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MILITARY SPECIFICATION

ENGINE, GAS TURBINE, PREPARATION FOR STORAGE AND SHIPMENT OF, PROCESS FOR

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers requirements governing preparation for storage and shipment of gas turbine engines. The intent is to protect the engines from physical damage and metal corrosion.

1.2 Application. The specification will be used in conjunction with the applicable engine model specification and/or technical manuals to assure accomplishing the intent of this specification. The model specification and technical manuals will provide specific details for the particular engine. This specification applies to newly procured engines, overhauled engines, and field engines. Procuring activities, contractors, overhaul facilities and user organizations will comply with this specification.

1.3 Classification. Preservation for the applicable level of protection shall be one of the following types as described in 3.3:

a. Level A - Type I (This level is suitable for long term storage in uncontrolled environmental conditions.)

b. Level B - Type II or III (This level is suitable for short term shipping and storage under controlled environmental conditions.)

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards and handbooks. The following specifications and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation, form a part of this specification to the extent specified herein.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Oklahoma City Air Logistics Center/MMEDO, Tinker AFB OK 73145 by using the self-addressed Standardization Document Improved Proposal (DD Form 1426) appearing at the end of this document or by letter.

NO DELIVERABLE DATA REQUIRED BY THIS DOCUMENT

SPECIFICATIONS

FEDERAL

L-P-378	-	Plastic Sheet and Strip, Thin Gauge, Polyolefin
P-D-680	-	Dry Cleaning Solvent
BB-N-411	-	Nitrogen, Technical
PPP-C-795	-	Cushioning Material, Flexible, Cellular, Plastic Film for Packaging Applications
PPP-C-1797	-	Cushioning Material, Resilient, Low Density, Unicellular, Polypropylene Foam
PPP-T-60	-	Tape, Packaging, Waterproof
PPP-T-70	-	Tape, Packaging, Plastic Film

MILITARY

MIL-P-116	-	Preservation, Methods of
MIL-B-121	-	Barrier Material, Greaseproofed, Waterproofed, Flexible
MIL-P-149	-	Plastic Coating Compound, Strippable (Hot Dipping)
MIL-D-3464	-	Desiccants, Activated, Bagged, Packaging Use and Static Dehumidification
MIL-C-4339	-	Corrosion Preventive, Soluble Oil, for Water Injection Systems
MIL-C-5501	-	Cap and Plug, Protective, Dust and Moisture Seal
MIL-C-5584	-	Container, Shipping and Storage, Metal Reusable
MIL-L-6081	-	Lubricating Oil, Jet Engine
MIL-C-6529	-	Corrosion Preventive, Aircraft Engine
MIL-L-7808	-	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-C-9959	-	Container, Shipping and Storage (Flexible, Reusable, Water Vaporproof)
MIL-C-14200		Container, Shipping and Storage, Metal, Reusable, for Engines, Transmissions, Differentials, Transfers and Similar Assemblies
MIL-C-15074	-	Corrosion Preventive, Fingerprint Remover
MIL-C-16173	-	Corrosion Preventive Compound, Solvent Cutback, Cold Application
MIL-L-23699	-	Lubricating Oil, Aircraft Turbine Engines, Synthetic Base
MIL-G-23827	-	Grease, Aircraft and Instrument, Gear and Actuator Screw
MIL-I-26860	-	Indicator, Humidity, Plug, Color Change

STANDARDS

FEDERAL

FED-STD-595	-	Colors
FED-STD-791	-	Lubricant, Liquid Fuel and Related Products, Methods of Testing

MILITARY

MIL-STD-129 - Marking for Shipment and Storage
MS 27417 - Cap-propeller Shaft Thread, Shipping
MS 27423 - Protector-propeller Shaft, Plastic

(Copies of specifications, standards, handbooks, drawings and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications.

Navy Technical Manual

NAVAIR Manual 15-02-500 - Preservation of Aircraft Engines

(Applications for copies should be addressed to Commanding Officer, U.S. Naval Publications and Forms Center (NPFC 103), 5801 Tabor Avenue, Philadelphia PA 19120.)

3. REQUIREMENTS

3.1 General requirements.

3.1.1 Materials and processes. Materials and processes used in the preparation for storage and shipment of gas turbine engines shall be as specified herein. If contractor's specifications are used, they will conform to this military specification. Any deviation from this military specification by a contractor will be reviewed and approved by the appropriate department or agency of the DOD.

3.1.2 Cleaning. Every precaution shall be exercised to keep the engine and its accessories clean and free from foreign material of any kind at all times. Complete external cleaning of the engine shall not normally be undertaken. When cleansing individual parts for application of preservatives, tapes or other materials, and for removing these from surfaces, only petroleum solvent-type cleansers shall be used. In the case of close tolerance, bare metal surfaces, great care shall be taken to insure removal of any perspiration residues. Perspiration residues shall be removed by wiping the surface first with a cloth containing fingerprint remover conforming to MIL-C-15074, and then with a cloth containing solvent conforming to P-D-680.

3.1.3 Lubrication system corrosion-preventative oils. The following corrosion-preventative oils will be used to preserve the engine lubricating system. At the time of use, the oils will be waterfree, at a minimum temperature of 60°F and filtered through a 10 micron filter before being added to the engine lubricating system.

a. Synthetic-base oil systems. The corrosion-preventative oil used in the preservation of gas turbine engines which require MIL-L-7808 or MIL-L-23699 lubricating oil for normal operation shall be the operating oil of the grade specified for the engine unless otherwise stated in the model specification or technical manual.

b. Mineral-base oil systems. When a corrosion-preventative oil is specified for the preservation of gas turbine engines which require MIL-L-6081 lubricating oil for normal operation, the corrosion-preventative oil shall be one of the following:

(1) A mixture of 1 part by volume of corrosion-preventative compound conforming to Type I of MIL-C-6529 and 3 parts by volume of lubricating oil conforming to the specified grade of MIL-L-6081.

(2) Undiluted corrosion-preventative mixture conforming to Type III of MIL-C-6529.

3.1.4 Fuel system corrosion-preventative oil. The engine fuel system will be preserved by using oil conforming to MIL-L-6081, grade 1010. This corrosion-preventative oil for the fuel system shall contain no more than 200 PPM water, no more than 20 miligrams per liter of sediment when filtered through a 1.2 micron filter patch in accordance with FED-STD-791, Method 3010 and have a minimum flash point of 206°F T.O.C. (Technical order compliance).

3.2 Detail requirements.

3.2.1 Acceptance run. Engines shall undergo the acceptance test using the lubricating oil specified by the applicable engine model specification or technical manual.

3.2.2 Preservation run. A preservation run will not be required unless flushing of the lubrication system with corrosion-preventative oil is specified by the engine model specification or technical manual. When use of corrosion-preventative oil is required, either of two procedures may be followed.

a. If the model specification or technical manual allows corrosion-preventative oil to be used as the engine lubricant for acceptance testing, no additional preservation run is required.

b. If the model specification or technical manual does not allow corrosion-preventative oil to be used for acceptance testing, an additional preservation run will be required using corrosion-preventative oil. During the run, the engine shall be operated for a minimum of two minutes at approximately 75 percent maximum continuous power.

NOTE: Corrosion preventative oil containing volatile corrosion inhibitor shall not be used in a preservation run.

3.2.3 Oil drainage. After the acceptance run or the preservation run, the lubricating oil shall be drained from the engine before storage and shipment unless prohibited by the engine model specification or technical manual.

3.2.4 Preservation of fuel system. After draining and blowing out or flushing, the fuel system shall be preserved by introducing oil conforming to MIL-L-6081, grade 1010, into the fuel inlet. All parts of the fuel system

which are normally subjected to fuel shall be coated with oil. The fuel system shall not be drained following preservation but shall be left, filled with the preserving oil to the maximum extent possible. To prevent loss of fluids, all openings shall be blanked off with pressure sealing steel type closures using "O" rings or gaskets as applicable.

3.2.5 Preservation of liquid deicing system and water injection system. Unless otherwise directed, the liquid deicing system and fluid injection system shall be drained, blown out with air, then flushed with solvent conforming to P-D-680, containing five percent by volume of corrosion-preventative soluble oil in accordance with MIL-C-4339. The system shall be drained again and blown out with clean compressed air free of liquid water.

3.2.6 Compressor spraying. Unless otherwise specfied in the applicable engine model specification, technical order or contract, the compressor section shall be sprayed with corrosion-preventative oil as specified in 3.1.3,b. while being motored by the starter or auxiliary turning device. The speed of rotation shall not exceed the starting speed, and spraying shall be accomplished during both run-up and coast-down. The spraying operation shall not be started until the engine has cooled sufficiently to eliminate the possibility of auto-ignition. Precautions shall be taken to prevent accidental firings by either grounding the ignition plugs or by disconnecting the ignition leads. Spraying shall be accomplished with a suitable spray gun held approximately 18 inches from the compressor inlet. The spray nozzle shall be moved constantly in order that the entire area will be covered. It shall be the contractor's responsibility to determine the amount of corrosion-preventative oil required to coat all internal surfaces of the compressor section and to specify this amount together with the spraying procedure in the Handbook of Maintenance Instructions applicable to the specific engine model.

3.2.7 Accessory pads and drives. If the generator, starter or other accessory is installed, preservation treatment of its pad or drive will not be necessary. If an accessory is not installed, the pad or drive for that accessory shall be coated with corrosion-preventative referenced in 3.1.3 and covered with a suitable oil-resistant plastic, metal closure or cap. Threaded caps or plugs shall be made of steel.

3.2.8 Preservation of reduction-gear assembly. When a turboprop engine is to be preserved, if the reduction-gear assembly is shipped separate from the power unit, the drive spline(s) shall be handsprayed with the applicable corrosion-preventative, following which the engine cover plate shall be installed. A cover plate shall be provided to close off all exposed internal surfaces of the reduction-gear assembly.

3.2.9 Propeller shaft. When a turbo-prop engine is to be preserved, the exposed surface of the propeller shaft shall be thoroughly coated with soft film corrosion preventative compound conforming to MIL-C-16173, Grade 2. Precautions shall be taken to remove fingerprints prior to application of the compound. The shaft shall then be wrapped with a greaseproof wrap conforming to MIL-B-121, Grade A, secured with moisture-resistant tape conforming to

PPP-T-60, or shall be protected with plastic protector conforming to MS27423. A propeller shaft thread shipping cap conforming to MS27417 shall be installed.

3.2.10 Extension shafts. If applicable, the extension shafting shall be coated with material conforminng to MIL-P-149. If the configuration is such as to make the use of material conforming to MIL-P-149 impractical, extension shafts shall be treated in a similar manner to propeller shafts.

3.2.10.1 Internal spline. When a turboshaft engine with an internal drive spline is to be preserved, the exposed surface of the spline and adjacent components shall be preserved with compound conforming to MIL-C-16173, Grade 2, prior to the installation of the power shaft locking plate. Precaution shall be taken to remove fingerprints prior to application of the compound. In instances where the locking device does not completely close the spline opening, it shall be covered with barrier material conforming to MIL-B-121, Type II, Grade A, and secured with waterproof tape conforming to PP-T-60.

3.2.11 Plugs, caps, screens, or covers. Plugs, caps, screens, or covers, as required, shall be installed over all engine openings. Liquidproof closures shall be used to seal all openings from which fuel or oil could drip when the engine is mounted in its container. All shipping closure devices, plugs, and caps for fluid (liquid) systems shall be metal and equipped with fluid (hydraulic, oil, or fuel) resistant O-rings or gaskets as appropriate for the openings involved. All shipping closure devices for other than liquid system openings shall be of non-shedding plastic or metal and shall be resistant to all fluids which may flow or drip and contact the closures during storage and shipment. Shipping closures for threaded openings shall conform to MIL-C-5501. All shipping closures shall be light yellow, No. 13655 of FED-STD-595.

3.2.12 Excess fuel or oil. All excess fuel or oil shall be wiped from external surfaces.

3.2.13 Starter and generator. The starter and generator, if procured with the engine, shall be shipped installed if possible.

3.3 Preservation-packaging.

3.3.1 Preservation-packaging procedures. This specification covers three types of shipping and storage packages. The user or procuring activity will determine which type to use depending on the conditions of shipment and storage. The types are:

a. Level A - Type I (Metal container), see 3.3.2.
b. Level B - Type II (Flexible container), see 3.3.3.1
Type III (Shroud cover), see 3.3.3.2

Types II and III are generally suitable for short term shipping and storage under controlled environmental conditions.

3.3.2 Level A.

3.3.2.1 Type I (metal container). The engine shall be enclosed in a metal container conforming to MIL-C-5584 or other suitable container specification, in accordance with the following procedures.

3.3.2.2 General condition. Inspect the metal container for sound general condition and cleanliness prior to use. Any condition compromising the safe delivery of an engine will be corrected. During inspection, check closely for rust, cracks or dents in the gasket area, bolt holes and skids. Closure hardware should be inspected for corrosion or other damage sufficient to make the hardware unserviceable. Unserviceable items shall be replaced with new equivalent items. Also inspect the container dunnage and shock mounts to insure they are operable and not cracked.

3.3.2.3 Bolts and nuts. All bolts and nuts used in securing engines to shipping devices shall be properly torqued. Self-locking nuts, safety wired cap screws, castellated nuts, or other captive self-locking hardware shall be used for securing the engine.

3.3.2.4 Humidity indication. A humidity indicator plug, conforming to MIL-I-26860, shall be inserted in the receptacle provided, or secured to the inside of the container in such a manner that it may be readily viewed if an inspection window is provided.

3.3.2.5 Desiccant. Desiccant conforming to MIL-D-3464 shall be placed in the desicant holder of the container. The amount of dehydrating agent shall be determined in accordance with the appropriate quantity of desiccant formula of MIL-P-116. The desiccant shall not be removed from its air-tight container until immediately prior to use.

3.3.2.6 Closure procedure. The gasket and lid shall then be installed. Upon reassembly, flange bolt threads and nut faces shall be lubricated with grease conforming to MIL-C-16173, Grade 1 may be used as an alternate. Exercise care that grease is not placed on O-ring or groove. Flange bolts shall be torqued to an even tension in accordance with Table I.

TABLE I. Torquing of engine container.

ENGINE CONTAINER	INCH-POUNDS TORQUE
J79	800-900
TF41	800-900
T64	800-900
J75	1300-1400
J57	1300-1400
TF33	1300-1400
TF30	As per Engine T O
T76	"
TF34	"
J85	"
T56	"
F401	"
T58	"
New engines	"

3.3.2.7 Purging procedures. Metal engine storage containers are designed to be pressurized for two reasons. The first is to prevent moisture and oxygen from entering the container which would result in corrosion. The second, is to lower the oxygen content of the container atmosphere to eliminate an explosive hazard.

a. If an oxygen-analyzer is available, use Purging Procedure I.

b. If an oxygen-analyzer is not available, use Purging Procedure II.

c. If JP5 or similar 138°F or higher flash point fuels are used during last engine run, use Purging Procedure III.

3.3.2.7.1 Purging procedure I.

a. Use an oxygen-analyzer, Mine Safety Appliance, P/N 457610, NSN 6630-01-079-5480RU.

b. Ground container to common ground. (Warning: Insure that no ignition source is present within 50 feet of gas flow since flammable fuel vapor may be present.)

c. Remove the valve core and bleed the container to atmospheric pressure. (Warning: Keep body parts from in front of valve core to prevent injury. Wear suitable eye protection.)

NOTE: Replace the valve core as soon as gas flow from the container can no longer be detected. Nitrogen atmosphere will be lost if container is allowed to stand for an extended period with the valve core removed.

d. Replace the valve core and pressurize the container through the valve assembly to a pressure of 7.5 ± 0.5 psig using nitrogn in accordance with BB-N-411, Type I, Grade A and B, Class 1. Set the pressure regulator on the nitrogen source to 15 psig.

NOTE: A higher regulator setting of 90 psig is permissable for a single bottle. When two or more bottles are attached together, the regulator pressure will not exceed 15 psig.

e. Allow gases in the container to intermix and stabilize for a minimum of 30 minutes.

f. Check the entire container assembly for leaks using soap water solution. Repair leaks and repressurize. Do not attempt to stop leakage of the closure flange by over-torquing the closure bolts or by the application of gasket adhesives.

g. Connect oxygen analyzer to the service valve and obtain oxygen percentage reading. If reading is above 9.1%, repeat steps c. through e until oxygen reading is 9.1% or below.

h. When a safe reading of 9.1% oxygen or below is obtained, reduce the container pressure to 5.0 ± 0.5 psig, temperature conpensated in accordance with table 2.

i. Check the container for leaks per step f.

j. Replace filler valve cap and outer shield assembly.

3.3.2.7.2 Purging procedure II.

a. Use this procedure when no oxygen analyzer is available.

b. Ground container to common ground. Insure that no ignition source is present within 50 feet of gas flow since flammable fuel vapor may be present.

c. Remove the valve core and bleed the container to atmospheric pressure. (Keep body parts from in front of valve core to prevent injury. Wear suitable eye protection.)

NOTE: Replace the valve core as soon as gas flow from the container can no longer be detected. Nitrogen atmosphere will be lost if container is allowed to stand for an extended period with the valve core removed.

d. Replace the valve core and pressurize the container through the valve assembly to a pressure of 7.5 ± 0.5 psig using nitrogen in accordance with BB-N-411, Type I, Grade A and B, Class 1. Set the pressure regulator on the nitrogen source to 15 psig.

NOTE: A higher regulator setting of 90 psig is permissable for a single bottle. When two or more bottles are attached together, the regulator pressure will not exceed 15 psig.

e. Allow gases in the container to intermix and stabilize for a period of 30 minutes minimum.

f. Check the entire container assembly for leaks using soap water solution. Repair leaks and repressurize. Do not attempt to stop leakage of the closure flange by over-torquing the closure bolts or by the application of gasket adhesives.

g. Repeat steps c. through e. two more times, then reduce the container pressure to 5.0 ± 0.5 psig, temperature compensated in accordance with table 2.

h. Check the entire container assembly for pressure leaks per f.

i. Replace filler valve cap and outer shield assembly.

3.3.2.7.3 Purging procedure III.

a. Use this procedure only when last engine run was with JP5 or similar 138°F or higher flash point fuel.

b. Pressurize to 5.0 ±0 .5 psig using either nitrogen (BB-N-411, Type I, Grade A and B, Class 1) or compressed air that is free of particulates and contains no more than 0.06 milligrams of water per liter of air. Temperature compensate the container pressure in accordance with table 2.

TABLE 2. Temperature versus nitrogen pressure

TEMPERATURE PRESSURE			TEMPERATURE PRESSURE		
C°	F°	PSIG	C°	F°	PSIG
60.0°	140°	7.6	10.0°	50°	4.3
54.4	130	7.3	4.4	40	3.9
48.9	120	6.9	-1.1	30	3.5
43.3	110	6.5	-6.7	20	3.2
37.8	100	6.1	-12.2	10	2.8
32.3	90	5.8	-17.8	0	2.4
26.7	80	5.4	-23.3	-10	2.0
21.1	70	5.0	-18.9	-20	1.7
15.6	60	4.6	-34.4	-30	1.3

NOTE: If nitrogen is used, a pressure regulator setting of 90 psig is permissible for a single bottle. When two or more bottles are attached together the regulator pressure will not exceed 15 psig.

c. Check the entire container assembly for pressure leaks using a soap water solution. Check for leaks by brushing a soap solution over all seams, closure joints, relief valve, humidity and desiccant access ports, etc., while observing for bubbles that are blown away or increase in size and break.

d. Replace filler valve cap and outer shield assembly.

3.3.2.7.4 Alternate preparation procedures. Determine from the container nameplate, the specification to which the container was manufactured. Follow alternate preparation procedure I if the specification requires the container to have a relief valve with a pressure and vacuum capability (refer to Table 3, Relief Valve, Operation [PSIG]. Plus and minus values indicate pressurization and vacuum capability.) Follow alternate preparation procedure II if the relief valve has only pressure capability.

TABLE 3. Pressurization test.

SPECIFICATION	RELIEF VALVE TEST REQUIREMENT	OPERATION (PSIG)
MIL-C-5584	+20	+7 to 10
MIL-C-5584A	+20	+10
MIL-C-5584B	+20	+10
MIL-C-5584C	+10	+2.5, -1.0
80132 (15000 series)	+1.5	+1.0, -1.0
MIL-C-14200A (Type I and II)		
Type I - Pressurized	+10	Not applicable
Type II - Controlled Breathing	+ 5	Not specified

3.3.2.7.4.1 Alternate preparation procedure I.

a. Pressurize container with clean dry air to 0.5 PSIG higher than the positive pressure (PSIG) valve requirement listed in the Relief Valve Operation column of Table 3. Check that the relief valve has actuated and that air is flowing through valve. If air is not flowing through valve, replace the valve with an equivalent automatic relief valve and retest.

b. After the pressure has dropped sufficiently to allow the relief valve to close, check entire container for leaks using soap-water solution. Repair leaks, if necessary, and repressurize. Do not attempt to stop leakage at the closure area by overtorquing closure hardware or by application of gasket adhesives.

c. Test with combustible gas indicator (Mine Safety Appliance "Tankscope" Gas Indicator P/N 460300). The internal gas atmosphere can be checked by bleeding air through the container filling valve into the indicator. The sampling shall continue until the meter stabilizes. A reading of no more than 20 percent of the lower explosive limit for the fuel used in the engine is considered safe and required for shipment. Clean and/or purge the container and clean or seal the engine as necessary until the 20 percent reading or lower is obtained for the container atmosphere. When the proper reading is obtained, depressurize the container and attach an appropriate "safe" label which is dated and signed by the person who tested the container atmosphere.

3.3.2.7.4.2 Alternate preparation procedure II. Follow alternate preparation procedure I with the following changes:

a. Pressurize to 0.5 PSIG above the Relief Valve Operation pressures listed in Table 3. In the case of MIL-C-14200, pressurize to the Test Requirements of Table 3.

b. After a safe atmosphere is certified, pressurize to 5 PSIG with clean dry air using Table 2 pressure valves to compensate for temperature variation.

3.3.3 Level B.

3.3.3.1 Type II (flexible container). The engine shall be enclosed in a flexible environmental protective container conforming to MIL-C-9959 to be used in conjunction with appropriate adapters, transportation trailers and shipping bucks according to the following procedures.

3.3.3.1.2 Engine protrusions. Engine protrusions which may cause damage to the container shall be padded with barrier material conforming to MIL-B-121, and secured with tape in accordance with PPP-T-60 or PPP-T-70. Cushioning material conforming to PPP-C-795 or PPP-C-1797 may be used only if MIL-B-121 barrier material rests against the engine surfaces. PPP-C-795 or PPP-C-1797 can damage engine surfaces when in direct contact with them.

3.3.3.1.3 Bolts and nuts. All bolts and nuts used in securing engines to shipping devices shall be properly torqued. Self-locking nuts, safety wired cap screws or castellated nuts shall be used for securing the engine.

3.3.3.1.4 Desiccant. Desiccant conforming to MIL-D-3464 shall be placed in the desiccant pouches of the container. The amount of this dehydrating agent shall be determined in accordance with MIL-C-9959 or MIL-P-116.

3.3.3.1.5 Flexible container seal. Flexible containers shall then be sealed and secured about the engine by the zipper-type fasteners and container straps, fast locks or other approved closure devices.

3.3.3.2 Type III (shroud cover). The engine shall be enclosed in a plastic and paper shroud in accordance with the following instructions and utilizing the appropriate adapters, transportation trailers and shipping bucks.

3.3.3.2.1 Material requirement. Material for shroud cover in order of installation is: Inner wrap with L-P-378, Type I, class 1, Grade A, 6 mil polyethylene plastic sheet 12' or 16' width; intermediate wrap with MIL-B-121, Grade A; and overwrap with L-P-378 6 mil polyethylene. All three wraps are secured with PPP-T-70, 4 inch wide plastic film tape, transparent, clear, water and weather resistant. Approximately three rolls of PPP-T-70 tape are required for each engine shroud with special care given to ends of engine to prevent loosening of shroud by wind during transport.

3.3.3.2.2 Shrouding procedure. Engines may be either wrapped while mounted on trailers or prior to mounting to trailers while still attached to the engine handling device. Shroud cover consists of a buildup of three wraps, each of which will provide a cocoon wrap, and shall be applied to the engine in the following order:

a. Inner wrap of 6 mil polyethylene plastic sheet, cut the length of the engine, will be installed to provide a leakproof section along the entire undersection of the engine. The ends of the shroud will be folded over the top of the engine and taped, leaving ends of the engine open. Do not allow tape to contact metal surface of engine. Adding additional length of inner wrap along the entire top section of the engine may be required when the 16' width is not utilized. See illustration #1.

b. Intermediate wrap of MIL-B-121, Grade A, will require approximately four strips, each strip the length of the engine. Each of the four strips will be installed around the circumference beginning with the center section of the engine with overlapped folded ends of strip taped on top of engines and all seams of each successive strip taped which provides additional protection to top of engine. Additional width of strips on each end of engine and secure with tape. (If lifting device is attached, leave top folded ends around hoist brackets open until overwrap is installed and engine is mounted on trailer before closing and taping.) Marking and labeling will be accomplished before installing last overwrap. See illustration #2.

c. Overwrap of 6 mil polyethylene plastic sheet cut 1 1/2 times length of engine will be installed to provide an additional leakproof section along entire undersection of the engine. Side of sheet will be overlapped over the tip of the engine and taped. (If using 12' width of 6 mil polyethylene plastic sheet and edges do not meet, tape edges to intermediate wrap and add an additional strip of 6 mil polyethelene plastic sheet to cover top on engine, overlap and tape entire length of engine. See illustration #3. Each end of overwrap will be twisted, pulling out slack to form a close fitting overwrap. Twist will be secured with tape and trimmed to approximately 8 to 10 inches to form a pigtail. See illustration #4. The pigtail will be folded against the end of the engine and secured with tape. Special care will be given to heavily taping of all seams and ends of overwrap to prevent loosening of overwrap during transport. See illustration #5. Shroud cover will be cut on each side of engine mounting adapters to allow access of backup wrench. Attach mounting adapters to rail adapters and tape all cuts to insure a weather-tight seal. See illustration #6.

NOTE: Shroud will serve as a fluid leakage receptacle during shipment but will not provide adequate protection to the engine for outside storage. Engines shipped on open type carrier equipment will be covered with tarpaulins which will protect the engines from weather elements. Tarpaulins will be installed and fastened in a manner which will prevent vibration and flapping during movement.

3.4 Log entries. After appropriate entries have been made, log books or other engine forms shall be enclosed within the log book receptacle of the engine container or the engine record receptacle attached to the transportation trailer.

3.5 Marking of containers. Metal and flexible shipping containers shall be marked according to the instructions contained herein.

3.5.1 Metal container marking. The markings shall be white, No. 37875 per FED-STD-595. The letters shall be 1 to 2 inches high.

a. The following information shall appear on the same side of the shipping container as the humidity indicator:

ENGINE, GAS TURBINE
MODEL NO.
ENGINE SERIAL NO.
CONTRACT OR ORDER NO.
NAME OF MANUFACTURER
NAME OF CONTRACTOR (If different from manufacturer)
EXHAUST CONE(is or is not) INCLUDED HEREIN

b. A data panel for application of preservation and represervation data conforming to Figure 1 shall be applied on the same side of the container as the inspection port. The date of packing shall be entered therein.

c. An additional marking shall be applied in a convenient place where it is easy to read.

"DO NOT BREAK THE SEALS ON THIS CONTAINER UNTIL READY FOR USE UNLESS INSPECTION OF THE INTERIOR(S) SHOWS RENEWAL OF DEHYDRATING AGENT OR REPRESERVATION TO BE NECESSARY".

3.5.2 Flexible container markings. Markings applicable to engines or equipment being stored or shipped in flexible environmental container shall not be stenciled on external surface of the container.

a. For the Air Force, this information shall be entered on an appropriate AFTO form and placed in the receptacle for engine records.

b. For the Army, all markings shall be applied to the external surface of the container by means of labels or tags as prescribed by MIL-STD-129 and affixed to the supporting frame of the flexible container.

c. For the Navy, all markings shall be applied in accordance with NAVAIR Manual 15-02-500.

3.5.3 Additional markings. Additional markings shall be applied to comply with the requirements of MIL-STD-129.

4. QUALITY ASSURANCE PROVISIONS

4.1 General inspection. The process for the preparation of engines for shipment and storage and all materials entering into the procedure thereof shall be subject to inspection to determine compliance with this specification.

4.2 Responsibility for inspection. Primary responsibility for inspection to assure compliance with this specification lies with the activity preparing the engine for storage and/or shipment. A contractor is responsible for the

performance of all inspection requirements as specified herein, unless otherwise specified in the contract or purchase order. The government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.3 Inspection of metal containers. Inspect the metal container for general condition and cleanliness prior to use. Any condition compromising the safe delivery of engines will be corrected. Damage will be repaired by local maintenance. If the damage has rendered the container unserviceable, the container will be sent to the appropriate organization for overhaul.

4.3.1 Humidity inspection. The humidity indicator shall be checked immediately prior to shipment. The desiccant shall be replaced if a relative humidity of more than 30% is indicated and the container shall be resealed and repressurized if applicable (see 3.3.2.7).

4.3.2 Pressure inspection. Metal containers conforming to MIL-C-5584B or earlier revisions, shall be checked for internal pressure within 24 hours of shipment. If an internal pressure of less than 3 psi is indicated, the container shall be repressurized to 5 ± 0.5 psi using nitrogen or air (see 3.3.2.7) and tested for leaks. All seams, closure joints and provisions for relief valves, humidity indicators, desiccant access, etc., shall be brushed with a soap solution and observed for bubbles which are blown away or increase in size or break.

5. PACKAGING (Not applicable)

6. NOTES

6.1 Ordering data. Procurement documents should specify:

a. the type container to be used for the engine and components (see 3.3.2 and 3.3.3)

b. items to be shipped in each container

c. color to be used for marking, if white does not give sufficient contrast (see 3.5).

6.2 Special shipping devices. Any special requirements for shipping containers or stands, such as ownership, repairability, reusability, proprietary rights, and reproducible manufacturing drawings should be included as items in the contract or order.

6.3. Contamination. Extreme caution must be observed to avoid contaminating oils. Synthetic-base oils must never be mixed with mineral-base oils. Care shall be taken to ensure that lubricating oils, preservative oils, and hydraulic fluids are kept in clean covered containers prior to use, and that they are dispensed to engine systems through filters that provide particulate contamination controls equivalent to the smallest micrometer-size filter in the system involved.

6.4 Reclaimed materials. The use of reclaimed materials shall be encouraged to the maximum extent possible. The large O-ring seals used to seal the metal container halves will not be reused.

6.5 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

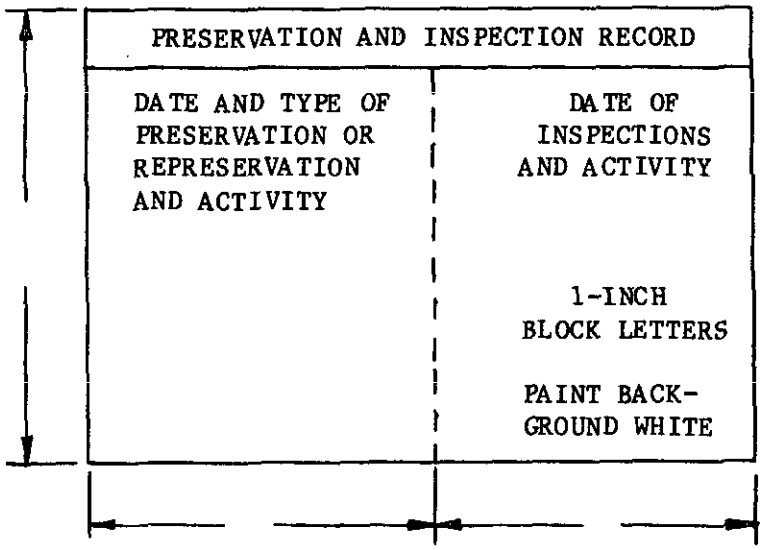
Custodians:
Army - AV
Navy - AS
Air Force - 99

Review activities:
Army - SM
Air Force - 11
Navy - SH

User activities:
Navy - MC

Preparing activity:
Air Force - 71

Project No:
Pack - 0731



PANEL MAY BE DIVIDED INTO SECTIONS, AT DOTTED LINE, IF SPACE IS NOT AVAILABLE FOR APPLICATION OF COMPLETE PANEL.

LOCATE BLOCK ON UPPER HALF OF CONTAINER

APPLY TO INSPECTION WINDOW SIDE OF THE SHIPPING CONTAINER

STENCIL DATES AND ACTIVITIES WITH 3/4 INCH OR 1-INCH BLOCK LETTERS, USING BLACK STENCIL PAINT ACCEPTABLE TO THE PROCURING ACTIVITY.

DIMENSIONS IN INCHES.

FIGURE 1. Preservation marking.

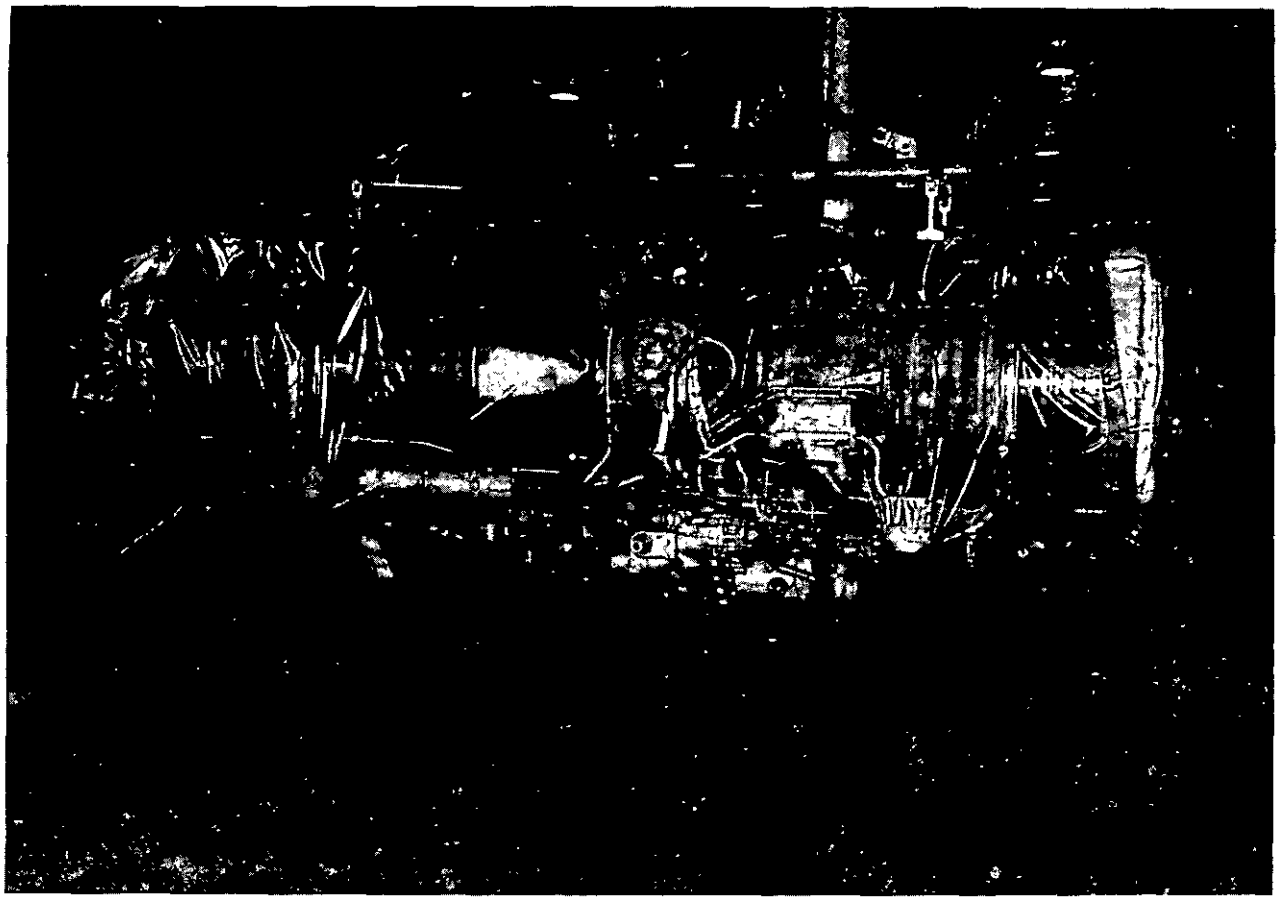


Illustration 1.

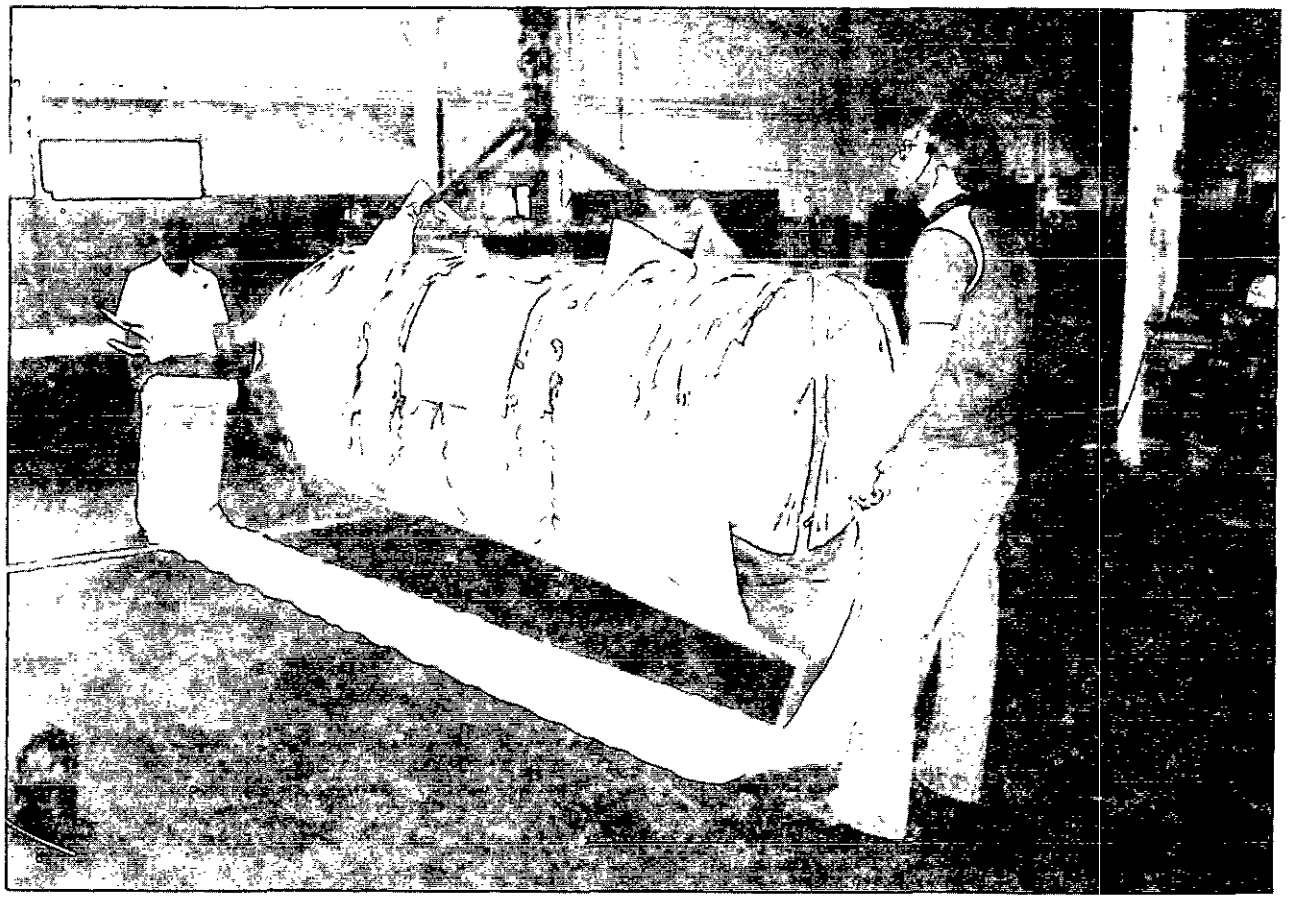


Illustration 2.

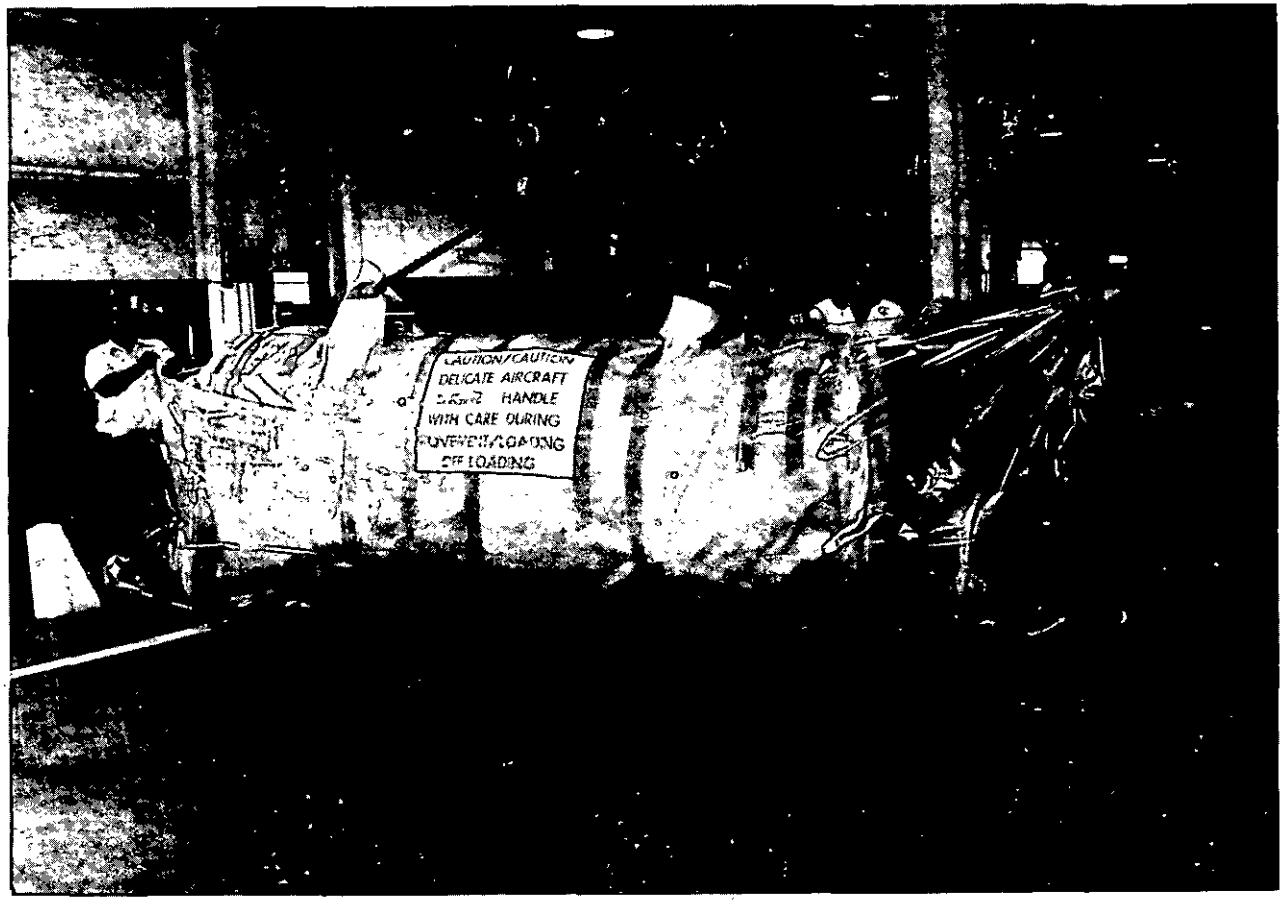


Illustration 3.

Illustration 4.

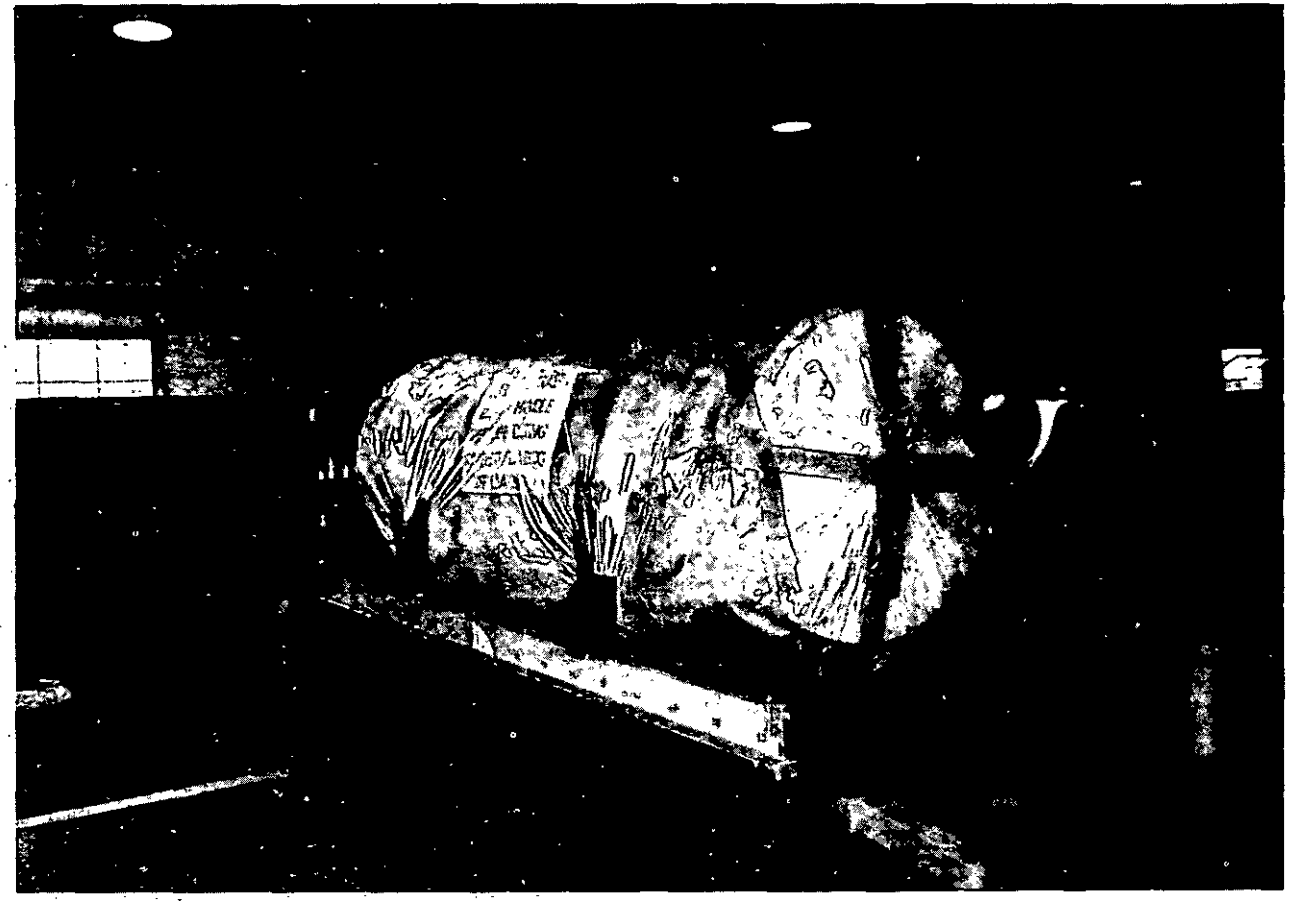


Illustration 5.

Illustration 6.

☆U.S. GOVERNMENT PRINTING OFFICE: 1983-605-034/2008

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions Reverse Side)

1 DOCUMENT NUMBER	2 DOCUMENT TITLE

3a. NAME OF SUBMITTING ORGANIZATION	4 TYPE OF ORGANIZATION *(Mark one)*
b ADDRESS *(Street, City, State ZIP Code)*	☐ VENDOR ☐ USER ☐ MANUFACTURER ☐ OTHER *(Specify)* _____

5 PROBLEM AREAS

a. Paragraph Number and Wording

b Recommended Wording

c Reason/Rationale for Recommendation

6 REMARKS

7a NAME OF SUBMITTER *(Last First, MI)* – Optional	b WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c MAILING ADDRESS *(Street City, State ZIP Code)* – Optional	8 DATE OF SUBMISSION *(YYMMDD)*

DD FORM 82 MAR 1426

PREVIOUS EDITION IS OBSOLETE