

MIL-D-81609C(AS)
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MILITARY SPECIFICATION

DETECTING SET, MAGNETIC AN/ASQ-81(V)

This specification is approved for use by the Naval Air Systems Command, Department of the Navy and is available for use by all Departments and agencies of the Department of Defense.

1. SCOPE

1.1 Scope - The equipment covered by this specification shall be installed in fixed wing aircraft or towed by rotary wing aircraft for use in the detection of anomalies in the magnetic field of the earth due to the presence of submarines.

*1.2 Classification - The equipment covered by this specification includes eleven installation configurations and they shall consist of the following items:

(1) Detecting Set, Magnetic AN/ASQ-81(V)-1 (Inboard)

<u>Unit</u>	<u>Type Designation</u>	<u>Appl. Paragraph</u>
Control, Detecting Set	C-6983/ASQ-81(V)	3.5.1
Amplifier-Power Supply	AM-4535/ASQ-81(V)	3.5.2
Base, Shock Mount	MT-3618/ASQ-81(V)	3.5.3
Detector, Magnetic	DT-323A/ASQ-81(V)	3.5.4

* (2) Detecting Set, Magnetic AN/ASQ-81A(V)-1 (Inboard)

<u>Unit</u>	<u>Type Designation</u>	<u>Appl. Paragraph</u>
Control, Detecting Set	C-9086/ASQ-81(V)	3.5.1
Amplifier-Power Supply	AM-4535/ASQ-81(V)	3.5.2
Detector, Magnetic	DT-323A/ASQ-81(V)	3.5.4

* (3) Detecting Set, Magnetic AN/ASQ-81B(V)-1 (Inboard)

<u>Unit</u>	<u>Type Designation</u>	<u>Appl. Paragraph</u>
Control, Detecting Set	C-6983/ASQ-81(V)	3.5.1
Amplifier-Power Supply	AM-4535/ASQ-81(V)	3.5.2
Base, Shock Mount	MT-3618/ASQ-81(V)	3.5.3
Detector, Magnetic	DT-323B/ASQ-81(V)	3.5.4

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Naval Air Systems Command, Washington, D. C. 20361 Attn: AIR-5490 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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*(4) Detecting Set, Magnetic AN/ASQ-81B(V)-3 (Inboard)

<u>Unit</u>	<u>Type Designation</u>	<u>Appl. Paragraph</u>
Control, Detecting Set	C-9086/ASQ-81(V)	3.5.1
Amplifier-Power Supply	AM-4535/ASQ-81(V)	3.5.2
Detector, Magnetic	DT-323B/ASQ-81(V)	3.5.4

*(5) Detecting Set, Magnetic AN/ASQ-81C(V)-3 (Inboard)

<u>Unit</u>	<u>Type Designation</u>	<u>Appl. Paragraph</u>
Control, Detecting Set	C-9086/ASQ-81(V)	3.5.1
Amplifier-Power Supply	AM-4535/ASQ-81(V)	3.5.2
Detector, Magnetic	DT-323C/ASQ-81(V)	3.5.4

*(6) Detecting Set, Magnetic AN/ASQ-81C(V)-1 (Inboard)

<u>Unit</u>	<u>Type Designation</u>	<u>Appl. Paragraph</u>
Control, Detecting Set	C-6983/ASQ-81(V)	3.5.1
Amplifier-Power Supply	AM-4535/ASQ-81(V)	3.5.2
Base, Shock Mount	MT-3618/ASQ-81(V)	3.5.3
Detector, Magnetic	DT-323C/ASQ-81(V)	3.5.4

*(7) Detecting Set, Magnetic AN/ASQ-81A(V)-2 (Towed)

<u>Unit</u>	<u>Type Designation</u>	<u>Appl. Paragraph</u>
Control, Detecting Set	C-9086/ASQ-81(V)	3.5.1
Amplifier-Power Supply	AM-4535/ASQ-81(V)	3.5.2
Base, Shock Mount	MT-3618/ASQ-81(V)	3.5.3
Towed Body, Magnetic	TB-623/ASQ-81(V)	3.5.5
Detecting		
Control, Reeling Machine	C-6984A/ASQ-81(V)	3.5.6
Reeling Machine,	RL-305A/ASQ-81(V)	3.5.7
Magnetic Detector		
Launching		

*(8) Detecting Set, Magnetic AN/ASQ-81B(V)-2 (Towed)

<u>Unit</u>	<u>Type Designation</u>	<u>Appl. Paragraph</u>
Control, Detecting Set	C-9086/ASQ-81(V)	3.5.1
Amplifier-Power Supply	AM-4535/ASQ-81(V)	3.5.2
Base, Shock Mount	MT-3618/ASQ-81(V)	3.5.3
Towed Body, Magnetic	TB-623A/ASQ-81(V)	3.5.5
Detecting		
Control, Reeling Machine	C-6984A/ASQ-81(V)	3.5.6
Reeling Machine,	RL-305A/ASQ-81(V)	3.5.7
Detector Launching		

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*(9) Detecting Set, Magnetic AN/ASQ-81B(V)-4 (Towed)

<u>Unit</u>	<u>Type Designation</u>	<u>Appl Para.</u>
Control, Detecting Set	C-10557/ASQ-81B(V)	3.5.1
Amplifier-Power Supply	AM-4535/ASQ-81(V)	3.5.2
Base, Shock Mount	MT-3618/ASQ-81(V)	3.5.3
Towed Body, Magnetic Detecting	TB-623A/ASQ-81(V)	3.5.5
Control, Reeling Machine	C-10556/ASQ-81B(V)	3.5.6
Reeling Machine, Magnetic Detector Launching	RL-305A/ASQ-81(V)	3.5.7

*(10) Detecting Set, Magnetic AN/ASQ-81C(V)-2 (Towed)

<u>Unit</u>	<u>Type Designation</u>	<u>Appl Para.</u>
Control, Detecting Set	C-9086/ASQ-81(V)	3.5.1
Amplifier-Power Supply	AM-4535/ASQ-81(V)	3.5.2
Base, Shock Mount	MT-3618/ASQ-81(V)	3.5.3
Towed Body, Magnetic Detecting	TB-623B/ASQ-81(V)	3.5.5
Control, Reeling Machine	C-6984A/ASQ-81(V)	3.5.6
Reeling Machine, Magnetic Detector Launching	RL-305A/ASQ-81(V)	3.5.7

*(11) Detecting Set, Magnetic AN/ASQ-81C(V)-4 (Towed)

<u>Unit</u>	<u>Type Designation</u>	<u>Appl Para.</u>
Control, Detecting Set	C-10557/ASQ-81B(V)	3.5.1
Amplifier-Power Supply	AM-4535/ASQ-81(V)	3.5.2
Base, Shock Mount	MT-3618/ASQ-81(V)	3.5.3
Towed Body, Magnetic Detecting	TB-623B/ASQ-81(V)	3.5.5
Control, Reeling Machine	C-10556/ASQ-81B(V)	3.5.6
Reeling Machine, Magnetic Detector Launching	TL-305A/ASQ-81(V)	3.5.7

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1.3 Associated Equipment - This equipment shall operate with the associated equipment listed in 6.8.

2. APPLICABLE DOCUMENTS

*2.1 Issues of Documents - The following documents of the issue in effect on the date of the initial production contract form a part of this specification to the extent specified herein:

SPECIFICATIONS

Military

MIL-C-172	Cases Bases, Mounting and Mounts Vibration (For Use with Electronic Equipment in Aircraft)
MIL-W-5088	Wiring; Aircraft, Installation of
MIL-E-5400	Electronic Equipment, Aircraft, General Specification for
MIL-T-5422	Testing, Environmental, Aircraft Electronic Equipment
MIL-C-6781	Control Panel; Aircraft Equipment, Rack or Console Mounted
MIL-P-7788	Plate, Plastic, Lighting
MIL-M-7793	Meter, Time Totalizing
MIL-A-8591	Airborne Stores and Associated Equipment, General Specification for
MIL-E-17555	Electronic and Electrical Equipment and Associated Repair Parts, Prepara- tion for Delivery of
MIL-T-18303	Test Procedures; Preproduction and Acceptance for Aircraft Electronic Equipment, Format of
MIL-N-18307	Nomenclature and Nameplates for Aeronautical Electronic and Associated Equipment
MIL-I-81219	Indicator, Elapsed Time Electrochemical

NAVAL AIR SYSTEMS COMMAND

- AR-5 Microelectronic Devices Used in Avionics Equipment, Procedure for Selection and Approval of
- AR-8 Versatile Avionic Shop Test System, Avionic System Compatibility, General Requirements for
- AR-9 Versatile Avionics Shop Test System Test Program, General Requirements for
- AR-10 Maintainability of Avionics Equipment and Systems, General Requirements for
- WR-101 Weapons Requirements for Advanced ASW Electronic Systems Part I - Electromagnetic Control Requirements for Advanced ASW Avionics Systems

STANDARDS

Federal

FED-STD-595 Color

Military

- MIL-STD-415 Test Points and Test Facilities for Electronic Systems and Associated Equipment, Design Standard for
- MIL-STD-461 Electromagnetic Interference Characteristics, Requirements for Equipment
- MIL-STD-470 Maintainability Program Requirements (for Systems and Equipments)
- MIL-STD-471 Maintainability Demonstration
- MIL-STD-704 Electric Power, Aircraft Characteristics and Utilization of
- MIL-STD-781 Test Levels and Accept/Reject Criteria for Reliability of Non-Expendable Electronic Equipment

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MIL-STD-785 Requirements for Reliability Program
(for Systems and Equipments)

MIL-STD-794 Parts and Equipment, Procedures for
Packaging and Packing of

MIL-STD-831 Test Reports, Preparation of

MS25212 Control Panel, Console Type Aircraft
Equipment, Basic Dimensions

MS91403 Cases, Large Size (for use with elec-
tronic equipment in aircraft)

MS91405 Bases, Mounting, Large Size (for use
with electronic equipment in aircraft)

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

*2.2 Precedence of Documents - When the requirements of the contract, this specification or applicable subsidiary specifications are in conflict, the following precedence shall apply:

a. Contract - The contract shall have precedence over any specification.

b. This Specification - This specification shall have precedence over all applicable subsidiary specifications. Any deviation from this specification, or from subsidiary specifications where applicable, shall be specifically approved in writing by the procuring activity.

c. Referenced Specifications - Any referenced specification shall have precedence over all applicable subsidiary specifications referenced therein. All referenced specifications shall apply to the extent specified.

3. REQUIREMENTS

3.1 First Article - When specified (see 6.3) the contractor shall furnish sample unit(s) for first article inspection and approval (see 4.2. and 6.3).

3.2 Parts and Materials - In the selection of parts and materials, fulfillment of major design objectives shall be the prime consideration. In so doing, the following shall govern:

- a. Microelectronic technology shall be considered and microelectronic items shall conform to requirements specified herein.
- b. Other parts and materials requirements shall conform to Specification MIL-E-5400. (See 3.5.4.5)
- c. Nonrepairable subassemblies, as outlined in Specification MIL-E-5400, shall be used when practicable. The general size of the subassembly and the amount of circuitry to be included therein shall be to the satisfaction of the procuring activity. Nonrepairable subassemblies shall be reliable. (See 6.5)
- d. When previously produced models of this equipment did not use nonrepairable subassemblies, the design shall not be changed to employ nonrepairable assemblies without the approval of the procuring activity.

*3.2.1 Non-Standard Part and Materials Approval - Approval for the use of nonstandard parts and materials (including transistors and diodes) other than microelectronic devices shall be obtained as outlined in Specification MIL-E-5400. The selection and use of a nonstandard part required because of its ability to meet the non-magnetic requirements of the equipment shall be considered adequate reason for the use of the nonstandard part. Non-magnetic microelectronic assemblies shall meet AR-5 requirements as achievable within the constraints of the magnetic inclusion requirements. Microelectronic devices shall be approved as outlined in AR-5.

*3.2.2 Microelectronic Modular Assemblies - When used, Microelectronic Modular Assemblies shall meet the requirements of AR-5. Paragraph 3.3 of AR-5, including Microelectronic Interchangeability Demonstration tests shall not be required.

3.2.3 Modules - The electronic portions of the equipment shall be functionally modularized in accordance with specification AR-10 except as modified herein.

3.3 Design and Construction - The equipment shall conform to all the applicable requirements of Specification MIL-E-5400 for design, construction and workmanship, except as otherwise specified herein.

*3.3.1 Total Weight - The total weight of the equipment, excluding cables, shall be a minimum consistent with good design and shall not exceed:

- a. 49.0 pounds for Detecting Set, Magnetic AN/ASQ-81A(V)-1, AN/ASQ-81B(V)-3, or AN/ASQ-81C(V)-3.

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- b. 51.3 pounds for Detecting Set, Magnetic AN/ASQ-81(V)-1, AN/ASQ-81B(V)-1, or AN/ASQ-81C(V)-1.
- c. 148.3 pounds for Detecting Set, Magnetic AN/ASQ-81A(V)-2, AN/ASQ-81B(V)-2, AN/ASQ-81B(V)-4, AN/ASQ-81C(V)-2, or AN/ASQ-81C(V)-4 without Towed Body ballast or 160.8 pounds with maximum ballast.

3.3.2 Reliability

3.3.2.1 Reliability Program - The contractor shall establish and conduct a reliability assurance program in accordance with MIL-STD-785.

3.3.2.2 Operational Stability - All the equipment, except the Reeling Machine, Magnetic Detector Launching, shall operate with satisfactory performance continuously or intermittently for a period of at least 500 hours without the necessity for re-adjustment of any controls which are inaccessible to the operator during normal use. The Reeling Machine, Magnetic Detector Launching, shall operate satisfactorily during a minimum of 300 complete reel in - reel out cycles.

*3.3.2.3 Operating Life - The equipment shall have a total operating life of 10,000 hours with reasonable servicing, replacement of parts, and observance of duty cycle. Parts requiring scheduled replacement shall be specified by the contractor in the Reliability Qualification Test Procedure.

*3.3.2.4 Reliability in Mean Time Between Failures - The specified mean (operating) time between failures (MTBF) for the equipment, including any Built-In Test provisions, shall be:

- a. 1000 hours for Detecting Set, Magnetic AN/ASQ-81(V)-1, AN/ASQ-81A(V)-1, AN/ASQ-81B(V)-1, AN/ASQ-81B(V)-3, AN/ASQ-81C(V)-3; or AN/ASQ-81C(V)-1.
- b. 500 hours for Detecting Set, Magnetic AN/ASQ-81A(V)-2, AN/ASQ-81B(V)-2, AN/ASQ-81B(V)-4, AN/ASQ-81C(V)-2, AN/ASQ-81C(V)-4.

when tested and accepted as outlined under the requirements of 4.4.3.

*3.3.2.5 Time Totalizing Meter - The following units shall contain time totalizing meters in accordance with Specification MIL-M-7793 or MIL-I-81219.

<u>Unit</u>	<u>Type Designation</u>	<u>Type of Meter</u>
a. Control, Detecting Set	C-6983/ASQ-81(V) or C-9086/ASQ-81(V) or C-10557/ASQ-81B(V)	MS17322-10
b. Amplifier-Power Supply	AM-4535/ASQ-81(V)	MS17322-10
c. Detector, Magnetic	DT-323/ASQ-81(V) or DT-323A/ASQ-81(V) or DT-323B/ASQ-81(V) or DT-323C/ASQ-81(V)	MS3311-3
d. Towed Body, Magnetic Detecting	TB-623/ASQ-81(V) or TB-623A/ASQ-81(V) or TB-623B/ASQ-81(V)	MS3311-3
e. Reeling Machine, Magnetic Detector Launching	RL-305A/ASQ-81(V)	MS17322-10

3.3.3 Cabling and Connections

3.3.3.1 Cables and Connectors - The equipment shall provide for the use of cables and connectors in accordance with Specification MIL-E-5400.

3.3.3.2 Interconnection Cabling - The equipment shall be capable of satisfactory operation using external wiring in accordance with the applicable requirements of Specification MIL-W-5088 and WR-101 (Part 1). The external wiring shall be unshielded, except that a minimum number of the individual wires may be shielded when demonstrated as necessary to meet interference control requirements and provided the assembly of the cable to its plugs may be easily accomplished. External cables and that portion of the connectors attached to the cables shall not be supplied as part of the equipment.

*3.3.4 Control Panels - All rack or console mounted control panels shall conform to the applicable requirements of Specification MIL-C-6781, except as otherwise specified herein. The configuration of all panels must be approved by the procuring activity prior to preproduction testing. The light intensity of the SYSTEM READY and UNIT FAIL indicators on the Control, Detecting Set C-6983/ASQ-81(V), C-9086/ASQ-81(V), C-6984A/ASQ-81(V) and C-10556/ASQ-81B(V) will be non-adjustable and at least 50 FT. LAMBERTS at rated voltage.

3.3.5 Interchangeability - The equipment shall meet the interchangeability requirements of Specification MIL-E-5400.

*3.3.6 Electromagnetic Interference Control - The equipment shall be designed in accordance with the requirements of MIL-STD-461 except as modified in the following paragraphs.

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3.3.6.1
modifications apply:

For all configurations of the AN/ASQ-81 the following

- a. The conducted emission levels of CE01 on the power leads shall be:
 - (1) CW conducted emissions (2KHz - 20KHz) - not greater than 88dB above one microvolt for CW conducted emissions on any of the three phases or neutral leads.
- b. The conducted emission levels of CE02 on the signal leads shall be:
 - (1) CW conducted emissions (30Hz - 20KHz) - not greater than 75dB above one microvolt on the cable connecting 1J2 and 2J2.
 - (2) Broadband conducted emission (30Hz - 20KHz) - not greater than 95dB above one microamp per 20KHz on the cable connecting 1J2 and 2J2.
- c. The conducted emission levels of CE03 on the power leads shall be:
 - (1) CW conducted emissions (50MHz) - not greater than 26dB above one microamp on any of the three phases or neutral leads.
 - (2) Broadband steady-state conducted emissions (20KHz - 30KHz) - not greater than 122dB above one microamp per MHz on any of the three phases or neutral leads.
 - (3) Switching transients (8.0MHz) - not greater than 68dB above one microvolt per MHz on any of the three phases or neutral leads when the CAL switch is operated.
- d. The conducted emission levels of CE04 on the signal leads shall be:
 - (1) CW conducted emissions (.2MHz - 50MHz) - not greater than 64dB above one microamp on 1J2, 2J5, and 2J6 cables.
 - (2) Broadband steady-state conducted emissions: (58KHz - 240KHz) - not greater than 104dB above one microamp per MHz on 1J2 cable.

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- (3) (240KHz - 1.05MHz) - not greater than 86dB above one microamp per MHz on the 1J2, 2J5, and 2J6 cable.
 - (4) (1.05MHz - 5.3MHz) - not greater than 59dB above one microamp per MHz on the 1J2 cable.
 - (5) Switching transients:
 - (a) (.800MHz) - not greater than 117dB above one microvolt per MHz on the 1J2 cable when the CAL switch is operated nor greater than 75dB above one microvolt per MHz on the 1J2 cable when the ALT COMP switch is operated.
 - (b) (.8MHz) - not greater than 75dB above one microvolt per MHz on the 1J2 cable when the CAL switch is operated, nor greater than 74dB above one microvolt per MHz on the 1J2 cable when the ALT COMP switch is operated.
- e. The radiated emission levels of RE02 shall be:
- (1) CW radiated emission (14KHz - 1,000MHz) - not greater than 68dB above one microvolt per meter.
 - (2) Switching transient (14KHz - 14.8MHz) - not greater than 53dB above one microvolt per MHz when the ALT COMP switch is operated.

3.3.6.2 The AN/ASQ-81A(V)-2, AN/ASQ-81B(V)-2, AN/ASQ-81B(V)-4, AN/ASQ-81C(V)-2 and AN/ASQ-81C(V)-4 configurations shall have the following additional requirements modifications for their peculiar equipments and lines:

- a. The conducted emission levels of CE01 on the power leads shall be:

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- (1) CW conducted emissions:
 - (a) (30HZ - 5KHz) - not greater than 105dB above one microvolt on any of the three phases or neutral leads nor greater than 78dB above one microvolt on the +28VDC return line.
 - (b) (5KHz - 9KHz) - not greater than 70dB above one microvolt on any of the three phases or neutral leads.
 - (c) (9KHz - 20KHz) - not greater than 52dB above one microvolt on any of the three phases or neutral leads.
- b. The conducted emission level of CE02 on the signal leads shall be:
 - (1) CW conducted emissions: (30Hz - 9KHz) - not greater than 84dB above one microvolt on the cable connecting 5J1 and 6J1.
- c. The conducted emission levels of CE03 on the power lead shall be:
 - (1) Broadband steady-state conducted emissions:
 - (a) (58KHz - 1.1MHz) - not greater than 107dB above one microamp per MHz on the +28VDC high and return lines.
 - (b) (1.1MHz - 2.4MHz) - not greater than 71dB above one microamp per MHz on the +28VDC high and return lines.
 - (c) (124KHz - 1.1MHz) - not greater than 90dB above one microamp per MHz on any of the three phases or neutral power leads.
 - (d) (1.1MHz - 7MHz) - not greater than 60dB above one microamp per MHz on any of the three phases or neutral power leads.

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(2) Switching transients:

- (a) REEL switch operation - (20KHz - 50MHz) - not greater than 132dB above one microamp per MHz on any of the three phases or neutral power leads nor greater than 141dB above one microamp per MHz on either the +28VDC high line or the 28VDC return line.
- (b) AUX REEL CONTROL switch operation - (20KHz - 50MHz) - not greater than 131dB above one microamp per MHz on any of the three phases or neutral power leads nor greater than 140dB above one microamp per MHz on either the +28VDC high line or the +28VDC return line.

d. The conducted emission levels of CE04 on the signal leads shall be:

(1) Switching transients:

- (a) REEL switch operation - (20KHz - 50MHz) - not greater than 135dB above one microamp per MHz on the 5J1 cable.
- (b) AUX REEL CONTROL switch operation - (20KHz - 50MHz) - not greater than 138dB above one microamp per MHz on the 5J1 cable.

e. The radiated emission levels of RE02 shall be:

- (1) Broadband steady-state conducted emissions: (14KHz - 35KHz) - not greater than 104dB above one microvolt per meter per MHz.
- (2) Switching transients:
 - (a) REEL switch operation - (14KHz - 1GHz) - not greater than 135dB above one microvolt per meter per MHz.
 - (b) AUX REEL CONTROL switch operation - (14KHz - 1GHz) - not greater than 134dB above one microvolt per meter per MHz.

3.3.7 Provisions for Maintainability - The Maintainability Programs, built-in test features, construction and packaging, provisions for test points and other maintainability parameters shall be as specified in Specification AR-10 except as modified herein.

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3.3.7.1 Maintainability Program - The contractor shall establish and conduct a maintainability program in accordance with MIL-STD-470 and MIL-STD-471. All maintenance shall be capable of being performed by a technician with a comprehensive ability level as follows:

- a. Civilian education: High school graduate or equivalent.
- b. Technical training: Navy, Class A Technician school appropriate to the maintenance task.
- c. Experience: Two years of technical experience in addition to technical training.

3.3.7.2 Maintainability Requirements - The equipment design shall incorporate the following maintainability requirements:

*3.3.7.2.1 Weapon Replaceable Assembly (WRA) Types -

The equipment units shall be WRA's of either the Light Replaceable Assembly (LRA) type or Hard Replaceable Assembly (HRA) type as follows:

<u>Unit</u>	<u>Type Designation</u>	<u>WRA Type</u>
a. Control, Detecting Set	C-6983/ASQ-81(V) or C-9086/ASQ-81(V) or C-10557/ASQ-81B(V)	LRA
b. Amplifier-Power Supply	AM-4535/ASQ-81(V)	LRA
c. Detector, Magnetic	DT-323/ASQ-81(V) or DT-323A/ASQ-81(V) or DT-323B/ASQ-81(V) or DT-323C/ASQ-81(V)	HRA
d. Towed Body, Magnetic Detecting	TB-623/ASQ-81(V) or TB-623A/ASQ-81(V) or TB-623B/ASQ-81(V)	HRA
e. Reeling Machine, Mag Detector Launching	RL-305A/ASQ-81(V)	HRA
f. Control, Reeling Machine	C-6984A/ASQ-81(V) or C-10556/ASQ-81B(V)	LRA

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3.3.7.2.2 Packaging Requirements - The equipment shall be packaged in modular form so that, to the maximum extent practical, all subassemblies are the plug-in type and are easily removable. If a special tool is required for removal, it shall be provided and attached to the equipment. Modules referred to herein shall be QRA's as defined in AR-10.

3.3.7.2.3 Module Accessibility - Module arrangement will be such that access to each module does not require the removal of adjacent modules or parts other than access panels.

3.3.7.2.4 Keying - Modules and connectors (excepting internal RF type connectors) shall be keyed to prevent the insertion of a connector or subassembly into an improper location within or on the equipment. Internal RF connectors shall be legibly marked with reference designations.

3.3.7.2.5 Part Replacement - Part replacement on the modules shall be possible by technicians working in a designated service area such as intermediate maintenance activity. Conformal coatings, encapsulants, embedments or potting materials used with modular assemblies containing integrated circuits and discrete parts shall be easily removable without damage to the assembly.

3.3.7.2.6 Nonrepairable Assemblies - All designs for nonrepairable assemblies shall be submitted to the procuring activity for review, prior to release for fabrication.

3.3.7.2.7 Adjustments - Procuring activity review is required for design and use of all periodic adjustment, alignment, or calibration functions except for those specified herein. Adjustments, serviceable at the organizational maintenance level, shall be identified and accessible without a requirement to remove or relocate subassemblies or parts other than access panels.

3.3.7.2.8 Access Panels - Access panels shall be retained by quick disconnect fasteners, i.e., hand operated slide, Dzus type, etc.

3.3.7.2.9 Service Access - Devices requiring removal periodically for inspection or servicing shall be retained by quick disconnect fasteners, i.e., hand operated slide, Dzus type, etc.

3.3.7.2.10 Mounting Devices - Connectors, receptacles, fuses, circuit breakers, or any other electronic part, shall not be part of any mounting associated with the equipment.

3.3.7.2.11 Test Point Requirements - All test points shall be in accordance with MIL-STD-415 and shall accommodate standard Navy approved test equipment, i.e., multimeter or oscilloscope probes.

3.3.7.2.11.1 Power Supply Test Points - Accessible external individual test receptacles shall be provided on the front panel of the equipment to measure the output voltages. In the event an external, multipin test connector is provided on the equipment, the power supply voltages may be made available at this test connector instead of at the individual test receptacles.

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3.3.7.2.11.2 Chassis Test Points - In addition to the AR-10 requirements, test points and built-in test facilities shall be included in the design of the equipment and shall be in accordance with MIL-STD-415. Test points shall be chosen to provide a straightforward, logical, step-by-step troubleshooting sequence, as well as provide a single end-to-end performance check.

3.3.7.3 Organization Level Maintainability Requirements - The equipment shall provide the operator or Organizational maintenance technician, while airborne or on the ground, with performance/readiness test and fault isolation indicators.

3.3.7.3.1 Performance/Readiness Test Requirements - Suitable features shall be incorporated in the equipment to permit GO-NO-GO indication of equipment readiness. These features may be in conjunction with but not necessarily as part of the fault isolation features. The operation of the performance/readiness test feature shall be an on-demand, manually energized test mode of operation.

3.3.7.3.2 Fault Isolation - In conjunction with, but not necessarily as part of the Performance/Readiness testing features, there shall be features incorporated which will permit fault isolation to the WRA when it is of the HRA type and to the QRA when the WRA is of the LRA type. These features shall include the necessary switching arrangements with a GO-NO-GO readout device that will clearly indicate whether or not the function selected is within minimum performance standards. If a built-in readout device is not feasible, means shall be provided to use general or standard test equipment, i.e., oscilloscope, VOM etc.

3.3.7.3.2.1 Mean Time to Repair (MTTR) - The time to perform unscheduled maintenance action shall be composed of:

- a. Recognition of a fault.
- b. Isolation of the fault to a maintenance module.
- c. Maintenance module replacement.
- d. Retest for system readiness.

MTTR is the summation of all maintenance downtimes during a given period divided by the number of maintenance tasks performed during the same period. For Organization Maintenance, the MTTR shall not exceed 30 minutes. The maximum time required to accomplish any single maintenance action at Organizational level shall not exceed 60 minutes.

*3.3.7.3.3 Organizational Level Maintainability Indices -

The Light Replaceable Assembly (LRA) ratio, non-ambiguity (N-A) ratio and Fixed Interface (FI) ratio, as defined in specification AR-10, shall not be less than the following:

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	<u>Configuration</u>	<u>LRA Ratio</u>	<u>N-A Ratio</u>	<u>FI Ratio</u>
a.	AN/ASQ-81(V)-1	0.66	0.97	1.00
b.	AN/ASQ-81A(V)-1	0.66	0.97	1.00
c.	AN/ASQ-81B(V)-1	0.66	0.97	1.00
d.	AN/ASQ-81B(V)-3	0.66	0.97	1.00
e.	AN/ASQ-81C(V)-3	0.66	0.97	1.00
f.	AN/ASQ-81C(V)-1	0.66	0.97	1.00
g.	AN/ASQ-81A(V)-2	0.80	0.80	1.00
h.	AN/ASQ-81B(V)-2	0.80	0.80	1.00
i.	AN/ASQ-81B(V)-4	0.80	0.80	1.00
j.	AN/ASQ-81C(V)-2	0.80	0.80	1.00
k.	AN/ASQ-81C(V)-4	0.80	0.80	1.00

3.3.7.4 Intermediate Level Maintainability Requirements - Intermediate level maintenance shall be accomplished utilizing the designated or planned fleet operational test equipment by technicians with a comprehensive ability level described in paragraph 3.3.7.1.

3.3.7.4.1 Compatibility with VAST - To the greatest extent practicable, the equipment shall be compatible with the Versatile Avionic Shop Test System (VAST) and shall meet the requirements of Specification AR-8. When required by the contract, VAST Test Programs shall be furnished in accordance with Specification AR-9. If VAST Test Programs exist for the equipment, and changes to the equipment are made which will affect the fault diagnosis procedure, changes to the existing test program shall be prepared as part of the equipment changes in accordance with Specification AR-9.

*3.3.7.4.2 Intermediate Level Maintainability Indices -

The Quick Replaceable Assembly (QRA) ratio, Shop Non-Ambiguity (SN-A) ratio and Ship Fixed Interface (SFI) ratio, as defined in specification AR-10, shall not be less than the following:

	<u>Unit</u>	<u>QRA Ratio</u>	<u>SN-A Ratio</u>	<u>SFI Ratio</u>
a.	Control, Detecting Set C-6983/ASQ-81(V) or C-9086/ASQ-81(V) or C-10557/ASQ-81B(V)	0.75	0.74	0.75

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	<u>Unit</u>	<u>QRA Ratio</u>	<u>SN-A Ratio</u>	<u>SFI Ratio</u>
b.	Amplifier-Power Supply AM-4535/ASQ-81(V)	0.89	0.89	0.94
c.	Detector, Magnetic DT-323/ASQ-81(V) or DT-323A/ASQ-81(V) or DT-323B/ASQ-81(V) or DT-323C/ASQ-81(V)	N.A.	N.A.	N.A.
d.	Towed Body, Mag Detecting TB-623/ASQ-81(V) or TB-623A/ASQ-81(V) or TB-623B/ASQ-81(V) or	N.A.	N.A.	N.A.
e.	Reeling Machine, Detector Launching RL-305A/ASQ-81(V)	0.50	0.80	1.00
f.	Control, Reeling Machine C-6984A/ASQ-81(V) C-10566/ASQ-81B(V)	N.A.	N.A.	N.A.

3.3.7.5. Maintainability Assurance - Testing to demonstrate the achievement of the maintainability requirement specified herein shall be in accordance with paragraph 4.5.

*3.3.8 Nomenclature and Nameplates - Nomenclature assignment and nameplate approval for equipment identification shall be in accordance with Specification MIL-N-18307.

*3.3.9 Standard Conditions - The following conditions shall be used to establish normal performance characteristics under standard conditions and for making laboratory bench tests, except that required field test may be conducted under outside ambient conditions:

- a. Temperature Room Ambient ($25 \pm 5^{\circ}\text{C}$)
- b. Altitude Normal ground
- c. Vibration None
- d. Humidity Room ambient up to 90% relative humidity
- *e. Input Power Voltage

(1) Detecting Set, Magnetic AN/ASQ-81(V)-1, AN/ASQ-81A(V)-1, AN/ASQ-81B(V)-1, AN/ASQ-81B(V)-3, AN/ASQ-81C(V)-3, or AN/ASQ-81C(V)-1 require the following:

115 ± 1.0 VAC 400 Hz $\pm 1\%$
 27.5 ± 0.5 VAC 400 Hz $\pm 1\%$ for edge light panel lamps

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- (2) Detecting Set, Magnetic AN/ASQ-81A(V)-2, AN/ASQ-81B(V)-2 or AN/ASQ-81C(V)-2 require the following:

115 \pm 1.0 VAC 400 Hz \pm 1%
 27.5 \pm 0.5 VDC
 27.5 \pm 0.5 VAC 400 Hz \pm 1% for edge light panel lamps

- (3) Detecting Set, Magnetic AN/ASQ-81B(V)-4 or AN/ASQ-81C(V)-4 require the following:

115 \pm 1.0 VAC 400 Hz \pm 1%
 27.5 \pm 0.5 VDC
 5 \pm 1.0 VAC 400 Hz \pm 1% for edge light panel lamps

3.3.10 Service Conditions - The equipment shall operate satisfactorily under any of the environmental service conditions or combination of those conditions as specified in Specification MIL-E-5400 for Class 1A equipment, except as modified herein. Any time the equipment is required to be operated in a magnetic environment, e.g., temperature-altitude chamber, vibration table, etc., the resonance loop shall be locked to a magnetic detector simulator (dummy head).

3.3.10.1 Vibration - The equipment shall operate satisfactorily when subjected to the vibration requirements of curves II and IV of Specification MIL-E-5400, except as modified herein.

*3.3.10.1.1 Control, Detecting Set C-6983/ASQ-81(V), C-9086/ASQ-81(V), or C-10557/ASQ-81B(V) - The Control, Detecting Set shall operate satisfactorily when subjected to the vibration requirements of Curve III of Specification MIL-E-5400.

*3.3.10.2 Temperature - The equipment shall operate satisfactorily when subjected to the temperature requirements of Class 1A equipment of Specification MIL-E-5400 except for the Detector, Magnetic DT-323/ASQ-81(V), DT-323A/ASQ-81(V), DT-323B/ASQ-81(V), or DT-323C/ASQ-81(V) and the Towed Body, Magnetic Detecting TB-623/ASQ-81(V), TB-623A/ASQ-81(V), or TB-623B/ASQ-81(V).

*3.3.10.2.1 Detector, Magnetic DT-323/ASQ-81(V), DT-323A/ASQ-81(V), DT-323B/ASQ-81(V), or DT-323C/ASQ-81(V) - The maximum operating temperature for the Detector, Magnetic unit shall be +55°C. The maximum storage temperature of this unit shall be +71°C. The minimum temperature shall be as specified in MIL-E-5400 for Class 1A equipment.

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*3.3.10.2.2 Towed Body, Magnetic Detecting, TB-623/ASQ-81(V), TB-623A/ASQ-81(V), or TB-623B/ASQ-81(V) -

The maximum operating temperature for the Towed Body, Magnetic Detecting unit shall be +55°C. The maximum storage temperature of this unit shall be +71°C. The minimum temperature shall be as specified in MIL-E-5400 for Class 1A equipment.

3.3.10.3 Altitude - The equipment shall operate at all altitudes from sea level to 30,000 feet. Transporting the equipment in a non-operating condition at any altitude up to 50,000 feet shall cause no permanent damage to the equipment.

*3.3.10.3.1 Rate of Change in Altitude - The maximum rate of change in altitude shall be as follows:

*3.3.10.3.1.1 Detector, Magnetic DT-323/ASQ-81(V) and Towed Body TB-623/ASQ-81(V) - The maximum rate of change in altitude in an operating or non-operating condition at or below 18,000 feet shall be 6,000 feet per minute. The rate of change in altitude above 18,000 feet shall be unrestricted.

*3.3.10.3.1.2 Detector, Magnetic DT-323A/ASQ-81(V), DT-323B/ASQ-81(V), DT-323C/ASQ-81(V) or Towed Body, TB-623A/ASQ-81(V), TB-623B/ASQ-81(V) - The rate of change in altitude shall be unrestricted.

*3.3.10.4 Shock - The equipment shall operate satisfactorily when subjected to the shock requirements of specification MIL-E-5400.

3.3.11 Warm-Up Time - The time required for the equipment to warm-up prior to operation shall be kept to a minimum and shall not exceed 5 minutes under standard conditions and 10 minutes at extreme service conditions. Extreme service conditions shall be defined as one or any combination of conditions as specified in MIL-E-5400.

*3.3.12 Primary Input Power Requirements - The equipment shall meet all applicable requirements of MIL-STD-704 and shall give specified performance from the following power source with characteristics as defined in MIL-STD-704 having limits as defined herein. Normal operation shall be maintained between the bounds of limits 5 and 6 of figures 3 and 9 of MIL-STD-704. Loss of normal operation may occur under the limits 1 and 4 of figures 3 and 9; however, normal operation shall resume upon the return of the input voltage to within the normal steady state limits. The power required shall not exceed the following specified amounts:

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- a. Electronic Group - AC Power (Three Phase)
115/200 V, Category "B", 150 VA.
- *b. Reeling Machine Group - AC Power (Three Phase)
115/200 V, Category "B", 6.2 KVA starting surge,
2.0 KVA thereafter during reel out and reel in.
DC Power, 28 V, Category "B", 340 watts surge
on Towed Body release, 100 watts during reel
out and reel in under extreme service conditions,
70 watts during reel out and reel in under
standard conditions, 16.2 watts with towed body
at any trail position.
- *c. Lighting Power - Input power for lighting shall
require not more than 0.5 Amps at 28 volts AC or
DC and not more than 2.2 Amps at 5 volts AC or
DC.

3.3.13 Protective Devices - Circuit breakers shall be used in lieu of fuses. Circuit breakers that are not automatically reset shall be accessible from the exterior of the equipment, plainly marked as to rating and size, and shall be of the fault indicating type.

3.4 Performance - Unless otherwise specified, values set forth to establish the requirements for satisfactory performance apply to performance under both standard and extreme service conditions. When reduced performance under extreme conditions is acceptable, tolerances or values setting forth acceptable variations from the performance under the standard conditions will be specified by the procuring activity. Any time the equipment is required to be operated in an environment of high magnetic field intensities or gradients, normal operation may not be possible, and tests can be conducted using a dummy head; however, complete system performance shall be demonstrated in a quiet magnetic area.

*3.4.1 Operation - The equipment shall detect anomalies in the magnetic field of the earth and provide a visual indication on a peripheral display. This shall be accomplished by maintaining an oscillator at the Larmor frequency of the metastable helium sensor through the aid of an electronic servo loop. Variations in the oscillator frequency shall be converted to an analog voltage representation and suitably bandpass filtered prior to the display. The sensitive detecting element for the AN/ASQ-81(V)-1, AN/ASQ-81A(V)-1, AN/ASQ-81B(V)-1, AN/ASQ-81B(V)-3, AN/ASQ-81C(V)-3 and AN/ASQ-81C(V)-1 equipment shall be designed for mounting in an aircraft external MAD boom. The sensitive detecting element for the AN/ASQ-81A(V)-2, AN/ASQ-81B(V)-2, AN/ASQ-81B(V)-4, AN/ASQ-81C(V)-2, and AN/ASQ-81C(V)-4 equipment shall be designed for mounting in a towed body which may be trailed from the aircraft.

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3.4.1.1. Resonance Loop - The electronic servo loop which maintains the oscillator at the Larmor frequency shall automatically acquire the resonance frequency upon equipment turn on and shall maintain normal operation over the entire range of the earth's magnetic field intensity without operator attention.

3.4.2 Indication - Indication of the presence of an anomaly in the terrestrial magnetic field shall be shown by recording a signal on a Recorder, Magnetic Distortion RO-32/ASQ or an equivalent indicator (not supplied).

*3.4.3 Sensitivity - Sensitivity of the equipment under standard conditions shall permit a 0.02 gamma peak-to-peak signal to be discernible above the highest equipment noise. Sensitivity of the equipment under extreme low temperature conditions shall permit a 0.04 gamma peak-to-peak signal to be discernible above the highest equipment noise. This signal shall be discernible at the system output.

*3.4.3.1 Noise Characteristics - Equipment noise is defined as the largest uncorrelated peak-to-peak variation of the output signal occurring in any 30 second window of a five minute noise run. The bandpass filters (see paragraph 3.4.4) are set to 0.04 Hz and 0.6Hz cutoff frequencies and a sensitivity setting of 0.4 gamma full scale for noise measurements. Correlation may be achieved by operating two magnetometer systems simultaneously. The maximum allowable uncorrelated noise shall not exceed 0.016 gammas. At the completion of testing contained in paragraphs 4.4.1.3, 4.4.2 or 4.4.3, the maximum allowable uncorrelated noise shall not exceed 0.024 gammas, and after system adjustment shall again not exceed 0.016 gammas. It is recognized that the allowable system noise level is close to the environment which at times may have localized effects degrading the apparent system noise level for periods of time. Therefore, the five minute period may be in the best five minute period out of a longer time interval.

3.4.3.2 Sensitivity Check - A self-contained method of checking the equipment shall be provided and shall be designed so that the complete portion of the analog signal electronics can be checked. Provided the magnetometer bandpass filters (see paragraph 3.4.4) are set to 0.04 Hz and 0.6 Hz cutoff frequencies, this calibration test shall produce a peak-to-peak signal in gamma within $\pm 15\%$ accuracy on the following gain settings (see paragraph 3.4.3.3):

GAMMAS FS	0.1	0.2	0.4	1.0	2.0	4.0
CAL SIG	0.06	0.16	0.16	0.6	1.6	1.6

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3.4.3.3 Control of Gain - Provisions shall be made for the control of signal gain such that a +7.5 volt output into a 15 K ohm or greater load will be produced for the 9 sensitivity steps of: 0.1, 0.2, 0.4, 1.0, 2.0, 4.0, 10.0, 20.0 and 40.0 gamma peak-to-peak signals.

3.4.4 Frequency Response - The equipment shall be designed with operator selectable passband frequency control. The passband selection shall consist of an adjustable lowpass filter (24 dB/octave rejection slope) with 3 dB \pm 1.5 dB cutoff at 2.0, 0.6, 0.4 and 0.2 Hz and an independently adjustable highpass filter (36 dB/octave rejection slope) with 3 dB \pm 1.5 dB cutoff at 0.1, 0.08, 0.06 and 0.04 Hz.

3.4.4.1 Gradient Signals - The equipment shall not exhibit degradation when the sensor is subjected to magnetic field intensity variations at rates up to 200 gammas per minute on a gain setting of 1.0 gamma and a bandpass setting of 0.06 to 0.6 Hz.

3.4.5 Orientation - The equipment shall meet or exceed the following orientation requirements:

a. The equipment shall not require a gimbal system for precise orientation of the sensing element on any heading at any geographic location.

b. A 360° rotation of the unit containing the sensitive detecting element in the horizontal plane about a vertical axis through the sensing element at a rate of one revolution per minute shall not produce a signal of more than 0.05 gamma peak-to-peak.

c. When the unit containing the sensitive detecting element is maneuvered on cardinal and intercardinal headings in the ambient earth's magnetic field, the maximum allowable maneuver noise shall be 0.048 gamma for an $\pm 10^\circ$ roll, $\pm 5^\circ$ pitch or $\pm 10^\circ$ yaw. The Figure of Merit (FOM) shall not exceed 0.24, when normalized to the standard 12 measurement method. At the completion of testing contained in paragraph 4.4.1.3, 4.4.2, or 4.4.3, the FOM shall not exceed 0.32, and after system adjustment shall again not exceed 0.24. The maneuvers shall be executed at a rate within the 0.04 to 0.6 Hz bandpass of the system.

d. The sensitive detecting element shall operate such that the absorption signal in the least favorable orientation is not less than 74% of the signal produced in the most favorable orientation with respect to the earth's total magnetic field vector.

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3.5 Detail Requirements*3.5.1 Control Detecting Set C-6983/ASQ-81(V), C-9086/ASQ-81(V), or C-10557/ASQ-81B(V) -

The Detecting Set Control shall meet the applicable requirements of specification MIL-C-6781 for Type I control.

*a. The C-6983/ASQ-81(V) shall include a gray edge-lighted panel with white lighting to conform to MIL-P-7788D, Class 2-W, Type IV with lamp voltage of 28 volts. Adjustment knobs shall be black.

*b. The C-9086/ASQ-81(V) shall include a black edge-lighted panel with red lights to conform to MIL-P-7788D, Class 1-R, Type IV with lamp voltage of 28 volts. Adjustment knobs shall be gray.

*c. The C-10557/ASQ-81B(V) shall include a black edge-lighted panel with white lights to conform to MIL-P-7788E, Class 1-W, Type IV with lamp voltage of 5 volts. Adjustment knobs shall be gray.

3.5.1.1. Function - The Detecting Set Control shall contain all the controls necessary to operate the Magnetic Detecting Set, AN/ASQ-81(V) in flight. The unit shall also contain a portion of the signal processing circuits.

*3.5.1.2 Form Factor - The control unit shall conform to Standard MS 25212 and the dimensions shall not exceed 5.75 inches in width, 9.00 inches in height and 4.70 inches in depth.

3.5.1.3 Weight - The weight of this unit, including all components and mounting provisions, shall not exceed 7 pounds.

3.5.1.4 Mounting - The Detecting Set Control unit shall be mounted in accordance with Specification MIL-C-6781.

3.5.1.5 Controls - The following controls required for flight operation of the Magnetic Detecting Set AN/ASQ-81(V) shall be located on the front panel of the Detecting Set Control:

a. ON-OFF - A two position toggle switch shall be provided to control the power to the equipment.

b. CALIBRATE - A two position toggle switch shall be provided to energize the calibration signal specified in paragraph 3.4.3.2 of this specification.

c. GAIN - A rotary switch shall provide the 9 steps of sensitivity control as specified in paragraph 3.4.3.3 of this specification. A tenth position of this switch shall energize the performance/readiness test mode of operation.

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d. BANDPASS - Two rotary switches shall be provided to select the highpass and lowpass filter cutoff frequencies as specified in paragraph 3.4.4 of this specification.

*e. RECORDER ZERO - A potentiometer shall be provided to center (adjust to a zero bias) the system analog output to the Recorder, Magnetic Distortion RO-32/ASQ, or equivalent indicator.

*f. PUSH TO DAMP - A push button switch shall be provided in the center of the RECORDER ZERO control to short to ground the outputs of the bandpass amplifiers in the event of signal circuit saturation.

*g. ALTITUDE COMPENSATOR - A two position toggle switch shall be provided to activate the altitude compensation circuitry when required.

3.5.1.6 Electrical Connections - Connections to external circuits shall be provided as follows:

<u>Reference Designation</u>	<u>Receptacle Type</u>	<u>Function</u>
a. 1J1	MS3122E12-10SW	Recorder output, panel lamp power and test connections.
b. 1J2	MS3122E20-41PW	Interconnections to Amplifier-Power Supply unit.

3.5.2 Amplifier-Power Supply AM-4535/ASQ-81(V) - The Amplifier-Power Supply shall meet the following requirements:

3.5.2.1 Functions - The Amplifier-Power Supply shall contain part of the resonance loop electronics, part of the signal processing circuitry, portions of the BIT circuitry and the system power supplies. The unit sends the resonance frequency to the sensing element and receives a phase sensitive error signal. Circuits in the Amplifier-Power Supply null this error signal to keep the resonance oscillator frequency equal to the Larmor frequency generated within the sensing elements. The Amplifier-Power Supply also converts changes in the resonance oscillator frequency to an analog voltage which is modified for transmission to the Control, Detecting Set.

3.5.2.2 Form Factor - The Amplifier-Power Supply shall be enclosed in standard MS91403-B1C case.

3.5.2.3 Weight - The weight of the Amplifier-Power Supply shall not exceed 22 pounds.

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*3.5.2.4 Mounting - The Amplifier-Power Supply shall be located in the aircraft and shall be supported by the Base, Shock Mount MT-3618/ASQ-81(V). The following configurations will not include the Base, Shock Mount: Detecting Set, Magnetic AN/ASQ-81A(V)-1, AN/ASQ-81B(V)-3 and AN/ASQ-81C(V)-3.

*3.5.2.5 Contents - The Amplifier-Power Supply shall contain the resonance oscillator, line driver, 430 Hz reference circuits, loop AGC, loop phase detector and integrator, auto-lock control, and sensor simulator (dummy head). Other assemblies included are the rectifiers, regulators, discriminators, amplifiers, fault indicators and test points.

3.5.2.6 Controls - The following controls which are not required for flight operation of the equipment shall be located on the front panel of the Amplifier-Power Supply:

a. ALTITUDE COMPENSATOR - A potentiometer shall be provided to control the gain of the altitude compensation circuits to permit compensation of vertical gradients ranging in magnitudes from 0.005 gamma per foot to 0.01 gamma per foot. An external connection shall be provided for the utilization of an aircraft-generated vertical gradient compensation signal.

b. BUILT-IN-TEST - A rotary switch shall be provided to permit fault isolation of the unit subassemblies.

*3.5.2.7 Electrical Connections - Connections to external circuits shall be provided as follows:

<u>Reference Designation</u>	<u>Receptacle Type</u>	<u>Function</u>
a. 2J1	MS3113H8C4PW	External Power
b. 2J2	MS3122E20-41SW	Interconnections to Detecting Set Control
c. 2J3	UG657/U	Resonance frequency auxiliary output
d. 2J4	MS3122E20-41S	Test Connector
e. 2J5	UG657/U	Composite signal to sensing elements
f. 2J6	MS39012/31-0001	Power to sensing elements

3.5.3 Base, Shock Mount MT-3618/ASQ-81(V) - The mounting base shall conform to the following requirements:

3.5.3.1 Function - The shock mount base shall support the Amplifier-Power Supply in the aircraft. Vibration isolation properties and ultimate strength of this shock mount shall be in accordance with the applicable requirements of Specification MIL-C-172.

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3.5.3.2 Form Factor - The shock mount base shall be in conformance with Standard MS91405.

3.5.3.3 Weight - The weight of the unit shall not exceed 2.3 pounds.

*3.5.4 Detector, Magnetic DT-323/ASQ-81(V), DT-323A/ASQ-81(V), DT-323B(V), or DT-323C/ASQ-81(V) - The magnetic detector shall conform to the following requirements.

3.5.4.1 Function - The sensitive detecting elements of the Magnetic Detecting Set, their associated optics and electronics shall be located in the Magnetic Detector. The unit shall receive the resonance frequency from the Amplifier-Power Supply and shall develop an error signal within the sensing element. The error signal shall be transmitted to the Amplifier-Power Supply to keep the resonance oscillator frequency equal to the Larmor frequency. An altitude compensation signal shall also be generated and transmitted to the Amplifier-Power Supply.

3.5.4.2 Form Factor - The Magnetic Detector installation shall normally be in the external MAD boom. The form shall be cylindrical with a mounting surface diameter of 7.16 ± 0.06 inches and maximum overall length of 55.0 inches.

3.5.4.3 Mounting - The Magnetic Detector housing shall be mounted without vibration isolation, however, individual assemblies within the housing may be shock isolated as required.

3.5.4.4 Weight - The weight of this unit, including all components and mounting provisions, shall not exceed 20 pounds.

3.5.4.5. Materials - There shall be no magnetic materials used in the construction of the Magnetic Detector unit. All materials used in its construction shall be subjected to a magnetic inclusion test. The magnetic inclusion test procedure shall be approved by the procuring activity.

3.5.4.6 Contents- The Magnetic Detector shall contain the following:

a. Magnetic Sensor Assembly - The Magnetic Sensor portion of the Magnetic Detector shall contain the sensing elements and their associated optics and electronics which include the spectral lamps (helium), collimating lenses, circular polarizers, absorption cells (helium), infrared detectors, tuned matching network and ignition circuitry for the spectral lamps and absorption cells, and an rf coil system to supply the resonance frequency to the absorption cells.

*b. Detector Amplifier Assembly - The Detector-Amplifier portion of the unit shall contain portions of the resonance loop and the electronics necessary to excite the sensing elements. Assemblies in this portion of the Magnetic Detector include the exciter, ignition and ignition control circuitry for the spectral lamps and absorption cells, the constant current amplifier, preamplifier, the summing amplifier and the voltage regulator.

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c. Altitude Compensator Assembly - The Altitude Compensator portion of the unit shall receive atmospheric pressure information from a static pressure port on the aircraft airframe. The pressure information shall be converted by means of a barometric transducer, to an electrical signal which is to be transmitted to the Amplifier-Power Supply. The electrical signal will be used to compensate for signals resulting from vertical movement of the Magnetic Detector unit through the earth's vertical magnetic field gradients. Provisions shall be incorporated in the design to permit deletion of this subassembly without requiring modification to any other portions of the equipment.

3.5.4.7 Controls - No external controls shall be provided on the Magnetic Detector unit.

*3.5.4.8 Electrical Connections - Connections to external circuits shall be provided as follows:

<u>Reference Designation</u>	<u>Receptacle Type</u>	<u>Function</u>
a. 3J1	96214-536153-2 (or approved equivalent)	Composite signal to Amplifier Power Supply
b. 3J2	96214-536152-2 (or approved equivalent)	Power from Amplifier-Power Supply

*3.5.5 Towed Body, Magnetic Detecting TB-623/ASQ-81(V), TB-623A/ASQ-81(V), TB-623B/ASQ-81(V) The towed body shall conform to the following requirements:

3.5.5.1 Function - The Towed Body shall provide an aerodynamically stable platform for towing the sensitive detecting elements and their associated optics and electronics. The unit shall receive the resonance frequency generated in the Amplifier-Power Supply and shall develop an error signal within the sensitive detecting element. The error signal shall be transmitted to the Amplifier-Power Supply to keep the resonance oscillator frequency equal to the Larmor frequency. An altitude compensator signal shall also be generated and transmitted to the Amplifier-Power Supply.

3.5.5.2 Form Factor - Refer to Figure 1.

*3.5.5.3 Mounting - The Towed Body shall be attached by cable to the Reeling Machine, RL-305A/ASQ-81(V) in such a manner as to permit rapid removal. In the stowed position, the Towed Body shall be rigidly supported by the Reeling Machine. In the trail position, the unit shall be vibration isolated from the tow cable. The stabilizer portion of the Towed Body shall be removable to facilitate transporting or maintenance.

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3.5.5.4 Weight - The weight of the Towed Body shall not exceed 27.5 pounds without additional ballast. Additional ballast shall be supplied with the Towed Body for a maximum weight of 40 pounds.

3.5.5.5 Materials - The materials used in the Towed Body shall meet the requirements of paragraph 3.5.4.5 of this specification.

3.5.5.5.1 Finish - The nose of the Towed Body shall be black, color #17038 per Fed. Std. 595. The housing and stabilizer shall be red, color #11136, and yellow, color #13655 per Fed. Std. 595 in alternate quadrants as shown in Figure 2.

3.5.5.6 Contents - The Towed Body contents shall be the same as specified in paragraph 3.5.4.6 of this specification except the altitude compensator shall receive atmospheric pressure information from static pressure ports on the Towed Body.

3.5.5.7 Controls - No external controls shall be provided on the Towed Body.

*3.5.5.8 Electrical Connections - Connections to external circuits shall be provided through a single nonmagnetic triaxial connector, P/N 96214-507349-34.

3.5.5.9 Other General Requirements

3.5.5.9.1 Balance - When supported from the tow point, the long axis of the Towed Body shall be balanced to within $\pm 2^\circ$ of horizontal by adjusting the position of the ballast.

3.5.5.9.2 Buoyancy - The Towed Body with the tow cable attached shall remain buoyant in water.

*3.5.6 Control, Reeling Machine C-6984A/ASQ-81(V) and C-10556/ASQ-81B(V) -

The Reeling Machine Control unit shall meet the applicable requirements of specification MIL-C-6781 for Type 1 control panel.

*a. The C-6984A/ASQ-81(V) shall include a black edge lighted panel with red lighting to conform to MIL-P-7788D, Class 1-R, Type IV with a lamp voltage of 28 volts.

*b. The C-10556/ASQ-81B(V) shall include a black edge lighted panel with white lighting to conform to MIL-P-7788E, Class 1-W, Type IV with a lamp voltage of 5 volts.

*3.5.6.1 Function - The Reeling Machine Control shall contain all the controls necessary to operate the Reeling Machine, Magnetic Detector Launching RL-305A/ASQ-81(V) in flight:

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3.5.6.2 Form Factor - The Reeling Machine Control shall conform to Standard MS 25212 and the dimensions shall not exceed 5.75 inches in width, 3.75 inches in height and 4.50 inches in depth.

3.5.6.3 Weight - The weight of this unit shall not exceed 1.5 pounds.

3.5.6.4 Mounting - The Reeling Machine Control shall be mounted in accordance with Specification MIL-C-6781.

3.5.6.5 Contents - The contents of this unit shall include:

a. Towed Body Trail Light - A lamp indicator, VEHICLE TRAIL, is on any time the Towed Body is in the unstowed position. This lamp shall be amber and include a push to test and dimming feature.

*b. Cable Limit Light - A lamp indicator, CABLE LIMIT; OFF when the Towed Body is stowed or the reel motor is running; is ON when the Towed Body is at the preset limit; and blinks if the Towed Body is stopped at an intermediate position indicating an abnormal position. This lamp shall be amber and include a push to test and dimming feature.

c. Power Light - A lamp indicator, POWER, is lighted when both the power switch is on and power is available to the Reeling Machine. This lamp shall be green.

*3.5.6.6 Controls - The following controls required to operate the Reeling Machine, Magnetic Detector Launching RL-305A/ASQ-81(V) shall be located on the front panel of the Reeling Machine Control.

a. POWER ON-OFF - Controls power to the Reeling Machine group.

b. REEL IN-OUT - This three position switch either trails or retrieves the Towed Body. This switch is held in either the IN or OUT position magnetically with 28 V and will automatically return to the neutral position if power is removed. In the OUT position, the Towed Body will go to the full trail position. In the IN position, the Towed Body will fully retract. The Towed Body may be stopped at any intermediate position by returning the switch to the center position.

3.5.6.7 Electrical Connections - Connections to external circuits shall be provided as follows:

<u>Reference Designation</u>	<u>Receptacle Type</u>	<u>Function</u>
a. 5J1	MS3122E20-41P	Interconnections to cockpit controls and indicators, and the Reeling Machine Magnetic Detector Launching RL-305A/ASQ-81(V)

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*3.5.7 Reeling Machine, Magnetic Detector Launching, RL-305A/ASQ-81(V) The Reeling Machine shall conform to the following requirements:

*3.5.7.1 Function - The Reeling Machine shall provide for trailing, retrieving and stowage of the Towed Body, Magnetic Detecting TB-623/ASQ-81(V), TB-623A/ASQ-81(V), or TB-623B/ASQ-81(V). The unit shall contain the logic and control circuits for: tow cable limit and speed change, slip rings for sending composite signal and power via the tow cable to the Towed Body, safety devices and stowing mechanism. The Reeling Machine shall automatically remove power from the reel drive mechanism when the Towed Body is fully retrieved.

3.5.7.2 Form Factor - Refer to Figure 3.

*3.5.7.3 Weight - The weight of this unit shall not exceed 88.0 pounds including cable.

3.5.7.4 Mounting - Refer to Figure 3.

3.5.7.5 Contents - The contents of this unit shall consist of the following assemblies and subassemblies:

- a. Reeling Machine
- b. Latch Assembly
- c. Safety Devices

3.5.7.5.1 Reel Assembly - The Reel Machine shall provide for the reel drive mechanism, reel and slip ring assembly and tow cable. The reel drive mechanism shall supply mechanical torque to rotate the reel to either wind or unwind the towing cable. The reel shall contain at least 200 feet of tow cable.

*a. Torque and Braking - The reel drive mechanism shall supply sufficient torque to unwind or wind the reel at an average rate of 200 + 40 FPM. The mechanism shall include a braking device to prevent free wheeling of the mechanism when control power is removed.

b. Slip Rings - The slip rings and brushes shall maintain positive and uninterrupted mechanical contact during all conditions of operation of the aircraft.

c. Level Winding Mechanism - The Reel Assembly shall contain a level winding mechanism to permit even (level) winding and unwinding of the towing cable from the reel.

d. Tow Cable - The Tow Cable shall be a triaxial cable with the outer conductor being the strain member. The breaking strength of the strain member shall not be less than 1000 pounds.

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*e. Reeling Rate - The reel shall wind and unwind at an average of 200 ± 40 FPM. However, the reeling rate shall reduce to 50 ± 10 FPM at a distance which is adjustable from 4 feet to 12 feet from the stowed position.

*f. Motor Duty Cycle - The reel motor shall have an operational duty cycle of 2 minutes on and 15 minutes off at maximum temperature and altitude and a maintenance low speed duty cycle of 4 minutes on and 20 minutes off.

3.5.7.5.2 Latch Assembly - The contents of the unit shall provide automatic latching devices to stow the towed body, and to release the towed body from the Reeling Machine upon remote control from the operator's control console in the aircraft. The latch assembly shall exhibit dependable operation under all service conditions.

3.5.7.5.3 Safety Devices - The unit shall provide the following safety devices to insure proper operation of the equipment:

*a. Cable Cutter - The unit shall provide for a cable cutter device for emergency jettisoning of the towing cable. The emergency jettisoning signal shall be a manually supplied 28 VDC signal from the aircraft or an automatic signal at 700 ± 70 pounds of tension of the towed cable. The cable cutter shall be accessible through a hinged access door for arming or inspection.

*b. Power Overload - The unit shall provide automatic power interruption of Reeling Machine power when an overload condition exists. The overload circuit shall be remotely resettable from the operator's console.

*c. Cable Tension Limits - The unit shall provide automatic power interruption of reeling mechanism power when there is less than 8 pounds or more than 230 pounds of tension on the tow cable.

*d. Cable Tension in Stowed Position - At the completion of the reel-in operation, with the latches closed, a minimum of 160 pounds and a maximum of 260 pounds tension shall be applied to the tow cable before power is removed and the brake applied.

3.5.7.6 Controls - The following controls which are not required for flight operation of the equipment shall be provided:

a. Auxiliary Reel Control IN-OUT - This three position switch (spring loaded to center position) shall be available external to the Reeling Machine on the bottom surface. This switch shall override the Reel IN-OUT switch in the Control, Reeling Machine and shall permit releasing and retrieving of the Towed Body during ground operation or maintenance.

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*3.5.7.7 Electrical Connections - Electrical connections to external circuits shall consist of the following:

<u>Reference Designation</u>	<u>Receptacle Type</u>	<u>Function</u>
a. 6J1	MS3110E22-41P	Interconnect to aircraft power and control circuits
b. 6P2	96214-553044-2 (or approved equivalent)	Tow Cable interconnection to Towed Body, Magnetic Detecting TB-623, TB-623A or TB-623B
c. 6J3	MS3120E14-12S	Interconnect to Cable Maintenance Fixture MX-9516/ASQ-81(V)

3.5.7.8 Finish - The finish of the Reeling Machine covers shall be gray, color #36231 per Fed. Std. 595.

4. QUALITY ASSURANCE PROVISION

4.1 Responsibility for Inspection - Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the procuring activity. The procuring activity reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Classification of Tests - Items covered by this specification shall be subjected to the following tests to determine compliance with all applicable requirements:

- a. Preproduction (First Article) Tests
- b. Initial Production Tests
- c. Acceptance Tests
- d. Life Tests

4.2 Preproduction (First Article) Tests - When specified by contract, preproduction tests shall be made on an equipment representative of the production equipments to be supplied under contract. Preproduction tests shall be accomplished under the responsibility of the contractor and shall be conducted in accordance with the approved test procedure of 4.7. The government inspector and the procuring activity shall be advised when tests are to be conducted so that a representative may be designated to witness or supervise the tests when so desired. Contractors not having adequate facilities to conduct all required tests shall obtain the services of a commercial testing laboratory acceptable to the procuring activity.

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4.2.1 Preproduction (First Article) Test Data - The contractor shall make available all data collected in conducting these tests to the procuring activity for review.

*4.2.2 Scope of Tests - Preproduction test shall include all tests deemed necessary by the procuring activity to determine that the equipment meets all requirements of this specification and the contract. Preproduction tests shall include, but need not be limited to the following:

- a. Environmental Test in accordance with MIL-T-5422
- b. Interference Tests in accordance with MIL-STD-461
- c. Power Input Test

4.2.2.1 Power Input Test - Each equipment shall be subjected to a range of input voltage and frequencies as specified herein:

a. The input voltage shall be varied within the limits defined in paragraph 3.3.12. The input frequency shall remain between the limits of 380 Hz and 420 Hz. The equipment shall perform as specified in paragraph 3.3.12.

b. It shall be demonstrated that input voltage transients greater than those specified above shall not cause damage to the equipment and when the voltage returns within the specified limits normal operation shall automatically resume (See 3.3.12).

4.2.3 Preproduction (First Article) Approval - Approval of the preproduction sample shall be by the procuring activity upon satisfactory completion of all tests. No production equipment shall be delivered prior to the approval of the preproduction sample. Prefabrication of production equipment prior to the approval of the preproduction sample shall be at the contractor's own risk. The approved preproduction sample shall be retained by the contractor for his use in fabrication and testing of equipment to be submitted for acceptance. The preproduction sample shall not be considered as one of the equipments under the contract.

4.2.4 Production Equipments - Equipments supplied under the contract shall in all respects, including design, construction, workmanship, performance and quality, be equivalent to be approved preproduction sample. Each equipment shall be capable of successfully passing the same tests as imposed on the preproduction sample, but need not be subjected to those tests. Evidence of non-compliance with the above shall constitute cause for rejection and for equipment already accepted by the procuring activity, it shall be the obligation of the contractor to make necessary corrections to the satisfaction of the procuring activity.

4.3 Initial Production Tests - One of the first ten production equipments shall be selected and sent to a designated Government laboratory for tests. This equipment shall be selected by the procuring activity after the equipment has successfully passed all individual tests. The preproduction sample shall not be selected for this test.

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4.3.1 Scope of Tests - This equipment shall be subjected to any and all tests the procuring activity deems necessary to assure that the production equipment is equivalent to the previously approved preproduction sample and that it meets all applicable requirements, including design, construction, workmanship, performance and quality.

4.3.2 Accessory Material - In addition to the complete equipment submitted for Initial Production Tests the contractor shall also include data necessary to test the equipment.

4.3.3. Initial Production Sample Approval - Approval of the Initial Production Sample shall be by the procuring activity upon satisfactory completion of all tests. Any design, material or performance defect made evident during this test shall be corrected by the contractor to the satisfaction of the procuring activity. Failure of the initial production sample to pass any of the tests shall be cause for the deliveries of equipment under the contract to cease until proper corrective action is approved and accomplished. Corrective action shall also be accomplished on equipment previously accepted.

4.3.4 Reconditioning of Initial Production Test Sample - On completion of the initial production test the equipments shall be reworked by the contractor by replacing all worn or damaged items. After reworking, the contractor shall resubmit the equipment for acceptance.

4.4 Acceptance Tests - The contractor shall furnish all samples and shall be responsible for accomplishing the acceptance tests. All inspection and testing shall be under the supervision of the government inspector. Contractors not having testing facilities satisfactory to the procuring activity shall engage the services of a commercial testing laboratory acceptable to the procuring activity. The contractor shall prepare test reports showing quantitative results for all acceptance tests. Such reports shall be signed by an authorized representative of the contractor or laboratory, as applicable. Acceptance or approval of material during the course of manufacture shall not be construed as a guarantee of the acceptance of the finished product. Acceptance test shall consist of the following:

- a. Individual Test (See 4.4.1)
- b. Sampling Test (See 4.4.2)
- c. Reliability Assurance Test (See 4.4.3)
- d. Special Test (See 4.4.4)

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4.4.1 Individual Tests - Each equipment submitted for acceptance shall be subjected to the individual tests. These tests shall be adequate to determine compliance with the requirements of materials, workmanship, operational adequacy and reliability. As a minimum, each equipment accepted shall have passed the following tests:

- a. Examination of Product (See 4.4.1.1)
- b. Operational Test (See 4.4.1.2)
- c. Manufacturing Run In Test (See 4.4.1.3)

4.4.1.1 Examination of Product - Each equipment shall be examined carefully to determine that the material and workmanship requirements have been met.

4.4.1.2 Operational Test - Each equipment shall be operated long enough to permit the equipment temperature to stabilize and to check sufficient characteristics and record adequate data to assure satisfactory equipment operation.

4.4.1.3 Manufacturing Run In Test - Each equipment shall be operated under the conditions specified herein for a period of 10 hours without failure. A failure shall be defined as anything which causes malfunctioning of the equipment. Only those adjustments will be permitted which can be made by using such controls and adjustments that are accessible to the operator during the normal use of the equipment.

- a. Temperature Ambient room
- b. Humidity Ambient room
- c. Vibration Any selected frequency within the range of 20 to 30 cps (excluding resonant points) and a minimum amplitude of ± 3 g's

The equipment shall be vibrated (without vibration isolators) for a period of 10 minutes prior to the beginning of the 10-hours period of operation. Where feasible, the equipment shall be operated during this vibration period for the purpose of detecting flaws and imperfect workmanship. Operation within the specified limits of satisfactory performance is not necessarily required during the vibration period. This direction of vibration should be vertical to the normal mounting plane for 5 minutes and lateral to the plane for 5 minutes. Where it is not feasible to vibrate the equipment in 2 directions the vertical direction shall be used. During the 10-hour period of operation following the 10-minute vibration period the equipment shall be mechanically cycled periodically through its various phases of operation. Should a failure occur, it should be repaired and the test started over, except that the 10-minute vibration period need not be repeated when it is certain the failure was not a result of the vibration. Should repetitive failures occur, corrective action shall be taken to eliminate this defect from future equipment. A record shall be kept of all failures.

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The 10-hour period specified above may be composed of two 5-hour periods to conform with standard working hours. When the All Equipment Screening Test, paragraph 4.4.3.2 of this specification, is required by the contract, the Manufacturing Run In Test shall be omitted.

***4.4.2** Sampling Tests - Equipment selected for sampling tests shall first have passed the individual tests. Equipments shall be selected for sampling tests by the government inspector in accordance with the following: (Sampling tests shall not be conducted unless Reliability Assurance Tests of 4.4.3 are deleted by contractual action).

<u>Quantity of Equipments Offered for Acceptance</u>	<u>Quantity to be Selected For Sampling Tests</u>
a. First 10	1
b. Next 50	1
c. Next 75	1
d. Next 100	1
	1 for each additional 200 or fraction thereof

4.4.2.1 Scope of Tests - As a minimum each equipment selected for sampling tests shall be subjected to the following tests:

a. Complete operational test at ambient room conditions, making all necessary measurements to assure that all applicable specification requirements have been met.

b. Operational tests at certain environmental conditions. The conditions may vary for each equipment tested and should be based on results of the preproduction, initial production, individual and special tests.

*c. Manufacturing run in test specified in paragraph 4.4.1.3 except that the test duration shall be 120 hours for the Magnetic Detecting Set electronics and 10 reel in - reel out and latching operations of the Reeling Machine and Reeling Machine Control, with no restriction on the number of failures. However, each failure shall be analyzed as to cause and remedial action proposed.

***4.4.3** Reliability Assurance Tests - Reliability Assurance Tests shall be conducted in accordance with MIL-STD-781. Equipments selected for Reliability Assurance Tests shall first have passed the Individual Tests. All equipment undergoing reliability assurance tests shall be mounted identical to the manner in which the equipment will be mounted in the aircraft.

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*4.4.3.1 Qualification Phase - Prior to the acceptance of equipments under the contract or order, a minimum of three (3) equipments shall be tested as outlined in MIL-STD-781, under the section entitled "Qualification Phase of Production Reliability Tests". The maximum number of equipments to be used shall be those listed in Table 5 of MIL-STD-781. For the Qualification Phase, Test Level E shall be used. The Accept-Reject Criteria for Test Plan IV shall be used.

*4.4.3.2 All Equipment Screening Phase - Each equipment produced, except the Reeling Machine and Reeling Machine Control, shall be tested as outlined in MIL-STD-781 (as modified herein) under the section entitled "Test Plan XXIX (All Equipment Screening Test)". The test time shall be 75 hours and Test Level E shall be used. The Reeling Machine and Reeling Machine Control shall be cycled through ten complete reel in - reel out operations under simulated load conditions. The latching mechanism shall release and latch the Towed Body or equivalent ten times. The Reeling Machine and Reeling Machine Control shall be tested at standard conditions.

4.4.3.3 Test Details - The length of a temperature cycle shall be 12 hours with a heating period of 9 hours. Voltage cycling is not required. Other test details such as the performance characteristics to be measured, special failure criteria, preventative maintenance to be allowed during the test, etc., shall be submitted for approval to the procuring activity prior to the beginning of any Reliability Assurance Test Phase.

4.4.4 Special Tests - Special tests shall be conducted on equipments for the purpose of checking the effect of any design or material change on the performance of the equipment and to assure adequate quality control. The equipment selected for special tests may be selected from equipment previously subjected to the sampling or Reliability Assurance Tests.

4.4.4.1 Special Test Schedule - Selection of equipments for special test shall be made as follows:

a. On an early equipment after an engineering or material change.

b. Whenever failure reports or other information indicate additional tests are required. (This will be determined by the procuring activity).

4.4.4.2 Scope of Tests - Special tests shall consist of such tests as approved by the procuring activity. Test procedures previously approved for the preproduction tests shall be used where applicable. When not applicable, the contractor shall prepare a test procedure and submit it to the procuring activity for approval prior to conducting the tests.

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4.4.5 Equipment Failure - Should a failure occur during either the sampling, reliability assurance or special tests, the following action shall be taken:

- a. Determine the cause of failure.
- b. Determine if the failure is an isolated case or design defect.
- c. Submit to the procuring activity for approval, proposed corrective action intended to reduce the possibility of the same failure(s) occurring in future tests.
- d. Where practical, include a test in the individual test to check all equipment for this requirement until reasonable assurance is obtained that the defect has been satisfactorily corrected.

4.5 Maintainability Demonstration - When specifically required by contract a Maintainability Demonstration shall be conducted per MIL-STD-471, using Method 1, Test Plan (A1) and Test Plan (B2) to verify that the requirements of 3.3.7.3.2.1 are satisfied.

4.5.1 Test Conditions - One equipment shall be used for this test. The contractor shall select any one of the equipments that is available. All dust covers shall be in place on the equipment prior to the initiation of this test. Before beginning the test, the equipment shall be checked to determine that it is operating normally. Test equipment, tools, spare parts, diagnostic programs and documentation shall be available for the test.

4.5.2 Repair Actions - A repair action shall be as follows:

- a. Fault Isolation
- b. Repair
- c. Equipment Checkout

4.5.3 Simulated Failures - The failures shall be randomly introduced, one at a time, throughout the equipment. The points of failures shall be determined by the procuring activity prior to the initiation of the tests.

4.5.3.1 Inducing Failures - Single failures shall be induced into the equipment by removal of a component, substituting a bad component for a good component (incorrect value or total failure) or shorting selected components. Any failure induced for demonstration purposes will consist of a continuous malfunction.

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4.5.4 Repair Time Measurements - The time required for the technician to perform each repair action, including the use of technical manuals and support equipment, shall be measured starting at the time the technician is made aware that a malfunction exists and ending at the time the equipment is restored to normal operation. Any delay, such as waiting for parts, obtaining test equipment or administrative delays shall be excluded.

4.6 Life Test - When specified by contract, the contractor shall furnish all samples and shall be responsible for accomplishing the life tests. The test shall be of 300 hours duration and shall be conducted on equipments that have passed the individual test. The life test shall be performed under the condition specified in 4.6.1. The life test sample shall be selected by the Government inspector in accordance with the following. (Equipments which have successfully passed the Initial Production Test, Sampling Tests, Reliability Tests or Special Tests may be selected for life tests.) When reliability test are conducted, the life test shall be omitted if, during the reliability tests, a quantity of equipments equal to, or more than, that listed below receive at least 300 hours each of test time.

<u>Quantity of Equipments Offered for Acceptance</u>	<u>Quantity to be Selected for Life Test</u>
a. First 25	1
b. Next 175	1
c. Next 300	1 for each additional 500 or fraction thereof.

*4.6.1 Test Conditions - The life test shall be conducted under the following simulated service conditions:

- | | |
|-------------------------|------------------------------|
| a. Temperature | Normal room |
| b. Altitude | Normal ground (0 - 5000 ft.) |
| c. Humidity | Room ambient |
| *d. Input Power Voltage | |

(1) Detecting Set, Magnetic AN/ASQ-81(V)-1, AN/ASQ-81A(V)-1, AN/ASQ-81B(V)-1, AN/ASQ-81B(V)-3, AN/ASQ-81C(V)-3 or AN/ASQ-81C(V)-1 require the following:

115 + 5 volts at 380 to 420 Hz
27.5 ± 2 volts at 380 to 420 Hz for edge light panel lamps

(2) Detecting Set, Magnetic AN/ASQ-81A(V)-2, AN/ASQ-81B(V)-2, or AN/ASQ-81C(V)-2 require the following:

115 +5 volts at 380 to 420 Hz
27.5 ± 2.0 VDC

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27.5 ± 2.0 volts 380 to 420 Hz for edge light panel lamps

*(3) Detecting Set, Magnetic AN/ASQ-81B(V)-4 or AN/ASQ-81C(V)-4 require the following:

115 ± 5 volts at 380 to 420 Hz
 27.5 ± 2.0 VDC
 5.0 ± 1.0 volts at 380 to 420 Hz

4.6.2 Test Periods - The test may be run continuously or intermittently. Any period of operation shall be of sufficient duration to permit the equipment temperature to stabilize. Periodically, the equipment shall be turned on and off several times and put through its various phases of operation.

4.6.3 Performance Check - At approximately 8 hour intervals during the test, a limited performance check shall be made. The performance check proposed by the contractor shall be subject to review by the procuring activity.

4.6.4 Test Data - The contractor shall keep a daily record of the performance of the equipment, making particular note of any deficiencies or failures. In the event of part failures, the defective part shall be replaced and the operation resumed for the balance of the test period. A record shall be kept of all failures throughout the test. This record shall indicate the following:

- a. Part type number
- b. The circuit reference symbol number
- c. The part function
- d. Name of the manufacturer
- e. Nature of the failure
- f. The number of hours which the part operated prior to failure

4.6.4.1 Failure Report - In the event of a failure, the Government inspector shall be notified immediately. A report shall be submitted to the Government inspector upon completion of test. In this report the contractor shall propose suitable and adequate design or material corrections for all failures which occurred. The Government inspector will review such proposals and determine whether they are acceptable.

4.7 Test Procedures - The procedures used for conducting preproduction tests, acceptance tests and life tests shall be prepared by the contractor and submitted to the procuring activity for review and approval. The right is reserved by the procuring activity or the Government inspector to modify the tests or require any additional tests deemed necessary to determine compliance with the requirements of this specification or the contract. Specification MIL-T-18303 shall be used for preparation of test procedures. When approved test procedures are available from previous contracts, such procedures will be provided and may be used when their use is approved by the

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procuring activity. However, the right is reserved by the procuring activity to require modification of such procedures, including additional tests, when deemed necessary.

*4.8 Reconditioning of Tested Equipment - Equipment which has been subjected to preproduction and/or life tests shall be reconditioned by the contractor by replacing all worn or damaged items, at the contractor's expense. After reworking, the contractor shall resubmit the equipment for acceptance.

4.9 Presubmission Testing - No item, part or complete equipment shall be submitted by the contractor until it has been previously tested and inspected by the contractor and found to comply, with all applicable requirements.

4.10 Rejection and Retest - Equipment which has been rejected may be reworked or have parts replaced to correct the defects and be resubmitted for acceptance. Before resubmitting, full particulars concerning previous rejection and the action taken to correct the defects found in the original shall be made available to the Government inspector.

4.11 Test Data Reporting - MIL-STD-831 shall be used as a guide in the preparation of test reports.

5. PACKAGING

*5.1 General - All major units and parts of the equipment shall be preserved, packaged, packed and marked for the level of shipment specified in the contract or order in accordance with Specifications MIL-E-17555 and MIL-STD-794. In the event the equipment is not covered in Specification MIL-E-17555, the method of preservation for Level A shall be determined in accordance with the selection chart in Appendix D of MIL-STD-794. The Detector, Magnetic DT-323/ASQ-81(V), DT-323A/ASQ-81(V), DT-323B/ASQ-81(V), or DT-323C/ASQ-81(V) and the Towed Body, Magnetic Detecting TB-623/ASQ-81(V), TB-623A/ASQ-81(V), or TB-623B/ASQ-81(V) shall be preserved, packed and marked in a Shipping and Storage Container, Magnetic Detector - Towed Body, CNU-198/E or equivalent.

6. NOTES

6.1 Intended Use - The equipment covered in this specification will be used in fixed wing or rotary wing aircraft to detect anomalies in the magnetic field of the earth due to the presence of submarines.

6.2 Ordering Data - Purchasers should exercise any desired options offered herein, and procurement documents should specify the following:

6.2.1 Procurement Requirements

- a. Title, number and date of this specification
- b. Selection of applicable levels of packaging and packing (See 5.1)

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*6.2.2 Data Requirements - When this specification is used in a procurement which incorporates a DD Form 1423 and invokes the provisions of DAR-7-104.9(n) of the DAR, the data requirements identified below will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (DD Form 1423) incorporated into the contract. When the provisions of DAR-7-104.9(n) are not invoked, the data specified below will be delivered by the contractor in accordance with the contract requirements. Deliverable data required by this specification is cited in the following paragraphs:

	<u>Paragraph</u>	<u>Data Requirement</u>	<u>Applicable DID</u>
a.	3.2.1	Non-Standard Parts Approval Requests	DI-E-7028
b.	3.2.1	Micro-electronic Devices and Assembly Approval Requests	UDI-E-21337
c.	3.3.4	Console Mounted Control Drawing Requirements	UDI-E-21339
d.	4.2.3	Design Approval Test Report	UDI-T-21350
e.	4.4.2	Reliability Test and Demonstration Report	DI-R-7034
f.	4.4.3.3	Test Procedures	UDI-T-21347
g.	4.4.4.2	Test Procedures	UDI-T-21347
h.	4.4.5	Reliability Test and Demonstration Report	DI-R-7034
i.	4.7	Test Procedures	UDI-T-21347

(Copies of Data Item Descriptions required by the contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

6. First Article - When a first article is required, it shall be tested and approved under the appropriate provisions of 7-104.55 of the DAR. The first article shall be a preproduction sample. The first article shall consist of one unit. When a first article is required for inspection and approval see paragraphs 3.1 and 4.2.

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6.4 Performance Objectives - Minimum size and weight, simplicity of operation, ease of maintenance and an improvement in the performance and reliability of the specific functions beyond the requirements of this specification are objectives which shall be considered in the production of this equipment. Where it appears a substantial reduction in size and weight or improvement in simplicity of design, performance, ease of maintenance or reliability will result from the use of materials, parts and processes other than those specified in Specification MIL-E-5400, it is desired their use be investigated. When investigation shows advantages can be realized, a request for approval shall be submitted to the procuring activity for consideration. Each request shall be accompanied by complete supporting information.

6.5 Non-Repairable Subassemblies - As a general rule, non-repairable subassemblies should be encapsulated or hermetically sealed. The number of connections internal to the subassembly should be held to a minimum. Detail parts tolerances and ratings should be so selected that the life of the subassembly is greater than that of a similar repairable one. With few exceptions (such as high voltage power supplies), the non-repairable subassembly should evidence a Mean-Time-To-Failure greater than 5000 hours, and for many applications this figure must be nearer 50,000 hours.

6.6 Type Designations - The type designation may be modified by the procuring activity upon application by the contractor for assignment of nomenclature in accordance with 3.3.8. The correct type number shall be used on nameplates, shipping records and instruction books, as applicable.

6.7 Changes from Previous Issues - In specification revisions and superseding amendments an asterisk "*" preceding a paragraph number denotes paragraphs in which changes have been made from the previous issue. This has been done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content as written, irrespective of the asterisk notations and relationship to the last previous issue.

6.8 Associated Equipment - The equipment shall operate with one or more of the following associated equipment:

- a. AN/ASA-64 Detecting Group, Submarine Anomaly
- b. AN/ASA-65 Compensator Group, Magnetic
- c. RO-32/ASQ Recorder, Magnetic Distortion, or equivalent.

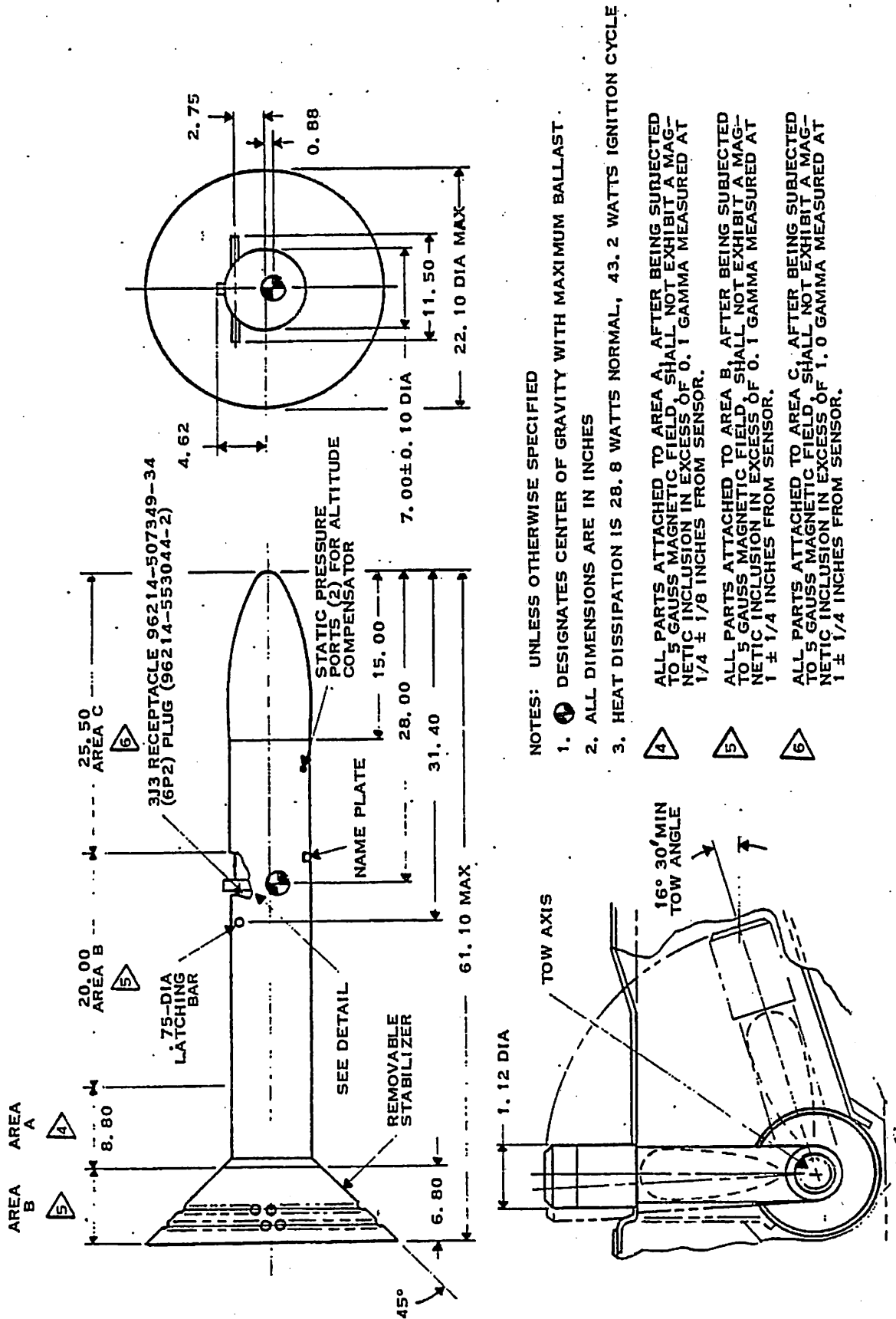
MIL-D-81609C(AS)

6.9 Performance Characteristics to be Measured - Performance characteristics to be measured to insure that the equipment complies with all the requirements of 3.4 (Performance) and 3.5 (Detail Requirements) and all operations requirements, shall be submitted to the procuring activity for approval.

Preparing activity:
Navy - AS

(Project 5895-N293)

MIL-D-81609C(AS)



*FIGURE 1. TOWED BODY, MAGNETIC DETECTING TB-623/ASQ-81(V), TB-623A/ASQ-81(V) OR TB-623B/ASQ-81(V)

NOTES: UNLESS OTHERWISE SPECIFIED

1. COLORS PER FED-STD-595

LEGEND



RED, COLOR NO. 11136



BLACK, COLOR NO. 17038



YELLOW, COLOR NO. 13655

2. ALL DIMENSIONS ARE IN INCHES

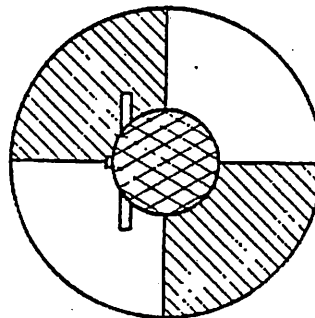
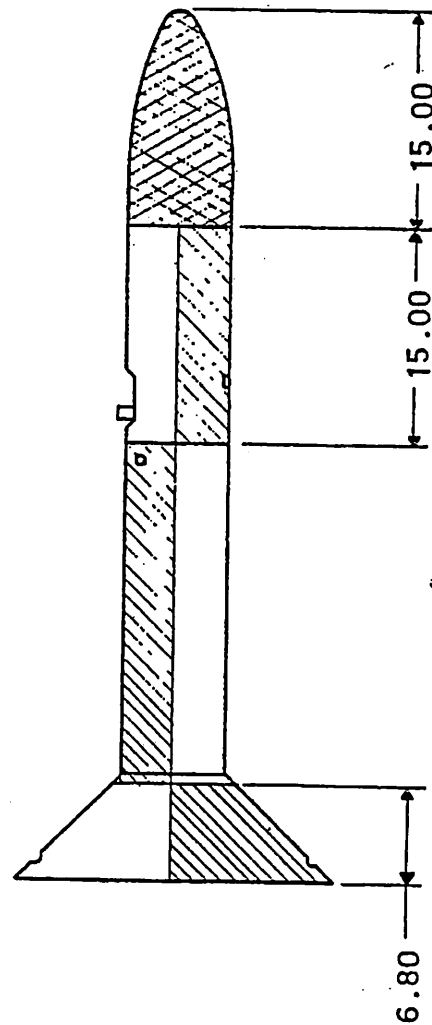


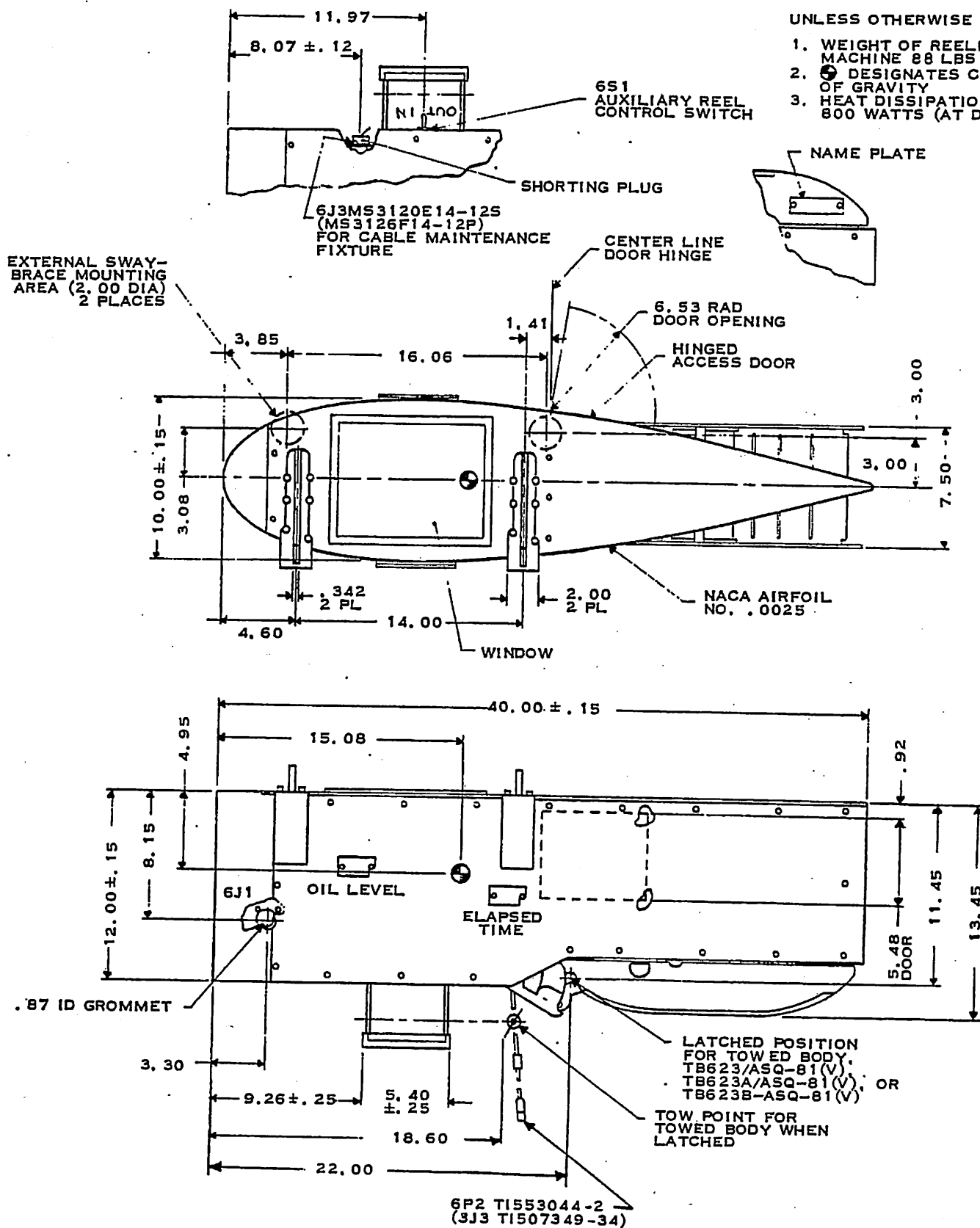
FIGURE 2. TOWED BODY, MAGNETIC DETECTING TB-623/ASQ-R1(V), TB-623A/ASQ-R1(V) OR TB-623B/ASQ-R1(V)

MIL-D-81906C(AS)

NOTES:

UNLESS OTHERWISE SPECIFIED

1. WEIGHT OF REELING MACHINE 88 LBS
2. \odot DESIGNATES CENTER OF GRAVITY
3. HEAT DISSIPATION IS 800 WATTS (AT DUTY CYCLE)

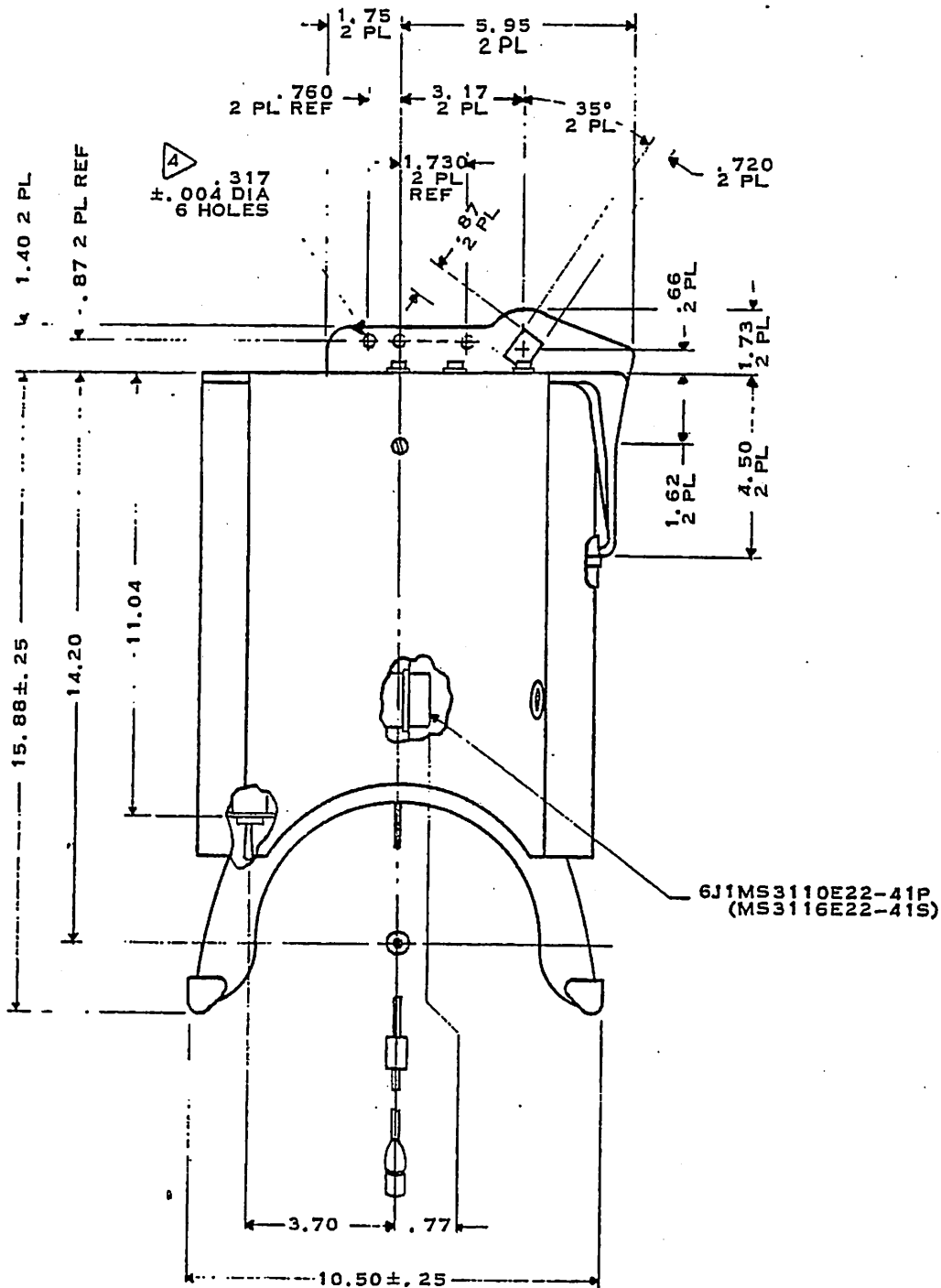


*FIGURE 3. REELING MACHINE, MAGNETIC DETECTOR LAUNCHING RL-305A/ASQ-81(V) FORM FACTOR (SHEET 1 OF 2)

MIL-D-81906C(AS)

NOTES: CONT.

△ LOCATION OF .317 ± .004 DIA HOLES DETERMINED BY KAMAN AEROSPACE CORP TOOL NO. K631413-1T1, 2 (TEXAS INSTRUMENTS DRAWING 731795-1)



*FIGURE 3. REELING MACHINE, MAGNETIC DETECTOR LAUNCHING, RL-305A/ASQ-81(V), FORM FACTOR (SHEET 2 OF 2)