 (CAGE 81349)	kt
211B		Deleted (Refer to Item 66F)	
211C	7520-00-043-3408	Marking Pen A-A-2778 (CAGE 58536)	ea
212	7510-00-266-6712	Masking Tape, 1-inch A-A-883 (CAGE 58536)	rl
213	7510-00-266-6709	Masking Tape, 1 1/2-inches A-A-883 (CAGE 58536)	rl
214	7510-00-266-6710	Masking Tape, 2-inches A-A-883 (CAGE 58536)	rl
215	7510-00-266-6707	Masking Tape, 3-inches A-A-883 (CAGE 58536)	rl
216	9340-01-177-8572	Mat, Reinforcing, Fibrous 1659 (CAGE 95746)	50 yd rl
*217	6810-00-281-2785 6810-00-281-2762 6810-00-281-2763	Methyl Ethyl Ketone ASTM D 740 (CAGE 81346)	gal 5 gal 55 gal
*218	6810-00-180-5976 6810-00-281-2761	Methyl Isobutyl Ketone ASTM D 1153 (CAGE 81346)	5 gal 55 gal
*219	6810-00-264-6715	Molybdenum Disulfide AMS-M-7866 (CAGE 81343)	1 lb
219A	2925-00-497-4957	Neoprene Sleeve 10-30233 (CAGE 77820)	ft
*220	6810-00-222-9655 6810-00-237-2918	Nitric Acid A-A-59105 (CAGE 58536)	500 ml 80 oz

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*221	6830-00-782-2641 6830-01-028-9402	Nitrogen A-A-59503 (CAGE 58536)	187 cu ft cyl 226 cu ft cyl
*221A	8010-00-664-7468	Paint, Heat Resistant Aluminum TT-P-28 (CAGE 81348)	qt
221B	8010-01-357-4155	Paint, Heat Resisting GES-69AR (CAGE 58913)	kt
*222	8010-01-131-6254	Paint, Polyurethane MIL-DTL-53039, Type 2 Color: No. 37030, Black (CAGE 81349)	kt
*222A	8010-01-131-6255	Paint, Polyurethane MIL-DTL-53039, Type 2 Color: No. 34031, Dark Green (CAGE 81349)	kt
*223	8010-01-146-2646	Paint, Polyurethane MIL-DTL-53039, Type 2 Color: No. 37038, Black (CAGE 81349)	kt
*224	8010-01-146-2649	Paint, Polyurethane MIL-DTL-53039, Type 2 Color: No. 36231, Dark Gull Gray (CAGE 81349)	kt
*225	8010-01-144-9872	Paint, Polyurethane MIL-DTL-53039, Type 2 Color: No. 37875, Insignia White (CAGE 81349)	kt
*226	8010-01-144-9873	Paint, Polyurethane MIL-DTL-53039, Type 2 Color: No. 31136, Insignia Red (CAGE 81349)	kt
*227	8010-01-055-2319	Paint, Polyurethane MIL-DTL-53039, Type 2 Color: No. 34088, Olive Drab (CAGE 81349)	kt

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*227A	8010-01-235-8059	Paint, Polyurethane MIL-DTL-53039, Type 2 Color: No. 33538, Orange Yellow (CAGE 81349)	kt
*228		Deleted (Refer to Item 240A)	
229	8010-00-815-2970	Paint Remover MIL-R-25134 (CAGE 81349)	1 gal
*230	8010-00-142-9273 8010-00-926-1488 8010-00-926-1489	Paint Remover MIL-R-81294 (CAGE 81349)	pt 5 gal 55 gal
*231	8010-00-515-2258	Paint Remover TT-R-248 (CAGE 81348)	5 gal
231A	8010-01-485-2312	Paint Remover PR-3133 (CAGE 5HCF1)	1 gal
232	8010-00-558-7026	Paint Thinner A-A-2904 (CAGE 58536)	5 gal
*233	3680-00-237-3457	Parting Compound 225 (CAGE 22401)	cn
233A	9150-00-223-4119	Penetrating Oil VV-P-216 (CAGE 81348)	ea
*234	9150-00-250-0926	Petrolatum VV-P-236 (CAGE 81348)	1.75 lbs
234A	9330-01-196-5436	Plastic Sheet A4000 (CAGE 53912)	rl
235	9330-00-260-3800	Plastic Sheet M24768/16-S-14 (CAGE 81349)	sh
235A	9330-01-473-7822	Plastic Sheet 51789/52006 (CAGE 0NMM3)	sh
236		Deleted (Refer to Item 237B)	

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
236A	9330-01-182-2750 9330-01-341-7812 9339-01-358-7526	Plastic Sheet CADCO 0731 (CAGE 12626) KGOC20543S (CAGE 7Z980) A-A-2848 (CAGE 58536)	rl rl sh
237	9330-00-169-6407	Plastic Strip 8561 (CAGE 52152)	rl
237A	9330-01-208-1025	Plastic Strip Artus -.015 Pink-5x20 (CAGE 96013)	ea
237B	9330-00-982-5707	Plastic, Polyvinyl Sheet MIL-P-78 (CAGE 81349)	sh
238		Deleted (Refer to Item 211A)	
239		Deleted (Refer to Item 258A)	
*240	8010-01-131-6255	Polyurethane Coating MIL-C-46168 (CAGE 81349)	kt
*240A	8010-01-265-9127	Polyurethane Coating MIL-PRF-85285 (CAGE 81349)	kt
240B	8010-01-057-3599	Polyurethane Coating 23-T3-103 (CAGE OKXA5)	kt
*241	8010-00-181-8281	Polyurethane Coating MIL-C-83286 (CAGE 81349)	kt
241A	9320-01-247-7735	Polyurethane Tape, Abrasion Resistant SS9538-002 (CAGE 78286)	rl
241B		Polyurethane Tape, Abrasion Resistant SS9538-007 (CAGE 78286)	rl
241C	9330-01-202-8903	Polyurethane Tape WX-1206 (CAGE 61748)	rl

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
241D	8010-01-131-9195	Polyurethane Coating MIL-C-83286 (CAGE 81349)	kt
242	7510-01-326-1568	Pressure Sensitive Adhesive Tape 8663-SS-1-4 (CAGE 52152)	rl
243	9330-01-326-1821	Pressure Sensitive Adhesive Tape 8663-SS-1-8 (CAGE 52152)	rl
243A	9330-01-338-9994	Pressure Sensitive Adhesive Tape 8681HS (CAGE 52152)	rl
244	7510-01-326-1567	Pressure Sensitive Adhesive Tape 8663-2 (CAGE 52152)	rl
244A		Deleted (Refer to Item 241C)	
244B	7510-01-408-9946	Pressure Sensitive Adhesive Tape Flashbreaker 2 (CAGE 53912)	rl
244C	7510-00-079-7604	Pressure Sensitive Adhesive Tape 4516 (CAGE 52152)	rl
245	7510-00-551-9826	Pressure Sensitive Adhesive Tape A-A-113 (CAGE 58536)	rl
246		Deleted (Refer to Item 251B)	
247	7510-00-290-2026	Pressure Sensitive Adhesive Tape A-A-883 (CAGE 58536)	rl
248	7510-01-032-4082	Pressure Sensitive Adhesive Tape 4508 (CAGE 52152)	rl
249	7510-00-663-0195 7510-00-663-0196	Pressure Sensitive Adhesive Tape PPP-T-60 (CAGE 81348)	yd yd
250	7510-01-158-6603	Pressure Sensitive Adhesive Tape 218 (CAGE 52152)	rl

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
250A	7510-00-079-7604	Pressure Sensitive Adhesive Tape 4516 (CAGE 52152)	rl
250B	5330-01-514-8772	Pressure Sensitive Adhesive Tape HT3000-100 (CAGE 1NPE1)	rl
250C	5330-01-513-0861	Pressure Sensitive Adhesive Tape HT3000-150 (CAGE 1NPE1)	rl
250D	5330-01-513-0876	Pressure Sensitive Adhesive Tape HT3000-200 (CAGE 1NPE1)	rl
250E	5970-01-623-9080	Pressure Sensitive Adhesive Tape 8663MB (CAGE 76381)	rl
251	7510-01-248-7514	Pressure Sensitive Adhesive Tape 5423 (CAGE 52152)	in.
251A		Pressure Sensitive Tape 5430 (CAGE 52152)	rl
251B	7510-01-200-0832	Pressure Sensitive Tape K1245 (CAGE 04963)	rl
252	4920-01-307-3169	Pressure Test Kit TO26A179-401 (CAGE 59297)	kt
253		Deleted (Refer to Item 106B)	
*254	8040-01-181-2355	Primer Accelerator No. 4 (CAGE 30676)	8 oz
255	8040-01-205-6819	Primer METLBOND 6726 (CAGE 04622)	gal
256		Deleted (Refer to Item 135A)	
*257		Deleted (Refer to Item 126B and 135)	
*258		Deleted (Refer to Item 126B and 135)	

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
258A	8010-01-371-1952	Primer Coating Aeroglaze 9924 (CAGE 30676)	3 oz
*259	8010-01-040-0947	Primer Coating No. 81 (CAGE 52152)	15 oz
259A		Deleted (Refer to Item 25A)	
260		Deleted (Refer to Item 115A)	
261	6830-01-137-7971	Refrigerant A-A-58060 (CAGE 58536)	50 lb cyl
262	6830-01-370-8756	Refrigerant HFC-134A (CAGE 2S827)	125 lb cyl
263		Refrigerant SUVA 9000, R-407C (CAGE 82348)	gal
263A	9150-01-443-9390	Refrigerant Oil Icematic SW 32 (CAGE 2R128)	gal
264	1560-01-305-7910	Repair Plug Kit 052M002-501 (CAGE 59297)	kt
264A		Deleted (Refer to Item 302C)	
264B	1560-01-305-7911	Repair Plug Kit 052M003-501 (CAGE 59297)	kt
265	8415-00-266-8677	Rubber Gloves MIL-DTL-32066 (CAGE 81349)	pr
266		Deleted (Refer to Item 264B)	
267	9320-01-154-2225	Rubber Sheet MIL-C-3133, Grade SCE 3L (CAGE 81349)	sh
267A	9320-00-580-6756	Rubber Sheet, 0.063-inch thick MIL-C-3133, Grade SBE 11L (CAGE 81349)	sh

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
267B		Rubber Sheet, 0.050-inch thick MIL-R-6855, Class 2, Grade 60 (CAGE 81349)	sh
268	9320-01-157-9070	Rubber Sheet, 0.062-inch thick MIL-R-6855, Class 2, Grade 60 (CAGE 81349)	sh
269	9320-00-241-9764	Rubber Sheet, 0.188-inch thick MIL-R-6855, Class 2, Grade 60 (CAGE 81349)	sh
269A	8305-01-163-1882	Satin Cloth 7781 (CAGE 95746)	yd
270	7920-00-934-3469	Scouring Pad LP50 (CAGE 81348)	bx
270A	7510-00-736-6407	Seal, Moisture CMC-3750 Tape B-540 (CAGE 85480)	rl
271		Deleted (Refer to Item 302A)	
271A	8030-01-014-5869	Sealing Compound 24231 (CAGE 05972)	bt
*271B	8030-01-383-4993	Sealing Compound AMS3284 (CAGE 81349)	bt
*272	8030-00-180-5931	Sealing Compound Epocast 169A-1/9615 (CAGE 99384)	kt
272A	8030-01-132-9624 8030-01-475-2444	Sealing Compound 243 (CAGE 05927)	bt
*273	8030-00-891-8358	Sealing Compound MIL-R-46082, Type 1 (CAGE 81349)	bt
*274	8030-00-181-7529	Sealing Compound MIL-R-46082, Type 2 (CAGE 81349)	bt

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*275	8030-00-433-4145	Sealing Compound MIL-S-11030, Type 3 (CAGE 81349)	ro
*276	8030-00-964-7537	Sealing Compound ASTM D5363, Grade C (CAGE 81346)	bt
*277	8030-00-081-2340	Sealing Compound ASTM D5363, Grade AA (CAGE 81346)	bt
*278	8030-00-081-2329	Sealing Compound ASTM D5363, Grade E (CAGE 81346)	bx
*279	8030-00-081-2336	Sealing Compound ASTM D5363, Grade AV (CAGE 81346)	bt
*280	8030-00-081-2335	Sealing Compound ASTM D5363, Grade B (CAGE 81346)	bt
*281	8030-00-081-2326	Sealing Compound ASTM D5363, Grade H (CAGE 81346)	bt
*282	8030-00-082-2508	Sealing Compound ASTM D5363, Grade T (CAGE 81346)	bt
*283	8030-00-081-2339	Sealing Compound ASTM D5363, Grade A (CAGE 81346)	bt
283A	8030-01-494-9650	Sealing Compound HT3326-5-50 (CAGE 1NPE1)	kt
*284	8030-00-664-4019	Sealing Compound MIL-S-4383 (CAGE 81349)	pt
*285	8030-00-111-2762	Sealing Compound MIL-S-46163, Type III, Grade R (CAGE 81349)	bt
*286	8030-00-111-2763	Sealing Compound MIL-S-46163, Type III, Grade R (CAGE 81349)	bx

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
286A	8030-01-069-3046	Sealing Compound MIL-S-46163, Type II, Grade M (CAGE 81349)	bt
*287	8030-01-192-2807	Sealing Compound MIL-PRF-81733 (CAGE 81349)	kt
*288	8030-00-008-7204	Sealing Compound MIL-PRF-81733, Type 3-1 (CAGE 81349)	kt
289	8030-00-174-2597	Sealing Compound MIL-S-8516 (CAGE 81349)	kt
*290	8030-00-152-0021	Sealing Compound MIL-S-8784 (CAGE 81349)	ca
*291	8030-00-680-2041	Sealing Compound MIL-S-8784 (CAGE 81349)	kt
*292	8030-00-723-2746	Sealing Compound MIL-S-8802 (CAGE 81349)	kt
293	8030-01-044-5527	Sealing Compound 07331 (CAGE 05972)	bt
*293A	8030-01-158-6070	Sealing Compound 27131 (CAGE 05972)	bt
294	8030-00-714-3013	Sealing Compound 590 (CAGE 77464)	gal
*295	8030-01-234-2186	Sealing Compound PR1436GB-2 (CAGE 83574)	pt
*295A	8030-01-370-2161	Sealing Compound PR-1775, B-2 (CAGE 85374)	6 oz
*295B	8030-01-290-5138	Sealing Compound PR-1826, B-2 (CAGE 85374)	kt

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
*296	8030-00-753-5006	Sealing Compound PR-1440, B-2 (CAGE 83574)	kt
*296A	8030-00-753-4597	Sealing Compound PR-1440, B-1/2 (CAGE 83574)	kt
*297		Deleted (Refer to Item 73B)	
298	8030-00-599-7753	Sealing Compound 1372W (CAGE 77247)	tu
299	8030-00-148-9833	Sealing Compound 27121 (CAGE 05972)	bt
300	8030-01-393-5471	Sealing Compound CHO-Shield 2002 (CAGE 18565)	gal
301	8010-14-360-0749	Sealing Compound (MASTINOX 6856KD (1913/3601)) (CAGE F1419)	tu
*301A	8030-01-450-0381	Sealing Compound CA 1000 (CAGE 83574)	tu
302	8030-00-339-0310	Sealing Compound 69-31 (CAGE 05972)	bt
*302A	8030-00-142-9718	Sealing Compound Epocast 1652 A/B (CAGE 99384)	kt
302B	8030-00-142-9738	Sealing Compound Epocast 1310A/9226 (CAGE 99384)	kt
302C	8030-01-387-2007	Sealing Compound 68060 (CAGE 05972)	bt
302D	8030-01-494-9651	Sealing Compound TG8498-50 (CAGE 1NPE1)	ca

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
302E	8030-01-290-5136	Sealing Compound AMS3277 (CAGE 81343)	kt
303		Deleted (Refer to Item 301A)	
304		Deleted (Refer to Item 305)	
*304A		Deleted (Refer to Item 276 through 283)	
305		Deleted (Refer to Item 276 through 283)	
*306	8030-00-900-2373	Sealing Primer ASTM D 5363, Grade N (CAGE 81346)	bt
307		Deleted (Refer to Item 282)	
307A		Deleted (Refer to Item 237A)	
308		Deleted (Refer to Item 309)	
*309	6850-00-177-5094 6850-00-880-7616	Silicone Compound MIL-S-8660 (CAGE 81349)	2 oz 8 oz
310		Deleted (Refer to Item 121)	
311	5970-00-284-8468	Sleeving, Insulation MIL-I-7444 (CAGE 81349)	ft
312		Deleted (Refer to Item 313)	
313	3439-00-269-9610	Solder QQ-S-571 (CAGE 81348)	sp
313A		Deleted (Refer to Item 99B)	
314	9330-00-753-5372	Spiral Wrap R23100-1 (CAGE 50599)	ea
315	9330-00-688-7856	Spiral Wrap R23100-3 (CAGE 50599)	ft
315A	9330-00-688-7857	Spiral Wrap R23100-4 (CAGE 50599)	ft

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
315B	9330-00-074-0963	Spiral Wrap R23100-5 (CAGE 50599)	ft
315C	7340-00-753-5565	Stirring Stick, Beverage A-A-1081 (CAGE 58536)	ea
315D	5970-01-381-7180	Spiral Wrap SW31 BK005 (CAGE 92194)	ft
316		Deleted (Refer to Item 231)	
316A	8030-00-889-3535	Tape, Antiseize A-A-58092 (CAGE 58536)	ea
317		Deleted (Refer to Item 282)	4 oz
317A	8510-00-170-5469	Talcum Powder U-T-30 (CAGE 81348)	16 oz
317B	4020-00-900-0986	Tape, Lacing and Tying A-A-52080 (CAGE 58536)	rl
317C	4020-01-179-1949	Tape SS7057-2 (CAGE 78286)	ft
318		Deleted (Refer to Item 319B)	
318A	9320-01-247-7735	Tape, Anti-Chafe 8671 (CAGE 52152)	rl
318B	5640-00-103-2254	Tape, Duct A-A-2231 (CAGE 58536)	rl
319	5970-00-723-5413	Tape, Insulation HM 350 (CAGE 71643)	rl
319A		Tape, Insulation 1300891 (CAGE 04813)	lb
319B	5970-00-883-1161	Tape, Insulation A2005 (CAGE 71643)	rl

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
320	5970-00-186-6627	Tape, Insulation 7001 (CAGE 88301)	rl
320A	5970-00-955-9976	Tape, Insulation, Electrical MS70T09-S (CAGE 07099)	rl
321		Deleted (Refer to Item 317B)	
321A		Deleted (Refer to Item 317C)	
322	9390-01-334-4357	Tape, Reflective 7610 (CAGE 52170)	rl
322A		Teflon Urethane Coating 23-73-90 (CAGE 17564)	kt
322B	6515-01-504-9326	Tape, Teflon 25629LT (CAGE 5X927)	rl
323	6685-01-177-2764	Temp Indicator Card 4B-225 (CAGE 82682)	pkg
324	6810-00-819-1128	Tetrachloroethylene ASTM D 4376 (CAGE 81346)	5 gal
324A	8010-01-097-5253	Thinner 9958 (CAGE 30676)	1 gal
324B	8010-00-165-6760	Thinner, Acrylic MIL-T-81722, Type III (CAGE 81349)	1 gal
325	8310-00-204-3749	Thread V-T-295, Type 1, Class A (CAGE 81348)	tu
326	8310-00-530-1182	Thread A-A-52094 (CAGE 58536)	yd
327	8310-01-341-2715	Thread, Break-A-Way MIL-T-43624 Jewel Red 16/4 (CAGE 81349)	rl

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
328	5975-00-984-6582	Tiedown Strap MS3367-1-0 (CAGE 81343)	100 pkg
329	5975-00-074-2072	Tiedown Strap MS3367-1-9 (CAGE 81343)	100 pkg
330	5975-00-899-4606	Tiedown Strap MS3367-2-0 (CAGE 81343)	100 pkg
331	5975-00-156-3253	Tiedown Strap MS3367-2-9 (CAGE 81343)	100 pkg
332	5975-00-985-6630	Tiedown Strap MS3367-3-0 (CAGE 81343)	100 pkg
333	5975-00-451-5001	Tiedown Strap MS3367-3-9 (CAGE 81343)	100 pkg
334	5975-00-903-2284	Tiedown Strap MS3367-4-0 (CAGE 81343)	100 pkg
334A	5975-00-727-5153	Tiedown Strap MS3367-4-9 (CAGE 81343)	100 pkg
335	5975-00-111-3208	Tiedown Strap MS3367-5-9 (CAGE 81343)	100 pkg
336	5975-01-048-2922	Tiedown Strap MS3367-6-0 (CAGE 81343)	100 pkg
337	5975-00-133-8696	Tiedown Strap MS3367-6-9 (CAGE 81343)	100 pkg
338	5975-00-570-9598	Tiedown Strap MS3367-7-9 (CAGE 81343)	100 pkg
*339	6810-00-579-8431 6810-00-281-2002	Toluene A-A-59107 (CAGE 58536)	qt gal

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

(1) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION	(4) (U/M)/(U/I)
340		Deleted (Refer to Item 155A)	
340A	6810-00-141-6078	Tribasic Sodium Phosphate O-S-642 (CAGE 81348)	1 lb
*341	6810-00-476-5612	Trichloroethane 1,1,1 MIL-T-81533 (CAGE 81349)	cn
*342	6810-00-930-6311	Trichloroethane 1,1,1 ASTM D 4126 (CAGE 81346)	12 oz
343	6810-00-678-4418	Trichloroethylene, Technical ASTM D 4080 (CAGE 81346)	55 gal
344	4720-01-145-6685	Tubing, Nonmetallic Tygothane 3/8-inch ID (CAGE 34384)	ft
344A	4710-01-087-1629	Tubing, Nonmetallic 4710-EG-000-3 (CAGE 81996)	ft
345		Deleted (Refer to Item 141B)	
345A		Vacuum Bagging Film SL800 (CAGE 53912)	rl
346		Deleted (Refer to Item 137A)	
347		Deleted (Refer to Item 137B)	
347A		Deleted (Refer to Item 137C)	
347B	8315-01-331-4506	Velcro Strap SJ3401-200/3.00 (CAGE 52152)	yd
348	8030-00-267-1583	Walkway Compound A-A-59166 (CAGE 58536)	gal
349		Deleted (Refer to Item 315C)	
NOTE: When using lubricating oil for servicing engine only, refer to General Electric SEI-671 manual for approved oils.			

* Read the associated hazardous material warning for this item. Warnings are called out in Paragraph D-1.3 of this Appendix.

APPENDIX E

STORAGE OF AIRCRAFT

APPENDIX OVERVIEW

PARAGRAPH	TITLE	PAGE
E-1	INTRODUCTION AND SCOPE	E-2
E-2	FLYABLE, SHORT-TERM, AND INTERMEDIATE STORAGE	E-3
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E-5	PREPARING HELICOPTER FOR INTERMEDIATE STORAGE	E-13
E-6	PUTTING HELICOPTER INTO SERVICE AFTER FLYABLE STORAGE	E-19
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E-8	PUTTING HELICOPTER INTO SERVICE AFTER INTERMEDIATE STORAGE	E-26

E-1 INTRODUCTION AND SCOPE.

E-1.1 Introduction.

This task contains instructions for storage of helicopter and activation after storage. Storage of helicopter includes corrosion control, which consists primarily of using preservatives to prevent moisture from contacting exposed metal surfaces. There are two main types of corrosion, direct chemical and electrochemical, each is defined as follows:

(1) Direct chemical corrosion: Occurs when chemicals in the atmosphere cause metal surfaces to erode or etch.

(2) Electrochemical corrosion: Occurs when adjacent surfaces of dissimilar metals become electrolytic cells in the presence of moisture.

Preservation procedures are based on the principle that clean, moisture-free surfaces will not corrode. Preservation of the helicopter consists of cleaning the exposed metal surfaces and providing a barrier between the surfaces and the moisture-laden atmosphere.

E-1.2 Environmental Conditions.

- a. The weather must be taken into account when a helicopter is to be placed in storage. The category of storage selected will determine the amount of ground operation, motoring of engines, and other required maintenance for which men and materials are needed. Wet weather conditions create corrosion, rot, mildew, and mold. To prevent environmental conditions from damaging equipment, perform inspections regularly and take proper preventive maintenance action.

- b. The following practices should be used as a guide during exceptionally wet weather conditions:

- (1) Prevent rot, mildew, and mold by keeping fabrics, rubber, and other susceptible materials as dry as possible. Keep fabric material in the helicopter clean.
- (2) Treat all visible corrosion.
- (3) Wash helicopter often.
- (4) Lubricate moving parts when helicopter is exposed to salt-laden air or mud.
- (5) Open all drain holes to make sure water drains properly.
- (6) If fuel cells are not preserved, keep fuel cells full to prevent condensation in cells.

E-1.3 Categories of Storage.

The information in this task does not cover when or why helicopters are stored and activated, only how this is done. The instructions in this task cover three types of helicopter storage. The three types and their duration are:

FLYABLE STORAGE	NO TIME LIMIT
SHORT-TERM STORAGE	1 TO 45 DAYS
INTERMEDIATE STORAGE	46 TO 180 DAYS

E-2 FLYABLE, SHORT-TERM, AND INTERMEDIATE STORAGE.

PARAGRAPH BREAKDOWN

		PAGE			PAGE
E-2.1	General Procedures	E-3	E-2.2	Inspection During Storage	E-3

INITIAL SETUP

Tools

- Aircraft Mechanic’s Toolkit
- Fan
- Thermometer

References

- MIL-STD-794
- PARA 1-3-3

- PARA 1-3-5
- PARA 1-5-1 through PARA 1-5-13
- PARA 1-6-2
- PARA 1-6-4
- PARA 1-6-6
- SEI 671

E-2.1 General Procedures.

- Use the following procedures whenever a helicopter is placed in a flyable, short-term, or intermediate storage:
- a. Tow helicopter (PARA 1-6-2).
 - b. Park helicopter (PARA 1-6-6).
 - c. Observe fire regulations for helicopters parked outside.
 - d. Tie down helicopter (PARA 1-6-4).
 - e. Lubricate helicopter before placing it in storage (PARA 1-5-1 through PARA 1-5-13).
 - f. Protect engines from corrosion resulting from dirt, moisture, and disuse (SEI 671).
 - g. Cover and protect elastomeric bearings from sunlight.

E-2.2 Inspection During Storage.

- The local maintenance officer is responsible for maintaining proper helicopter ventilation and preservation; maintaining helicopter drain valves in operable condition and free from obstructions (open drain valves for the duration of the storage period); providing drains in protective covers at locations where water collects; and for establishing an inspection program for stored helicopters. Inspect as follows:
- a. Determine peak interior helicopter temperatures during hot weather conditions as follows:
 - (1) Hang standard thermometers temporarily in helicopter.
 - (2) Record interior temperatures at 30-minute intervals during hottest part of day.

NOTE

If normal ventilating methods are not enough, provide fan ventilation.

- (3) If interior temperatures go over 160°F (71°C), ventilate helicopter.

- b. Periodically inspect helicopter for corrosion. Frequency of inspection will be determined by local commander based on humidity, temperature, atmospheric conditions, and storage conditions. When found, treat corrosion as required.
- c. Inspect tiedown devices (ground wire, wheel chocks, mooring ropes, rods, and eyes) at regular intervals for bending and signs of wear. Inspect tiedown devices immediately after helicopter has been subjected to winds over 40 mph. If any tiedown device is bent or show signs of wear, replace tiedown device.

- d. Inspect protective covers for proper drainage. If cover(s) are damaged or worn, replace cover.
- e. Inspect communication equipment for fungus and corrosion. If fungus or corrosion is found, perform the following:

NOTE

Do not remove or package antennas.

- (1) Remove, repair, and package communication equipment that is deteriorating (MIL-STD-794).
- (2) Store packaged equipment in helicopter from which it was removed.
- f. Inspect tires for at least 75% normal tire pressure during storage period. If tire pressure is below 75%, service landing gear tire(s) (PARA 1-3-3 or PARA 1-3-5).

E-3 PREPARING HELICOPTER FOR FLYABLE STORAGE.

PARAGRAPH BREAKDOWN

		PAGE			PAGE
E-3.1	Inspection Before Flyable Storage	E-6	E-3.7	Fuel Cells	E-6
E-3.2	Engines	E-6	E-3.8	Electrical System	E-6
E-3.3	Auxiliary Power Unit	E-6	E-3.9	Landing Gear	E-6
E-3.4	Hydraulic Systems	E-6	E-3.10	Airframe	E-7
E-3.5	Main Rotor Head	E-6	E-3.11	Flight Controls	E-7
E-3.6	Gear Boxes	E-6	E-3.12	Inspection During Flyable Storage	E-7

INITIAL SETUP

Tools

- Aircraft Mechanic’s Toolkit

Materials/Parts

- Barrier Material, Item 80, Appendix D
- Dry-Cleaning Solvent, Item 124, Appendix D
- Hydraulic Fluid, Item 154, Appendix D
- Hydraulic Fluid, Item 155, Appendix D
- Machinery Towel, Item 211, Appendix D
- Pressure Sensitive Adhesive Tape, Item 245, Appendix D

References

- Appendix D
- PARA E-2.2
- PARA 1-3-2

- PARA 1-3-3
- PARA 1-3-4
- PARA 1-3-5
- PARA 1-3-8
- PARA 1-3-9
- PARA 1-3-12
- PARA 1-3-13
- PARA 1-3-14
- PARA 1-3-15
- PARA 1-3-18
- PARA 1-6-5
- PARA 9-4-33
- SEI 671
- TM 1-70-36-MTF
- TM 1-70-36-10

E-3.1 Inspection Before Flyable Storage.**NOTE**

Helicopters in flyable storage will be kept in a serviceable condition.

- a. Install static ground wire.
- b. Perform 10-hour engine inspection (SEI 671).
- c. Enter in helicopter logbook. Include date and type of storage.

E-3.2 Engines.

- a. Preserve engines per short-term storage criteria (SEI 671).
- b. Install engine exhaust plugs (PARA 1-6-5).
- c. Install engine inlet plugs (PARA 1-6-5).

E-3.3 Auxiliary Power Unit.

- a. Check and service APU (PARA 1-3-9).
- b. Start and operate APU for 10 to 15 minutes (TM 1-70-36-10).
- c. Install APU exhaust plug (PARA 1-6-5).
- d. Seal APU inlet with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape, Item 245, Appendix D.

E-3.4 Hydraulic Systems.

- a. Service hydraulic systems (PARA 1-3-8).
- b. Check accumulators for required pressure (PARA 1-3-8).

E-3.5 Main Rotor Head.

- a. Check damper indicators on dampers for proper fluid level (PARA 1-3-15).
- b. If necessary, service dampers (PARA 1-3-15).

E-3.6 Gear Boxes.

Check, and if necessary, service main transmission (PARA 1-3-12), intermediate gear box (PARA 1-3-

13), and tail gear box (PARA 1-3-14) to proper oil level.

E-3.7 Fuel Cells.

- a. Drain any water from fuel cells before adding fuel.

NOTE

Keep fuel cells at full level for duration of storage.

- b. Refuel main fuel cells (PARA 1-3-18).

E-3.8 Electrical System.

- a. Disconnect electrical connector, P140, from battery (PARA 9-4-33).
- b. Disconnect electrical connector, P141, from battery and connect to dummy electrical connector on battery relay junction box (PARA 9-4-33).
- c. Wrap battery electrical connector with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape, Item 245, Appendix D.

NOTE

Remove battery from helicopter when ambient temperature is below -40°F (-40°C). Store battery in heated building.

- d. If required, remove battery (PARA 9-4-33).

E-3.9 Landing Gear.

- a. Maintain normal tire pressure (PARA 1-3-3 and PARA 1-3-5).
- b. Maintain normal shock strut extension (PARA 1-3-2 and PARA 1-3-4).
- c. Clean polished chrome surfaces on exposed pistons using machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.
- d. Coat cleaned piston surfaces with hydraulic fluid, Item 154 or Item 155, Appendix D.

E-3.10 Airframe.

- a. Close doors and windows unless ventilation is required.
- b. Cover all fuselage openings to keep water, dust, or other foreign matter out.

NOTE

Engine inspection is required every 14 days.

- c. Perform 14-day engine inspection (SEI 671).

E-3.11 Flight Controls.

Release friction lock on pilot's collective stick.

NOTE

- Make sure main and tail rotor blades are turned during engine run up.

E-3.12 Inspection During Flyable Storage.

- a. Inspect using local directives.
- b. Inspect helicopter (PARA E-2.2).

- Engine run up is required every 14 days.
- d. Run up engine every 14 days (TM 1-70-36-MTF).

E-4 PREPARING HELICOPTER FOR SHORT-TERM STORAGE.

PARAGRAPH BREAKDOWN

		PAGE			PAGE
E-4.1	Inspection Before Short-Term Storage	E-9	E-4.9	Fuel Cells	E-11
E-4.2	Engines	E-9	E-4.10	Electrical System	E-11
E-4.3	Auxiliary Power Unit	E-9	E-4.11	Instruments	E-11
E-4.4	Hydraulic Systems	E-10	E-4.12	Avionics	E-11
E-4.5	Gear Boxes	E-10	E-4.13	Landing Gear	E-11
E-4.6	Main Rotor Blades	E-10	E-4.14	Airframe	E-12
E-4.7	Main Rotor Head	E-11	E-4.15	Flight Controls	E-12
E-4.8	Tail Rotor	E-11	E-4.16	Inspection During Short-Term Storage	E-12

INITIAL SETUP

Tools

- Aircraft Mechanic's Toolkit
- Protection, Eye

Materials/Parts

- Barrier Material, Item 80, Appendix D
- Condition Tag, Green
- Corrosion Preventive Compound, Item 112, Appendix D
- Dry-Cleaning Solvent, Item 124, Appendix D
- Hydraulic Fluid, Item 154, Appendix D
- Hydraulic Fluid, Item 155, Appendix D
- Lubricating Oil, Item 207, Appendix D
- Machinery Towel, Item 211, Appendix D

- Nitrogen, Item 221, Appendix D

- Pressure Sensitive Adhesive Tape, Item 245, Appendix D

- Rags

References

- Appendix D
- PARA E-2.2
- PARA 1-3-2
- PARA 1-3-3
- PARA 1-3-4
- PARA 1-3-5
- PARA 1-3-8
- PARA 1-3-9
- PARA 1-3-10

- PARA 1-3-12
- PARA 1-3-13
- PARA 1-3-14
- PARA 1-3-15
- PARA 1-4-1
- PARA 1-6-4
- PARA 1-6-5
- PARA 1-6-7
- PARA 9-4-33
- SEI 671
- TM 1-70-36-PMS-1
- TM 11-70-36-23

E-4.1 Inspection Before Short-Term Storage.

NOTE

Helicopters in short-term storage will be kept in a serviceable condition.

- a. Install static ground wire.
- b. Perform 10 hour/14 day inspection (TM 1-70-36-PMS-1).
- c. Enter in helicopter logbook. Include date, type of storage, and removed or disconnected components.

E-4.2 Engines.

- a. Preserve engines (SEI 671).
- b. Install engine exhaust plugs (PARA 1-6-5).
- c. Install engine inlet plugs (PARA 1-6-5).

E-4.3 Auxiliary Power Unit.

- a. Check and service APU oil tank to FULL (PARA 1-3-9).
- b. Disconnect electrical connector from ignition exciter.
- c. Insulate electrical connector.
- d. Disconnect fuel line from fuel manifold.
- e. Disconnect fuel line from start fuel injector.

WARNING

Injury to personnel will result if precautions are not taken while using compressed air. Compressed air will propel debris from hoses and tubes. Point hoses and tubes in a safe direction before blowing compressed air. Do not point hose towards personnel when blowing compressed air through hose. Make sure all personnel are wearing safety glasses when compressed air is being used.

- f. Blow out remaining fuel from fuel manifold and start fuel injector. Use dry, compressed air or bottled nitrogen, Item 221, Appendix D, at 30 psi.
- g. Place rags under disconnected lines to catch fuel and oil.
- h. Disconnect fuel line from fuel inlet filter.
- i. Connect gravity-feed supply of lubricating oil, Item 207, Appendix D, to filter fitting.
- j. Place APU switch to START and motor APU until APU automatically shuts down.
- k. Recharge accumulator, using external power or APU handpump (PARA 1-3-10).
- l. Repeat motoring until oil flows through fuel control and out of drain.
- m. Disconnect oil supply.

- n. Motor APU to remove any residual preservative oil from fuel system.
- o. Recharge accumulator (PARA 1-3-10).
- p. Disconnect drain lines.
- q. Connect fuel line to fuel inlet filter.
- r. Connect fuel line to fuel manifold.
- s. Connect fuel line to start fuel injector.
- t. Connect electrical connector to ignition exciter.
- u. Place a green condition tag on the APU engine stating: "APU FUEL SYSTEM PRESERVED WITH LUBRICATING OIL, MIL-PRF-6081. FLUSHING REQUIRED BEFORE STARTING."
- w. Dry APU with machinery towel, Item 211, Appendix D, and blow dry with compressed air.
- x. Install APU exhaust plug (PARA 1-6-5).
- y. Seal APU inlet with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape, Item 245, Appendix D.

CAUTION

Damage to components may result if dry-cleaning solvent is allowed to come in contact with surfaces. Do not allow dry-cleaning solvent to come in contact with wire insulation, rubber, or gasket material surfaces. These surfaces may be damaged by dry-cleaning solvent.

- v. Clean APU external surfaces with machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.

WARNING

Injury to personnel will result if precautions are not taken while using compressed air. Compressed air will propel debris from hoses and tubes. Point hoses and tubes in a safe direction before blowing compressed air. Do not point hose towards personnel when blowing compressed air through hose. Make sure all personnel are wearing safety glasses when compressed air is being used.

E-4.4 Hydraulic Systems.

- a. Service hydraulic systems (PARA 1-3-8).
- b. Check accumulator for proper charge (PARA 1-3-8).
- c. Clean exposed pistons of all servos with machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.
- d. Coat all cleaned pistons with hydraulic fluid, Item 154, Appendix D.

E-4.5 Gear Boxes.

CAUTION

Damage to equipment will result if tail gear box is filled past the normal service level. Do not fill tail gear box past normal service level, beyond bull's eye on sight plug. Gear box oil from over servicing during storage can penetrate the bearing seal of pitch change shaft grease packed bearing. The presence of grease in pitch change shaft bearing is necessary for proper function.

- a. Check, and if necessary, service main transmission (PARA 1-3-12), intermediate gear box (PARA 1-3-13), and tail gear box (PARA 1-3-14) to proper oil level.
- b. Coat exposed surfaces of drive train parts with corrosion preventive compound, Item 112, Appendix D.

E-4.6 Main Rotor Blades.

If necessary, fold main rotor blades (PARA 1-6-7).

E-4.7 Main Rotor Head.

- a. Check damper indicators on dampers for proper fluid level (PARA 1-3-15).
- b. If necessary, service dampers (PARA 1-3-15).



Damage to components may result if corrosion preventative compound is allowed to come in contact with surfaces. Do not allow corrosion preventative compound to come in contact with bearings or rubber boots. Surfaces may be damaged by corrosion preventative compound.

- c. Coat exposed surfaces with corrosion preventative compound, Item 112, Appendix D.
- d. Cover elastomeric bearings with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape Item 245, Appendix D, to protect from sunlight.

E-4.8 Tail Rotor.

- a. Coat exposed metal surfaces with corrosion preventive compound, Item 112, Appendix D.
- b. Cover hub, pitch control rods, and tail gear box output shaft with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape Item 245, Appendix D.

E-4.9 Fuel Cells.

- a. Helicopter will be stored with fuel cells at full level for duration of storage.
- b. Drain any water from fuel cells before adding fuel.

E-4.10 Electrical System.

- a. Disconnect electrical connector, P140, from battery (PARA 9-4-33).
- b. Disconnect electrical connector, P141, from battery and connect to dummy electrical con-

necting on battery relay junction box (PARA 9-4-33).

- c. Wrap battery electrical connector with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape, Item 245, Appendix D.

NOTE

Remove battery from helicopter when ambient temperature is below -40°F (-40°C). Store battery in heated building.

- d. If required, remove battery (PARA 9-4-33).

E-4.11 Instruments.

- a. Clean pitot tube with dry-cleaning solvent, Item 124, Appendix D.
- b. Install pitot tube cover (PARA 1-6-5).

E-4.12 Avionics.

NOTE

Do not remove unclassified avionics from helicopter unless malfunctions exist. Repaired avionics must be installed immediately upon return from the repair shop.

- a. Remove, protect, and return classified avionics equipment to proper storage facility as noted in applicable directives.
- b. Remove 9-volt battery from Doppler computer display unit (TM 11-70-36-23).

E-4.13 Landing Gear.

- a. Maintain normal tire pressure (PARA 1-3-3 and PARA 1-3-5).
- b. Maintain normal shock strut extension (PARA 1-3-2 and PARA 1-3-4).
- c. Clean polished chrome surfaces on exposed pistons using machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.

- d. Coat cleaned piston surfaces with hydraulic fluid, Item 154 or Item 155, Appendix D.
- e. Cover tires with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape, Item 245, Appendix D.

E-4.14 Airframe.

- a. Clean interior and exterior fuselage surfaces (PARA 1-4-1).
- b. Close doors and windows unless ventilation is required.

- c. Cover all fuselage openings to keep out water, dust, or other foreign matter.
- d. Moor helicopter (PARA 1-6-4).

E-4.15 Flight Controls.

Release friction lock on pilot's collective stick.

E-4.16 Inspection During Short-Term Storage.

- a. Inspect using local directives.
- b. Inspect helicopter (PARA E-2.2).

E-5 PREPARING HELICOPTER FOR INTERMEDIATE STORAGE.

PARAGRAPH BREAKDOWN

PAGE			PAGE		
E-5.1	Inspection Before Intermediate Storage	E-14	E-5.10	Electrical System	E-17
E-5.2	Engines	E-14	E-5.11	Instruments	E-17
E-5.3	Auxiliary Power Unit	E-14	E-5.12	Avionics	E-17
E-5.4	Hydraulic Systems	E-15	E-5.13	Landing Gear	E-17
E-5.5	Gear Boxes	E-16	E-5.14	Utility Items	E-17
E-5.6	Main Rotor Blades	E-16	E-5.15	Airframe	E-18
E-5.7	Main Rotor Head	E-16	E-5.16	Flight Controls	E-18
E-5.8	Tail Rotor	E-16	E-5.17	Inspection During Intermediate Storage	E-18
E-5.9	Fuel Cells	E-17			

INITIAL SETUP

Tools

- Aircraft Mechanic’s Toolkit
- Main Rotor Blade Shipping Container
- Protection, Eye
- Tail Rotor Blade Shipping Container

Materials/Parts

- Barrier Material, Item 80, Appendix D
- Condition Tag, Green
- Corrosion Preventive Compound, Item 112, Appendix D
- Dry-Cleaning Solvent, Item 124, Appendix D
- Hydraulic Fluid, Item 154, Appendix D

- Hydraulic Fluid, Item 155, Appendix D
- Lubricating Oil, Item 207, Appendix D
- Machinery Towel, Item 211, Appendix D
- Nitrogen, Item 221, Appendix D
- Pressure Sensitive Adhesive Tape, Item 245, Appendix D
- Rags
- Tags

References

- Appendix D
- PARA E-2.2
- PARA 1-3-2
- PARA 1-3-3

- PARA 1-3-4
- PARA 1-3-5
- PARA 1-3-8
- PARA 1-3-9
- PARA 1-3-10
- PARA 1-3-12
- PARA 1-3-13
- PARA 1-3-14
- PARA 1-3-15
- PARA 1-4-1
- PARA 1-4-5
- PARA 1-6-4
- PARA 1-6-5
- PARA 5-4-28
- PARA 5-4-35
- PARA 8-4-26
- PARA 9-4-33
- PARA 10-4-40
- PARA 17-4-1
- PARA 17-4-2
- SEI 671
- TM 1-70-36-PMS-1
- TM 11-70-36-23

E-5.1 Inspection Before Intermediate Storage.

NOTE

Helicopters in intermediate storage will be kept in a serviceable condition.

- a. Install static ground wire.
- b. Perform 10 hour/14 day inspection (TM 1-70-36-PMS-1).
- c. Enter in helicopter logbook. Include date, type of storage, and removed or disconnected components.

E-5.2 Engines.

- a. Preserve engines (SEI 671).

- b. Install engine exhaust plugs (PARA 1-6-5).
- c. Install engine inlet plugs (PARA 1-6-5).

E-5.3 Auxiliary Power Unit.

- a. Check and service APU oil tank to FULL (PARA 1-3-9).
- b. Disconnect electrical connector from ignition exciter.
- c. Insulate electrical connector.
- d. Disconnect fuel line from fuel manifold.
- e. Disconnect fuel line from start fuel injector.

WARNING

Injury to personnel will result if precautions are not taken while using compressed air. Compressed air will propel debris from hoses and tubes. Point hoses and tubes in a safe direction before blowing compressed air. Do not point hose towards personnel when blowing compressed air through hose. Make sure all personnel are wearing safety glasses when compressed air is being used.

- f. Blow out remaining fuel from fuel manifold and start fuel injector. Use dry, compressed air or bottled nitrogen, Item 221, Appendix D, at 30 psi.
- g. Place rags under disconnected lines to catch fuel and oil.
- h. Disconnect fuel line from fuel inlet filter.
- i. Connect gravity-feed supply of lubricating oil, Item 207, Appendix D, to filter fitting.
- j. Place APU switch to START and motor APU until APU automatically shuts down.
- k. Recharge accumulator, using external power or APU handpump (PARA 1-3-10).
- l. Repeat motoring until oil flows through fuel control and out of drain.
- m. Disconnect oil supply.
- n. Motor APU to remove any residual preservative oil from fuel system.
- o. Recharge accumulator (PARA 1-3-10).
- p. Disconnect drain lines.
- q. Connect fuel line to fuel inlet filter.
- r. Connect fuel line to fuel manifold.
- s. Connect fuel line to start fuel injector.

- t. Connect electrical connector to ignition exciter.
- u. Place a green condition tag on the APU engine stating: "APU FUEL SYSTEM PRESERVED WITH LUBRICATING OIL, MIL-PRF-6081. FLUSHING REQUIRED BEFORE STARTING."

CAUTION

Damage to components may result if dry-cleaning solvent is allowed to come in contact with surfaces. Do not allow dry-cleaning solvent to come in contact with wire insulation, rubber, or gasket material surfaces. Surfaces may be damaged by dry-cleaning solvent.

- v. Clean APU external surfaces with machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.

WARNING

Injury to personnel will result if precautions are not taken while using compressed air. Compressed air will propel debris from hoses and tubes. Point hoses and tubes in a safe direction before blowing compressed air. Do not point hose towards personnel when blowing compressed air through hose. Make sure all personnel are wearing safety glasses when compressed air is being used.

- w. Dry APU with machinery towel, Item 211, Appendix D, then blow dry with compressed air.
- x. Install APU exhaust plug (PARA 1-6-5).
- y. Seal APU inlet with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape, Item 245, Appendix D.

E-5.4 Hydraulic Systems.

- a. Service hydraulic systems (PARA 1-3-8).

- b. Check accumulator for proper charge (PARA 1-3-8).
- c. Clean exposed pistons of all servos with machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.
- d. Coat all cleaned pistons with hydraulic fluid, Item 154 or Item 155, Appendix D.

E-5.5 Gear Boxes.

CAUTION

Damage to equipment will result if tail gear box is filled past the normal service level. Do not fill tail gear box past normal service level, beyond bull's eye on sight plug. Gear box oil from over servicing during storage can penetrate the bearing seal of pitch change shaft grease packed bearing. The presence of grease in pitch change shaft bearing is necessary for proper function.

- a. Check, and if necessary, service main transmission (PARA 1-3-12), intermediate gear box (PARA 1-3-13), and tail gear box (PARA 1-3-14) to proper oil level.
- b. Coat exposed surfaces of drive train components with corrosion preventive compound, Item 112, Appendix D.

E-5.6 Main Rotor Blades.

- a. Remove main rotor blades (PARA 5-4-28).
- b. Tag main rotor blades with helicopter serial number.
- c. Clean main rotor blade cuffs (PARA 1-4-5).
- d. Coat main rotor blade pin sockets with corrosion preventive compound, Item 112, Appendix D.
- e. Cover main rotor blade cuffs with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape, Item 245, Appendix D.

- f. Clean main rotor blades (PARA 1-4-5).
- g. Place main rotor blades in shipping containers.

E-5.7 Main Rotor Head.

- a. Check damper indicators on dampers for proper fluid level (PARA 1-3-15).
- b. If necessary, service dampers (PARA 1-3-15).

CAUTION

Damage to components may result if corrosion preventative compound is allowed to come in contact with surfaces. Do not allow corrosion preventative compound to come in contact with bearings or rubber boots. Surfaces may be damaged by corrosion preventative compound.

- c. Coat exposed surfaces with corrosion preventive compound, Item 112, Appendix D.
- d. Cover elastomeric bearings with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape, Item 245, Appendix D, to protect from sunlight.

E-5.8 Tail Rotor.

- a. Remove tail rotor blades (PARA 5-4-35).
- b. Tag and store tail rotor components (other than tail rotor blades) in cabin area.
- c. Tag tail rotor blades with helicopter serial number and place in shipping containers.
- d. Place tail rotor blades in shipping containers.
- e. Coat exposed metal surfaces of tail rotor with corrosion preventive compound, Item 112, Appendix D.
- f. Cover tail gear box output shaft with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape, Item 245, Appendix D.

E-5.9 Fuel Cells.

Helicopter will be stored with fuel cells drained and purged (PARA 10-4-40).

E-5.10 Electrical System.

- a. Disconnect electrical connector, P140, from battery (PARA 9-4-33).
- b. Disconnect electrical connector, P141, from battery and connect to dummy electrical connector on battery relay junction box (PARA 9-4-33).
- c. Wrap battery electrical connector with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape, Item 245, Appendix D.
- d. Remove battery (PARA 9-4-33). Transfer battery to battery shop or other heated building.

E-5.11 Instruments.

- a. Remove clocks (PARA 8-4-26).
- b. Attach a green condition tag on clock and store in secure facility.
- c. Clean pitot tube with dry-cleaning solvent, Item 124, Appendix D.
- d. Install pitot tube cover (PARA 1-6-5).

E-5.12 Avionics.

NOTE

Do not remove unclassified communication equipment from helicopter unless malfunctions exist. Repaired communication equipment must be installed immediately upon return from the repair shop.

- a. Remove, protect, and return classified communication equipment to proper storage facility as noted in applicable directives.
- b. Cover disconnected connectors with barrier material, Item 80, Appendix D. Secure with

pressure sensitive adhesive tape, Item 245, Appendix D.

- c. Clean antenna masts, metal mounts, brackets, and associated mechanical items. Use dry-cleaning solvent, Item 124, Appendix D.
- d. Coat cleaned surfaces. Use corrosion preventive compound, Item 112, Appendix D.
- e. If necessary, remove mechanical items showing evidence of corrosion.
- f. Remove corrosion, preserve, package, and store mechanical items with equipment from which it was removed.
- g. Remove 9-volt battery from Doppler computer display unit (TM 11-70-36-23).

E-5.13 Landing Gear.

- a. Maintain normal tire pressure (PARA 1-3-3 and PARA 1-3-5).
- b. Maintain normal shock strut extension (PARA 1-3-2 and PARA 1-3-4).
- c. Clean polished chrome surfaces on exposed pistons using machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.
- d. Coat cleaned piston surfaces with hydraulic fluid, Item 154 or Item 155, Appendix D.
- e. Cover tires with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape, Item 245, Appendix D.

E-5.14 Utility Items.

- a. Remove fire extinguishers from cockpit and cabin (PARA 17-4-1 and PARA 17-4-2).
- b. Transfer fire extinguishers to proper storage facility.
- c. Remove first aid kits (PARA 17-4-1 and PARA 17-4-2).

E-5.15 Airframe.

- a. Clean interior and exterior fuselage surfaces (PARA 1-4-1).
- b. Close doors and windows unless ventilation is required.
- c. Cover fuselage openings to keep out water, dust, or other foreign matter.
- d. Clean external surfaces of plastic windows.
- e. Dry windows and surrounding areas thoroughly.

- f. Cover windows with barrier material, Item 80, Appendix D. Secure with pressure sensitive adhesive tape, Item 245, Appendix D.
- g. Moor helicopter (PARA 1-6-4).

E-5.16 Flight Controls.

Release friction lock on pilot's collective stick.

E-5.17 Inspection During Intermediate Storage.

- a. Inspect helicopter using local directives.
- b. Inspect helicopter (PARA E-2.2).

E-6 PUTTING HELICOPTER INTO SERVICE AFTER FLYABLE STORAGE.

PARAGRAPH BREAKDOWN

			PAGE				PAGE
E-6.1	Airframe	E-20		E-6.7	Hydraulic Systems	E-20	
E-6.2	Landing Gear	E-20		E-6.8	Engines	E-20	
E-6.3	Electrical System	E-20		E-6.9	Auxiliary Power Unit	E-20	
E-6.4	Fuel Cells	E-20		E-6.10	Inspection After Activation From Flyable Storage	E-20	
E-6.5	Gear Boxes	E-20					
E-6.6	Main Rotor Head	E-20					

INITIAL SETUP

Tools

- Aircraft Mechanic’s Toolkit

Materials/Parts

- Dry-Cleaning Solvent, Item 124, Appendix D
- Hydraulic Fluid, Item 154, Appendix D
- Hydraulic Fluid, Item 155, Appendix D
- Machinery Towel, Item 211, Appendix D

References

- Appendix D
- PARA 1-3-2
- PARA 1-3-3
- PARA 1-3-4
- PARA 1-3-5

- PARA 1-3-8
- PARA 1-3-9
- PARA 1-3-12
- PARA 1-3-13
- PARA 1-3-14
- PARA 1-3-15
- PARA 1-3-17
- PARA 1-4-1
- PARA 1-6-4
- PARA 1-6-5
- PARA 9-4-33
- SEI 671
- TM 1-70-36-PMS-1
- TM 1-70-36-10

E-6.1 Airframe.

- a. Before performing operational checks, make sure all systems and components are de-pressured and serviced.
- b. Remove tiedown restraints (PARA 1-6-4).
- c. Remove protective covers and stow (PARA 1-6-5).
- d. Remove all barrier material.
- e. Clean residue left by barrier material tape with dry-cleaning solvent, Item 124, Appendix D.
- f. Clean interior and exterior fuselage surfaces (PARA 1-4-1).
- g. Open doors and windows.

E-6.2 Landing Gear.

- a. Check tires for proper inflation, condition and rotation (PARA 1-3-3 and PARA 1-3-5).
- b. Clean polished chrome surfaces on exposed pistons using machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.
- c. Coat cleaned piston surfaces with hydraulic fluid, Item 154 or Item 155, Appendix D.
- d. Service shock struts (PARA 1-3-2 and PARA 1-3-4).

E-6.3 Electrical System.

- a. If required, install battery (PARA 9-4-33).
- b. Remove tape and barrier material from battery connector.
- c. Connect electrical connector, P140, to battery (PARA 9-4-33).
- d. Connect electrical connector, P141, to battery (PARA 9-4-33).

E-6.4 Fuel Cells.

- a. Drain any water from fuel cells before adding fuel.

- b. Refuel fuel cells as required (PARA 1-3-17).

E-6.5 Gear Boxes.

Check, and if necessary, service main transmission (PARA 1-3-12), intermediate gear box (PARA 1-3-13), and tail gear box (PARA 1-3-14) to proper oil level.

E-6.6 Main Rotor Head.

- a. Check damper indicators on dampers for proper fluid level (PARA 1-3-15).
- b. If necessary, service dampers (PARA 1-3-15).

E-6.7 Hydraulic Systems.

- a. Service hydraulic systems (PARA 1-3-8).
- b. Check hydraulic accumulators for required pre-charge pressure (PARA 1-3-8).

E-6.8 Engines.

- a. Remove and stow engine inlet and exhaust plugs (PARA 1-6-5).
- b. Check and service engine (SEI 671).
- c. Clean engine external surfaces, as necessary (SEI 671).

E-6.9 Auxiliary Power Unit.

- a. Remove tape and barrier material from intake.
- b. Remove and stow APU exhaust plug (PARA 1-6-5).
- c. Check and service APU (PARA 1-3-9).
- d. Start and operate APU for 5 minutes (TM 1-70-36-10).
- e. Shut down APU (TM 1-70-36-10).

E-6.10 Inspection After Activation From Flyable Storage.

- a. Check helicopter logbook for record of components removed or disconnected. Check

- that components have been installed or connected.
- b. Check that all procedures required to activate helicopter from flyable storage have been done.
- c. Check that helicopter logbook entries have been posted.
- d. Perform 10 hour/14 day inspection (TM 1-70-36-PMS-1).

E-7 PUTTING HELICOPTER INTO SERVICE AFTER SHORT-TERM STORAGE.

PARAGRAPH BREAKDOWN

			PAGE				PAGE
E-7.1	Airframe	E-23		E-7.9	Main Rotor Blades	E-24	
E-7.2	Landing Gear	E-23		E-7.10	Gear Boxes	E-24	
E-7.3	Avionics	E-23		E-7.11	Hydraulic Systems	E-24	
E-7.4	Instruments	E-23		E-7.12	Auxiliary Power Unit	E-24	
E-7.5	Electrical System	E-23		E-7.13	Engines	E-24	
E-7.6	Fuel Cells	E-23		E-7.14	Inspection After Activation from Short-Term Storage	E-25	
E-7.7	Tail Rotor	E-23					
E-7.8	Main Rotor Head	E-24					

INITIAL SETUP

- PARA 1-3-4

Tools

- PARA 1-3-5

- Aircraft Mechanic’s Toolkit
- Container

- PARA 1-3-8
- PARA 1-3-9

Materials/Parts

- PARA 1-3-10

- Dry-Cleaning Solvent, Item 124, Appendix D
- Hydraulic Fluid, Item 154, Appendix D
- Hydraulic Fluid, Item 155, Appendix D
- Machinery Towel, Item 211, Appendix D

- PARA 1-3-12
- PARA 1-3-13
- PARA 1-3-14
- PARA 1-3-15

References

- PARA 1-3-17

- Appendix D
- PARA 1-3-2
- PARA 1-3-3

- PARA 1-4-1
- PARA 1-6-4
- PARA 1-6-5

- PARA 1-6-7
- PARA 9-4-33
- SEI 671
- TM 1-70-36-PMS-1
- TM 1-70-36-10
- TM 11-70-36-23

E-7.1 Airframe.

- a. Before performing operational checks, make sure related systems or components are de-pressured and serviced.
- b. Remove tiedown restraints (PARA 1-6-4).
- c. Remove protective covers and stow (PARA 1-6-5).
- d. Remove all barrier material from airframe and components.
- e. Clean residue left by barrier material tape with dry-cleaning solvent, Item 124, Appendix D.
- f. Clean interior and exterior fuselage surfaces (PARA 1-4-1).
- g. Open doors and windows.

E-7.2 Landing Gear.

- a. Check tires for proper inflation, condition and rotation (PARA 1-3-3 and PARA 1-3-5).
- b. Clean polished chrome surfaces on exposed pistons using machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.
- c. Coat cleaned piston surfaces with hydraulic fluid, Item 154 or Item 155, Appendix D.
- d. Service shock struts (PARA 1-3-2 and PARA 1-3-4).

E-7.3 Avionics.

- a. Requisition classified avionics equipment from supply office. Protect and install classified equipment as noted in applicable directives.

- b. Remove tags from avionics equipment.

- c. Install 9-volt battery from Doppler computer display unit (TM 11-70-36-23).

E-7.4 Instruments.

- a. Remove pitot tube protective cover and stow (PARA 1-6-5).
- b. Remove tape and barrier material sealing static and sideslip ports.
- c. Remove tape residue with dry-cleaning solvent, Item 124, Appendix D.

E-7.5 Electrical System.

- a. If required, install battery (PARA 9-4-33).
- b. Remove tape and barrier material from battery connector.
- c. Connect electrical connector, P140, to battery (PARA 9-4-33).
- d. Connect electrical connector, P141, to battery (PARA 9-4-33).

E-7.6 Fuel Cells.

- a. Drain any water from fuel cells before adding fuel.
- b. Refuel fuel cells as required (PARA 1-3-17).

E-7.7 Tail Rotor.

Clean corrosion preventive compound from tail rotor using machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.

E-7.8 Main Rotor Head.

CAUTION

Damage to components may result if dry-cleaning solvent is allowed to come in contact with surfaces. Do not allow dry-cleaning solvent to come in contact with elastomeric bearings or rubber boots. These surfaces may be damaged by dry-cleaning solvent.

- a. Clean corrosion preventive compound from main rotor head using machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.
- b. Check damper indicators on dampers for proper fluid level (PARA 1-3-15).
- c. If necessary, service dampers (PARA 1-3-15).

E-7.9 Main Rotor Blades.

If necessary, unfold main rotor blades (PARA 1-6-7).

E-7.10 Gear Boxes.

- a. Drain some oil and check main transmission for proper oil level (PARA 1-3-12).
- b. Drain some oil and check intermediate gear box (PARA 1-3-13) and tail gear box (PARA 1-3-14) for proper oil level. Discontinue draining at proper oil level.
- c. Clean corrosion preventive compound from drive train components. Use machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.

E-7.11 Hydraulic Systems.

- a. Service hydraulic systems (PARA 1-3-8).
- b. Check accumulator for proper pressure (PARA 1-3-8).
- c. Clean exposed pistons of all servos with machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.

- d. Coat all clean piston surfaces with hydraulic fluid, Item 154 or Item 155, Appendix D.

E-7.12 Auxiliary Power Unit.

- a. Remove tape and barrier material from intake.
- b. Remove and stow APU exhaust plug (PARA 1-6-5).
- c. Check and service APU (PARA 1-3-9).
- d. Disconnect fuel line from fuel manifold.
- e. Disconnect fuel line from fuel injector.
- f. Connect drain lines to disconnected fuel lines.
- g. Place end of drain lines in empty quart container.
- h. Place APU switch to START and motor APU until APU automatically shuts down.
- i. Recharge accumulator, using external power or APU handpump (PARA 1-3-10).
- j. Repeat motoring until oil-free fuel flows through fuel control and out of drain lines.
- k. Recharge accumulator to required pressure (PARA 1-3-10).
- l. Disconnect drain lines.
- m. Connect fuel line to fuel manifold.
- n. Connect fuel line to start fuel injector.
- o. Connect electrical connector to ignition exciter.
- p. Drain accumulated fuel from combustor fuel drain.
- q. Start and operate APU for 5 minutes (TM 1-70-36-10).

E-7.13 Engines.

- a. Remove and stow engine inlet and exhaust plugs (PARA 1-6-5).

- b. Depreserve engine (SEI 671).

E-7.14 Inspection After Activation from Short-Term Storage.

- a. Check helicopter logbook for record of components removed or disconnected. Check that these components have been installed or connected.
- b. Check that all procedures required to activate helicopter after short-term storage have been done.

- c. Check that all PRESERVED tags have been removed.
- d. Check that helicopter logbook entries have been posted for helicopter, engines, and APU.
- e. Perform 10 hour/14 day inspection (TM 1-70-36-PMS-1).

E-8 PUTTING HELICOPTER INTO SERVICE AFTER INTERMEDIATE STORAGE.

PARAGRAPH BREAKDOWN

			PAGE				PAGE
E-8.1	Airframe	E-27		E-8.10	Main Rotor Blades	E-28	
E-8.2	Landing Gear	E-27		E-8.11	Gear Boxes	E-28	
E-8.3	Utility Items	E-27		E-8.12	Hydraulic Systems	E-28	
E-8.4	Avionics	E-27		E-8.13	Auxiliary Power Unit	E-28	
E-8.5	Instruments	E-27		E-8.14	Engines	E-29	
E-8.6	Electrical System	E-27		E-8.15	Inspection Following Activation from Intermediate Storage	E-29	
E-8.7	Fuel Cells	E-28					
E-8.8	Tail Rotor	E-28					
E-8.9	Main Rotor Head	E-28					

INITIAL SETUP

- PARA 1-3-3

Tools

- PARA 1-3-4

- Aircraft Mechanic’s Toolkit
- Container

- PARA 1-3-5
- PARA 1-3-8

Materials/Parts

- PARA 1-3-9

- Dry-Cleaning Solvent, Item 124, Appendix D
- Hydraulic Fluid, Item 154, Appendix D
- Hydraulic Fluid, Item 155, Appendix D
- Machinery Towel, Item 211, Appendix D

- PARA 1-3-10
- PARA 1-3-12
- PARA 1-3-13
- PARA 1-3-14

References

- PARA 1-3-15

- Appendix D
- PARA 1-3-2

- PARA 1-3-17
- PARA 1-4-1

- PARA 1-6-4
- PARA 1-6-5
- PARA 5-4-28
- PARA 5-4-35
- PARA 8-4-26
- PARA 9-4-33
- PARA 17-4-1
- PARA 17-4-2
- SEI 671
- TM 1-70-36-PMS-1
- TM 1-70-36-10
- TM 11-70-36-23

E-8.1 Airframe.

- a. Before performing operational checks, make sure related systems or components are depre-served and serviced.
- b. Remove tiedown restraints (PARA 1-6-4).
- c. Remove protective covers and stow (PARA 1-6-5).
- d. Remove all barrier material from airframe and components.
- e. Clean residue left by barrier material tape with dry-cleaning solvent, Item 124, Appendix D.
- f. Clean interior and exterior fuselage surfaces (PARA 1-4-1).
- g. Open doors and windows.

E-8.2 Landing Gear.

- a. Check tires for proper inflation and condition (PARA 1-3-3 and PARA 1-3-5).
- b. Clean polished chrome surfaces on exposed pistons using machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.
- c. Coat cleaned piston surfaces with hydraulic fluid, Item 154 or Item 155, Appendix D.
- d. Service main landing gear and tail landing gear shock struts (PARA 1-3-2 and PARA 1-3-4).

E-8.3 Utility Items.

- a. Install fire extinguishers in cabin and cockpit (PARA 17-4-1 and PARA 17-4-2).
- b. Install first aid kits in cabin and cockpit (PARA 17-4-1 and PARA 17-4-2).

E-8.4 Avionics.

- a. Requisition classified communication equip-ment from supply office. Protect and install classified equipment as noted in applicable directives.
- b. Remove tags from communication equipment.
- c. Install 9-volt battery from Doppler computer display unit (TM 11-70-36-23).

E-8.5 Instruments.

- a. Remove pitot tube protective cover and stow (PARA 1-6-5).
- b. Remove tape and barrier material sealing static and sideslip ports.
- c. Remove tape residue with dry-cleaning solvent Item 124, Appendix D.
- d. Install clocks (PARA 8-4-26).

E-8.6 Electrical System.

- a. Install battery (PARA 9-4-33).
- b. Remove tape and barrier material from battery connector.

- c. Connect electrical connector, P140, to battery (PARA 9-4-33).
- d. Connect electrical connector, P141, to battery (PARA 9-4-33).

E-8.7 Fuel Cells.

- a. Prepare fuel cells for service.
- b. Refuel fuel cells (PARA 1-3-17).

E-8.8 Tail Rotor.

- a. Clean corrosion preventive compound from tail rotor using machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.
- b. Install tail rotor blades (PARA 5-4-35).

E-8.9 Main Rotor Head.

CAUTION

Damage to components may result if dry-cleaning solvent is allowed to come in contact with surfaces. Do not allow dry-cleaning solvent to come in contact with elastomeric bearings or rubber boots. These surfaces may be damaged by dry-cleaning solvent.

- a. Clean corrosion preventive compound from main rotor head using machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.
- b. Check damper indicators on dampers for proper fluid level (PARA 1-3-15).
- c. If necessary, service dampers (PARA 1-3-15).

E-8.10 Main Rotor Blades.

CAUTION

Make sure color codes on main rotor blades agree with color code on sleeves.

Install main rotor blades (PARA 5-4-28).

E-8.11 Gear Boxes.

- a. Drain some oil and check main transmission for proper oil level (PARA 1-3-12).
- b. Drain some oil and check intermediate gear box (PARA 1-3-13) and tail gear box (PARA 1-3-14) for proper oil level. Discontinue draining at proper oil level.
- c. Clean corrosion preventive compound from drive train components using machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.

E-8.12 Hydraulic Systems.

- a. Service hydraulic systems (PARA 1-3-8).
- b. Check accumulator for proper pressure (PARA 1-3-8).
- c. Clean exposed pistons of all servos with machinery towel, Item 211, Appendix D, and dry-cleaning solvent, Item 124, Appendix D.
- d. Coat all cleaned pistons with hydraulic fluid, Item 154 or Item 155, Appendix D.

E-8.13 Auxiliary Power Unit.

- a. Remove tape and barrier material from intake.
- b. Remove and store APU exhaust plug (PARA 1-6-5).
- c. Check and service APU (PARA 1-3-9).
- d. Disconnect fuel line from fuel manifold.
- e. Disconnect fuel line from start fuel injector.
- f. Connect drain lines to disconnected fuel lines.
- g. Place end of drain lines in empty quart container.
- h. Place APU switch to START and motor APU until APU automatically shuts down.

- i. Recharge accumulator, using external power or APU handpump (PARA 1-3-10).
- j. Repeat motoring until oil-free fuel flows through fuel control and out of drain lines.
- k. Recharge accumulator to required pressure (PARA 1-3-10).
- l. Disconnect drain lines.
- m. Connect fuel line to fuel manifold.
- n. Connect fuel line to start fuel injector.
- o. Connect electrical connector to ignition exciter.
- p. Drain accumulated fuel from combustor fuel drain.
- q. Start and operate APU for 5 minutes (TM 1-70-36-10).

E-8.14 Engines.

- a. Remove and stow engine inlet and exhaust plugs (PARA 1-6-5).

- b. Depreserve engine (SEI 671).

E-8.15 Inspection Following Activation from Intermediate Storage.

- a. Check helicopter logbook for record of components removed or disconnected. Check that these components have been installed or connected.
- b. Check that all procedures required to activate helicopter from intermediate storage have been done.
- c. Check that all PRESERVED tags have been removed.
- d. Check that helicopter logbook entries have been posted for helicopter, engines, and APU.
- e. Perform 10 hour/14 day inspection (TM 1-70-36-PMS-1).

Anexo IX - 12_20-01-01-302.pdf

Miscellaneous products used on helicopters

302. Use of oils

A. Miscellaneous products used on helicopters

NOTE

This work card is applicable to technical documentation that does not use CM codes for the identification of materials.

NOTE

Following the design office decision, DOD-L-85734 R (AS) type oils or NATO O-160 type oils can be used in the gear boxes of the above-mentioned aircraft as an alternative to NATO O-156 oils.

If an oil change is made on a gearbox, it is recommended to wash the gearbox as per the WC or MET for the corresponding aircraft.

Oil								
AIR standard	NATO Symbol	Specification		Characteristic-s		Manufactur-er	Commercial name	Remarks
		Us	UK	Pour point (°C)	Flash point (°C)			
3511A Ester-type synthetic oil for on-board equipment and instruments	O-147	MIL-PRF 6085E	DEF-STAN 91-49 ind 1	Less than - 66	225	NYCO	NYCOLUBE 11B	
				- 68	220	SHELL	AEROSHELL FLUID 12	
				Less than - 60	227	TOTAL	ROYCO INSTRUMENT OIL 885 (obsolete)	
				Less than - 57	225	AIR BP LUBRICANTS	BRAYCO 885	
				- 64	225	Anderol	Royco 885	
3512A Mineral oil for turbo-machines (9 cst type)	O-138		DEF-STAN 91-97 ind 1	- 32	235	NYCO	TURBONYCOIL 3512	
				- 32	230	TOTAL	921 AEROTURBINE	

Oil								
AIR standard	NATO Symbol	Specification		Characteristic-s		Manufactur-er	Commercial name	Remarks
		Us	UK	Pour point (°C)	Flash point (°C)			
Ester type oil (US origin) for turbomachines (3 CST type)	O-148	MIL-PRF 7808L GRADE 3 (1)		- 62	+ 220	Anderol	Royco 808	
				- 60	220	Eastman	Eastman TURBO OIL 2389	
				Less than - 62	235	SHELL	AEROSHELL TURBINE OIL 308	
				- 60	224	EXXON MOBIL	MOBIL AVREX S TURBO 256	
				- 60	234	EXXON MOBIL	MOBIL TURBO319A-2	**
				- 62	225	TOTAL	ROYCO TURBINE OIL 808 (obsolete)	
				- 72	225	NYCO	TURBONYCOIL 160	
Ester-type synthetic oil (US origin) for turbine aircraft (4 CST type)	O-163	MIL-PRF 7808L GRADE 4		- 57	228	EXXON MOBIL	MOBIL TURBO 284 (obsolete)	
					240	Nyco	Turbonycoil	

(1): product not recommended for French SNECMA / ATAR-type engines (refer to STANAG 1135 standard).

Oil								
AIR standard	NATO Symbol	Specification		Characteristics		Manufactur-er	Commercial name	Re-marks
		Us	UK	Pour point (°C)	Flash point (°C)			
3514A ind 2 Ester type oil (French origin) for turbomachines (3 c-st type)	O-150			Less than - 60	222	NYCO	TURBONYCOIL 13B	

Oil								
AIR standard	NATO Symbol	Specification		Characteristics		Manufacturer	Commercial name	Remarks
		Us	UK	Pour point (°C)	Flash point (°C)			
3515B ind 3 Mineral oil for turbo-machines and general use (3 cst type)	O-135		DEF S-TAN 91-99 ind 2 and 1	- 54	170	NYCO	TURBONYCOYLIL 280P	
				Less than - 45	146	SHELL	AEROSHELL TURBINE OIL 3	**
				- 45	178	TOTAL	AEROTURBINE 331	
3516A ind 2 Mineral oil for turbo-machines (2 cst type)	O-133	MIL-PRF-6081E GRADE 1010		- 60	145	EXXON MOBIL	MOBIL AVREX M TURBO 201/1010	
				- 62	300	TOTAL	ROYCO TURBINE OIL 481	
				Less than - 66	160	NYCO	TURBONYCOIL 3516	
				- 57	154	SHELL	AEROSHELL TURBINE OIL 2	
				Less than - 60	140	TOTAL	AEROTURBINE 222 (obsolete)	
				- 59	140	AIR BP LUBRICANTS	BRAYCO 460	

** : products which meet the specifications but were not submitted to Aviation Authorities for approval.

Oil								
AIR standard	NATO Sym- bol	Specification		Characteristics		Manufactur- er	Commercial name	Remark- s
		Us	UK	Pour point (°C)	Flash point (°C)			
	O-149 (5)		DEF STAN 91-98 (DER D 2487)	- 59	235	AIR BP LU- BRICANTS	BP TURBO OIL 274	(5)
Oil (5) ester type for turbomachines (7.5 cst type)				- 60	250	NYCO	TURBONYCOIL 35M	
				Less than - 54	242	SHELL	AEROSHELL TURBIN OIL 750	
3517A	O-159			Less than - 54	242	SHELL	AEROSHELL TURBINE OIL 750	** (5)
Ester type synthetic oil (5) for turbomachines (7.5 cst type)								

Oil								
AIR standard	NATO Symbol	Specification		Characteristics		Manufacturer	Commercial name	Remarks
		Us	UK	Pour point (°C)	Flash point (°C)			
DCSEA 255/A	O-155	MIL-PRF-6086	DEFS-TAN 91-112	- 30	240	NYCO	NYCOLUBE 3525	
(e.g. AIR 3525B) "Extreme pressure" mineral oil for gear lubrication		GRADE M	GRADE M	Less than - 29	204	SHELL	AEROSHELL FLUID 5MA see NOTE	
				- 36	222	TOTAL	TOTAL AEROGear 823 *	
				- 39	232	TOTAL	TOTAL AEROGear 1032 *	

* : Total Aerogear 823: the temperature must not drop below - 25°C.

* : Total Aerogear 1032: recommended for temperatures up to - 35°C.

** : products which meet the specifications but were not submitted to Aviation Authorities for approval.

(5): products under symbols O-149 and O-159 are interchangeable and can be mixed.

NOTE

This oil can be used with restrictions. Refer to the section "Limitations" of each specific flight manual.

Oil								
AIR standard	NATO Symbol	Specification		Characteristics		Manufacturer	Commercial name	Remarks
		Us	UK	Pour point (°C)	Flash point (°C)			
Mineral oil grade 65 for piston engines (e.g. AIR 3560D Grade SAE 30)	O-113 (obsolete)	J-1966 SAE GRADE 30 (supercedes MIL-L-6082E)		- 33	246	AIR BP LUBRICANTS	CASTROL AVIATOR S65	
				Less than - 20	230	SHELL	AEROSHELL OIL 65	
Mineral oil for piston engines (e.g. AIR 3560D Grade SAE 40)	O-115 (obsolete)	J-1966 SAE GRADE 40 (supercedes MIL-L-6082E)		- 24	246	AIR BP LUBRICANTS	CASTROL AVIATOR S80	**
				- 20	260	SHELL	AEROSHELL OIL 80	
				- 15	268	TOTAL	TOTAL AERO 80	

Oil								
AIR standard	NATO Symbol	Specification		Characteristics		Manufacturer	Commercial name	Remarks
		Us	UK	Pour point (°C)	Flash point (°C)			
Mineral oil for piston engines (e.g. AIR 3560D Grade SAE 50)	O-117 (obsolete)	J-1966 SAE GRADE 50 (supersedes MIL-L-6082E)		- 12	249	SHELL	AEROSHELL OIL 100	
				- 12	274	TOTAL	TOTAL AERO 100	
				- 24	246	AIR BP LUBRICANTS	CASTROL AVIATOR S100	

** : products which meet the specifications but were not submitted to Aviation Authorities for approval.

Oil								
AIR standard	NATO Symbol	Specification		Characteristics		Manufacturer	Commercial name	Remarks
		Us	UK	Pour point (°C)	Flash point (°C)			
Dispersant mineral oil 3570D grade (e.g. AIR SAE 40)	O-123 (obsolete)	J-1899 SAE GRADE 40 (Supersedes MIL-L-22851D)		- 26	246	SHELL	AEROSHELL OIL W80	
				- 30	250	EXXON MOBIL	EXXON AVIATION OIL EE80	
				- 33	272	TOTAL	TOTAL AERO D80	
				- 27	237	AIR BP	CASTROL AVIATOR AD80	
Dispersing mineral oil for piston engines (e.g. AIR 3570D Grade SAE 50)	O-125 (obsolete)	J-1899 SAE GRADE 50 (Supersedes MIL-L-22851D)		- 27	237	AIR BP LUBRICANTS	CASTROL AVIATOR AD100	
				- 23	277	SHELL	AEROSHELL OIL W100	
				- 30	278	TOTAL	TOTAL AERO D100	
				- 27	253	EXXON MOBIL	EXXON AVIATION OIL EE100	
Dispersing mineral oil for piston engines (e.g. AIR 3570D Grade SAE 60)	O-128 (obsolete)	J-1899 SAE GRADE 60 (Supersedes MIL-L-22851D)		- 27	237	CASTROL	CASTROLAERO AD120	
				- 24	259	EXXON MOBIL	EXXON AVIATION OIL EE120	
				- 21	288	SHELL	AEROSHELL OIL W120	
				- 30	292	TOTAL	TOTAL AERO D120	

Oil								
AIR standard	NATO Symbol	Specification		Characteristics		Manufacturer	Commercial name	Remarks
		Us	UK	Pour point (°C)	Flash point (°C)			
1/2 dispersant synthetic oil for piston engines grade	O-162 (obsolete)	MIL-L-22851D / SAE: J 1899		- 36	254	TOTAL	TOTAL AERO DM (15W-50)	(2) **

(2): authorized for use by DGAC, AVCO-LYCOMING, TELEDYNE-CONTINENTAL.

** : products which meet the specifications but were not submitted to Aviation Authorities for approval.

Oil								
AIR standard	NATO Symbol	Specification		Characteristics		Manufacturer	Manufacturer	Remarks
		Us	UK	Pour point (°C)	Flash point (°C)			
Fluid mineral oil for low temperature use	O-142	MIL-PRF-7870E	DEF STAN 91-47 IND 1	- 63	153	EXXON MOBIL	EXXON INSTRUMENT OIL (obsolete)	**
					Greater than 150	TOTAL	ROYCO 363	
				Less than - 60	142	AIR BP LUBRICANTS	BRAYCO 363	**
				Less than - 57	155	SHELL	AEROSHELL FLUID 3	
				Less than - 63	131	NYCO	NYCOLUBE 7870	
"Extreme pressure" oil for gears	O-153	MIL-PRF-6086 GRADE L	DEF STAN 91-112	- 48	166	NYCO	NYCOLUBE 64	

Oil								
AIR standard	NATO Symbol	Specification		Characteristics		Manufacturer	Remarks	
		Us	UK	Pour point (°C)	Flash point (°C)			
DCSEA 299/A (4) Synthetic oil for turbomachines (5 cst type) (6)	O-156	MIL-PRF-23699G GRADE STD	DEF STAN 91-101 ind 3 Amdt 1	GRADE STD (NATO O-156): standard				
				- 63	256	SHELL	AEROSHELL TURBINE OIL 529 (obsolete)	
				- 59	270	EXXON MOBIL	MOBIL JET OIL II	
				- 57	235	Eastman	Eastman TURBO OIL 2380	
				- 57	273	NYCO	TURBONYCOIL 600	
				- 59	264	TOTAL	ROYCO 500	
				- 54	262	TOTAL	AEROTURBINE 535 (obsolete)	
				- 63	256	Shell	Aeroshell turbine oil 500	

(2): authorized for use by DGAC, AVCO-LYCOMING, TELEDYNE-CONTINENTAL.

** : products which meet the specifications but were not submitted to Aviation Authorities for approval.

Oil								
AIR standard	NATO Symbol	Specification		Characteristic- s		Manufactur- er	Commercial name	Re- marks
		Us	UK	Pour point (°C)	Flash point (°C)			
DCSEA 299/A (4) Synthetic oil for tur- boma- chines (5 c- st type) (6)	O-156 O-154 O-152	MIL- PRF- 23699G GRADE HTS MIL- PRF- 23699G GRADE C/I	DEF STAN 91-101 ind 3 Amdt 1	GRADE HTS (NATO O-156/O-154): High Thermal Stability				
				- 63	274	Nyco	Turbonycoil 640	
				- 60	268	SHELL	AEROSHELL TURBINE OIL 560	
				- 62	254	EXXON MOBIL	MOBIL JET OIL 254	
				- 57	Greater than 205	Eastman	Eastman TURBO OIL 2197	
				- 58	260	TOTAL	ROYCO 560	
				GRADE C/I (NATO O-156/O-152): corrosion inhibiting				
					254	NYCO	TURBONYCOIL 601	
				- 54	246	SHELL	AEROSHELL TURBINE OIL 531 (obsolete)	

Oil								
AIR standard	NATO Symbol	Specification		Characteristic-s		Manufactur-er	Commercial name	Re-marks
		Us	UK	Pour point (°C)	Flash point (°C)			
Synthetic oil for tur-boma-chines and helicopter transmis-sion sys-tems (type 5 cst)	O-160	DOD-PRF-85734 A	DEF STAN 91-100 ind 3 Amdt 1	- 60	260	SHELL	AEROSHELL TURBINE OIL 555	
				- 60	255	Eastman	Eastman TURBO OIL 25	
				- 57	260	Anderol	Royco turbine oil 555	
				- 57	272	Nyco	Turbonycoil 699	

(1): product not recommended for French SNECMA / ATAR type engines (refer to standard AIR 0115A).

(2): authorized for use by DGAC, AVCO-LYCOMING, TELEDYNE-CONTINENTAL.

(3): oil approved by CEP Sarclay and JPX.

(4): do not mix oils of different grades.

(5): products under symbols O-149 and O-159 are interchangeable and can be mixed.

(6): do not mix oils of different grades with a same specification. However, if a mixture of different grades is accidentally produced, completely wash the lubrication system.

* : Total Aerogear 823: the temperature must not drop below - 25°C.

* : Total Aerogear 1032: recommended for temperatures up to - 35°C.

** : products which meet the specifications but were not submitted to Aviation Authorities for approval.