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PERFORMANCE SPECIFICATION

TESTER, UNIVERSAL RECEPTACLE, AERIAL REFUELING

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

1. SCOPE

1.1 Scope. This specification covers a type of universal aerial refueling receptacle ground tester (UARRGT) to be used in functionally testing receiver aircraft using the boom-receptacle method of aerial refueling.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents. The following documents of this issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

TT-S-735	Standard Test Fluids; Hydrocarbon

DEPARTMENT OF DEFENSE

MIL-PRF-94/3	Resistor, Variable, Composition General Specific Style RV6
MIL-L-3661	Lampholders, Indicator Lights, Indicator-Light Housings, and Indicator-Light Lenses, General Specification for

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Technology & Industrial Services Division, SA-ALC/TIRDM, Kelly AFB, TX 78241-5609 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FS4920

MIL-M-10304/32	Meter, Electrical Indicating, Panel Type, Ruggedized; Voltmeter, DC (Flush Mounting, Round Flange, 1 inch), Styles, 05, 06, and 07
MIL-PRF-23377	Primer Coating: Epoxy, High-Solids
MIL-A-25896	Adapter, Pressure Fuel Servicing, Aircraft, Nominal 2-1/2 Inch Diameter
MIL-R-27521	Receptacle, Flying Boom, Aerial Refueling
MIL-L-3661/35	Lenses, Indicator Light, Watertight, Style Lc3
MIL-L-3661/47	Lampholders, Housing, Indicator-Light, Watertight, Style LH89
MIL-S-38449	Signal And Signal/Intercommunication Amplifiers, Universal, Aerial Refueling
MIL-C-5015	Connectors, Electrical, Circular Threaded, AN Type, General Specification for
MIL-PRF-5624S	Turbine Fuel, Aviation, Grades JP-4, JP-5, and JP-5/JP-8 ST
MIL-N-5877	Nozzle, Pressure Fuel Servicing, Locking, Type D-1, D-1R, D-2 and D-2R, Nominal 2-1/2 Inch Diameter
MIL-PRF-7024	Calibrating Fluids, Aircraft Fuel System Component
MIL-T-83133	Turbine Fuels, Aviation, Kerosene Types, NATO F-34 (JP-8) and NATO F-35
MIL-H-83511(2)	Headset Microphone And Headset Electrical (Medium Nose Attenuation, Hearing Protective), General Specifications For
MIL-H-83511/2	Headset - Microphone, H-157A/AIC
MIL-PRF-85285C	Coating: Polyurethane, High-Solids
MIL-C-8605	Cap; Pressure Fuel Servicing
MIL-F-8615(2)	Fuel System Components, General Specification for (ASG)
MIL-A-8625F	Anodic Coatings for Aluminum and Aluminum Alloys
MIL-S-8834F(4)	Switch, Toggle, Positive Break General Specification for

STANDARDS

FEDERAL

FED-STD-595B	Colors Used in Government Procurement

DEPARTMENT OF DEFENSE

MIL-STD-130	Identification Marking of US Military Property
MIL-STD-464	Electromagnetic Environmental Effects Requirements For Systems
MIL-STD-785	Reliability Program for Systems and Equipment Development and Production
MS24484J	Adapter, Pressure Fuel Servicing, Nominal 2.5 Inch Diameter
MS25384C	Electrostatic Discharger Jumper, Fuel Nozzle-To-Aircraft
MS27604	Nozzle-Universal Aerial Refueling Tanker Boom
MS29520	Envelope Dimensions Nozzle, Pressure Fuel Servicing Locking Aircraft, Type D-1, D-1R, D-2 and D-2R
MS29526E	Cap-Pressure Fuel Servicing, Nominal 2-1/2 Inch Diameter Non-Flush Type
MS3106D	Connector, Plug, Electric, Straight, Solder Contacts, AN Type
MS8005C	Hose Assembly Permanently Attached Fittings, Tetrafluoroethylene High Temperature,
MS90310	Switch, Toggle, Positive Break, Miniature, Toggle Sealed, Solder Lug, Single Pole, 469 Mounting Bushing

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available for the Standardization document Order Desk, 700 Robbins Avenue, building 4D, Philadelphia, PA 19111-5094).

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification, to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

DRAWINGS

XAR INDUSTRIES 7034 RECEPTACLE, UNIVERSAL, UARRSI

GUIDE SPECIFICATION

AFGS-87154A FUEL SYSTEMS GENERAL DESIGN SPECIFICATION FOR

2.3 Non-Government publications. The following document forms a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

Aerospace Recommended Practice

SAE-ARP 868 Pressure Drop Test for Fuel system Components

(Application for copies should be addressed to the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the reference cited herein, the text of this document takes precedence. Nothing in this document, however, supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First Article. First article testing is required unless otherwise specified.

3.2 Components. The tester and its container shall consist of the following components which shall be integral or included parts of the assembly:

Tester

a. Universal Aerial Refueling (AR) Nozzle
b. Nozzle Dust Cover
c. Pressure Fuel Servicing Adapter
d. Adapter Dust Cap
e. Body (Reducer) with Bleed Valve Provisions
f. Handle Assembly
g. Electrical box
    (1) Oscilloscope connector
    (2) Telephone jack or other suitable headset connection
    (3) Electrical harness and connector
    (4) Recharging connection
    (5) On-off/reset switch
    (6) Voltmeter and voltage switch
    (7) Indicator lights
    (8) Intercommunication switch
    (9) Signal switch
    (10) Signal amplifier
    (11) 28-Volt (28V) rechargeable batteries (nickel-cadmium sealed)
    (12) Headset amplifier with volume control
    (13) Battery charger
h. Bleed Valve Assembly

Container

a. Battery Charging Harness
b. Charging Indicator Light - (Incorporated in Electric Box Item #14)
c. Pedestal/Sliding Valve Assembly Removal Tool
d. Headset, Adapter, Cable

3.3 Materials and manufacturing processes. All materials and processes used in the manufacturing of the tester and the tester container shall be resistant to fuel conforming to MIL-T-5624(JP-4), MIL-T-83133 (JP-8), or to fluid conforming to TT-S-735 (types I and III having an aromatic content from 0 to 30 percent), or to fluid conforming to MIL-C-7024, Type III, calibrating fluid, where environmental testing with aromatics is not required. The use of magnesium and copper or alloys of either of these metals is prohibited. Teflon shall not be used for gaskets, seals or packings in any location where an impact load is encountered. Castings shall be capable of withstanding the structural loads as specified in 3.5.11 and shock loads of 4.4.12.1

3.4 Design. The tester shall be designed to engage with a boom receptacle slipway installation conforming to MIL-R-27521 and MIL-F-87154. The opposite end shall permit the engagement of a Type D-1 nozzle, conforming to MIL-N-5877 and MS29520, for fuel transfer. Upon engagement by ground personnel, the tester shall be held in place by the hydraulic toggles of the receptacle. The use of the tester shall permit checking of the electrical circuitry, the intercommunications capability via use of the headset/headset amplifier and the receptacle induction coil, and the function of the receptacle toggles and contact and latch switches. Use of the tester shall also permit transferring of fuel to perform leakage checks and other related receptacle and aerial refueling system checks. Maximum envelope size and angular relationship shall be in accordance with Figure 1. The tester shall include a fluid bleed valve, which allows evacuation of air from the unit prior to usage. A drain hose shall be provided. Also provided will be a utility carrying handle, attached to the body and handle assembly. (3.6.6).

3.4.1 Finish. All aluminum-alloy parts shall be anodized or adequately treated in some other acceptable manner for corrosion prevention. The nozzle head (MS27604) shall be hard-coat anodized. The pedestal/sliding valve assembly removal tool (3.6.26) shall be non-dyed red and utility carrying handle which shall be dyed black. Steel parts, not in moving contact with other parts, shall be chrome plated or adequately treated in some other acceptable manner for corrosion prevention. Cadmium plating shall not be used. Corrosion-resisting steel parts shall be passivated. The electrical box (3.6.10) shall be electrodeposited, tin lead or solder dip plating, using matte reflow or flow brightened finish procedure.

3.4.2 Paint. Areas which require paint, except for the electrical box, shall receive two coats of zinc chromate primer for aluminum surfaces. The finish paint shall be semigloss or lusterless. The tester shall be color coded to indicate fuel use. The electrical box shall be primed per MIL-P-23377, Type 1, Class 1, and painted with FED-STD-595. No paint shall be permitted in areas where it could be introduced into the fuel passage.

3.5 Operating requirements. The tester shall be capable of operating under the following conditions and be capable of meeting the following requirements:

3.5.1 Dielectric Strength. The tester electrical system and induction coal shall be capable of withstanding a surge of 1,000Vrms, 60 Hz, between test points for 1 minute.

3.5.2 Noise Susceptibility. The tester shall not advance from READY to CONTACT or from CONTACT to DISCONNECT when the signal leads are subjected to high-frequency noise bursts (broad band RF) for a maximum time duration of one millisecond and a minimum voltage amplitude of 200V peak-to-peak. These bursts are generally associated with the actuation of reactive solenoids.

3.5.3 Fuel Pressure and Leakage. The tester shall be capable of withstanding operating, proof, and burst pressures of 120, 240, and 360 lbs per square inch gage (psig) respectively under the conditions specified herein. There shall be no fuel leakage during any pressure and transfer conditions except during disconnects. The leakage during a normal disconnect without pressure shall not exceed 25 cubic centimeters (cc). The leakage during disconnects initiated under pressure shall not exceed 50 cc.

3.5.4 Pressure Drop. The pressure drop shall not exceed 18 psig, at a fuel flow of 600 gallons per minute (gpm), when the tester is engaged with the receptacle and the D-1 refueling nozzle is connected to the tester.

3.5.5 Fuel Resistance and Extreme Temperature. The tester shall withstand the fuel resistance and extreme temperature test as specified herein without fuel leakage or malfunction.

3.5.6 Contaminated Fuel Endurance. The tester shall withstand the contaminated fuel endurance test as specified herein without fuel leakage or malfunction.

3.5.7 Endurance. The tester shall be capable of operating for 5,000 cycles as specified in Section 4, without deterioration, deformation, corrosion, fuel leakage, or malfunction.

3.5.8 Compatibility. The tester shall be capable of meeting all performance requirements when engaged with the various receiver aircraft using the boom receptacle method of aerial refueling.

3.5.9 Bonding. The tester shall meet the requirements of MIL-B-5087 and this specification when tested as specified herein.

3.5.10 Induction Coil. The induction coil shall withstand immersion in fluid conformation to TT-S-735, types I and III, without disintegration or deterioration and shall be capable of meeting the dielectric strength requirements specified herein after such immersion.

3.5.11 Structural Requirements. The tester shall be capable of withstanding the following loads:

a. Tension limit load, body and nozzle - 3,000 lbs.
b. Bending limit load, handles and structural attach points - 3,000 lbs.
c. Compression limit load, nozzle - 6,000 lbs.

NOTE: The tester shall be capable of withstanding the bending limit load applied to the outermost end of each handle. Any structural attach points shall also be capable of withstanding the 3,000-pound tension limit load. The nozzle striker plates and nozzle tip shall be capable of withstanding the compression limit load.

d. Tension, compression, and bending limit loads; elbow and index handle assembly - 1,000 lbs.

NOTE: The tester shall be capable of withstanding the tension, compression, and bending limit loads when applied separately at the center of the elbow openings as follows: (1) Tension and compression loads applied in a direction parallel to the centerline of the elbow, and (2) Bending loads applied perpendicular to the centerline of the elbow and, by indexing the elbow assembly, in the three directions producing the greatest bending loads on the elbow.

3.5.12 Temperature and altitude. The tester shall be capable of operating at temperature ranges of -40 to 70°C (-40° to 160°F); -40° to 66°C (-40° to 150°F) for battery pack with reduced operating time below 0°F and altitudes from 0 to 10,000 feet.

3.6 Interface Requirements.

3.6.1 Weight. The total weight of the tester including the components described in 3.2 shall not exceed 25 lbs. The weight of the container, or of the pedestal/sliding valve assembly removal tool, shall not be included in this total.

3.6.2 Nozzle, Universal. The receptacle mating portion of the tester shall consist of a nozzle head assembly in accordance with MS27604. The tester shall incorporate a mounting flange with bolt circle in accordance with MS27604 which will accommodate the nozzle head assembly. The nozzle latching grooves, poppet latching grooves, poppet valve assembly, and the nozzle body shall be dimensionally and functionally comparable with the

flying boom nozzle head assembly. The nozzle poppet comparable with the flying boom nozzle head assembly. The nozzle poppet (spring loaded with dashpot for dampening surges) shall provide a positive shutoff when the tester is disconnected from the receptacle. Fuel leakage during any disconnect condition shall not exceed that specified herein. The same poppet, when opened, shall provide a flow path for fuel transfer.

3.6.3 Nozzle Dust Cover. A dust cover compatible with the MS27604 nozzle diameter shall be provided for the fuel outlet end of the tester. The dust cover shall be attached to the main body of the tester by a cable assembly. The cable shall in no way interfere with the tester performance or its operation.

3.6.4 Pressure Fuel Servicing Adapter. A 2-1/2 inch diameter fuel servicing adapter conforming to MS24484-2 and selected from the qualified products list (QPL) of MIL-A-25896 shall be installed on the tester on the opposite end from the MS27604 nozzle. The adapter shall be located in an elbow assembly of the tester which has 360° of swivel motion to allow 30° increment indexing of the adapter. The adapter and envelope in and around the elbow assembly shall be compatible with the D-1 (MIL-N 5877/MS29520) nozzle installed and during normal operation of the D-1 nozzle.

3.6.5 Adapter Dust Cap. A dust cap conforming to MIL-C-8605 and MS29526-1 shall be provided for installation on the adapter. See figure 1 for location relationship.

3.6.6 Elbow (30°) and Index Handle Assembly. The elbow and index handle assembly, located between the adapter and the main body (reducer), shall provide 360° of swivel motion and shall index at 30° increments starting with 0° (12 o'clock position). The elbow shall include a 3/8-inch drain plug located at the 6 o'clock position when the index angle is at the 12 o'clock position. The index handle shall be capable of being manually held in an unlocked position while the elbow is repositioned by the operator to the desired adapter location for easy D-1 nozzle installation. The desired indexing and locking shall prevent any movement greater than 1/16 inch of the elbow/adapter in relation to the body. See figure 1 for location and angular relationship relative to the tester body. The load required to twist the elbow with respect to the body shall be not less than 5 inch-pounds (in-lb) nor greater than 30 in-lb of torque

3.6.7 Body and Handle Assembly. The tester body shall provide the fuel flow path from the D-1 nozzle adapter to the mounting flange for the MS27604 nozzle. The body shall also provide for the structural mounting of handles for nozzle insertion, a mounting pad for the electrical box, and a structural kick pad to protect the electrical box and its components. The handle, in conjunction with the restraining device (see 3.6.25), shall also function as levers for inserting the tester into receptacles designed to make use of this function. This function shall not affect the tester's operation in other types of receptacle installations. The handles shall be installed in a horizontal plane passing through the nozzle centerline and normal to the edges of the kick pad. The edges of the kick pad shall incorporate two receptacles (labeled GND) for inserting the D-1 nozzle the body and nozzle flange centerline shall be 13 degrees, 30 minutes, plus or minus 30 minutes (see Figure 1). The body shall include a spool valve which is lever activated and may be replaced as an entire assembled unit. The body shall also include a drain fitting, with sealing cap, for a separate drain hose. The hose shall be of the MS8005-4C type, with a length of 10 feet. The hose end fittings shall include dust caps or plugs. A utility carrying handle shall be attached to the body with pivotal mountings which permits folding for storage.

3.6.8 Electrical Requirements. The electrical components of the tester shall operate on 18 to 30V, nominally 28V DC power. All electrical components, materials, and wiring practices shall be fuel-resistant. Connectors shall be in accordance with MIL-C-5015.

3.6.9 Bonding. Electrical components metallic structures, with the exception of the induction coil core, shall be bonded and the electrical components shall be bonded to the tester.

3.6.10 Electrical Box and Electrical Interface System. The electrical system shall be in accordance with the electrical schematic contained in Figure 2. The top of the electrical box shall display the indicator lights, power switch, charge light and voltmeter. The side of the electrical box shall be equipped with connectors to mate with

an induction coil, the AC power cord, and headset Type H-157/AIC, in accordance with MIL-H-83511/2. Oscilloscope connections via two tip jacks, shall also be located on the side. The electrical box shall be environmentally sealed, and seals and gaskets shall be fuel-resistant. The parts external to the box shall be resistant to fuel spray.

3.6.11 Induction Coil. The induction coil shall be compatible with the MIL-R-27521 receptacle induction coil and designed and located in accordance with MS27604. The pole faces shall be protected from corrosion with one coat of clear urethane. Coil installation or replacement shall not require potting or special tools and shall be accomplished in a minimum of time.

3.6.12 Signal Receiving. The tester induction coil shall receive a positive transient voltage pulse of not less than 7.5V, nor more than 30V, when the tester nozzle is in the seated position and the receptacle induction coil receives an 18V to 30V pulse.

3.6.13 Signal Sending. The tester induction coil shall induce a positive transient voltage of not less than 7.5V and not more than 30V when the tester nozzle is in the seated position and the tester coil receives an 18 to 30V pulse by activation of the signal switch.

3.6.14 Induction Coil Terminal Identification. The polarity of the induction coil terminals shall be clearly and permanently identified by stamping, engraving, or with a securely attached nameplate, with engraving being preferable.

3.6.15 Voltmeter and Voltmeter Switch. The voltmeter shall meet the requirements of MIL-M-10304/32, and full scale shall read 30V with 2V divisions. The voltmeter shall measure the voltage supplied by the power pack to the circuits of the electrical box. A control to switch the voltage from 18-19V to 29-30V shall be provided adjacent to the voltmeter, and so designated on the face of the electrical box. The control shall be in accordance with MIL-S-8834 (MS90310-231).

3.6.16 Indicator Lights. Three indicator lights in accordance with MIL-L-3661/35 and /47 shall be provided. The lights shall be positioned, color coded, and labeled from left to right on the tester electrical box in the following order:

Blue	-	READY
Green	-	CONTACT MADE
Amber	-	DISCONNECT

The lights shall incorporate transparent lenses color coded as above. See figure 2 for electrical interface with the tester.

3.6.17 Intercommunication Switch. A switch shall be provided which shall permit the tester operator to converse with personnel inside the aircraft using the aircraft intercommunication system. It shall be labeled “TALK”.

3.6.18 Signal Switch. A signal (test) switch shall be provided which shall permit advancing the signal amplifier from READY to CONTACT (test) to disconnect in single-step functions by applying power to pin 6. The switch shall be a double-throw, single-pole switch spring loaded to a neutral position. The two positions shall be designated CONTACT (TEST) and DISCONNECT.

3.6.19 Signal Amplifier. The tester shall incorporate a P/N MS 38449-4 signal amplifier (or the equivalent thereof) selected from the Qualified Products List (QPL) of MIL-S-38449. The plug, if used, which connects the tester electrical circuits to the signal amplifier’s electrical receptacle shall be in accordance with MIL-C-5015. The signal amplifier, or the equivalent there-of, shall be contained within the electrical box of the tester.

3.6.20 Rechargeable Batteries. The batteries shall be of the rechargeable sealed nickel-cadmium type and shall provide nominal 28V to the tester power monitor (see figure 2). The batteries shall be capable of 1-hour continuous operation from a fully charged condition between -18°C and 52°C (0° and 125°F). Reduced operating time of at least 15 minutes is acceptable between -40°C to -18°C (-40°F to 0°F) and 52°C to 66°C (125°F to 150°F). A positive method of connecting the batteries to the tester shall be provided.

3.6.21 Battery Charger/Power Monitor. A charger capable of restoring the batteries to full charge in 4 hours after 1 hour's operation shall be included in the unit. The charger shall operate from 115V AC, 60 Hz. The charge light shall illuminate whenever charging is occurring. A power monitoring circuit shall be included to prevent short circuit or deep discharge of the batteries. This circuit shall shut off power to the electrical box when the terminal voltage of the battery drops too low for continued operation.

3.6.22 Headset Amplifier. A headset amplifier or equivalent with volume control shall be provided within the electrical box and electrically installed as shown on figure 2. If required, the wiring shall be shielded between pins of the signal amplifier and the headset amplifier. The signal amplifier shall be a Data Products New England, Inc. P/N 2119 or equivalent. The volume control knob shall be labeled VOLUME and the potentiometer shall be per MIL-PRF-94/3 or equivalent.

3.6.23 Container. The container shall be constructed of a material suitable for permanently housing the tester. The tester shall be positively held in place within the container when the container is held or placed in any position. The container shall meet the requirements of paragraph 4.4.13,, and this specification. The case shall be constructed of aluminum, plastic or a combination resin bonded material. All corners shall be rounded with at least ¼ radius. The cases shall be provided with quick-opening spring loaded or pull-down tension type latches. The main portion of the latch shall be on the case body and the smaller portion of the case cover. The latch shall be protected from damage by contact with other objects. Figure 1 shall be used for sizing the container. An electrical power cord shall be contained within the container. The cord shall be a minimum of 6 feet long. On one end, a standard 60 Hz, 115V AC plug shall be provided. The other end shall mate with the electrical box's charge connector. Charging shall be accomplished by plugging the electrical test box when the switch marked POWER is in the OFF/Recharge position. Recharging shall only take place between 4°C and 38 °C (40°F and 100°F).

3.6.24 Grounding Cable. A grounding cable in accordance with MS25384-1 (except that no ferrous materials shall be used), with grounding plugs on each end shall be provided. A minimum length of 10 feet shall be required.

3.6.25 Adjustable Restraining Device. A restraining device shall be provided for securing the tester to those receptacles capable of accepting it. The restraining device shall insert the nozzle into the receptacle when the tester's handles are actuated; and shall prevent the forcible ejection of the tester from the receptacle in case of inadvertent disconnect while under fuel pressure. The restoring device shall be infinitely adjustable from a minimum distance of 6 inches to a maximum distance of 3 feet. It shall be designed to interfere with those receptacles incorporating attachment points, in accordance with or equivalent to, those defined on AIR Dwg-7034. The restraining device shall be capable of withstanding the structural test of 4.4.11.5.

3.6.26 Pedestal/Sliding Valve Assembly Removal Tool. A removal tool shall be provided for removing the pedestal/sliding valve assembly for those receptacles having the capability of removing these parts from the front of the receptacle.

3.6.27 Headset Adapter Cable. A cable shall be provided to adapt the H-157/AIC headset to the tester electrical box. The adapter cable shall be equipped with a push-to-talk switch and the other end terminating in an electrical connector plug in accordance with MS3106A-16S-1P.

3.7 Support requirements verification.

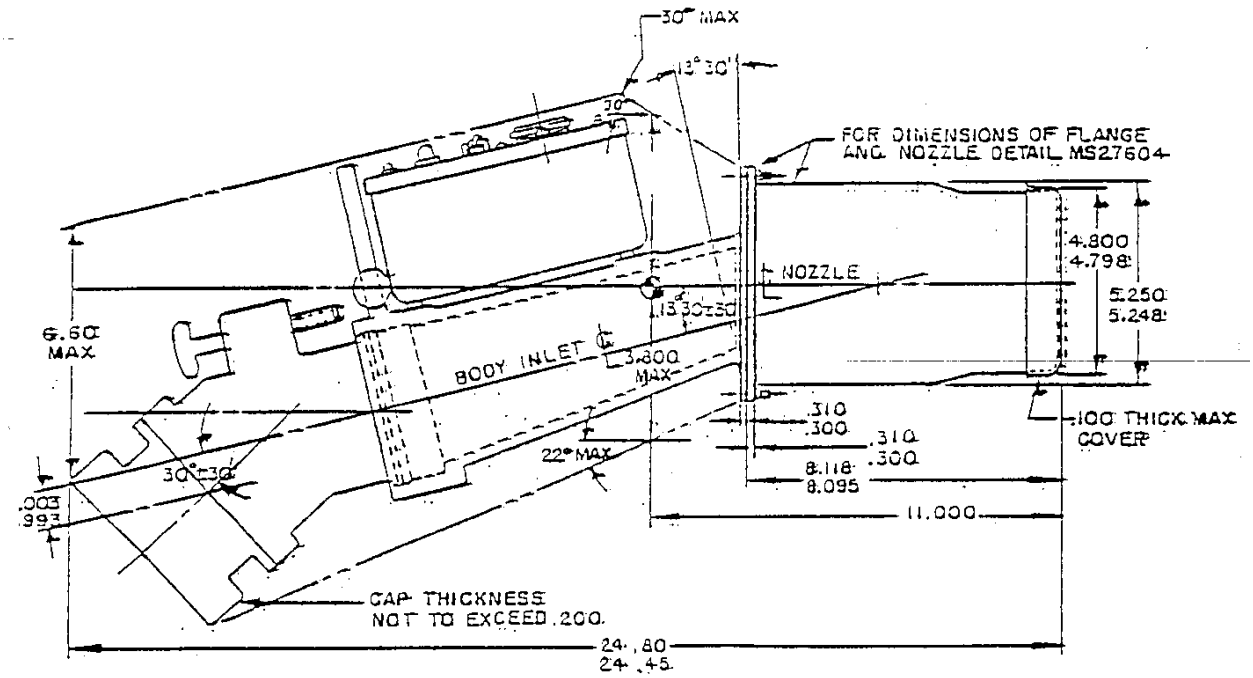


FIGURE 1. Tester (UARRGT). (drawing 1 of 2)

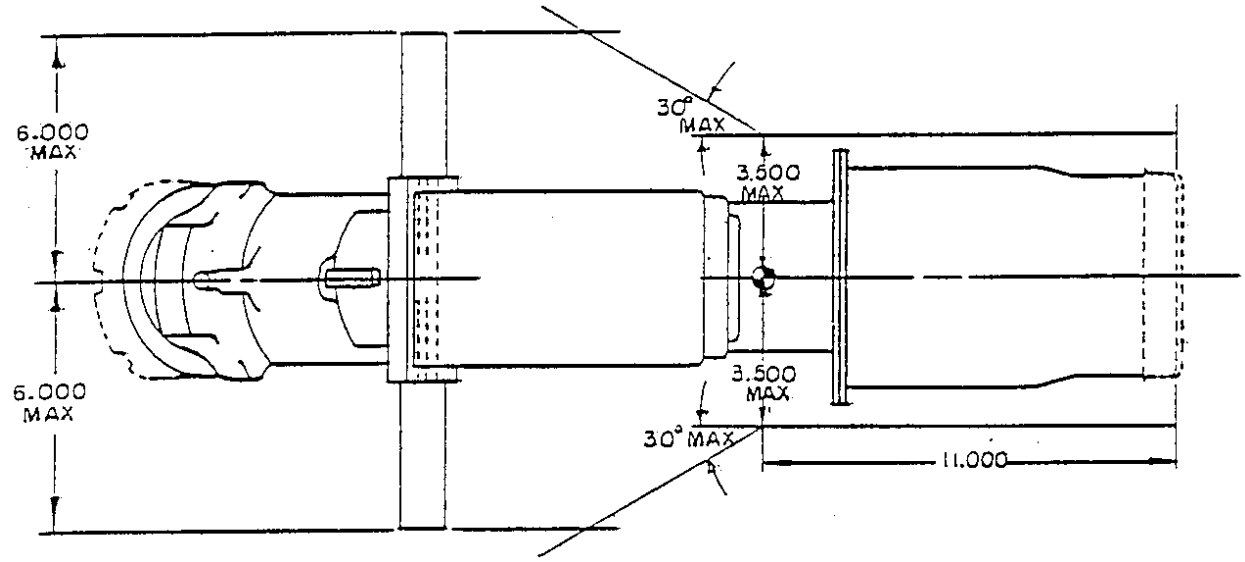


FIGURE 1. Tester (UARRGT). (drawing 2 of 2)

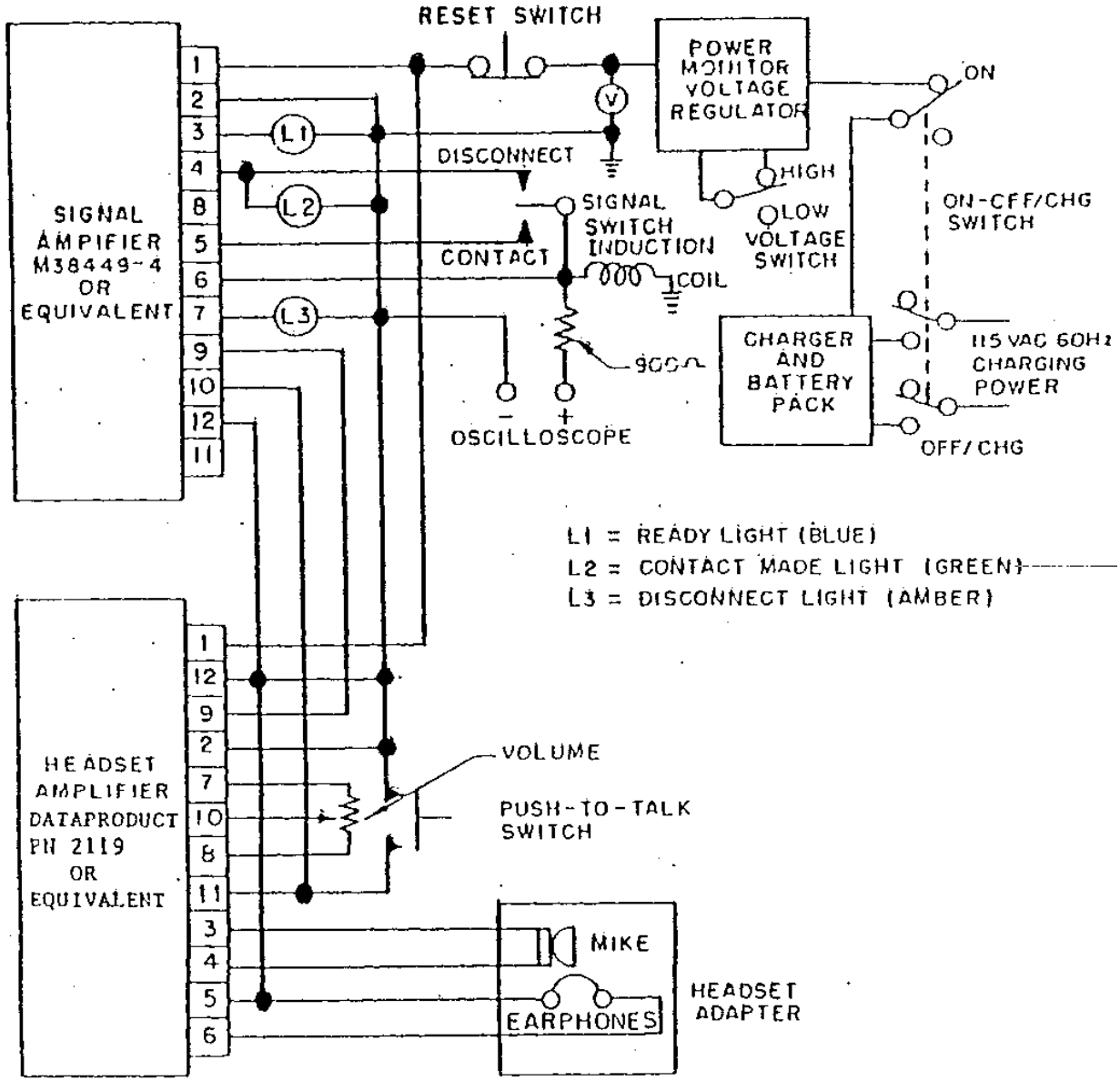


FIGURE 2. Tester Electrical Schematic

3.7.1 Reliability. The preproduction tests specified herein are representative of the total life cycle of the tester. Malfunction or unsatisfactory performance of the tester during preproduction testing shall not be permitted. If such conditions occur, retesting shall be required. Since any failures or unsatisfactory performance encountered during the test program may be corrected by retesting with satisfactory results, the total reliability of the tester may be analytically determined in accordance with MIL-STD-785.

3.7.2 Safety inspection. The tester shall be inspected for burrs, nicks, sharp edges, foreign materials, or other imperfections that pose physical danger to the operator.

3.8 Operating environmental requirements. The tester shall be capable of operation after being subjected to the following environmental conditions without degradation in performance.

3.8.1 Shock. After severe shock.

3.8.2 Corrosion resistance. After corrosion resistance testing of MIL-F-8615.

3.8.3 Humidity. After 95% relative humidity.

3.8.4 Dust (fine sand). Following exposure to a dust laden atmosphere.

3.8.5 Fungus. When encountering tropical climates and fungi.

3.8.6 Explosive atmosphere. Following explosive atmosphere tests.

3.8.7 Container tests. Tests as specified in paragraph 4.4.13.

4. VERIFICATION.

4.1 Classification of inspections. Inspection requirements specified herein are classified as follows:

a. First article inspection.
b. Conformance inspections.

4.1.1 First article inspection. First article inspection shall be performed on the initial production ready production-representative units of an order or when required by the contract. When a first article inspection is required (see 6.2), it includes all verifications listed in para. 4.3.

4.1.2 Conformance inspection. Conformance inspection shall be the following examinations and tests:

a. Examination of product (4.4.1)
b. Functional (4.4.2)
c. Dielectric strength and noise susceptibility (4.4.3)
d. Proof pressure (4.4.4)
e. Fuel leakage (4.4.5)
f. Bonding (4.4.15)

4.2 Test Conditions.

4.2.1 Atmospheric Conditions. Unless otherwise specified, all tests required by this specification shall be conducted at room temperature between 16 and 32°C, at a barometric pressure of 28 to 32 inches of mercury, and at a relative humidity of 80 percent or less. Where tests are substantially different from the above values, proper allowance shall be made for the change in instrument reading.

4.2.2 Fuel. Unless otherwise specified, testers shall be tested with MIL-T-5624, JP-4 fuel at a temperature of 16° to 32°C (60° to 90°F). Alternate test fluid conforming to MIL-C-7024, Type III, calibration fluid, may be used, except where environmental testing with aromatics is required.

4.2.3 Attitude. Unless otherwise specified, the tester (receptacle installed) shall be tested at 30° with the horizontal.

4.2.4 Temperature Measurement. Unless otherwise noted, all specified temperatures shall be verified by thermocouple at a suitable location on the test sample, or the sample shall be soaked at the specified temperature for 48 hour prior to testing and maintained at that temperature for the test duration.

4.3 First article tests. The contractor shall submit a test outline, procedures, and test setups to the procuring activity (see 6.2). Upon receipt of written approval from the procuring activity, the contractor may then proceed with the testing. The tests shall be conducted in the order listed, unless otherwise specified in the test procedure:

a. Tester sample No. 1
   (1) Examination (4.4.1)
   (2) Functional (4.4.2)
   (3) Dielectric Strength and Noise Susceptibility (4.4.3)
   (4) Proof Pressure (4.4.4)
   (5) Fuel Leakage (4.4.5)
   (6) Pressure Drop (4.4.7)
   (7) Fuel Resistance and Extreme Temperature (4.4.8)
   (8) Contaminated Fuel Endurance (4.4.9)
   (9) Endurance (4.4.10)
   (10) Structural Strength (4.4.11)
   (11) Burst Pressure (4.4.6)
   (12) Disassembly and Inspection (4.6.16)

b. Tester sample No. 2
   (1) Examination of Product (4.4.1)
   (2) Functional (4.4.2)
   (3) Dielectric Strength and Noise Susceptibility (4.4.3)
   (4) Proof Pressure (4.4.4)
   (5) Fuel Leakage (4.6.5)
   (6) Corrosion Resistance (4.4.12.2)
   (7) Humidity (4.4.12.3)
   (8) Fungus (4.4.12.6)
   (9) Dust (Fine Sand) (4.4.12.4)
   (10) Explosive Atmosphere (4.4.12.7)
   (11) Shock (4.4.12.1)
   (12) Bonding (4.4.15)
   (13) Disassembly and Inspection (4.4.16)

c. Container Sample No. 1
   (1) Container Tests (4.4.13)

d. Tester Sample No. 3 and Container Sample No. 2
   (1) Compatibility (4.4.14)

e. Induction Coil (4.6.17)
   (1) Dielectric Strength (4.4.3.1)

f. Pedestal/sliding Valve Assembly Removal Tool (3.6.26)

4.4 Requirements verification

4.4.1 Examination of Product. Each tester or component thereof shall be inspected to determine conformance to dimensional requirements in accordance with applicable drawings and to the requirements of this specification with respect to material, weight, marking, use of the specified connectors, finish, workmanship, and any other design criteria not covered by a specified test. Photographs shall be taken of assembled and disassembled (exploded view) testers.

4.4.2 Functional test. The functional test shall be conducted with a boom receptacle, as specified in 3.4. The receptacle shall be installed in a suitable test fixture incorporating an electrical system conforming to Figure 3. The hydraulic power applied to the receptacle's latch actuator shall be 3,000 psig nominal. The following tests shall be conducted first with the tester's electrical box voltage switch set for high voltage (30V nominal), and then the tests shall be repeated at low voltage (18V nominal). As the sequence of operations proceeds, the illumination of the indicator lights on the receptacle test control panel shall correspond with the indicator lights on the tester's electrical box.

a. Discharge the tester batteries until the power monitor cuts off. Recharge the batteries using the container recharging cord connected to a standard 115V, 60 Hz, AC power source. Recharge the batteries for a minimum of 240 minutes. The voltmeter shall indicate 26-30V. Tests specified in subparagraphs below shall be conducted satisfactorily without recharging the unit. Upon termination of the tests, the battery voltage shall be nominal 28V (24V-30V).
b. Turn power on with the ON-OFF/RECHARGE switch and check that the BLUE indicator READY light is illuminated.
c. Insert the tester into a boom receptacle and check that the BLUE READY light is extinguished and the GREEN CONTACT light is illuminated.
d. Disconnect the tester using the signal switch and check that the GREEN CONTACT light is extinguish and the AMBER DISCONNECT light is illuminated.
e. Remove the tester and reset the tester amplifier by actuating the reset switch. Check that the BLUE READY light is illuminated and the AMBER DISCONNECT light is extinguished. With the tester out of the receptacle, press the CONTACT/DISCONNECT switch to CONTACT and check the light sequence as specified in 4.4.2c. Press the CONTACT/DISCONNECT switch to DISCONNECT and check the light sequence as specified in 4.4.2d.
f. Connect an oscilloscope to the oscilloscope jacks on the tester electrical box. A permanent record, oscillograph, or oscilloscope picture shall be made under the following conditions, with the tester re-inserted in the receptacle:

(1) Normal alignment: Connections as shown on Figure 4, test 4B, using 18V DC nominal and then 30V DC nominal. Connections as shown on Figure 4, test 4A, using 18 volts DC nominal and then 30V DC nominal. The tester shall meet the voltage requirements of 3.6.5.

(2) Clockwise misalignment of centerline of Boom Coil to receiver coil, maximum air gap: Connections as shown on Figure 4, test 4B, using 18V DC nominal and then 30V DC nominal. Connections as shown on Figure 4, test 4A, using 18V DC nominal and then 30V DC nominal. Use a maximum air gap of 0.060 inch. The tester shall meet the voltage requirements of 3.6.8.

(3) Counterclockwise misalignment of centerline of boom coil to receiver coil, maximum air gap: Connections as shown on Figure 4, test 4B, using 18V DC nominal and then 30V DC nominal. Connections as shown on Figure 4, test 4A, using 18V DC nominal and then 30V DC nominal. The tester shall meet the voltage requirements of 3.6.8.

g. The AR intercommunications amplifier circuitry of the signal amplifiers shall be checked by connecting

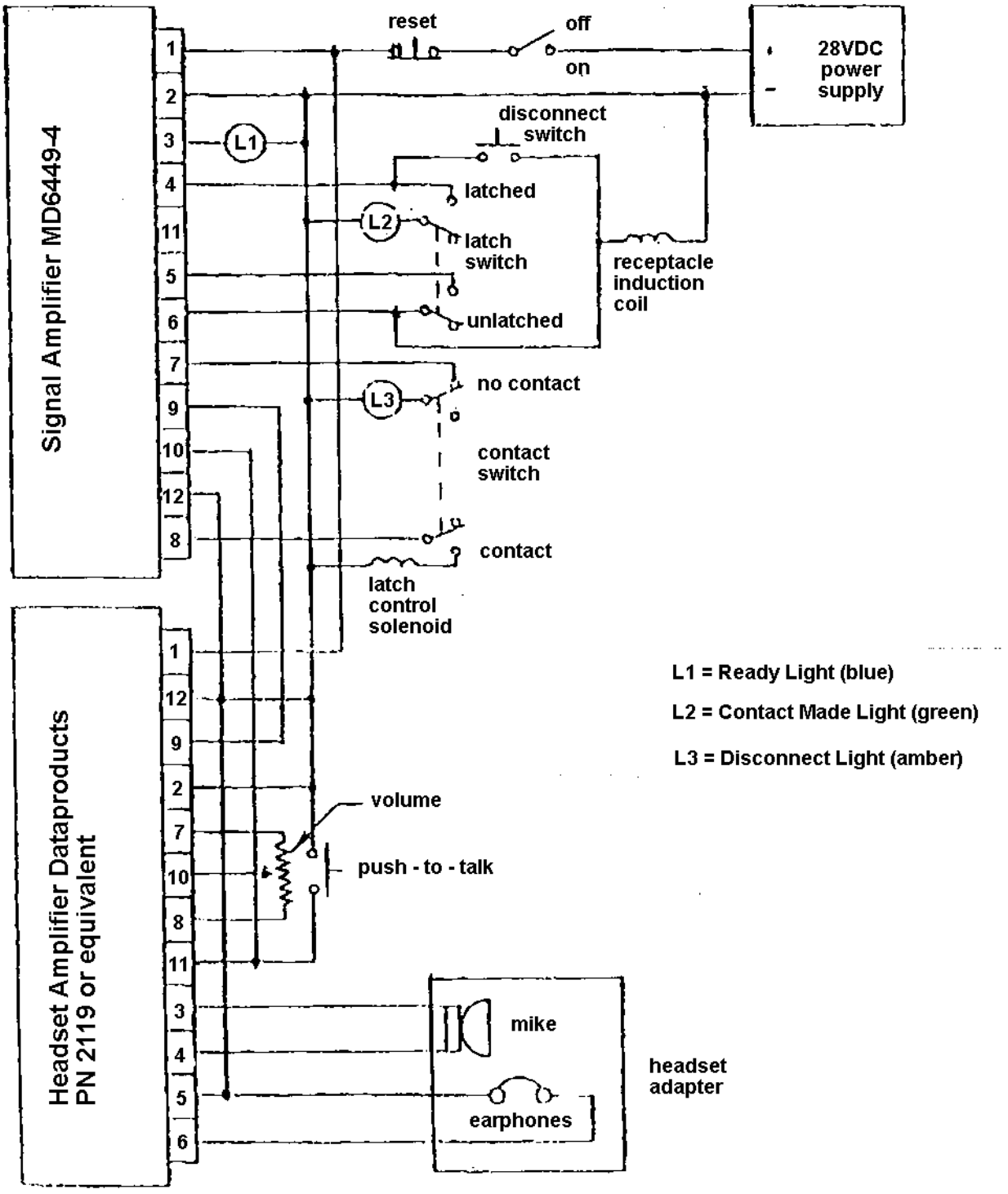
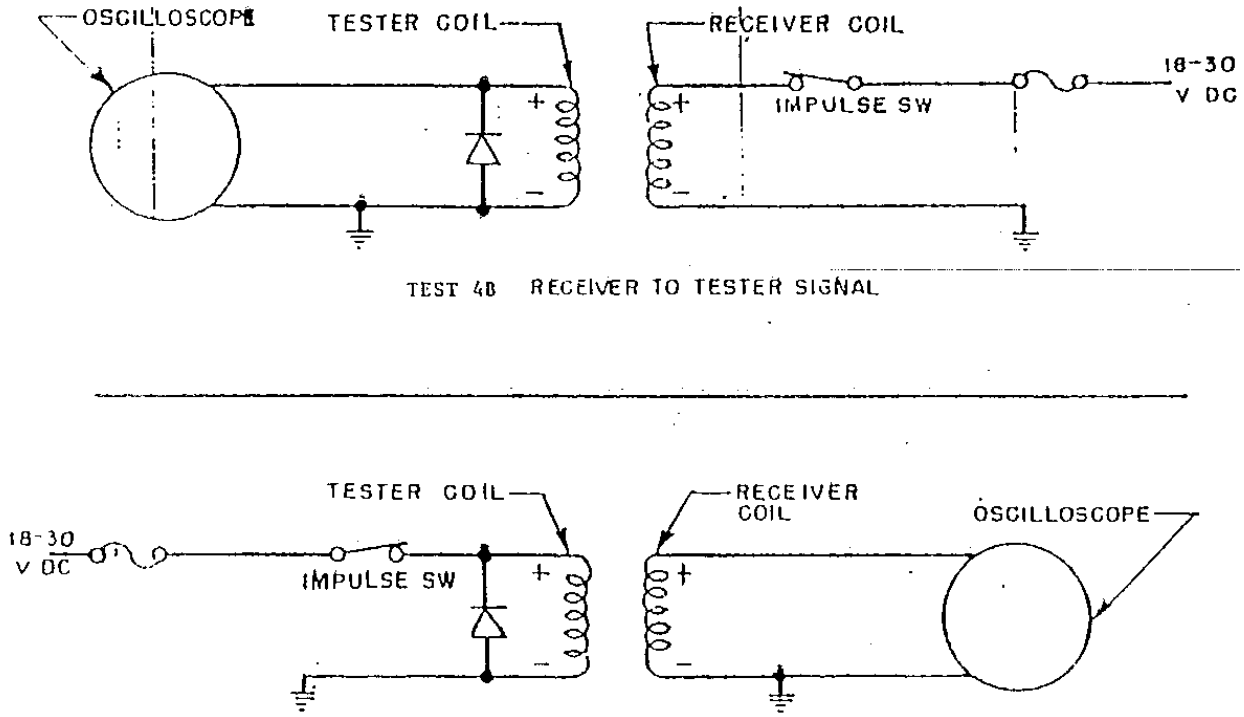


FIGURE 3. Functional Test Electrical Schematic



TEST 4A TESTER TO RECEIVER SIGNAL

FIGURE 4. Test Setup For Coil

headset to the tester using the headset adapter cable. With the tester inserted into the boom receptacle the following tests shall be accomplished:

(1) Actual voice communications shall be accomplished between the tester and test apparatus in both the READY and CONTACT MADE conditions. Intercommunication devices shall be a part of the test apparatus. Test personnel shall be separated a minimum of 60 feet or by a sound barrier between the personnel. Actual aircraft testing may be accomplished provided one person is within the confines of the aircraft and one near the tester. A normal voice tone (70 decibels) shall be used by both the tester and receptacle personnel. A minimum of 50 words shall be spoken and recorded without prior knowledge of context by the tester-to-receptacle and receptacle-to-tester personnel. A comparison of the recorded with the actual transmitted communications shall be made a part of the test report. Any missed words shall constitute failure of this test.

(2) A voice communication with a volume equivalent of a shout (90 decibels) shall be transmitted by both sender and receiver in the CONTACT MADE condition. Advancement of either amplifier shall constitute a failure.

4.4.3 Dielectric Strength and Noise Susceptibility

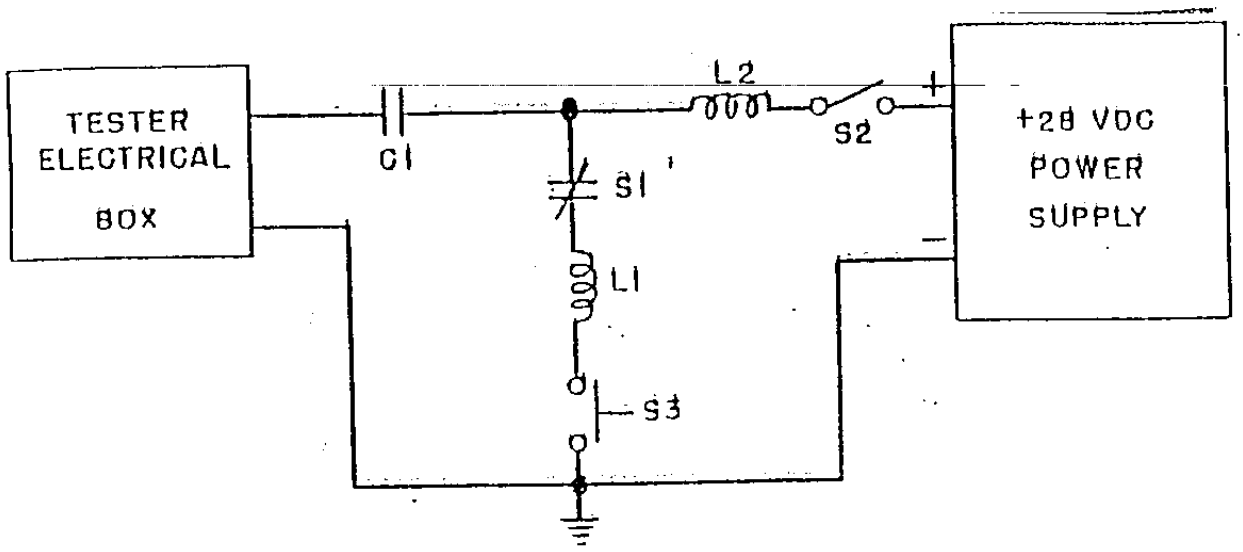
4.4.3.1 Dielectric Strength. A voltage of 1,000 Vrms, 60 Hz shall be applied for 1 minute between circuits and between each circuit and the metal frame of the component. Circuit flow in excess of 2 milliamperes or breakdown of insulation shall constitute failure.

4.4.3.2 Noise Susceptibility. The tester shall be subjected to a test in accordance with the steps outlined below and as shown on figure 5.

a. Disconnect the induction coil from the electrical box and connect both the lead from capacitor C1 of figure 4 and the negative side of the power supply to the electrical box through the induction coil connector.
b. With the HIGH/LOW switch in the high position, turn the power to ON with the ON-OFF/CHARGE switch. Check that the BLUE indicator READY light is illuminated.
c. Switch S3 shall be closed for approximately two seconds during which time L1 shall oscillate, the tester shall not advance, and the READY light shall remain illuminated.
d. Actuate the tester signal switch to CONTACT and check that the BLUE READY light is extinguished and the GREEN CONTACT light is illuminated.
e. Switch S3 shall be closed for approximately two seconds during which time L1 shall oscillate, the tester shall not advance and the CONTACT light shall remain illuminated.
f. Actuate the tester signal switch to DISCONNECT and check that the GREEN CONTACT light is extinguished and the AMBER DISCONNECT light is illuminated.
g. Press and release the RESET switch and check that the DISCONNECT light is extinguished and the READY light is illuminated.
h. Turn the ON-OFF switch to OFF. This completes the noise susceptibility test.

4.4.4 Proof Pressure. With the tester ports in the normally closed position, a hydrostatic proof pressure of 240 psig shall be applied for 1 minute. There shall be no evidence of distortion or damage to any part of the tester. The tester shall be subjected to and successfully complete the functional tests of 4.4.2 b, c, and d and the fuel leakage tests of 4.4.5. Prior to conducting this test, evacuate the trapped air from the tester utilizing the bleed valve. Deactivation of the valve shall cause positive sealing of the drain port.

4.4.5 Fuel Leakage. With the tester half full of fuel and no pressure on either the tester or the receptacle, the tester shall be engaged in the receptacle. There shall be no leakage. Prior to conducting this test, evacuate half of the trapped fuel utilizing the bleed valve. With the tester in the locked-in position and a D-1 nozzle connected, the fuel pressure shall be increased in 20-psig increments until an operating pressure of 120 psig is reached. Each pressure increment shall be maintained until it stablizes, except for the 120 psig reading which shall be held for 10



NOTES:

1. L1 is a rotary solenoid with self-interrupter contact S1, Ledex, type 5E, S1, Ledes, Type 5E, 33 ohms Coil, or equivalent.

2. Isolation choke L2 - 30 turns of #20 gauge insulated magnet wire on Magnetics, Inc. Coil, #080150/2A or equivalent. The coil shall have a permeability of 160 and the following dimensions: ID = 0.509, 0.005 inch; OD = 0.80, 0.010 inch; Height - 0.250, 0.010 inch.

3. C1 - 0.01 microfarad, 600V disc ceramic.

4. All leads shall be as short as possible and have a minimum of capacity to ground. No radio frequency suppressor components shall be used.

FIGURE 5. High Frequency Noise Susceptibility Test Schematic.

minutes. There shall be no leakage. Prior to conducting this test, evacuate trapped air from the tester utilizing the bleed valve. Deactivation of the valve shall cause positive sealing of the drain port. With the D-1 nozzle connected and fuel flowing at 30 +/-5 psig pressure, a disconnect shall be effected by actuation of the disconnected signal switch. The test shall be repeated with a static fuel pressure of 50 +5 psig. Fuel leakage in either case shall be an absolute minimum and shall not exceed 50 cc. With the D-1 nozzle removed, the tester shall be disconnected. Fuel leakage shall not exceed 25 cc.

4.4.6 Burst Pressure. With the tester ports in the normally closed position, a hydrostatic burst pressure of 360 psig shall be applied for 1 minute. No failure or permanent distortion shall be allowed. Upon completion of the test, the tester shall be subjected to and successfully complete the functional test of 4.6.2b, c, and d and the fuel leakage tests of 4.4.5.

4.4.7 Pressure Drop. The tester shall be engaged with the receptacle and the D-1 refueling nozzle connected to the tester. The fuel flow shall be increased in 100 gpm increments until 600 gpm is reached. A curve of pressure drop vs flow shall be plotted on logograph paper. The pressure drop shall not exceed 18 psig at 600 gpm. The pressure drop shall be conducted in accordance with ARP 868 and corrected in accordance with MIL-F-8615. The test setup and instrumentation shall be depicted by photographs and schematics.

4.4.8 Fuel Resistance. This test shall be conducted in accordance with MIL-F-8615. The functional and fuel leakage tests specified in MIL-F-8615 shall be conducted in accordance with 4.4.2 and 4.4.5.

NOTE: The tester batteries shall be removed for all low temperature soak conditions below 0°F and replaced prior to functional tests.

4.4.9 Contaminated Fuel Endurance. This test shall be conducted in accordance with MIL-F-8615. The functional and fuel leakage tests shall be conducted in accordance with 4.4.2b, c, and d and 4.4.5 herein.

4.4.10 Endurance. The test shall be subjected to the endurance tests specified in MIL-F-8615 except that only 5,000 cycles shall be performed. A cycle shall be defined as: (1) turn on tester power; (2) insert and lock the tester into the test apparatus; (3) rotate and index the elbow assembly every 30 through 360° once every 100 endurance cycles. A total of 50 rotations shall be accomplished by termination of the endurance test; (4) connect a D-1 ground nozzle to the tester; (5) flow fuel as applicable (wet tests); (6) subject the tester to the operating conditions of 3.5.2 as applicable to the test schedule for endurance tests in MIL-F-8615; (7) disconnect the D-1 nozzle; (8) electrically disconnect the tester with the signal switch; (9) turn off the tester power. The functional and leakage tests shall be conducted in accordance with 4.4.2 and 4.4.5. The tester shall be grounded and physically restrained during each cycle throughout this test.

4.4.11 Structural Strength. The functional and fuel leakage tests specified in 4.4.2b, c, and d and 4.4.5 shall be successfully conducted after completion of the structural tests. The tester shall be inserted into a structurally capable test fixture with loading capability greater than that specified herein or into a boom receptacle in accordance with MIL-R-27521 modified by replacing the hydraulic toggle latch actuator with a rigid link. The test fixture or receptacle centerline shall be inclined at a 30 angle with the horizontal.

4.4.11.1 Bending and Tension Limit Load, Body and Nozzle. With the tester installed in a receptacle and locked in place by restraining the receptacle toggles to the closed position, a 3,000 lb tension load shall be applied to the tester handles, in a plane parallel to the tester nozzle centerline. The test shall be repeated with the load applied to the structural attach points. This same load shall also be applied in a direction normal to the centerline of the handles and in a plane considered to produce the most severe bending stresses.

4.4.11.2 Compression Limit Load, Nozzle. With the tester installed in a receptacle and locked in place, a 6,000 lb compressive load shall be applied along the centerline of the nozzle. This test shall be repeated with the load applied in the opposite direction for a tension condition.

4.4.11.3 Bending Limit Load, Elbow. With the tester installed in a receptacle and locked in place and the adapter removed, a vertical downward bending load of 1,000 lbs shall be applied to the center of the elbow opening. The elbow shall be indexed to three different positions spaced 90° apart; one vertically up, one 90° to vertical, and the third position 180° with respect to the first position. The preceding elbow loads shall be repeated for each position.

4.4.11.4 Compression and Tension Limit Loads, Elbow. With the tester installed in a receptacle and locked in place, a 1,000 lbs compressive force shall be applied to the centerline of the opening of the elbow. The direction of the force shall be reversed for the tension limit load. The elbow shall be indexed as for the bending limit loads as specified in 4.4.11.4.

4.4.11.5 Tension Limit Load, Restricting Device. With the restraining device secured to the attachment points, specified in 3.6.25, a 3,000 lbs tension load shall be applied to the other end of the restraining device in a direction parallel to its long axis.

4.4.12 Operating environmental requirements verification.

4.4.12.1 Shock. The tester shall be subjected to the shock test to ensure that the unit can withstand the shocks or transient vibrations encountered in the handling, transportation, and service environments. Test the calibrated shock on a piece of equipment prior to using the actually conducting on the tester. The calibration load shall produce waveforms which meet or exceed test conditions required for this unit. Record the data to show that the transients met or exceeded desired test levels. Repeat the test three times for each orthogonal axis that is to be tested in both the positive and negative directions. The equipment shall not be operated during the test. The functional and fuel leakage tests specified in 4.4.2 and 4.4.5 shall be successfully conducted after completion of the shock test.

4.4.12.2 Corrosion Resistance. The tester shall be subjected to the corrosion resistance tests of MIL-F-8615. Upon completion of each test, the tester shall be subjected to and successfully complete the tests specified in 4.6.2 and 4.4.5.

4.4.12.3 Humidity. The tester shall be subjected to the humidity test of extreme temperature and humidity levels that those found in nature but for shorter durations. The unit shall be exposed to a minimum of 10 cycles to reveal potential test item problems. After a relatively short period of testing has elapsed, the test item may be given a visual inspection and operational checkout, and a decision may be made to continue or stop the test. The time after which a quick look can be made shall be seven days. The test item shall be configured in its assigned shipping/storage container, out of its shipping/storage container but not set up in its deployment mode and in its operational mode. Deterioration of any kind in any area of the test item must be completely described and evaluated as a potential failure or failure mode.

4.4.12.3.1 Humidity tests. The item shall be prepared for testing and a pretest standard ambient checkout shall be conducted.

a. Raise the internal chamber temperature to 60°C (140°F) and the relative humidity to 95±5% over a period of two hours.
b. Maintain the conditions of step a for not less than six hours.
c. Maintain 85% or greater relative humidity and reduce the internal chamber temperature in eight hours to 30°C (86°F) and 95% ±5% relative humidity.
d. Maintain the 30° (86°F) and 95% ±5 relative humidity for an additional eight hours.
e. Repeat steps a, b, c and d for a total of 10 cycles (not less than 240 hours).
f. Near the end of the fifth and tenth cycles, while still at 30°C (86°F) and 95% relative humidity operate the test item and obtain and record results in accordance with the general requirements.

The functional and fuel leakage tests specified in 4.6.2 and 4.6.5 shall be successfully conducted after completion of the humidity test. Evidence of corrosion, indicating improper selection of materials or inadequate protective finishes shall be reason for rejection.

4.4.12.4 Dust (Fine Sand). The tester shall be subjected to the dust test divided into two procedures. The small particle procedure (dust, fine sand) and the blowing sand test. The variables associated with the blowing sand and dust procedure include:

a. Air velocity
   (1) Blowing dust. The air velocities used in the blowing dust include a minimum air velocity to maintain
   test conditions (1.5 m/s or 300 ft/min) and a higher air velocity typical of desert winds (8.9m/s or 1750 ft/min) that shall be used for most tests.
   (2) Blowing sand. An air velocity in the range of 18 to 29 m/s (3540 to 5700 ft/min) is suggested for most blowing sand applications.

b. Temperature. Unless otherwise specified, these tests should be conducted at the operating or storage temperature obtained from the temperature response of the test item.

c. Sand dust composition.
   (1) Unless otherwise specified, the sand suggested to be used in the large particle test is silica sand (at least 95% by weight SiO2).
   (2) The small-particle (blowing dust) procedure may be conducted with either of the following dust compositions, by weight.

   •Red china clay is common throughout much of the world and contains solubilities (<2%, pH between 6 and 8 (5%); ferric oxide (Fe2O3) 10±5%; aluminum oxide A1xO3), 20±10%; silicondioxide (SiO2), silicon dioxide and remaining impurities.

   •Silicon flour has been widely used in dust testing and contains 97 to 99 percent (by weight) silicon dioxide (SiO2). The following size distribution applies to both red china and clay and silica flour: 10 percent shall pass through a 100 mesh screen; 98±2 clay shall pass through a 140 mesh screen; 90±2 percent shall pass through a 200 mesh screen; 75±2 percent shall pass through a 325 mesh screen.

d. Sand dust concentration
   (1) The dust concentration for the blowing dust test shall be maintained at 10.6 7 g/m3 unless otherwise specified.
   (2) The sand concentration shall be as follows unless otherwise specified.

   •The test items likely to be used close to aircraft (such as helicopters) operating over unpaved surfaces: 2.2 to± 0.5 g/m3.

   •For test items never used or never exposed in close to operating aircraft, but which may be found near operating surface vehicles: 1.1± 0.25 g/m3.

   •For test items that will be subjected only to natural conditions: 0.177 g/m3.

e. Orientation. The test item should be so oriented with respect to the blowing sand that the most vulnerable surface(s) faces the blowing sand. The test item may be reoriented at 90-minute intervals.

f. Test duration.
   (1) For the blowing sand tests, 90 minutes per face is considered to be a minimum.
   (2) For blowing dust tests, six hours at 23°C (73°F) and six hours at the high storage or operating temperatures are required. Additionally, sufficient time must be allowed at the low air velocity to stabilize the test item at the high temperature.

4.4.12.5 Dust and Sand Tests

4.4.12.5.1 Blowing dust test. The following test parameters are required for collecting the necessary information concerning the test item in a dust-laden environment.

a. Maintain less than 30% relative humidity throughout the test and temperature of 23°C.
b. Adjust the air velocity to the required value.
c. The dust feed control for the dust concentration shall be 10.67 g/m3.
d. Maintain the conditions of (a) through (c) for at least six hours.
e. Stop the dust feed, reduce the test section air velocity to that required to maintain the climatic conditions, and adjust the temperature to that determined from the test temperature.
f. Maintain (e) until stabilization.
g. Adjust the air velocity to that used in (b) and restart the dust feed to maintain the dust concentration as in ©.
h. If required, operate the test item in accordance with the approved test plan. Continue the exposure for at least six hours.
i. Turn off all chamber controls and allow the test item to return to standard ambient conditions.
j. Remember accumulated dust from the test item by brushing, wiping, or shaking, taking are to avoid introduction of additional dust into the test time. Do not remove dust by either air blast or vacuum cleaning.
k. Operate the test item in accordance with the approved test plan.
l. Document the results.
m. Inspect the test item giving special to grease seals and lubricants.

4.4.12.5.2 Blowing Sand Test

a. Adjust the temperature of the chamber to the high operating temperature of the test and maintain the temperature stabilization.
b. Adjust the air velocity to that required by the test plan.
c. Adjust the sand feeder to maintain the sand concentration specified in the test plan.
d. Maintain the conditions of (a), (b), and (c) for test duration.
e. If the operation of the test item during the test is required, perform an operational test of the item during the last hour of the test and document the results. If not continue.
f. Turn off all chamber controls and allow the test item to return to standard ambient conditions. Remove accumulated sand from the test unit by brushing, wiping, or shaking, taking care to avoid introduction of additional sand into the test unit.
g. Conduct an operation checkout of the test time in accordance with the approved test plan.
h. Document the results.
i. Visually inspect the test item booking for abrasion and clogging effects and any evidence of sand penetration.

Report the orientation and changes in the orientation during the test. The results of each performance should also be conducted. Results and duration of each section of the test. Also results of each test should be provided. The functional and fuel leakage tests, specified in 4.4.2 and 4.4.5, shall be successfully conducted after completion of the dust test.

4.6.12.6 Fungus. The tester shall be subjected to the fungus test. The unit and components shall be exposed to five species of fungi (aspergillus niger, aspergillus flavus, aspergillus versicolor, penicillium funiculosum and chaetomium globosum). It is recommended that the tests should be conducted by personnel trained in microbiological techniques. The unit shall be exposed twenty-eight days (minimum) to allow for fungal germination, breakdown of carbon molecules, and degradation of material. The units shall be tested in 1) normal shipping/storage container or transit case 2) under realisted storage or use conditions 3) with restraints (such as with openings that are normally covered. The units should be tested in chambers or cabinets, together with instrumentation capable of maintaining and monitoring the specific conditions of temperature and humidity.

4.4.12.6.1 Incubation of the test item

a. Incubate the test items under a daily cycle of temperature and humidity conditions consisting of 20

hours at a relative humidity of 95 + 5% and an air temperature of 30 + 1°C (86° + 2°F) followed by 4 hour period in which condition of 95% (+5%) relative humidity at 25 are maintained for at least two hours. Up to a total of two hours of the 4-hour period will be used for the transitions of temperature and relative humidity. Temperature and humidity conditions during the transition periods must be as follows: temperature 24 to 30°C and relative humidity above 90%.

b. Repeat the 24-hour daily cycle for the test duration.
c. After seven days, inspect the growth on the control cotton strips to verify that the environmental conditions in the chamber are suitable for growth. At this time, at least 90% of the part of the surface area of each test strip located at the level of the test item should be covered by fungi. If it is not, repeat the entire test with the adjustments of the chamber required to produce conditions suitable for growth. Leave the control strips in the chamber for the duration of the test.
d. If the cotton strips show satisfactory fungal growth after seven days continue the test for the require period from the time of inoculation as specified in the test plan. If there is a decrease in fungal growth on the cotton strips at the end of the test as compared to the 7-day results, the test is valid.

4.4.12.6.2 Inspection. At the end of the incubation period, inspect the test item immediately. If possible, inspect the item within the chamber. If the inspection is conducted outside of the chamber and is not completed in eight hours, return the test item to the test chamber or to a similar humid environment for a minimum of 12 hours. Except for hermetically sealed equipment, open the equipment enclosure and examine both the interior and exterior of the test time. Record the results of the inspection.

4.4.12.6.3 Functional and Fuel Leakage Tests. The functional and fuels leakage tests, specified in 4.6.2 and 4.6.5, shall be successfully conducted after completion of the fungus test. Repeat the 24 hour daily cycle for the test duration.

4.4.12.7 Explosive atmosphere. The tester shall be subjected to the explosive atmosphere test that evaluates the ability of the test item to be operated in a fuel vapor-laden environment without igniting the environment. The fuel recommended for the test shall be the single-component hydrocarbon n-hexane. The fuel vapor mixture is heated to the highest ambient air temperature at which the test item is required to operate during actual deployment.

4.4.12.7.1 Quantity of Fuel. Unless other specified, the fuel used shall be n-hexane, either reagent grade or 95 percent. The 95 percent n-hexane fuel actually is nearly 100 percent hexane, because the remaining 5 percent consists of hexane isomers. Fuel weight calculated to total 3.8 percent by volume of the test atmosphere represents 1.8 stoichiometric equivalents of n-hexane in air, giving a mixture needing only minimum energy for ignition.

a. Calculation of the volume of liquid n-hexane fuel for each test altitude:
   (1) In metric units: Volume of 95 percent n-hexane (ml)

[Net chamber volume (liters)] [chamber pressure (psia)]/(396 X 10-6)[chamber temp.K][specific gravity of n-hexane]

   (2) In English units:

[Net chamber vol.(ft3)][chamber pressure (psia)]/(48.89)[chamber temp (R)][specific gravity of n-hexane]

NOTES: Net volume of the test chamber: free volume less the test item displacement expressed in liters or cubic feet. The specific gravity of n-hexane will vary with temperature.

At 5°C (30F°C) - 0.673, at 10°C (50°F)- 0.668, at 20°C (68°F) - 0.659, at 25°C (77°F) - 0.655

The functional and fuel leakage tests, specified in 4.4.2 and 4.4.5 shall be successfully conducted after completion of the explosive atmosphere test.

4.4.12.7.2 Failure criteria. Failure of the fuel vapor and air environment constitutes failure of the test. The test plan for the conduct of the tests shall include the test altitudes, test temperatures, fuel volume and/or weight and test item configuration.

4.4.12.7.3 Operation in explosive atmosphere. The test item shall be installed in the test chamber and the item shall be operated to determine if it is functioning properly and to observe the location of any sparking or high temperature components which could cause an explosion. Thermocouples -2 each - shall be placed on the inside of the test chamber wall. The ambient temperature of the air inside of the chamber to the highest ambient air temperature at which the test item is required to operate during actual deployment. All testing should be done at this maximum air temperature.

4.4.12.7.4 Explosive atmosphere test. The ambient temperature shall be raised and the chamber air pressure shall be raised to simulate the test altitude to plus 1000 meters. The required quantity of n-hexane shall be injected into the test chamber and circulate the test atmosphere three minutes to allow for complete vaporization of fuel and the development of a homogeneous mixture. Increase the air pressure in the test chamber by bleeding air into the chamber. Simulate change of altitude at a rate no faster than 100 meters per minute. Stop the air pressure change at 1000 meters below test altitude or at ground level, whichever is first. Check the potential explosiveness of the air-vapor mixture by attempting to ignite a sample of the mixture by a spark-gap or glow plug ignition source having sufficient energy to ignite a 3.82 percent hexane mixture. If ignition does not occur, return the chamber to ambient atmospheric pressure, purge the chamber of the fuel vapor and reinitiate the test at the most recent test altitude. If the lower limit of simulated altitude reached is 3000 meters or greater above seal level, reduce the value of the test altitude by 3000 meters. If the station ambient pressure altitude (i.e. ground level) was reached, document the test results. If the station ambient pressure was not reached, continue to test using the new value of the test altitude and begin the test again.

4.4.13 Container tests. The tester container shall provide protection for the contained test equipment against shock, vibration, and deterioration from all environmental conditions that might be encountered during storage, shipment and unlimited used. The case shall be watertight and not be damaged or affected by dropping the case 10 times from a height of 30 feet. The cases shall be so designed that the geometric configuration will permit stacking without harm to the case or its contents.

4.4.14 Compatibility. The tester and container shall be subjected to compatibility tests which may consist of determining the compatibility of the tester with each different receiver aircraft having a boom receptacle. These tests shall be conducted by the Air Force, as determined necessary. One tester shall be furnished to the procuring activity for conducting these tests. This unit may be provided after completion of the regularly scheduled performance tests for final tests and approval.

4.4.14.1 Pedestal/sliding Valve Assembly Removal Tool. The use of the pedestal/sliding valve assembly removal tool, in accordance with 3.6.25 shall be demonstrated .

4.4.15 Bonding. A bonding test shall be conducted in accordance with MIL-B-5087, and as specified herein and approved by the procuring activity.

4.4.16 Disassembly and Inspection. The tester shall be disassembled and visually inspected. Evidence of excessive wear or deterioration shall be cause for rejection. Photographs of all parts shall be included in the preproduction test report.

4.4.17 Induction Coil. The test sample shall consist of one additional induction coil, supplied with the three complete tester assemblies of the same preproduction lot. The test specified in 4.4.17.1 shall be in addition to the preproduction tests conducted on the induction coils in the three assembled testers.

4.4.17.1 Fuel soak. The entire coil shall be immersed and allowed to stand for 100 hours, in Type I fluid conforming to TT-S-735, and then 100 hours in Type III fluid. At the conclusion of the immersion, there shall be

no disintegration or deterioration and the coil shall be subjected to and successfully complete the test specified in 4.4.3.

4.4.18 Magnetism. The induction coil shall not have parts with residual or induced magnetism so arranged to attract particles or debris internally or externally that may result in malfunction.

4.4.19 Construction. The tester and container shall be built to withstand the loads, strains, jars, vibrations, and other conditions incident to shipping, storage, installation, and service.

4.4.20 Part Numbering of Interchangeable Parts. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The item identification and part number requirements of DOD-STD-100 shall govern the manufacturer's part numbers and changes thereto.

4.5. Identification and Marking

4.5.1 Identification of Product. Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130.

4.5.2 Synthetic Rubber Parts. Equipment and assemblies containing synthetic rubber parts used in the tester, shall be marked.

4.5.3 Labeling. All switches, external connections, lights, indicator and adjustments on both the tester and container shall be labeled according to their function or purpose, as specified herein, with permanent, fuel and weather resistant markings.

4.6 Workmanship. All details of workmanship shall be of sufficiently high grade to insure satisfactory operation and service life. Parts shall not contain sharp edges, burrs, loose chips, dirt, or other foreign matter.

5. PACKAGING

5.1 Packaging. The preservation, packaging, labeling and marking shall be specified in the contract or purchase order. In general, the units shall conform to all applicable federal commercial regulations consistent with the industry practice.

6. NOTES

6.1 Intended Use. The testers covered by this specification are intended for ground testing only, and for transferring fuel from the D-1 nozzle to the boom receptacle. The MS27604 nozzle, a subassembly of the tester, shall not be installed on an aircraft for use in aerial refueling operations.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number, and date of this specification
b. Applicable levels of preservation, packaging, and packing (see 5.1).

6.2.1 Property. Government furnished property/government loaned property for testing purposes.

a. Receptacle, Flying Boom, Aerial Refueling. IAW MIL-R-27521, NSN 1680-01-085-0595 or equivalent.
b. Nozzle, Fuel Servicing, Locking, Pressure, Type D-1, 2-1/2 inch size, IAE MS 29520-1, NSN 4930-00-310-4858, or equivalent.
c. Connector, Electrical, NSN 5935-00-729-8802, REF. P/N PR06A16-26S or equivalent.

6.3 Subject term (key word) listing

boom receptacle
bleed valve
hose
indicator light

carrying handle
fuel leakage
fuel pressure
fuel resistance
fuel servicing adapter
nozzle
pedestal
receptacle
universal
universal receptacle aerial refueling

Custodian:
Air Force - 99
Army - AV1
Navy - AS

Preparing Activity
Air Force - 82

Agent Activity:
Air Force - 99

Project No. 4920-0500

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.

2. The submitter of this form must complete blocks 4, 5, 6, and 7.

3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	**1. DOCUMENT NUMBER** MIL-PRF-83323B	**2. DOCUMENT DATE (YYMMDD)** 97/11/01

3. DOCUMENT TITLE TESTER, UNIVERSAL RECEPTACLE, AERIAL REFUELING

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON *(if applicable)*	**7. DATE SUBMITTED** (YYMMDD)

8. PREPARING ACTIVITY

a. NAME TECHNOLOGY & INDUSTRIAL SERVICES DIVISION SA-ALC/TIRDM	b. TELEPHONE *Include Area Code)* (1) Commercial (210)925-6314 (2) AUTOVON 945-6314
c. ADDRESS *(Include Zip Code)* KELLY AFB, TX 78241-5609	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** DEFENSE QUALITY AND STANDARDIZATION OFFICE 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22401-3466 Telephone (703) 756-2340 AUTOVON 289-2340