

MIL-T-81734D(AS)

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Superseding

MIL-T-81734C(AS)

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MILITARY SPECIFICATION
TEST SET, AIRBORNE WEAPON CONTROL SYSTEM
AN/AWM-23(V)

This specification has been approved by the Naval
Air Systems Command, Department of the Navy

1. SCOPE

1.2 Scope. This specification covers the performance, design, and test requirements for the Airborne Weapon Control System Test Set AN/AWM-23(V).

2. APPLICABLE DOCUMENTS

2.1 General. The following documents, of the issue specified in AS-4053, Applicable Document List for AWCS Test Set AN/AWM-23(V), form a part of this specification to the extent specified herein.

SPECIFICATIONS

Military

MIL-H-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance
MIL-C-13777	Cable, Special Purpose, Electrical, General Specification for
MIL-E-175S5	Electronic and Electrical Equipment, Accessories, and Repair Parts; Packaging and Packing of
MIL-T-18303	Test Procedures, Preproduction, Acceptance, and Life for Aircraft Electronic Equipment, Format for
MIL-N-18307	Nomenclature and Identification for Electronic Aeronautical and Aeronautical Support Equipment including Ground Support Equipment

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to:

Engineering Specifications and Standards Department (Code 93) Naval Air Engineering Center, Lakehurst, NJ 08733, by using self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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MIL-T-21200	Test Equipment for use with Electronic and Fire Control Systems, General Specification for
MIL-P-27407	Propellant Pressurizing Agent, Helium
MIL-S-46844	Solder Bath Soldering of Printed Wiring Assemblies, Automatic Machine Type
MIL-W-81044	Wire, Electric, Crosslinked, Polyalkene Insulated, Copper
MIL-S-81775 (AS)	Service Set, Hydraulic System MX-9043()/AWM-23(V)
MIL-T-81776 (AS)	Test Station, Module OJ-217()/AWM-23(V) and OJ-378()/AWM-23(V)
MIL-T-81778(AS)	Test Station, Low Frequency OJ-215()/AWM-23(V) and OJ-379()/AWM-23(V)
MIL-K-81779(AS)	Kit, Tool, Special TK-222()/AWM-23(V)
MIL-S-81780(AS)	Special Handling Equipment
MIL-T-81781(AS)	Test Set, Missile Auxiliaries TS-3479()/AWM-23(V)
MIL-T-81782(AS)	Test Station, Computer OJ-216()/AWM-23(V)
MIL-T-81783(AS)	Test Station, Controls-Displays-Doppler Filter OJ-214()/AWM-23(V)
MIL-T-81784(AS)	Target Simulator, Infrared SM-630()/AWM-23(V)
MIL-T-81785(AS)	Test Station, Radio Frequency OJ-213()/AWM-23(V)
MIL-C-81952(AS)	Cooler, Liquid, Electronic Equipment HD-9S7()/AWM- 23 (V)
MIL-C-81954(AS)	Cable Assembly Set, Electrical, MATS, Special Purpose
MIL-S-81996(AS)	Stand, Fill-Drain, Coolant System MT-4730()/AWM-23(V)
MIL-T-85027(AS)	Test Set, Antenna, Boresight TS-3568()/AWM-23(V)
MIL-T-85039(AS)	Test Set, Missile Interface TS-3561()/AWM-23(V)

Naval Air Systems Command (NAVAIR)

AS-2197	Detail Specification, F-14A Weapon Control System
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Hughes Aircraft Company

HMS 2-1132	Material Specification, Wire (Bus), Solid Copper Conductor, General Purpose (200 C Ser\vice)
HMS 2-1144	Material Specification, Wire, Electrical, Poly-tetrafluoroethylene insulated, Hookup and General Purpose (for 392 F service)
HMS 2-1377	Material Specification, Cable -- Multiconductor, Hook-up and General Purpose (for 392 F service)
HMS 2-1480	Material Specification, Wire and Cable, Multiconductor, Hook-up, Fluorocarbon-TFE insulated, 600 volts RMS (275 F service).
HMS 2-1513	Material Specification, Wire and Cable, Cabling and Harnessing Usage, Polyalkene Insulated, 600 volts RMS (275 F service)
HMS 2-1514	Material Specification, Wire and Cable, Cabling and Harnessing Usage, Polyalkene Insulated, 100 volts RMS (275 F service)

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HMS 2-1551	Material Specification, Wire, Electrical, Poly-vinylidene, Fluoride Insulated
HM6 2-1563	Material Specification, Wire, Electrical, Poly-tetrafluoroethylene Insulated, 600 and 1000 volts RMS (for 392 F service)
HMS 2-1619	Material Specification, Wire and Cable, Electrical, Polyimide-Fluorocarbon Insulated (for 392 F service)
HMS 20-1458	Material Specification, Fluid, Dielectric Coolant, Silicate Ester Base.
HMS 22-1672	Material Specification, Gold-Silicon Solder Alloy
GS 30620-781	General Specification for Identification and Marking of AN/AWM-23 Ground Support Equipment
DP 30847-008	Detail Process Specification, Engineering Modification of Printed Circuit Boards
FS 31050-038	Finish Specification, AN/AWM-23 Ground Support Equipment
DP 31050-918	Detail Process Specification, REMCAM Fabrication Procedure
DP 31050-919	Detail Process Specification, Assembly of Repairable Multilayer Circuit Strips (REMCAM)
DP 50062	Detail Process Specification, Modification of REMCAM Circuit Boards
HP 11-39	Hughes Process, Welding, Resistance for the Assembly of Electronic Modules
HP 31-12	Hughes Process Solder Resist, Method for the Production of Etched Circuitry
HP 31-14	Hughes Process, Gold Plating Contacts of Solder-Plated Circuit Board, Process for
HP 31-16	Hughes Process, Printed Wiring Multilayer Board
HP 31-17	Hughes Process, Printed Circuit Board, Lead-Tin Plated, Projecting Contact Pin Type, Production of

Hughes Aircraft Company - Acceptance Test Procedures

3282204	Radio Frequency Test Station
3282205	Controls-Displays-Doppler Filter Test Station
3282206	Low Frequency Test Station
3282207	Computer Test Station
3282208	Module Test Station
3282209	Missile Auxiliaries Test Set
3282210	Infrared Target Simulator
3282212	Hydraulic System Service Set
3282244	Cooler, Liquid, Electronic Equipment Shop
3326964	Missile Interface Test Set

STANDARDS

Federal

BB-N-411	Nitrogen, Technical
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Military

MI L-STD-167	Mechanical Vibrations of Shipboard Equipment
MIL-STD-280	Definitions of Item Level, Item Exchangeability, Models, and Related Terms
MIL-STD-454	Standard General Requirements for Electronic Equipment
MIL-STD-461	Electromagnetic Interference Characteristics Requirements for Equipment
MIL-STD-480	Configuration Control Engineering Changes, Deviations and Waivers
MIL-STD-721	Definitions of Effectiveness Terms for Reliability Maintainability, Human Factors and Safety
MI L-STD-761	Electric Power, Alternating Current for Shipboard Use, Characteristics and Utilization of

Industry

NAS-729	Cable, Electrical, Flat Conductor, Flexible -- 300 volts, Copper
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PUBLICATIONS

Navy

AR-5	Microelectronic Devices Used in Avionics Equipment, Procedures for Selection and Approval of
NAVAI R 00-25-543	List of Standard Drawings used by the Naval Air Systems Command
NAVAI R 00-25-544	List of Specifications and Standards (Book Form) Approved by the Naval Air Systems Command

2.2 Availability of documents. When requesting specifications, standards, drawings, and publications, refer to both title and number. Copies of applicable specifications required by contractors in connection with specific procurement functions may be obtained upon application to the Commanding Officer, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120,

2.3 Precedence of documents. When the requirements of the contract, this specification, or applicable subsidiary documents are in conflict, the following precedence shall apply:

- a. Contract. The contract shall have precedence over any other document.
- b. This specification. This specification shall have precedence over all applicable subsidiary documents except those of Table I.
- c. Referenced documents. Any document referenced in this specification shall have precedence over all applicable documents referenced therein.

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TABLE I
ITEMS OF TEST SET AN/AWM-23(V)

ITEM	NOMENCLATURE	APPLICABLE SPECIFICATION	USAGE MAINTENANCE LEVEL
1.	Service Set, Hydraulic System MX-9043()/AWM-23(V)	MIL-S-81775(AS)	O/I
2.	Test Station, Module QJ-217()/AWM-23(V) and QJ-378()/AWM-23(V)	MIL-T-81776(AS)	I
3.	Test Station, Low Frequency QJ-215()/AWM-23(V) and QJ-379()/AWM-23(V)	MIL-T-81778(AS)	I
4.	Kit, Tool, Special TK-222()/ AWM-23(V)	MIL-K-81779(AS)	I
5.	Special Handling Equipment Adapter, Handling Antenna MX-9046()/AWM-23(V) and MX-9691()/AWM-23(V) Adapter, Handling, Tactical Information Display MX-9047()/AWM-23(V) Bar, Lifting, Antenna MX-9048()/AWM-23(V) Adapter, Hoisting, Antenna ADU-371()/E	MIL-S-81780(AS)	O/I O/I O Depot
6.	Test Set, Missile Auxiliaries TS3479()/AWM-23(V)	MIL-T-81781(AS)	O
7.	Test Station, Computer QJ-216()/AWM-23(V)	MIL-T-81782(AS)	I
8.	Test Station, Controls-Displays- Doppler Filter QJ-214()/AWM-23(V)	MIL-T-81783(AS)	I
9.	Target Simulator, Infrared SM-630()/AWM-23(V)	MIL-T-81784(AS)	O/I
10.	Test Station, Radio Frequency QJ-213()/AWM-23(V)	MIL-T-81785(AS)	I
11.	Cooler, Liquid, Electronic Equipment HD-957()/AWM-23(V)*	MIL-C-81952(AS)	I
12.	Cable Assembly Set, Electrical, MATS, Special Purpose	MIL-C-81954(AS)	O/I
13.	Stand, Fill-Drain, Coolant System MT-4730()/AWM-23(V)	MIL-S-81996(AS)	I
14.	Test Set, Antenna, Boresight TS-3568()/AWM-23(V)	MIL-T-85027(AS)	I
15.	Test Set, Missile Interface TS-3561()/AWM-23(V)	MIL-T-85039(AS)	O
NOTES. * See 6.5 a. I - Intermediate (See 6.3.3) b. O - Organizational (See 6.3.2)			

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3. REQUIREMENTS

3.1 Materials, parts, and processes. Unless otherwise specified herein, MIL-T-21200 shall apply for materials, parts, and processes.

3.1.1 Selection of materials, parts, and processes. Unless otherwise specified herein, MIL-T-21200 shall apply for the selection of materials, parts, and processes. In addition, selection of materials, parts, and processes may be based on documents or drawings listed in NAVAIR 00-25-543 or NAVAIR 00-25-544.

3.1.1.1 Approval of nonstandard materials, parts and processes. Parts submitted and approved on any prior PHOENIX contract need not be resubmitted nor reapproved. If a nonstandard part is submitted under this contract for disposition by Naval Avionics Facility, Indianapolis (NAFI) and the disposition designates a degradation in system performance or a maintenance problem, the Contractor will, at NAVAIR discretion retrofit the nonapproved parts with approved parts. In addition, the following shall apply:

- a. Electric and electronic part approval in accordance with MIL-T-21200.
- b. Microelectronic device approval in accordance with AR-5.
- c. Polyurethane elastomeric materials covered by requirements 17 and 47 of MIL-STD-454 shall have been tested and found suitable for the test set environment.

3.1.2 Flammable materials. In lieu of the requirements of MIL-T-21200, the following shall apply:

- a. Use of materials which may support combustion shall be avoided, wherever practical.
- b. No materials capable of causing an explosion shall be used.

3.1.3 Cables and connectors. The applicable requirements of MIL-T-21200 or MIL-C-13777 shall apply. In addition, if flexible flat conductor electrical cable is required, NAS 729 shall apply.

3.1.4 Wire. Wire shall be selected in accordance with MIL-T-21200 or MIL-W-81044, as applicable. In addition, the following types of wire may be used: HMS 2-1132, HMS 2-1513, HMS 2-1514, HMS 2-137?, HMS 2-1144, HMS 2-1563, HMS 2-1480, HMS 2-1551, HMS 2-1619.

3.1.5 Rotary switches. Rotary switches shall be in accordance with MIL-STD-454, Requirement 58, except that the material for contacts and contractors may also be copper with subsequent nickel and rhodium plating.

3.1.6 Finishes. Finishes and surface treatments shall be in accordance with FS 31050-038.

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3.1.7 Marking and identification. Marking and identification shall be in accordance with GS 30620-781 and panel marking processes in accordance with FS 31050-038. The requirements of MIL-N-18307 shall apply as specified in GS 30620-781.

3.1.8 Soldering. Soldering shall be performed in accordance with MIL-STD-454, Requirement 5, MIL-S-46844, or DP 30847-008 as appropriate. Solder for use in microelectronic items shall be in accordance with HMS 22-1672.

3.1.9 Welding.

3.1.9.1 Structural. Structural welding shall be in accordance with MIL-STD-454, Requirement 13.

3.1.9.2 Welds, resistance, electrical interconnections. Electrical interconnection resistance welds shall be in accordance with MIL-STD-454, Requirement 24 or in accordance with HP 11-39.

3.1.10 Printed wiring. Printed wiring (etched circuitry) shall be in accordance with HP 31-12, HP 31-17, HP 31-14 or HP 31-16. Plated-through holes may be used in lieu of test jacks. When using the Repairable Multi-layer Circuit Assembly Method (REMCAM) one or two REMCAM flat leads may occupy the plated through hole with the component lead, provided the procedure for this process is in accordance with DP 31050-918 and DP 31050-919.

3.1.11 Engineering changes to printed circuit boards. In the event that an engineering change to a printed circuit board cannot be implemented in the appropriate master patterns before the start of board fabrication, DP 50062 and DP 30847-008 may be used as the workmanship criterion for effecting the engineering change. In those cases where the rework deviates from the MIL-STD-454, Naval Technical Representative (NTR) approval of a minor deviation on a DD Form 1694 is required before production release of the engineering.

3.1.12 Replaceability of electronic standard parts and materials. Non-standard nonapproved electronic items may be used in the AN/AWM-23 with no requirement for traceability to a particular SRA or WRA in only those cases where approved parts are not available to meet schedule requirements. When such a replacement is utilized, the contractor shall abide by the replaceability of electronic standard parts and materials requirements of MIL-T-21200 as follows:

- a. The equipment shall be arranged to permit replacement of the nonstandard, nonapproved items by the approved items.
- b. NTR approval of a minor deviation on a DD Form 1694 is required before the items are incorporated into any hardware.

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3.2 Design and construction. The Airborne Weapon Control System Test Set AN/AWM-23(V) shall consist of the items of Table I. Each of the items of Table I shall include all necessary cables required for operation.

3.2.1 Design features. Except as otherwise specified herein, the design and construction of the test set shall be in accordance with MIL-T-21200.

3.2.1.1 Method of operation. The items of Table I shall be operable in manual, semiautomatic, or automatic modes as specified in the applicable specification.

3.2.1.2 Commercial test equipment. Commercial test equipment installed in the test set shall meet the functional requirements of the test set. The test set, including commercial test equipment installed in the test set, shall meet the environmental requirements of 3.2.3.2.

3.2.1.2.1 Other commercial components. Other commercial components (such as power supplies, tape readers, or tape recorders), may be incorporated in the test set. When installed in the test set, they shall meet the environmental and electrical service conditions of this specification.

3.2.1.3 Circuit grounds. To the greatest extent practicable, circuit ground or common shall be connected to the chassis, enclosure, or ship's hull at only one physical point. The ship's hull shall not be used as an electrical conductor in equipment circuitry.

3.2.1.4 Interchangeability. Interchangeability shall be in accordance with MIL-STD-454, Requirement 7.

3.2.1.5 Identification of product. MIL-T-21200 shall apply.

3.2.1.6 Human factors. The human engineering requirements of MIL-STD-454, Requirement 62, shall apply.

3.2.1.7 Test set generated acoustic noise. The equipment acoustic noise requirements of MIL-T-21200 shall apply except that liquid cooler noise level shall not exceed 80 decibels in any octave to 9600 Hertz (Hz), at a distance of 3 feet.

3.2.1.8 Forced-liquid cooling. Liquid coolant shall be routed within the Low Frequency Test Station, the Radio Frequency Test Station and the Fill-Drain Stand as required. Flow/no flow indication of liquid coolant shall be provided in these test stations. Individual flow rate requirements for each test station shall be as specified in the applicable specification. Maximum liquid coolant flow rate shall be 13 gallons per minute (gpm).

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3.2.1.9 Space and weight limitations. The test set shall occupy not more than 210 square feet of deck area when installed and operating, or with drawers and panels extended for maintenance. Included in this area are the space occupied by duct work required for entry of cooling air into the test stations and the space required for test station work surfaces. Areas not included are the following:

- a. Aisle and access space
- b. Space for portable items of the test set
- c. Space for auxiliary items of the test set (unless provision for such storage is made in a test station detail specification).

The total height of the test set, including shock mounts and permanently installed equipment, shall not exceed 76 inches. Total weight of the test set shall be not more than 21,250 pounds. Loading, averaged over the total deck area shall be not more than 200 pounds per square foot. Space and weight limitations for each test station shall be as specified in the applicable specifications of Table I.

3.2.1.10 Connectors. "Edgeboard" printed contacts utilizing pressure method contacts may be used for shop replaceable assemblies. Plug-in relays may be used.

3.2.1.11 Secondary electrical power. Secondary electrical power within the items of Table I shall be as specified in the applicable specifications.

3.2.1.12 Interface. Interface requirements for the items of Table I shall be as specified in the applicable specifications.

3.2.2 Utilities. The test set shall be designed to accept the utilities specified herein. Individual requirements to recondition and distribute the utilities within the test set items of Table I shall be as specified in the applicable specifications.

3.2.2.1 Electrical power. The test set shall operate from the electrical power listed below. Alternating current power conditions (Type I, Type III) are specified in MIL-STD-761. Alternating current power forms are listed in MIL-STD-761. Individual electrical power requirements for each item of the test set shall be as specified in the applicable specification.

<u>Power Form</u>	<u>Maximum Power Required</u>
a. 29 volts direct current (Vdc)	2 kilowatts (kW)
Steady state: 29 +4 Vdc;	
Ripple: +1 v peak-to-peak (p-p);	
Transient: +20 percent, steady state;	
Transient recovery: 2 seconds recovery to steady state	

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- b. 115/200 volts, alternating current, (Vat), at 400 Hertz (Hz), 3-phase, 4-wire, Type III 43 kilovolt-amperes (KVA)
- c. 115 Vat, at 60 Hz, single phase, Type I (See 6.8) 9 kVA
- d. 115 Vat, 60 Hz, 3-phase, 3-wire ungrounded, Type I 16.5 KVA
- e. 440 Vat, 60 Hz, 3-phase, 3-wire ungrounded, Type I 11 kVA

3.2.2.2 Clean air. The test set shall operate with clean air having the following characteristics:

- a. Temperature $+12.8 \pm 2.8^{\circ}$ Celsius (C)
($+55 \pm 5^{\circ}$ Fahrenheit (F))
- b. Humidity No free moisture and dew point below shop ambient temperature
- c. Particulate contamination Dust particles < 50 microns: density ≤ 0.10 gram per-pound of dry air
- d. Inlet pressure < 7 inches of water (static) at rated flow
- e. Flow rate ≤ 225 pounds per minute total,
 ≤ 75 pounds per minute per inlet port

3.2.2.3 Potable water. The test set shall operate with potable water having the following characteristics:

- a. Temperature 5.6 to 10°C (42 to 50°F)
- b. Flow rate ≤ 30 gpm upon demand
- c. Pressure 50 to 150 psig at rated flow

3.2.2.4 Liquid coolant. The test set shall operate with Coolanol 25 (Monsanto Chemical Co.), Oronite Flo-Cool 180 (Chevron Chemical Co.) or equivalent in accordance with HMS 20-1458.

3.2.2.5 Helium. The test set shall operate with helium, at pressures ranging from 1800 to 2200 psig and conforming to MIL-P-27407.

3.2.2.6 Nitrogen. The test set shall operate with nitrogen conforming to BB-N-411, Type I, Class I, Grade A, and supplied at pressures ranging from 2800 to 3000 psig to a two stage regulator. Test stations shall be capable of using nitrogen supplied at 125 ± 12 psig from the two stage regulator.

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3.2.2.7 Hydraulic fluid. The test set shall operate with hydraulic fluid conforming to MIL-H-5606.

3.2.3 Service conditions.

3.2.3.1 Electrical. The test set shall be designed to meet the performance requirements of this specification when supplied with the electrical power of 3.2.2.1. Commercial equipment items selected as elements of the test set shall meet the electrical service requirements of the manufacturer's specifications covering these items.

3.2.3.2 Environmental. The test set shall operate satisfactorily under the environmental service conditions specified below.

3.2.3.2.1 Organizational level. Equipment designed for use at the organizational level of maintenance shall withstand exposure to the environments specified in MIL-T-21200 for Class 2 equipment except that the maximum nonoperating temperature shall be $+71^{\circ}\text{C}$ ($+159.8^{\circ}\text{F}$) and the vibration exposure shall be in accordance with MIL-STD-167, Type I.

3.2.3.2.2 Intermediate level. Equipment designed for use at the intermediate level of maintenance shall meet the following environmental requirements:

- a. Vibration - The equipment shall withstand exposure to vibration in accordance with MIL-STD-167, Type I.
- b. Shock - The equipment shall withstand, with commercial equipment not installed in the test set, shock pulses of 15g amplitude for 11 ± 1 milliseconds duration applied in accordance with MIL-T-21200.
- c. Temperature/altitude - The test set shall provide continuous, satisfactory operation over temperatures ranging from zero to 45°C ($+32$ to $+113^{\circ}\text{F}$) at altitudes ranging from sea level to 10,000 feet. The maximum nonoperating temperature shall be $+71^{\circ}\text{C}$ ($+159.8^{\circ}\text{F}$), and the minimum shall be -40°C (-40°F). The maximum nonoperating altitude shall be 50,000 feet.
- d. Humidity - The test set shall withstand the effects of humidities up to 95 percent, with no condensation, under operating or nonoperating conditions. The test set, except commercial equipment, shall withstand the effects of humidities up to 95 percent, including condensation, under operating or nonoperating conditions.

3.2.4 Maintainability. MIL-T-21200, as modified below, shall apply.

3.2.4.1 Mean time to repair (MTTR). The test set items of Table I shall be capable of being restored to normal operation within 4 hours (mean time) after a malfunction is detected (see 6.3.14).

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3.2.4.2 Test points. Test points shall be in accordance with MIL-T-21200 except that color coding shall be in accordance with GS 30620-781.

3.2.4.3 Shop replaceable assemblies (SRAs). The electronic portions of the test set shall be divided into SRAs. Where practicable, these shall be Quick Replaceable Assemblies (QRAs). All others shall be In-Place Repairable Assemblies (IPRAs). QRAs shall be designed to make maximum practicable use of microelectronic packages.

3.2.4.4 Self test capabilities, Self test capability shall be as specified in the applicable specifications.

3.2.5 Reliability. Mean time between failures (MTBF) for the items of Table I under full powered conditions shall be as specified in the applicable specifications (see 6.3.13).

3.2.5.1 Operating life. The test set shall have a minimum of 15,000 hours operating life (see 6.3.12) with scheduled maintenance and replacement of parts.

3.2.5.2 Storage life. Storage life of the test set shall be a minimum of 5 years.

3.2.5.3 Operational stability. The test set shall operate satisfactorily over a period of 16 hours, continuously or intermittently, without the necessity for readjustment of any controls which are inaccessible during normal use. A standby condition shall be provided, as necessary, to maintain component temperature stability.

3.2.6 Electromagnetic interference (EMI). EMI for each Intermediate maintenance level item of the test set shall be in accordance with MIL-STD-461, Class ID, except that tests CE01, CE02, CE03, CE04, RS01, RS02, and RS04 and limits thereof shall be as specified in the specification for each test set item listed in Table I of this specification. Each organization level equipment, except the Service Set, Hydraulic System and the Special Handling Equipment, shall be in accordance with MIL-STD-461, Class ID, except the limits of test RS03 shall be in accordance with the test levels of Table II, and the tests CE01, CE02, CE03, CE04, RS01, RS02 and RS04 and limits shall be in accordance with the specification for each test set item listed in Table I of this specification.

3.2.7 Utilities protection. The test set shall protect itself and the item under test from damage as required for out-of-tolerance (OOT) utility inputs as follows.

3.2.7.1 Liquid cooling protection. Protection shall be provided for an OOT liquid coolant flow rate. Protection shall also be provided for an OOT temperature. The protective devices shall be effective when either or both OOT conditions exist.

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TABLE II
ENVIRONMENTAL LEVELS
(Unperturbed Field)

Frequency (mHz)	FIELD INTENSITY		
	Electric Field (volts/meter)	Magnetic Field (Ampere turns/meter)	Average Power Density Milliwatts/square centimeter
Communications Equipment (Continuous wave, unmodu- lated carrier values)			
.25 - .535	300	.5	
2 - 32	100	.5	
100 - 156			.01
225 - 400			.01
Radar Equipment			
200 - 225			10
400 - 450			1
1000 - 1300			1
2700 - 3600			10
5400 - 5900			100
8500 - 10300			100

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3.2.7.2 Clean air protection. Protection shall be provided for an OOT clean air flow rate. Protection shall also be provided for an OOT air temperature. The protective devices shall be effective when either or both OOT conditions exist.

3.2.7.3 Electrical power protection, Protection shall be provided for OOT 29 Vdc within the transient limits and maximum transient recovery time specified herein. Protection shall be provided for OOT power forms within the transient voltage limits and recovery times specified in System Characteristics section of MIL-STD-761. Protection of Utilization Equipment, Types I, II, and III power of MIL-STD-761 shall apply except protection for 400 Hz. Systems shall be limited to be within the limits of the power supply overvoltage/undervoltage self-interruption system specified in MIL-STD-761; whenever the performance of the power system goes outside the limits of the system protection described therein, the test set shall be capable of withstanding a switching surge spike voltage of 2500 volts peak, for a duration of 40 microseconds at an average repetition rate of one pulse per week for both 60 Hz and 400 Hz power vice the twice to four times normal amplitude specified therein.

3.2.8 Calibration cycle. The test set shall be designed for a minimum calibration cycle of nine months, exclusive of routine maintenance adjustments. Commercial equipment will be calibrated at periodic intervals established by the Navy.

3.3 Performance.

3.3.1 General. The test set shall provide the capability of handling, testing, and maintaining the Weapon Control System AN/AWG-9 of AS-2197 at the organizational and intermediate maintenance levels when used in conjunction with the following:

- a. The AN/AWG-9 built-in-test (BIT) capability
- b. The required general purpose test, conditioning, and handling equipment for at-aircraft organizational level maintenance
- c. The necessary AN/AWG-9 supplemental (slave) units
- d. The utilities of 3.2.2.

3.3.2 Organizational level functional requirements. Repair at organizational level will be restricted to replacing weapon replaceable assemblies (WRAS) and making necessary system adjustments. Organizational level GSE provided by the contractor is listed in Table I.

3.3.3 Intermediate level functional requirements. Intermediate level maintenance will consist of the following:

- a. Testing and adjusting the WWAs and SRAS of the Weapon Control System, AN/AWG-9, of AS-2197.
- b. Isolation of malfunctions to the smallest assemblies, modules, or piece parts which are repairable or replaceable at the intermediate maintenance level.

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- c. Repair or replacement of malfunctioning items.
- d. Determination that repaired or replaced items are performing within allowable limits.
- e. Program loading of computer non-destructive read-out (NDRO) and bulk store devices.

3.3.4 Warmup time. Warmup time for the test set shall not exceed 5 minutes for standard conditions of 4.4 and 20 minutes for the extreme temperature conditions of 3.2.3.2. Standby circuits may be used by the test set to meet the warmup requirements.

3.4 Detailed functional requirements. Functional requirements of the individual test set items shall be in accordance with the applicable specifications of Table 1.

3.5 Workmanship. Workmanship shall conform to MIL-STD-454, Requirement 9.

3.6 Elements. Elements requirements of the individual test set items shall be as specified in the applicable specifications of Table I.

4. QUALITY ASSURANCE PROVISIONS

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 Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 General. Acceptance of the AN/A\VM-23(V) shall be solely on the basis of this specification.

4.2.1 Classification. The AN/AWM-23(V) shall be classified as a production model in accordance with MIL-STD-280: "A model in its final form of final production design made by production tools, jigs, fixtures, and methods. It employs standard parts (or nonstandard parts approved by the agency concerned)." If it is necessary to depart temporarily from the mandatory requirements (parts, processes, etc.) of the technical documents, a form DD 1694 shall be prepared. Minor deviations shall be submitted to the Navy Technical Representative (NTR) for approval, Major and critical deviations and waivers shall be submitted to Naval Air Systems Command for approval in accordance with the contract. The DD Form 1694 (Request for Deviation/Naiver) shall be prepared as delineated in MIL-STD-480,

4.2.2 Individual items. Individual items of Table I of the AN/AWM-23(V) will be accepted separately and independently.

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4.2.3 In-process inspection. Prior to entering acceptance tests, all AN/AWM-23(V) items shall have-completed In-process inspections,

4.2.4 In-process data. The data resulting from contractor conducted in-process inspections shall be presented to the Cognizant Government Inspector (CGI) at the time items of the AN/AWM-23(V) are offered for Government inspection and acceptance.

4.2.5 Acceptance test plan. All testing shall be as specified in the acceptance test plan for the individual item. Data sheets containing test criteria and measurement results are a part of the acceptance procedure document for each item.

4.2.6 Test results. The contractor shall present test data, as documented evidence that each Test Station/Test Set has completed tests, as applicable. Test indications shall be recorded on test-data sheets-by the responsible contractor test engineer and respected by contractor Quality Assurance (QA). A record shall be kept of all failures.

4.2.7 Acceptance. Upon completion of Government Inspection, Government acceptance will be consummated by CGI execution of the DD Form 250.

4.2.8 Utilities. Forced-air cooling, electrical power consumption, water, nitrogen, compressed air, and forced liquid cooling performance are facilities requirements and need not require verification as conditions of acceptance. The contractor may use his facilities providing they are within the required tolerances of 3.2,2.

4.2.9 Configuration. Physical configuration of test stations during acceptance testing shall be dependent upon the shipping configuration as required by the equipment destination:

- a. Stations fully assembled (shore based installations). Test stations shall conform to their respective 493XXX-1XX drawings and shall be completely assembled and interconnected per the respective 493XXX-7XX installation control drawing.
- b. Bay shipment (shipboard installations), Test stations shall conform to their respective 493XXX-1XX drawings; however, to facilitate packaging for shipment, bays need be physically assembled to each other only to the extent necessary to permit functional testing required. This shall include temporary bolting as required for physical safety during test and the provision of electrical bonding as required.

4.3 Tests.

4.3.1 Electrical and electronic items - operational run-in test. The test set items shall be operated as specified in the individual item acceptance test plan (see Table III) to perform the operational run-in test. Equipment tests shall be performed at the beginning, 3 hours after the beginning, and at the end of the operational run-in test. The equipment shall be operated for a period of 6 hours, computed in the following manner:

- a. Operation. run in of 3 hours minimum without a failure from start is required

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TABLE III

INDEX OF PLANS FOR ACCEPTANCE OF
EQUIPMENT ITEMS OF AN/AWM-23(V)

(See Note 2)

EQUIPMENT	PLAN	ACCEPTANCE TEST PROCEDURE (ATP)
Radio Frequency Test Station	1	3282204
Low Frequency Test Station	2	3282206
Computer Test Station	3	3282207
Module Test Station	4	3282208
Controls - Displays - Doppler Filter Test Station	5	3282205
Hydraulic System Service Set	6	3282212
Cooler, Liquid, Electronic Equip- ment Shop	7	3282244
Special Handling Equipment, Special Tool Kit and Special Purpose MATS Electrical Cable Assembly Set	8	Note (1)
Infrared Target Simulator	9	3282210
Missile Auxiliaries Test Set	10	3282209
Coolant System Fill-Drain Stand	11	AR 31082-531
Antenna Boresight Test Set	12	Note (1)
Missile Interface Test Set	13	3326964
NOTES:		
(1) Inspection for conformance to drawings only.		
(2) If the applicable portion of the Technical Manual requires re- vision to conform with the applicable released Acceptance Test Procedure at time of delivery, the ATP shall be shipped with the AN/AWM-23 item. The ATP shall be used until the Technical Manual is updated.		

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- b. In the event of equipment failure after 3 hours of run-in time, the test set equipment shall be repaired and the test shall be continued. However, only one-half of the time accumulated to the time of failure shall be applicable towards meeting the total 6 hours operational run-in test. A maximum of three test set failures is allowable to complete a run-in test sequence.
- c. The test set panel mounted elapsed time meter shall be the indicator of operational run-in time accumulated.
- d. Slaved WCS units shall not be subjected to the operational run-in test, except as required to perform the equipment self-test.
- e. A relevant failure for the run-in test is defined as a condition of malfunction wherein the equipment is unable to provide a required test capability. Specific irrelevant failures include the failures of a slave WCS unit during self-test, the requirements for adjustments that are accessible during normal use, and common indicating devices such as 'light bulbs, numeric -readout tubes, and panel meters.

4.3.2 Mechanical items. As specified in the individual item acceptance test plan, the test set shall be inspected for conformance to drawings.

4.4 Environmental test conditions. All tests shall be performed under the prevailing environmental conditions which shall be within the following limits:

a. Temperature	Room ambient ($30 \pm 10^{\circ}\text{C}$)
b. Altitude	Normal ground
c. Vibration	None
d. Humidity	Room ambient up to 90 percent relative humidity

4.5 Test location. Inspection for the purpose of acceptance shall be made at the contractor's plants and the contractor's vendors' plants.

4.6 Acceptance schedule. The schedule of acceptance activities is shown in Table IV. Upon completion of Government acceptance, AN/AWM-23(V) systems shall be shipped in accordance with the allocation instructions. Minor changes may be made in the schedule of acceptance activities as informally agreed to by representatives of the Government and the contractor without requiring changes to this document. Delivery configuration shall be as stated in 4.2.9.

4.7 Test procedures. Acceptance tests shall be performed in accordance with a test plan and test procedures mutually agreeable to the procuring activity and the supplier. The test plan shall be prepared by the supplier. MLL-T-18303 shall be used as a guide for preparation of test procedures. All inspections and testing shall be under the supervision of the Government inspector. Acceptance or approval of material during the course of manufacture shall not be construed as a guarantee of the acceptance of the finished product 1

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TABLE IV
ACCEPTANCE ACTIVITIES

ITEM	ACCEPTANCE ACTIVITIES	RESPONSIBILITY	TIME
1	Submit request for allocation instructions to CAO*	HAC**	Delivery (D) day minus 120 days
2	Provide allocation instructions	CAO	D day minus 30 days
3	Complete Contractor inspection	HAC	D day minus 10 days
4	Notify Government that GSE control items are ready for inspection and acceptance	HAC	D day minus 10 days
5	Conduct Government inspection for acceptance	AFQAR***	D day
6	Accept and deliver units as appropriate	AFQAR	D day

* Contract Administrative Officer. Shipping instructions are provided to the CAO by NAVAIR.

** Hughes Aircraft Company

*** Air Force Quality Assurance Representative

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4.8 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 furnished to the Government Inspector. Units rejected after retest shall not be resubmitted without the specific approval of the procuring activity.

5. PREPARATION FOR DELIVERY

5.1 General. All major units and parts of equipment shall be preserved, packaged, packed and marked for the level of shipment specified in the contract or order in accordance with MIL-E-17555.

6. NOTES

6.1 Intended use. The AN/AWM-23 Test Set is intended to be used for performing AN/AWG-9 organizational and intermediate level maintenance aboard an aircraft carrier or at a shore installation.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. Applicable level of packaging and packing desired.

6.3 Definitions. For the purpose of this specification, the following definitions shall apply.

6.3.1 Proper performance of the maintenance function. Proper performance of the maintenance function is defined as testing, memory loading, fault isolating, repair, and adjustment to a degree of quality and thoroughness consistent with the requirements established for a given maintenance level, accomplished by the support personnel and resources established for that level, and accomplished in a period of time consistent with the work load predicted for maintenance involved in performing the function.

6.3.2 Organizational level maintenance. All maintenance performed by the using organization employing only those skills, tools, support equipment, publications, procedures, and techniques planned for service use when deployed. (Organizational maintenance of avionics equipment installed in an aircraft would be performed at or in the aircraft.)

6.3.3 Intermediate level maintenance. All maintenance other than organizational maintenance performed at the using activity, employing only skills, tools, support equipment, publications, procedures, techniques, and utilities planned for normal service use on board an aircraft carrier or at a designated intermediate maintenance facility ashore.

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6.3.4 Ground support equipment (GSE). GSE is defined as equipment used by operating forces for service, maintenance, test, fault isolation, and repair of units or components of the WCS AN/AWG-9 and is not physically a part of the WCS. It is composed of special test, special handling, and special conditioning equipment.

6.3.5 Commercial test equipment. Commercial test equipment is defined as test equipment listed and described in a manufacturer's catalog as a standard item. It is built to standards of good commercial practice; however, it is not required to meet military specifications.

6.3.6 Weapon replaceable assembly (WRA). NRA is a generic term which includes all the replaceable packages of an avionic equipment pod or system as installed in an aircraft weapon system with the exception of cables, mounting provisions, and fuse boxes or circuit breakers.

6.3.7 Shop replaceable assembly (SRA). A generic term which includes all the packages within a test set. The term SRA includes Quick Replaceable Assemblies (QRA) and In-Place Repairable Assemblies (IPRA).

6.3.8 Quick replaceable assembly (QRA). A preferred form of SRA which is easily removeable from the test set without complex removal operations. It is typified by a plug-in design.

6.3.9 In-place repairable assembly (IPRA). The least desirable form of d having the characteristic that it is repaired in the shop while in place in the test set.

6.3.10 Checkout. Checkout is defined as a test operation to verify compliance with established performance standards.

6.3.11 Primary failures. Failures which occur without being the result of associated equipment failures or through procedural errors, are primary failures.

6.3.12 Operating life. Operating life shall exclude standby power condition and includes only time on the elapsed time meter in the high voltage condition.

6.3.13 MTBF. The definition of MTBF shall be in accordance with MIL-STD-721. The determination of MTBF value includes the AN/AWG-9 items used as "slave" units.

6.3.14 MTTR. Mean time to repair, applied herein, consists of locating a defective shop replaceable assembly (SRA), replacing that SRA with a serviceable assembly, and performing a confidence test to verify repair.

6.4 Nomenclature cross-reference. The following is a cross reference between the official Navy nomenclature and the major contractor part numbers. The contractor part number suffix is controlled by the configuration list in the contract.

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	<u>Official Nomenclature</u>	<u>Contractor Part Number</u>
a.	Test Station, Radio Frequency OJ-213()/AWM-23(V)	493150-1XX
b.	Test Station, Controls-Displays- Doppler Filter OJ-214()/AWM-23(V)	493250-1XX
c.	Test Station, Low Frequency OJ-215()/AWM-23(V) and OJ-379()/AWM-23(V)	4933S0-1XX
d.	Test Station, Computer OJ-216()/AWM-23(V)	493400-1XX
e.	Test Station, Module OJ-217()/AWM-23(V) and OJ-378()/AWM-23(V)	493457-1xx
f.	Test Set, Missile Auxiliaries TS-3479()/AWM-23(V)	493502-1XX
g.	Target Simulator, Infrared SM-630()/AWM-23(V)	493505-1XX
h.	Kit, Tool, Special TK-222()/AWM-23(V)	493601-1XX
i.	Adapter, Handling, Antenna MX-9046()/AWM-23(V) and MX-9691()/AWM-23(V)	493602-1XX
j.	Adapter, Handling, Tactical Information Display MX-9047()/AWM-23(V)	493614-1XX
k.	Bar, Lifting, Antenna MX-9048()/AWM-23(V)	493619-1XX
l.	Adapter, Hoisting, Antenna ADU-371()/E	493625-1XX
m.	Service Set, Hydraulic System MX-9043()/AWM-23(V)	493703-1XX
n.	Cooler, Liquid, Electronic Equipment HD-957()/AWM-23(V)	493711-1XX
o.	Cable Assembly Set, Electrical, MATS, Special Purpose	493513-1XX

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- p. Stand Fill-Drain, Coolant System 493715-1XX
MT-4730()/AWM-23 (V)
- q. Test Set, Antenna, Boresight 493720-1XX
TS-3568()/AWM-23(V)
- r. Test Set Missile Interface 493507-1XX
TS-3561()/ANM-23(V)

6.5 Liquid cooler. The Cooler, Liquid, Electronic Equipment HD-957()/AWM-23(V) of MIL-C-81952(AS) which is included in the list of items comprising the AN/ANM-23(V) Test Set, replaces the Cooler, Liquid, Electronic Equipment HD-908()/ANM-23(V) of MIL-C-81777(AS).

6.6 Use of this specification. This specification shall be used as the standard form for the preparation of the specifications of Table I.

6.6.1 Paragraph listings. All paragraph numbers and topic headings shall be listed in the order shown in this specification except that, when a paragraph and all its subparagraphs are either applicable, not applicable or not required in their entirety, the paragraph and all subparagraph numbers may be listed under one topic heading and appropriately labeled; e.g.,

3.1 Materials, parts and processes. Applicable.

3.2.2 Utilities, Not applicable.

4.3.3 Special tests. Not required.

6.6.2 Paragraph applicability. Paragraphs of this specification which are completely applicable to the particular design shall be labeled "applicable," paragraphs which completely supersede the requirements of this specification shall be completely rewritten; paragraphs which contain deviations or supplementary requirements shall be labeled "applicable" and the deviation or supplementary requirement incorporated therein; paragraphs of this specification containing requirements that are not applicable to the particular design shall be labeled "not applicable;" and paragraphs which waive a requirement of this specification normally applicable to the particular design shall be labeled "not required".

6.6.3 Additional paragraphs. Add paragraphs as required,

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6.7 Abbreviations and acronyms.

AFQAR	Air Force Quality Assurance Representative
BIT	Built-in test
c	Celsius [Centigrade)
CAO	Contract Administrative Officer
CGI	Cognizant Government Inspector
EMI	Electromagnetic interference
F	Fahrenheit
GSE	Ground support equipment
HAC	Hughes Aircraft Company
Hz	Hertz
IPRA	In-place repairable assembly
kW	Kilowatts
MTBF	Mean time between failures
MTTR	Mean time to repair
NAFI	Naval Avionics Facility, Indianapolis
NAVAIR	Naval Air Systems Command
NTR	Naval Technical Representative
OOT	Out-of-tolerance
P-P	Peak-to-peak
PSIG	Pounds per square inch gage
QA	Quality assurance
QRA	Quick replaceable assembly
SRA	Shop replaceable assembly
Test Set	Airborne Weapon Control System Test Set AN/AWM-23(V)
Vac	Volts alternating current
Vdc	Volts direct current
WCS	Weapon control system
WRA	Weapon replaceable assembly

6.8 Convenience outlet power. 7.5 kVA of the 115 Vat, 60 Hz, single phase power is allocated to the convenience outlet strips on the test stations.

6.9 Changes from previous issue are not marked.

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