

MIL-STD-1505(USAF)

6 July 1971

SUPERSEDES

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19 July 1966

MILITARY STANDARD

REFURBISHMENT PROCEDURES
ROCKET MOTOR, AIR-2A



FSC 1340

MIL-STD-1505(USAF)

DEPARTMENT OF THE AIR FORCE

Washington DC 20330

REFURBISHMENT PROCEDURES, ROCKET MOTOR, AIR-2A

MIL-STD-1505(USAF)

1. This military standard has been approved by the Department of the Air Force. It sets forth the requirements for the refurbishment of AIR-2A Rocket Motors and components. This standard is applicable to the AIR-2A Rocket Motor, Types A/A44A-1A through A/A44A-3A and SR49-TC-1.

2. Recommended corrections, additions, or deletions should be addressed to OOAMA/MMEO, Hill Air Force Base, Utah 84401.

C O N T E N T S

Paragraph	Page
1. SCOPE	1
1.1 Scope	1
2. REFERENCED DOCUMENTS	1
2.1 Documents	1
2.2 Other publications	3
3. DEFINITIONS	4
3.1 Minor scratches	4
4. GENERAL REQUIREMENTS	4
4.1 Critical areas	4
4.2 Depth of scratches	5
4.3 Classification of Government-furnished property (GFP)	5
4.4 Hardware interchangeability	5
4.5 Ammunition color coding	5
4.6 Engineering changes	5
4.6.1 Modification	6
4.6.2 Desiccant	6
4.7 Cleaning solvents	6
4.8 Wiping cloths	6
4.9 Processing steps	6
4.10 Inspection and acceptance criteria	6
4.10.1 Category II and/or Category III parts	6
4.10.2 Paint chipping, scratches and scrapes	6
4.10.3 Acceptability	6
4.11 Receiving	7
4.12 Inspection and categorization	7
4.12.1 Heater blanket retainers	7
4.12.2 Fin fairings	7
4.12.3 Nozzle fairings	7
4.12.4 Launch lugs	7
4.12.5 Fin and actuator assemblies	7
4.12.6 Motor electrical	7
4.12.6.1 Motor initiating switches	8
4.12.6.2 Batteries	8
4.12.6.3 Safety switch	8
4.12.6.4 Bracket assembly	8
4.12.7 Ground strap	8
4.12.8 Heater blankets	8
4.12.8.1 Wrinkles, ridges and indentations	8
4.12.8.2 Raised areas, solid (blister appearance)	8
4.12.8.3 Blanket assembly joints	9
4.12.8.4 Delaminations, soft areas	9
4.12.9 Weather seals	9
4.12.10 Igniter plug	9
4.12.11 Bent tube	9
4.12.12 Well assembly	9
4.12.13 Key, exit cone lock	9

C O N T E N T S (cont)

Paragraph	Page
4.12.14 Dust caps	9
4.12.15 Reparable containers	9
4.12.15.1 Serviceable panels and bases	9
4.12.15.2 Non-reparable containers	9
4.12.15.3 Container acceptance	10
4.12.16 Motor chamber	10
4.12.16.1 Inspection	10
4.12.16.2 Scratches	10
4.12.16.3 Hot spots	10
4.12.16.4 Dents	10
4.12.16.5 Pits	10
4.12.16.6 Thread size	10
4.12.16.7 Damaged or missing threads	11
4.12.16.8 Thread pits	11
4.12.16.9 Aft ring	11
4.12.17 Aft closure	11
4.12.17.1 Fin brackets	11
4.12.17.2 Exit cone	11
4.12.17.3 Gas ports	11
4.12.18 Contractor interfaces	11
4.13 Refurbishment inspection and acceptance criteria	11
4.13.1 Fin fairings, fins, nozzle fairings and flaps	11
4.13.2 Launch lugs	12
4.13.3 Chamber hydrostatic test	12
4.13.4 Igniter boss surfaces	12
4.13.5 Aft closure	12
5. DETAILED REQUIREMENTS	14
5.1 Disassembly and refurbishment	14
5.1.1 Disassembly	14
5.1.2 Refurbishment procedure	15
5.1.2.1 Actuator assemblies	15
5.1.2.2 Aft closure assemblies from overage motors	18
5.1.2.3 Aft closure assemblies from fired motors	19
5.1.2.4 Chamber assembly	20
5.2 Motor buildup	21
5.2.1 Chamber assembly	21
5.2.2 Aft closure assembly	22
5.2.3 Motor assembly	23

T A B L E

Table 1 Trouble Shooting Chart	17
--	----

F I G U R E

Figure 1 Reworking of Igniter Boss	13
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MIL-STD-1505(USAF)

6 July 1971

SUPERSEDES

Dwg 66A37669

19 July 1966

MILITARY STANDARD
REFURBISHMENT PROCEDURES
ROCKET MOTOR, AIR-2A

1. SCOPE

1.1 Scope. This document sets forth the requirements for the refurbishment of AIR-2A Rocket Motors and components. Hardware may be new, or from overage motors, or fired motors.

2. REFERENCED DOCUMENTS

2.1 Documents. The issues of the following documents in effect on the date of invitation for bids form a part of this standard to the extent specified herein. (Where the provisions of this standard conflict with the documents referenced herein, this standard shall govern.)

SPECIFICATIONS

Federal

O-T-620	1, 1, 1 - Trichloroethane, Technical Inhibited (Methyl Chloroform)
O-T-634	Trichloroethylene, Technical
BB-N-411	Nitrogen, Technical
NN-P-530	Plywood, Flat Panel
QQ-P-416	Plating, Cadmium (Electrodeposited)
TT-C-490	Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coatings
TT-E-516	Enamel, Lustreless Quick-Drying Styrenated Alkyd Type
TT-M-261	Methyl Ethyl Ketone, Technical
TT-P-664	Primer Coating, Synthetic, Rust-inhibiting, Lacquer-Resisting

Military

MIL-M-3171	Magnesium Alloy, Processes For Pretreatment and Prevention of Corrosion On
MIL-H-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missile and Ordnance
MIL-I-6868	Inspection Process, Magnetic Particle
MIL-C-8514	Coating Compound, Metal Pretreatment, Resin-Acid
MIL-P-8585	Primer Coating, Zinc Chromate, Low-Moisture-Sensitivity

MIL-STD-1505(USAF)

MIL-S-8660	Silicone Compound
MIL-S-8802	Sealing Compound, Temperature-Resistant, Integral Fuel Tanks and Fuel Cell Cavities, High-Adhesion
MIL-C-15328	Primer(wash), Pretreatment, Blue (Formula No 117-B For Metals)
MIL-C-16173	Corrosion Preventive Compound, Solvent Cut- back, Cold-Application
MIL-G-23827	Grease, Aircraft and Instrument, Gear and Actuator Screw

STANDARDSFederal

FED-STD-595	Colors
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Military

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-709	Ammunition Color Coding
MIL-STD-794	Procedures For Packaging and Packing of
MIL-STD-1506	Inspection and Repair Procedure: Aft Closure and Exit Cone Assembly Bond Separation AIR-2A Rocket Motor

DRAWINGSAir Force

61A33783	Ground Strap
65A79075	Drawing Deviation to Douglas Drawing 3693980 (Safety Switch)
65C29025	Terminal Installation TB-11 on AIR-2A Rocket Motor
66D37667	Fin Security Tie Installation
67D29226	Weather Seal-Installation
67D29284	Ballast Installation, SR49-TC-1 Rocket Motor
68A33004	Electrical Checkout, Electrical Instal- lation Aft Umbilical (AIR-2A)
68C33001	Decal Identification
68C33100	Plug Assembly, Igniter Boss
68C33313	Packing, Preformed
68J33003	Electrical Installation Universal Motor
69D30086	Weather Seal AIR-2A (Genie)
69D30174	Plug, Test, Dual Fin Actuator, AIR-2A Rocket Motor
TPO 1340- 671-2763	Rocket Motor Genie, Type AIR-2A

PUBLICATIONSAir Force Manual

AFM 71-4	Packaging and Handling of Dangerous Materials for Transportation by Military Aircraft
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(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

DRAWINGSAerojet-General Corporation

3-011771	Lockwire
3-014124	Exit Cone
3-014132	Carbon Plug
3-023410	Graphite Insert
3-023431	Bracket - Mounting
3-023432	Bracket - Mounting
3-023449	Igniter Boss Plug, Shipping
3-023977	Insulator
3-026120	Tooth Assy
3-035528	Closure, Aft Machined
3-035529	Closure and Exit Cone Assembly
3-038856	Closure - Insulated
3-038885	Closure - Machined
3-038887	Closure Assembly - Aft Final
3-318795	Chamber Assembly - Riveted
3-318796	Chamber - Machined

Douglas Aircraft Company

DS 2497	Model Specification, Aeronautical Rocket Motor SR49-TD-1
1A39468	Strap, Grounding
1A97538	Requirements, Final Acceptance Rocket Motor Assembly
2605987	Poppet - Dual Fin Actuator
2684905	Cover, Engine Bracket
2685523	Cover Assy, Switch, Motor Initiating

MIL-STD-1505(USAF)

2694575	Dust Cap Receptacle - Aft Umbilical
3607553	Nozzle Fairing Assembly (69D30325 Ref)
3682963	Battery Assembly, Engine
3693980	Switch Assembly, Motor Safety
4605985	Seal - Dual Fin Actuator
5603409	Flap Assembly
5603410	Fin, Large
5604917	Actuator Assembly
5606200	Heater Blanket Installation
5607579	Fin and Actuator Installation
5608224	Fin Fairing
5682961	Bracket Assembly
5684041	Radiographic Position Chart for Fin Large
5685242	Rocket Motor
5685256	Rocket Motor, Model MB-1
7604866	Electrical Test Specification

Thiokol Chemical Corporation

1U32352	Desiccant, Rocket Motor
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Finch Paint Company

FR463-12-1A
FR443-3-2

ICC Regulations

Tariff Number 15

(Application for copies of other publications should be addressed to the procuring activity or as directed by the contracting officer.)

3. DEFINITIONS

3.1 Minor scratches. Minor scratches are scratches or marks that do not exceed the part tolerance.

4. GENERAL REQUIREMENTS

4.1 Critical areas. In addition to normal quality, the following critical areas shall be inspected 100 percent.

- a. Aft launch lug pad
- b. Forward launch lug insert and keylock
- c. Fin actuator brackets
- d. Igniter boss and threads
- e. Chamber aft machine surface

NOTE: This action is necessary to preclude deliveries of motors having one or more of these areas damaged to the point where the motor is useless for tactical application. The rear hole of the aft launch lug pad shall be inspected visually for double threading and inspected with go-no-go gage for proper thread size/fit. Threaded inserts in aft launch lug pads are not acceptable. Key-lock and threads of inserts in the forward attach ring shall be inspected visually for damage and they shall be replaced as necessary.

4.2 Depth of scratches. The depth of scratches or marks shall not render the part thinner than the allowable minimum dimension. Marks made by screwheads are acceptable provided they do not exceed the minimum acceptable limits for scratches (see 3.1).

4.3 Classification of Government-furnished property (GFP). After inspection, all GFP hardware shall be categorized as follows:

a. Category I (Reusable). Category I (resuable) GFP hardware is hardware that will function with the same integrity as a new part after cleaning, lubrication, painting, or similar processes, as required. Category I may be reinstalled. This includes all inert GFP hardware removed from fired, overage motors or new hardware.

b. Category II (Salvageable). Category II (salvageable) GFP hardware is hardware that will have the functional integrity of a new part after being reworked. This includes any hardware that must be reworked to conform to a required configuration. The required configuration may not be the latest configuration.

c. Category III (Scrap). Category III (scrap) GFP hardware is either hardware with damage such that rework is not feasible or hardware which cannot be reworked to conform to a required configuration.

4.4 Hardware interchangeability. To facilitate manufacture, all motor hardware shall be considered interchangeable, except as specified herein. Note: This shall be limited to Air Force changes and shall exclude all contractor's changes.

4.5 Ammunition color coding. The completed rocket motor shall be color coded in accordance with MIL-STD-709. The location of the painted strip shall be at the front edge of the forward skirt.

4.6 Engineering changes. This paragraph provides a means of incorporating Air Force initiated changes (i.e. technical order, time compliance technical order, Class I drawings, etc.) into production items that do not have updated contractor drawings reflecting the Air Force changes.

MIL-STD-1505(USAF)

4.6.1 Modification. All covers, terminal board P/N 2684905, (Douglas Aircraft Drawing) GFP and Contractor Furnished Property (CFP), modified in accordance with Air Force (AF) Drawing 69C29025, are acceptable for use with TB-11 and TB-12 having standard or special screws. New covers will not be modified for special screws in the terminal board. Special screws may be deleted from the terminal board.

4.6.2 Desiccant. Desiccant P/N 1U32352-03 (Thiokol Drawing) is applicable to the SR49-TC-1 Rocket Motor.

4.7 Cleaning solvents. Solvents for cleaning processes shall be trichloroethylene conforming to Specification O-T-634, 1,1,1-trichloroethane conforming to Specification O-T-620 and methyl-ethyl-ketone (MEK) conforming to Specification TT-M-621. They shall be used for cleaning of parts and components of the rocket motor when solvent cleaning is specified.

4.8 Wiping cloths. All wiping cloths used for final cleaning and wiping of parts and components prior to the application of preservatives and other protective coatings shall be clean, lint-free cloths or equivalent industrial wipes.

4.9 Processing steps. The sequence of operations specified herein may be varied as necessary, and accomplished concurrently to meet schedules and to facilitate processing.

4.10 Inspection and acceptance criteria. All GFP hardware shall be inspected and categorized in accordance with 4.3.

4.10.1 Category II or Category III parts. Parts in Category II or Category III must be submitted to a material review board for final disposition.

4.10.2 Paint chipping, scratches and scrapes. Paint chipping, scratches, or scrapes must be scuff-sanded or treated in an equivalent manner to feather edges, and primer must be applied prior to application of the top coat of paint.

NOTE: Magnesium parts shall be treated in accordance with MIL-M-3171.

4.10.3 Acceptability. Nuts, bolts, screws, fittings, etc are acceptable for reuse provided they have been cleaned, are functionally sound, contain no burrs, thread damage, rounding off of bolt heads, etc. On reinstallation, old torque marks must be obliterated or a different readily distinguishable torque mark utilized, which will be applied directly over non-obliterated torque marks or parts thereof.

4.11 Receiving. The shipping container shall be visually inspected for obvious damage as the motors and/or hardware are received. If the shipping container is damaged to the extent that the motor or hardware could be damaged, the container shall be opened and the contents inspected for visual damage.

4.12 Inspection and categorization. The following items shall be inspected and categorized:

a. Damaged parts will be classified as Category II - salvageable and Category III - scrap.

b. Category II parts are those parts that can be reworked to a useable condition with or without variation from the drawing.

4.12.1 Heater blanket retainers. Heater blanket retainers shall be checked for visual damage, cracks, scratches, and chipped paint. Marks left by screw heads shall not be cause for rejection. Cracks are not acceptable.

4.12.2 Fin fairings. Fin fairings shall be checked for visual damage, cracks, scratches and configuration for unlock hole. Cracks are not acceptable. Minor surface scratches are acceptable. Marks left by screw heads shall not be cause for rejection.

4.12.3 Nozzle fairings. Nozzle fairings shall be checked for visual damage, dents, cracks, scratches and configuration for drain hole. Check the condition of the nutplates. Cracks and large dents are not acceptable. Small dents shall be Category II. Marks left by screw heads shall not be cause for rejection.

4.12.4 Launch lugs. Launch lugs shall be checked for visual damage. Inspect the thickness and fore and aft width of the lugs to the applicable drawings. Check all bearing surfaces for condition of the cadmium plating. Verify the minimum thickness of the launch lug in the counter bore area. Cracks are not acceptable.

4.12.5 Fin and actuator assemblies. Fin and actuator assemblies shall be disassembled and inspected for cracked links, burrs, or wearing of bearing surfaces. Clean and replate plated parts (cadmium plate Dalic Process) as required. Complete disassembly except the actuating cylinder, shall be accomplished before inspection.

4.12.6 Motor electrical. Motor electrical shall be visually inspected, and checkout performed per Douglas Aircraft Company (DAC) drawing 7604866. Frayed, cracked or cut wiring insulation is not acceptable.

MIL-STD-1505(USAF)

4.12.6.1 Motor initiating switches. Motor initiating switches shall be visually inspected for cracks, evidence of actuation, or other damage. If the switch has been actuated, place it in Category III (scrap). If the roll pin is mis-aligned, place it in Category III (scrap). Cracks and other damage shall be classified Category III. Missing or damaged nylon inserts is not cause for rejection.

4.12.6.2 Batteries. Batteries shall be inspected per DAC drawing 3682963 to determine if they are expended. Batteries have a service life of 120 months and are to be reused if not expended provided they have a minimum of twenty-four (24) months service life remaining at the time of reinstallation. The manufactured date shall be noted on the Ammunition Data Card. Remove the "CONFIDENTIAL" marking from the batteries exhibiting this marking.

4.12.6.3 Safety switch. The safety switch shall be inspected and tested per DAC drawing 3693980. If the wiring is not Teflon insulated, it shall be classified as Category II. If the switch is not potted per AF Drawing change 65A79075, classify as Category II. Assemblies without nutplates and friction safety pin catch are not acceptable.

4.12.6.4 Bracket assembly. The bracket assembly DAC Drawing 5682961-501 shall be visually inspected. The following criteria apply to electrical harness terminal boards: Minor chips, scratches and cracks on the outside ends are acceptable providing the cracking is restricted to the outside end surface board and does not extend through the insulator surface (inside portion) of the terminal assembly holes. Terminal board separators may have cracks, chips or gouges provided 75 percent of the separator height remains unaffected. Wiring insulation may be other than Teflon.

4.12.7 Ground strap. The ground strap shall be visually inspected for breaks in the wire and damaged connectors. Bolt marks at connecting points are acceptable. Replace if braiding is frayed or broken in excess of 10 percent of the area. Protect the free end against paint contamination.

4.12.8 Heater blankets. The following visual inspection criteria are applicable: (Repairs may be performed after installation.)

4.12.8.1 Wrinkles, ridges and indentations. These imperfections are acceptable up to 14 inches long and .047 (3/64) inch deep, provided they are solid and there are not more than four of these areas per blanket half shell.

4.12.8.2 Raised areas, solid (blister appearance). These imperfections are acceptable up to 25 square inches and .047 (3/64) inch above the blanket surface, provided there are not more than two of these areas per blanket half shell, and there is a minimum of 6 inches between raised areas.

4.12.8.3 Blanket assembly joints. The adhesive used to bond the blanket half shells together may appear excessive (raised) or shrunken (depressed) after cure. These imperfections are acceptable up to .047 (3/64) inch in height or depth provided there are no cracks in the adhesive.

4.12.8.4 Delaminations, soft areas. Delaminations which occur between the outer skin and foam (blister appearance), not exceeding 1 inch square in size and .047 (3/64) inch in height, are acceptable provided there are not more than five of these areas per blanket half shell (bubble holes).

4.12.9 Weather seals. Scratches, gouges and cracks are not acceptable.

4.12.10 Igniter plug. Cracks are not acceptable.

4.12.11 Bent tube. Cracks, dents or deformed mating surfaces are not acceptable. Seating marks are not cause for rejection.

4.12.12 Well assembly. Inspect for obvious damage and insure both guide pins and nylon inserts are in place and properly aligned. Thread impressions in the nylon inserts are acceptable.

4.12.13 Key, exit cone lock. Cracks are not acceptable. Check for functional fit.

4.12.14 Dust caps. Cracks are not acceptable. Check for functional fit and insure that the inner rubber seal is present per DAC drawing 2685523. DAC drawing 2694575, manufactured from yellow-colored plastic material is Category III (scrap).

4.12.15 Reparable containers. Reparable containers are those having damage which can be repaired by replacement of complete panels (sides, ends, tops) or repair of the panels or base which have damage such as:

- a. Holes no larger than 6 inches in the largest dimension.
- b. No more than 2 holes in each side, top or bottom panel.
- c. No more than one hole per end panel.
- d. Loose or missing cleats or skids.

4.12.15.1 Serviceable panels and bases. Serviceable panels and bases of otherwise unserviceable containers should be retained for use in replacement of damage panels and bases of other containers.

4.12.15.2 Non-reparable containers. Non-reparable containers are those that cannot be repaired by replacement of one or more panels or base.

MIL-STD-1505(USAF)

4.12.15.3 Container acceptance. Reparable containers will be accepted by the Air Force for use when the following repairs have been accomplished:

- a. When damaged panels have been replaced with serviceable panels.
- b. When damaged base has been replaced with serviceable base.
- c. When holes, except drain holes, are covered with 3/8 inch plywood, Standard grade, exterior glue, NN-P-530.

NOTE: With the exception of holes being covered as stated above, the containers shall conform to TPO 1340-671-2763.

4.12.16 Motor chamber

4.12.16.1 Inspection. The chamber shall be inspected for hot spots, dents, scratches, etc. Chamber wall thickness measurements shall be taken of the aft, center, and forward sections of the chamber assembly. At least four measurements 90 degrees apart, shall be taken at each section. A minimum thickness of 0.104 inch is acceptable. Forward dome thickness shall be measured at two locations 180 degrees apart, between three and six inches from the igniter opening. A minimum of 0.104 inch thickness is acceptable.

4.12.16.2 Scratches. Scratches that can be completely removed by blending are acceptable. Minimum acceptable wall thickness after blending is 0.104 inch. This rework must be performed prior to hydrostatic testing and magnetic particle inspection.

4.12.16.3 Hot spots. All chambers with hot spots will be placed in Category III. NOTE: Any discoloration in parent metal generated by heat is classified as a hot spot.

4.12.16.4 Dents. Dents are not acceptable in the pressure vessel. Dents in the skirt, or skirts which are out of round are generally acceptable for rework.

4.12.16.5 Pits. The igniter boss forward face and "O" Ring seating surfaces having pits not greater than 0.060 inch in diameter or 0.010 inch deep are acceptable for rework. Pit clusters shall not exceed 20 percent of the surface area.

4.12.16.6 Thread size. Igniter boss threads not greater than 0.002 inch oversize (Pitch diameter) may be reworked in conformance with the applicable drawings by cadmium plating (Dalic Process) meeting the requirements of QQ-P-416.

4.12.16.7 Damaged or missing threads. A total of 2 linear inches of damaged or missing igniter boss threads is acceptable provided the defect does not extend below the root diameter of the thread and the threads accept the gages correctly. No portion of the 2 linear inches may exist on more than two adjacent threads if the defect extends below the pitch diameter of the thread.

4.12.16.8 Thread pits. Pits in the igniter boss threads shall not exceed 0.060 inch in diameter and 0.020 inch in depth.

4.12.16.9 Aft ring. The aft ring machined surface (1.25 inch forward from aft edge of lockwire groove) with pits not greater than 0.125 inch wide or 0.020 inch deep are acceptable for rework. Other interior areas of the aft ring machined surface may have pits or pit clusters not in excess of 0.125 inch wide by 0.040 inch deep. Depth of pits 1.25 inch forward from the aft edge of the lockwire groove shall not exceed 0.005 inch after plating.

4.12.17 Aft closure

4.12.17.1 Fin brackets. Inspect the aft closure for bent or cracked fin brackets. Cracks in welds may be reworked provided the rework is accomplished prior to hydrostatic testing and magnetic particle inspection.

NOTE: Heat treatment must be maintained after welding. Bent brackets may be straightened provided the parts are magnetic particle inspected afterwards.

4.12.17.2 Exit cone. Check for damage to the exit cone. Minor surface scratches and paint chips are allowable.

4.12.17.3 Gas ports. Inspect the condition of the gas ports (see 4.13.5f and g).

NOTE: In the event that insulator on the aft closure exceeds the 0.030 inch glue line tolerance, as cited on Aerojet General Corporation (AGC) Dwg 3-035529, but is otherwise acceptable, this glue line tolerance shall be considered as being 0.060 inch. Any insulator where the glue line exceeds 0.060 inch must be replaced. Any new insulators being installed shall not exceed 0.030 inch tolerance as cited on AGC Dwg 3-035529. Clean all interior surfaces of the closure when the insulator is removed. If the insulator is not removed, inspect and repair cement joint if required.

4.12.18 Contractor interfaces. Contractor interfaces with GFP hardware, such as tooling attach points, and grit blasting of chambers shall be inspected to verify that the minimum requirements of Category I are met. This includes both new and used hardware.

4.13 Refurbishment inspection and acceptance criteria

4.13.1 Fin fairings, fins, nozzle fairings and flaps. Refurbishment of these items shall be as follows:

a. Rework if required. Inspect per DAC Drawings 5608224, 5603410, 3607553, 5603409 and 5684041. Fin fairings other than DAC Drawing 5608224 shall be Category II.

MIL-STD-1505(USAF)

b. Drain holes shall be drilled in the nozzle fairings where they are missing.

c. Unlock holes shall be drilled in the fin fairings where they are missing.

d. The parts shall be checked for corrosion. If it is present, the items will be placed in Category II.

e. All used large fins shall be radiographic inspected per DAC drawing 5684041. The word "inspected" shall be ink stamped on the inside lower aft end of the fin.

4.13.2 Launch lugs. Refurbishment of the launch lugs shall be as follows:

a. Inspect and rework if required.

b. Replate if required. Cadmium plate may be applied without subsequent embrittlement relief. Use the Dalic Process per QQ-P-416.

4.13.3 Chamber hydrostatic test. This test shall be performed as follows:

a. Prior to hydrostatic testing pi tape the chamber in three locations; 6 inches aft of the forward girth weld, center, and 6 inches forward of the aft girth weld.

b. After hydrostatic testing pi tape at same locations specified in a. above.

c. Growth during hydrostatic testing of up to 0.07 percent is acceptable.

4.13.4 Igniter boss surfaces. Refurbishment shall be as follows:

a. Surface defects not in excess of those specified in 4.12.16.5 may be reworked by cadmium plating (Dalic Process or per QQ-P-416), to a minimum thickness of 0.002 inch. The plating shall be of sufficient thickness to give a maximum depth of 0.005 inch after plating.

b. Surfaces with pits in excess of 4.12.16.5 may be reworked according to Figure 1.

4.13.5 Aft closure. Refurbishment of aft closures shall be as follows:

a. Machined surfaces, other than the "O" ring and lockwire grooves, may have pits 0.020 inch in depth by 0.125 inch in diameter maximum.

b. Lockwire and "O" ring grooves may have pits up to 0.020 inch in depth by 0.125 inch in diameter. Concentrated pit areas and clusters are allowable for 9 linear inches total provided no individual pit cluster exceeds 0.5 inch in length. The pit depth after cadmium plating is to be a maximum of 0.005 inch in the "O" ring groove. Pits in the lockwire groove need not be filled.

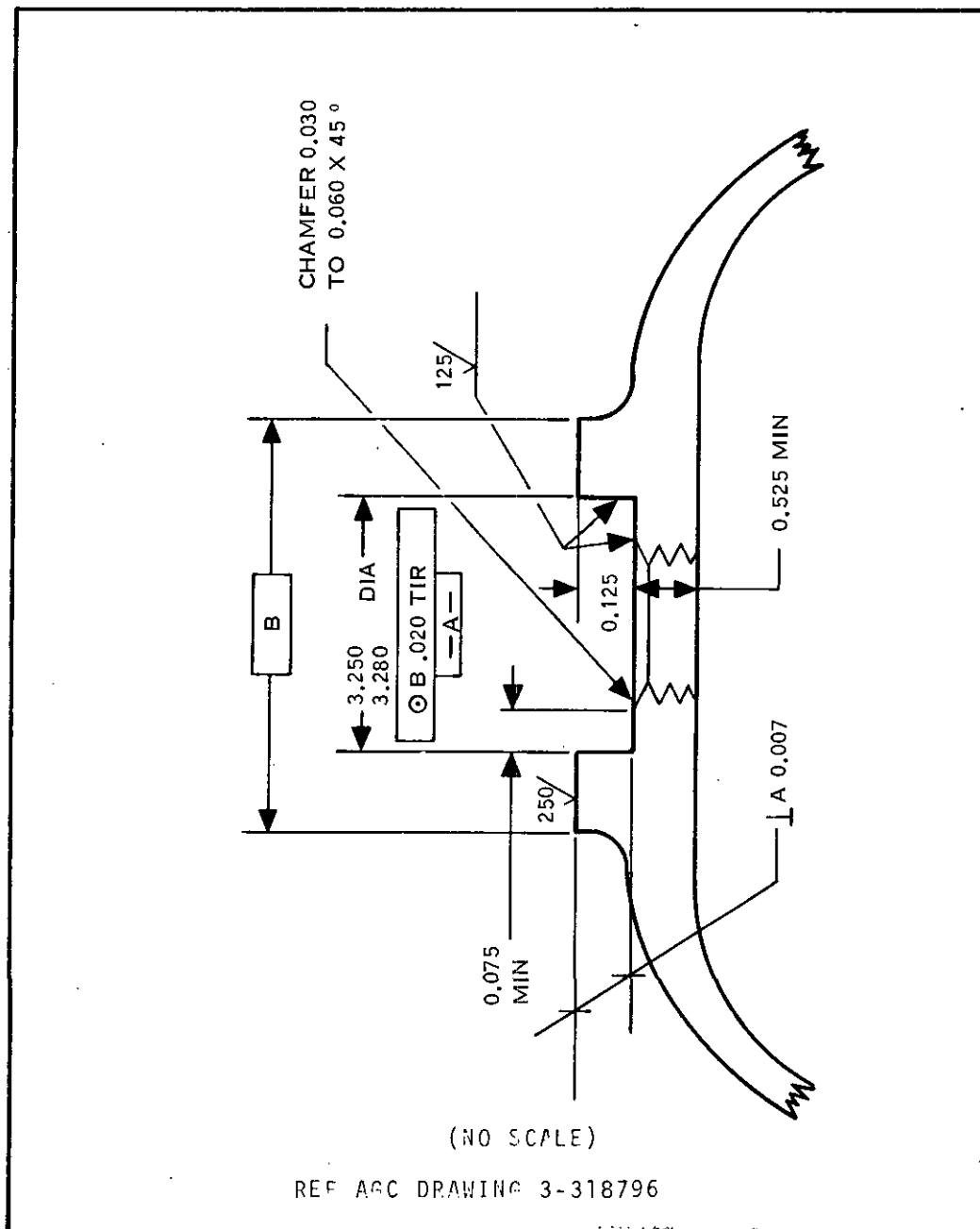


FIGURE 1
REWORKING OF IGNITER BOSS

MIL-STD-1505(USAF)

c. Inspect the installation of AF Drawing 69D30086 weather seal per AF Drawing 67D29226.

d. Check the condition of the nozzle graphite insert. Fits up to 0.06 inch in diameter and 0.03 inch in depth are acceptable. Scratches 0.03 inch deep circumferentially or 0.05 inch deep longitudinally, and not more than 1.5 inches long are acceptable provided the defects are not located more than 1.5 inches forward of the trailing edge of the graphite insert. Gouges caused by weather seal removal are acceptable providing these defects do not exceed 1.0 inch in width and 0.03 inch in depth, and are not located more than 1.0 inch forward of the trailing edge of the graphite insert. Any gouged area falling within the acceptable limits can be lightly sanded to remove sharp edges. Cracks are not acceptable regardless of size or location.

e. Inspect and repair the cement joint between the insulator, AGC Drawing 3-023977, and the aft closure, AGC Drawing 3-035528, per MIL-STD-1506.

NOTE: In the event that the insulator on the aft closure exceeds the 0.030 inch glue line tolerance, as cited on AGC Dwg 3-035529, but is otherwise acceptable, this glue line tolerance shall be considered as being 0.060 inch as specified in MIL-STD-1506. Any insulator where the glue line exceeds 0.060 inch must be replaced. Any new insulators being installed shall not exceed 0.030 inch tolerance as cited on AGC drawing 3-035529.

f. Examine the insulator for cracks or delaminations. The presence of either shall be cause for rejection. Minor tooling defects, in the area of the gas ports, are acceptable in the surface glaze providing they do not affect the cemented joint to the carbon port.

g. Cracked or broken gas ports are cause for rejection. Minor chips are acceptable providing the damage does not affect the plug perforations.

5. DETAILED REQUIREMENTS

5.1 Disassembly and refurbishment

5.1.1 Disassembly. The disassembly procedure shall be as follows:

a. Remove the heater blanket halves and salvage for reuse.

Note: Use care during pry operations to prevent damage (insulation breaks) adjacent to the bonded assembly joints.

b. Recovery of the heater blanket shall be made after all flight hardware, except the heater blanket, have been removed from the rocket motor.

c. The rocket motor may be conditioned at 200 degrees Fahrenheit (F) for up to 24 hours and the heater blanket removed by using appropriate tools to cut the adhesive along the joint and to pry the heater blanket from the rocket motor.

d. The excessive adhesive shall be removed from the heater

blankets and all electric wires cut flush to the heater blanket.

e. Inspection of the heater blankets shall be in accordance with 4.12.8.1, 4.12.8.2 and 4.12.8.4.

f. The heater blankets will be categorized as specified in 4.3.

g. Remove and inspect the following items for reuse in accordance with 4.12:

- (1) Heater Blanket Retainers
- (2) Fin Fairings
- (3) Nozzle Fairings
- (4) Launch Lugs - Forward and Aft
- (5) Fin and Actuator Assemblies
- (6) Motor Electrical
- (7) Nuts, Bolts, Screws, etc (see 4.10.3)
- (8) Ground Strap (DAC Drawing 1A39468 or AF Drawing 61A33783)
- (9) Aft Closure

5.1.2 Refurbishment procedure

5.1.2.1 Actuator assemblies. Actuator assemblies shall be refurbished as follows:

- a. Disassemble Actuator
- b. Remove and replace all "O" rings per DAC drawing 5604917
- c. Lubricate "O" rings per MIL-G-23827
- d. Polish poppet, DAC Drawing 2605987, as required to remove ring.
- e. Reface and radius inner edge of seat, DAC Drawing 4605985.
Limits: Reface 0.000 to 0.005 inch and radius 0.010 to 0.016 inch.
- f. Clean and lubricate bolt shanks, spacers, bolt holes, thrust faces, male threads of AN 815 fittings, and "B" nuts by brushing on a thin coat of MIL-G-23827 lubricant.
- g. Magnetic particle inspect piston dual-fin actuator per MIL-I-6868.
- h. Reassemble actuator
- i. Convert all actuators DAC Drawings 5604917-501 and 5604917-503 to 5604917-505.
- j. Testing. Testing of the cylinder assembly will be conducted on a test stand capable of supplying dry air or nitrogen. Specification BB-N-411, at varying pressures from 0 to 4100 pounds per square inch gage (psig). A flowmeter and a container of hydraulic fluid, in accordance with MIL-H-5606, are also required to check flow and leakage. Refer to Table 1, Trouble Shooting Chart, for probable causes and remedies for malfunctions occurring during testing. Perform test as follows:

MIL-STD-1505(USAF)

(1) Pull piston out to fully extend position until it is locked in place by the lock assembly. Check the extended length setting made during reassembly. Centerline of fitting must be between 6.470 and 6.490 inches from centerline of mounting hole in the cylinder.

(2) Install test plug AF Drawing 69D30174 (with "O" ring, conforming to AN6227-5, installed in forward groove) into cylinder.

(3) Install a 1/16-inch diameter orifice fitting in the bleed port. Install a flowmeter to the bleed port and apply 5 to 7 psig to the supply port. There will be no leakage past the internal packings.

(4) Slowly increase the pressure to 3900 to 4100 psig. There will be no leakage past the internal packings. Allow the pressure to return to ambient.

(5) Remove test plug and install spring and poppet in the cylinder. Lubricate packing sparingly with pneumatic lubricating grease in accordance with MIL-G-23827, and roll or rotate in respective grooves to eliminate twist or distortion. Position packings on seat and screw seat into the cylinder to approximate position observed during disassembly.

(6) Install the adjuster to approximate position observed during disassembly, but do not tighten. Adjuster will be torqued after completion of setting during test procedure.

(7) With 1/16-inch diameter orifice fitting in bleed port and with inlet pressure regulated to between 1280 and 1300 psig, crack the supply valve and apply pressure slowly to the supply port.

(8) Adjust the seat to provide relief valve cracking pressure of 1150 to 1200 psig. Tighten the adjuster and torque to 60 ± 5 inch pounds.

(9) Allow the valve to reseat by removing pressure from the supply port. Through the supply port, apply 30 psig less pressure than that required to obtain relief cracking pressure. Leakage past the seat and poppet will not exceed 1.0 cubic foot per minute (cfm) of free air or nitrogen.

NOTE: If the leakage test is satisfactory, allow the unit to drain and wipe off the remaining oil. If the test is not satisfactory, disassemble the unit sufficiently to replace defective packings and to apply sealing compound to mating surfaces of cylinder and head. Torque the bolts to 33 ± 2 inch pounds upon reassembly.

(10) Reduce the pressure to zero and remove the orifice fitting. Apply 5 to 7 psig pressure to the bleed port and submerge the unit in a container of hydraulic fluid, conforming to MIL-H-5606. There will be no leakage past the internal packings. Leakage between the head and cylinder will not exceed 10 cubic inches per minute of free air.

NOTE: Do not unlock the piston anywhere except by depressing the lock assembly.

(11) Depress the lock assembly to release the piston and push the piston into the cylinder. Gradually apply 3900 to 4100 psig pressure to the supply and bleed ports simultaneously. There will be no leakage past the internal packings. Leakage past the head and cylinder will not exceed 100 cubic inches per minute.

(12) Reduce the pressure to zero at the supply and bleed ports simultaneously. Open the supply port. Pull the piston out until it is locked in place by the lock assembly. Depress the lock assembly to release the piston and push the piston all the way into the cylinder.

(13) Apply 75 to 85 psig pressure at the bleed port. Apply 40 to 50 psig pressure at the supply port. The piston should stop when the centerline of the fitting is between 6.285 and 6.365 inches from the centerline of the mounting hole in the cylinder. Remove pressure at the bleed port and apply 90 to 100 psig to the supply port. The piston will extend fully and the lock assembly will snap into the groove in the piston.

(14) With the bleed port plugged, apply 5 to 7 psig pressure at the supply port. Increase the pressure to 3900 to 4100 psig. There will be no leakage past the internal packings in either case. Reduce the pressure to zero.

(15) After completion of the tests, open the bleed port to dump the trapped pressure. Install the seal P/N 800-020-10, or "O" Ring AN6227-2 and apply between 24 and 27 inch-pounds of torque to the plug. Push the piston to the retracted position and lockwire to the cylinder through the mounting hole with AN 995 wire. Cap the supply port with tape or a plastic plug to prevent internal contamination.

NOTE: When "O" Ring AN6227-2 is used, the associated Washer must be used therewith.

(16) Apply red dye identification to the adjuster, bolts, plug and setscrew, if required. Apply 1/8 to 1/4 inch black dot adjacent to bleed port plug to indicate proper seal assembly.

TABLE I Trouble Shooting Chart

TROUBLE	PROBABLE CAUSE	REMEDY
Excessive internal leakage	Defective packings	Disassemble and replace packings
Excessive external leakage	Bolt not properly torqued	Torque bolts to 38 \pm 2 inch-pounds
	Defective crush washer	Disassemble, replace crush washer, and retorque bolts

Table I Trouble Shooting Chart

TROUBLE	PROBABLE CAUSE	REMEDY
Piston does not stop in partially extended position as required by test.	Internal ports clogged with foreign matter	Disassemble and clean as required
	Internal spring broken	Disassemble and replace spring
Piston sticks or binds when pressure is applied to supply port	Excessive friction between the piston and springs	Disassemble and replace springs
	No lubricant on packings	Replace packings and apply lubricant
Piston does not lock automatically in fully extended position	Springs broken or defective	Disassemble and replace springs

(17) Mark cylinder assembly (decals or rubber stamp) with P/N, Name and Manufacture or Overhaul data (month-year).

5.1.2.2 Aft closure assemblies from overage motors. Aft closure assemblies removed from overage motors (unfired aft closure assemblies) shall be refurbished as follows:

- a. Identify with a "z" impression stamped next to the serial number.
- b. Remove and scrap the following items:
 - (1) "O" Rings, in accordance with AN 6227-84
 - (2) Lockwire, in accordance with 3-011771
 - (3) Weather Seal, not conforming to AF Drawing 69D30086
- c. Inspect assembly in accordance with 4.12.17
- d. If gas ports are the only defects, remove and replace, as required, per 5.2.2
- e. If spin vanes are loose or defective, reinstall loose vanes or replace defective vanes per 5.2.2
- f. If exit cone is defective, remove and replace exit cone and graphite insert, per 5.2.2. Scrap graphite insert, retain exit cone with spin vanes for possible rework.

g. If the closure insulator is defective, remove and scrap insulator, graphite insert and carbon plugs. Retain the closure assembly and exit cone with spin vanes, for rework, per 5.2.2 and 5.1.2.3; b.(1), b.(2), b.(4), b.(5), and c. through o.

h. If insulator is not removed inspect and repair the cement joint (if required) in accordance with MIL-STD-1506.

i. Serviceable exit cones shall be refurbished by weld filling all spin vane holes and rim holes and grinding them flush.

j. Retap any threads or replace any threaded inserts that are damaged, except Pressure Ports. Aft closures with out of tolerance threads or threaded inserts in the Pressure Ports shall be placed in category III.

k. Cadmium plate "O" ring grooves to 0.002 inch thickness, as required.

l. Strip paint if necessary on aft closure assembly.

m. Degrease all exterior surfaces of the aft closure and exit cone.

5.1.2.3 Aft closure assemblies from fired motors. Aft closure assemblies removed from fired motor chambers shall be refurbished as follows:

a. Identify with impression stamp "F" next to serial number.

b. Remove and scrap the following items:

(1) "O" rings, conforming to AN 6227-84

(2) Lockwire, AGC Drawing 3-011771

(3) Exit Cone (with spin vanes) AGC Drawing 3-014124

(4) Graphite Insert, AGC Drawing 3-023410

(5) Closure Insulator (with carbon plugs) AGC Drawing 3-023977

NOTE: Aft closure assembly may be heated to 400 degrees F, if required, to facilitate insulator removal.

c. Remove the adhesive by soaking in Kelite Deseal "A" or equivalent.

d. Strip paint in hot caustic bath and rinse.

MIL-STD-1505(USAF)

- e. Sandblast interior surfaces.
- f. Retap 3/8 - 24 UNF threads 4 places. Also, remove and replace any existing threaded insert.
- g. De-burr 6-5/8-8 UNS threads on neck of closure.
- h. Hydrostatic test to 2150 \pm 25 psig for one minute.
- i. Vapor degrease. Then let it dry and apply protective material to machined and applicable threaded surfaces.
- j. Perform magnetic particle inspection per MIL-I-6868.
- k. Clean and cadmium plate as required (Dalic Process) the "O" ring groove and lockwire groove to 0.0002 inch thickness.
- l. Apply phosphate coating per TT-C-490, Type I or Type III. Dry and apply protective material to machined and applicable threaded surfaces.
- m. Paint exterior surfaces, except machined surfaces, threaded holes and fin hinge holes with one coat of red oxide primer per TT-P-664.
- n. Apply MIL-C-16173, Grade 3 corrosion preventive compound to machined surfaces, as required.

o. Reassembly of closure shall be in accordance with 5.2.2.

5.1.2.4 Chamber assembly. The chamber assembly shall be refurbished as follows:

- a. Identify fired chambers by "F" and overage chambers by "Z" impression stamping next to the serial number on the aft balance lug. Where a letter "S" is found on the balance lug, obliterate the "S" identification.
- b. Remove overage propellant using a water knife or other suitable method. The tooth assembly may be removed using a water knife or by controlled heating of the forward dome.
- c. Remove the motor attach frame, umbilical support, and umbilical doubler from the chamber and identify each part with the serial number of the chamber from which they are removed.
- d. Strip the paint and primer from each part masking the four thread inserts in the motor attach frame.
- e. Prime the motor attach frame and umbilical doubler with FR 463-12-1A primer.
- f. Magnetic particle inspect the umbilical support.

g. Mask threaded holes and machined surfaces of the aft launch pad.

h. Apply in accordance with MIL-C-16173, Grade 3 corrosion preventive compound to the threads, except the aft lug pad. Apply a thin coat of primer, zinc chromate, low moisture sensitivity (MIL-P-8585) to the entire surface of the aft launch lug pad.

i. Subject the chamber to 650 ± 25 degrees F for one hour and remove the tooth assembly, AGC Drawing 3-026120 or remove tooth assembly, as stated in paragraph b.

j. Clean interior and exterior surfaces of the chamber by blasting with a mild abrasive. (See Metals Handbook, Heat Treating, Cleaning and Finishing, 8th Edition, Vol. 21). Grit is not authorized for use.

k. Inspect the chamber wall thickness in accordance with 4.12.16.1.

l. Check the security of the brackets on the head and dome and reattach if required, and remove brackets AGC Drawings 3-023431 and 3-023432 if present. Removal by bending action is prohibited. All sharp edges will be removed.

m. Hydrostatic test the chamber to 2150 ± 50 psig for one minute, at one cycle and inspect in accordance with 4.13.3.

n. Perform magnetic particle inspection of the chamber in accordance with MIL-I-6868.

o. Clean and apply phosphate coating per TT-C-490, Type 1. Touch up and rework may be accomplished in accordance with MIL-C-15328 or MIL-C-8514.

5.2 Motor buildup

5.2.1 Chamber assembly. The chamber assembly shall be built up as follows:

a. Install a new aft insulator.

b. Plug openings and mask as required to protect machined surfaces and threads. Paint the interior of the skirt and the exterior of the forward dome (including brackets) with FR 463-12-1A primer.

c. Seal the junction of the skirt and dome with a fillet of sealant, conforming to MIL-S-8802.

d. Mask as required and paint the exterior surface with red oxide primer conforming to TT-P-664.

NOTE: Two coats are required in the area covered by the heater blankets.

MIL-STD-1505(USAF)

e. Reinstall the motor attach frame, umbilical doubler, and umbilical support in accordance with AGC drawing 3-318795.

NOTE: The next larger size diameter rivets and screws may be used.

f. Drill 0.193 diameter holes four places in the motor attach frame and skirt in accordance with AGC drawing 3-318796 if required.

g. Install new nutplates on the forward dome brackets if required in accordance with DAC drawing 5685256.

h. Mask machined surfaces, threads, and the inside diameter (I.D.) of the chamber as required, install protective cap in igniter boss and sandblast aft insulator.

i. Cadmium plate (Dalic Process) the igniter boss threads, threaded hole in the umbilical support, and "O" ring machined surfaces as required. Pits in lockwire groove need not be filled.

j. Apply the liner and load the propellant in accordance with DAC Drawing DS 2497.

5.2.2 Aft closure assembly. The aft closure assembly shall be built up as follows:

a. Install the new closure insulator and Speer Graphite insert (when removed) in accordance with AGC drawings 3-038856 and 3-038887. The insert is to be flush to minus 0.003 inch from the end of the entrance cone with a maximum glue line of 0.005 inch between the insert and insulator.

b. Machine the O.D., "O" ring groove, and chamfer on the insulator in accordance with AGC drawing 3-038885 where required.

c. Install and torque the exit cone in accordance with AGC drawing 3-035529. Torque between 150 and 400 foot pounds prior to installation of the disc and set screw. A gap of 0.000 to 0.005 inch is permissible between the exit cone and graphite insert. Seal in accordance with DAC drawing 5685256.

d. Machine the insert throat and blend it to the exit cone in accordance with AGC drawing 3-035529. The insert is to be flush to minus 0.003 inch from the end of the entrance cone with a maximum gap of 0.005 inch between the insert and insulation.

e. Drill and counterbore the gas ports in accordance with AGC drawing 3-038885.

f. Drill eight holes for the spin vanes. Drill and tap sixteen rim holes in the exit cone in accordance with AGC drawing 3-035529.

g. Install the spin vanes in accordance with AGC drawing 3-035529.

h. Install the 3-014132 carbon plugs in accordance with AGC drawing 3-038887.

i. All joints shall be caulked.

j. Clean and paint using red oxide primer conforming to TT-P-664.

k. Install the weather seal AF69D30086 in accordance with AF drawing 67D29226 using (PR 1422) Class B 1/2 or B2 sealant conforming to MIL-S-8802.

l. Apply MIL-C-16173, Grade 3 corrosion preventive compound to machined surfaces, as required.

5.2.3 Motor assembly. The motor assembly shall be built up as follows:

a. Install AN6227-84 "O" rings on the 3-035529 closure assembly. Coat the "O" rings with MIL-S-8660, DC4 silicone grease.

b. Mask the aft area of the chamber (where sealant is to be applied) and install the aft closure. Install AGC Drawing 3-023449 igniter boss plug in accordance with AF drawing 68C33100, with preformed packing conforming to 68C33313.

c. Remove the masking from the chamber and seal chamber in accordance with DAC Drawing 5685256.

d. Install the heater blankets per DAC drawing 5606200 using MIL-S-8802 (PR 1422) Class B-1/2 or B-2 sealer. Included shall be a 1/8 inch continuous bead of sealant applied around the forward and aft ends of the heater blankets.

e. Paint the interior of the skirt and exterior of the forward dome with Gray FR Topcoat 443-3-2 (FED-STD-595, Color Number 36440).

f. Install motor electrical, batteries and switches per drawing 68J33003. Test in accordance with drawing 68A33004.

NOTE: Only new preformed packing, P/N AN900-10 shall be used in the assembly of the motor initiating switch.

g. Install the fins, flaps and actuators, and test in accordance with DAC Drawing 5607579.

NOTE: With the actuator cylinder fully extended (lock position), move the fin inward until resistance is met (bearing pin, etc, play removed). Then adjust the rocket fin indentation line and the rocket flap mating edge approximately parallel by visual inspection.

MIL-STD-1505(USAF)

h. Install the nozzle fairings and the fin fairings in accordance with DAC Drawing 5685242.

i. Install the ballast weights on the SR49-TC-1 Rocket Motor in accordance with AF Drawing 67D29284.

j. Inspect the paint on the aft launch lug pad and repair as required. Mask the top surface prior to application of finish paint.

k. Paint the exterior surfaces with white lusterless enamel in accordance with TT-E-516, color 37875 (FED-STD-595). Markings shall be in accordance with DAC Drawing 5685242. Add a painted strip at the front edge of the forward skirt to comply with the requirements of MIL-STD-709.

l. Perform the fin pull test IAW the DAC drawing 5685242.

m. Final acceptance inspection shall be IAW DAC Drawing 1A97538. The motor attach frame shall be checked by page IGP3 5685242.

NOTE: If the gage does not fit freely, check the bolt holes (4 places). The holes may be enlarged to 0.414 inch in diameter. Recheck with the gage.

n. Tie the fins per Air Force drawing 66D37667.

o. Install the launch lugs, forward and aft. Torque the forward lug bolts to 120 ± 20 inch pounds and dye mark the assembly. Align the aft launch lug at a 90 degree $\pm 1/2$ degree angle to the longitudinal axis and to the nearest 11/16 inch between the lower lug surface and the pad surface. Torque the check nut to 105 inch pounds and dye-mark the complete assemblies (lug to check nut and check nut to assembly pad).

p. The rocket motor shall be prepared for delivery in accordance with MIL-STD-794, except that exterior type shipping containers shall be furnished GFP.

q. Marking of the container for shipment and storage shall be in accordance with MIL-STD-129, ICC Regulations Tariff Number 15 and AFM 71-4.

r. An identification decal shall be provided in accordance with AF Drawing 68C33001.

Custodian:
Air Force - 70

Preparing activity:
Air Force - 70

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