MIL-T-49129(EL)
12 September 1977

MILITARY SPECIFICATION

TRANSCEIVER, INTEGRATED TACTICAL VOICE SECURITY EQUIPMENT, TSEC/KY-67, BANCROFT, AND ANCILLARY EQUIPMENT

This specification is approved for use by the Electronics Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to US Army Electronics Command, ATTN: DRSEL-RD-TS-S, Fort Monmouth, N.J. 07703 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC-5810

1. SCOPE

1.1 This specification covers the requirements for Integrated Tactical Voice Security Equipment, TSEC/KY-67 and ancillary equipments consisting of:

HYP-67/TSEC, Vehicular Amplifier-Power Adapter
CX-13016( )/U, Cable, Special Purpose Electrical
CY-7518( )/U, Battery Box
MX-9733( )/U, Adapter Audio
H-189( )/U, Handset
AT-892( )/PRC, Tape Antenna

Throughout this specification the TSEC/KY-67 will be referred to as the KY-67 and the HYP-67/TSEC will be referred to as HYP-67.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

Federal

NN-P-71	Pallet, Material Handling, Wood, Stringer Construction, 2 Way and 4 Way (Partial)
QQ-S-781	Strapping, Steel, Flat and Seals
PPP-B-585	Box, Wood, Wirebound
PPP-B-601	Box, Wood, Cleated and Plywood
PPP-B-621	Box, Wood, Nailed and Lock Corner
PPP-B-636	Box, Shipping, Fiberboard
PPP-B-640	Box, Fiberboard Corrugated, Triple-Wall

PPP-F-320	Fiberboard Corrugated and Solid Sheet-Stock (Container Grade), and Cut Shapes
PPP-P-291	Paperboard, Wrapping, Cushioning
PPP-S-760	Strapping, Nonmetallic, (And Connectors)
PPP-T-45	Tape, Gummed, Paper, Reinforced and Plain, for Sealing and Securing
PPP-T-97	Tape, Pressure-Sensitive Adhesive, Filament Reinforced

Military

MIL-B-18	Battery, Dry
MIL-P-116	Preservation-Packaging, Methods of
MIL-S-901	Shock Test, H.i. (High-impact), Shipboard Machinery, Equipment and Systems Requirements for (Navy)
MIL-L-3891	Luminescent Material and Equipment, (Nonradioactive)
MIL-P-11268	Parts, Materials and Processes Used In Electronic Equipment
MIL-F-14072	Finishes for Ground Electronic Equipment
MIL-P-19644	Plastic Molding Material (Polystyrene Foam, Expanded Bead)
MIL-P-26514	Polyurethane Foam, Rigid or Plastic, for Packaging
MIL-M-38510	Microcircuit, General Specification for
MIL-I-46058	Insulating Compound, Electrical (For Coating Printed Circuit Assemblies)
MIL-T-49130	Transceiver,Small Tactical Voice Security Equipment,TSEC/KY-67, BANCROFT and Ancillary Equipment, Nuclear Requirements for(U)
MIL-T-49131	Transceiver,Small Tactical Voice Security Equipment,TSEC/KY-67, BANCROFT and BANCROFT Vehicular System, TEMPEST Requirements for(U)
MIL-V-53341	Valve, Pressure Relief
MIL-P-55110	Printed Wiring Boards

MIL-C-55126	Controls, Intercommunications Set C-2296( )/VRC, C-2297( )/VRC, C-2298( )/VRC and Control Radio Set C-2299( )/VRC
MIL-A-55129	Amplifier, Audio Frequency AM-1780( )/VRC
MIL-A-55288	Antenna AS-1729( )/VRC
MIL-H-55380	Handset H-138( )/U and Handset H-207( )/U
MIL-C-55442	Cable Assemblies and Cord Assemblies, Packaging of
MIL-P-55640	Printed Wiring Boards Multi-layer (Plated-through Hole)

Electronics Command

SC-S-459	Battery, Primary Lithium Organic BA-5590/U

STANDARDS

Federal

FED-STD-356	Commercial Packaging of Supplies and Equipment
FED-STD-595	Colors

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection By Attributes
MIL-STD-129	Marking for Shipment and Storage

MIL-STD-147	Palletized and Containerized Unit Loads 40 Inch x 48 Inch Pallets, Skids, Runners or Pallet Type Base
MIL-STD-252	Wired Equipment, Classification of Visual and Mechanical Defects
MIL-STD-276	Impregnation of Porous Non-ferrous Metal Castings
MIL-STD-454	Standard General Requirements for Electronic Equipment
MIL-STD-461	Electromagnetic Interference Characteristics Requirements for Equipment
MIL-STD-462	Electromagnetic Interference Characteristics, Measurement of
MIL-STD-681	Identification Coding and Application of Hookup and Lead Wire
MIL-STD-781	Reliability Tests: Exponential Distribution
MIL-STD-810	Environmental Test Methods
MIL-STD-1275	Characteristics of 28 Volt D.C. Electrical Systems in Military Vehicles

National Security Agency

NSA-2	Nameplates and Marking of Electronic and Electro-mechanical Equipment

PUBLICATIONS

National Security Agency

CSESD-4	Communication Security Equipment System Document for TSEC/KY-57/58

American National Standards Institute (ANSI)

ANSI Y32.16	Electrical and Electronic Reference Designations

DRAWINGS

Electronics Command

SC-DL-135893	Antenna AT-892
SC-DL-414975	Mounting Base MT-1029

National Security Agency

ON241618	Input Recovery Board
ON241620	VPRC Board
ON241622	Trans Alarm
ON241624	CVSD Board
ON241626	Clock Control Board
ON241628	ISSR Board
ON241635	Power Supply Board
ON241639	Audio Board
ON241641	Interconnect Board
ON241775	Six Pin Audio Connector

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting office. Both the title and number or symbol should be stipulated when requesting copies.)

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order, the contractor shall furnish first article units in accordance with 4.3.

3.2 Procurement model. A procurement model of the equipment will be available for inspection by prospective bidders and will be lent to the contractor. Unless otherwise specified herein or in the invitation for bids, the equipment shall conform to the following:

3.2.1 Physical construction. Physical construction of the equipment shall conform to the model.

3.2.2 Features. The equipment shall incorporate all features of the model.

3.2.3 Performance. The contractor shall adjust and align the model for optimum performance and then shall measure its performance characteristics. Performance of the equipment shall conform to those measurements, except that, in case of conflict between specified performance characteristics and the performance of the model, specified performance characteristics shall govern.

3.3 Parts, materials, and processes; general. In addition to the requirements of this specification, the requirements of MIL-P-11268, including the selection requirements therein, shall apply (see 4.4).

3.3.1 Printed wiring assemblies. Materials and processes for printed wiring assemblies shall conform to MIL-P-55110. Multilayer printed wiring boards employing plated through holes shall be in accordance with MIL-P-55640 (see 4.4).

3.3.2 Castings. All castings required to be waterproof shall be impregnated in accordance with MIL-STD-276 (see 4.4).

3.3.3 Conformal coating. Printed wiring assemblies shall be conformally coated with a coating material in accordance with MIL-I-46058. The coating shall be applied to both sides of the cleaned printed wiring assemblies. These assemblies shall be cleaned of flux and other contaminants prior to coating. Cleaning compounds shall have no deleterious effects on any part of the printed wiring assemblies. The conformal coating shall be compatible with all parts of the printed wiring assembly and the thickness shall be 0.0035 inch $\pm$0.0025 inch. Assemblies having adjustable components shall not have the adjustable portion covered with the coating. Electrical and mechanical mating surfaces such as connector contact points, test points, screw threads, bearing surfaces, etc. shall not be coated (see 4.4).

3.3.4 Micro electronic devices. All micro electronic integrated circuit devices used in this equipment shall meet the requirements of MIL-M-38510 for Class B devices and their individual drawing requirements (see 4.4).

3.4 Finish, protective. Equipment shall be given protective finish in accordance with MIL-F-14072. This includes finish of hardware, such as handles, hinges, screws, etc. and necessary touch up after mounting. The final paint film on type I surfaces shall be in accordance with color chip number X24087 of FED-STD-595 (see 4.4).

3.5 Marking. (see 4.4).

3.5.1 General. Marking shall be in accordance with NSA-2.

3.5.2 Serial numbers. The following items shall have serial numbers:

TSEC/KY-67, Integrated Tactical Voice Security Equipment.

HYP-67/TSEC, Vehicular Amplifier-Power Adapter.

3.5.3 Nameplates for elements and subassemblies. Elements and subassemblies shall be identified by nameplates conforming to NSA-2 and the applicable drawings. The nameplates shall contain the information as specified in NSA-2 and a serial number.

3.5.4 Nameplates for equipment and ancillaries. Nameplates for equipment and ancillaries shall conform to NSA-2, Type B, Class 1 or Class 2, and the applicable drawings. The location of the nameplates on the ancillaries and equipment and method of fastening them to the ancillaries and equipment shall be in accordance with NSA-2.

3.5.5 Part marking. Parts shall be clearly identified by their respective part numbers, unless prohibited by part size. If vendor part numbers are used, the marking shall include the manufacturer's code number. Part marking shall conform to NSA-2, Group II, or III, and shall not affect the leakage path between conductors or any other factors of performance. Reference designations in accordance with NSA-2, and the Unit Numbering Method of ANSI Y32.16 shall be employed to identify a particular part on all types of data, including drawings, manuals, schematics, diagrams, and provisioning documentation. Semiconductor integrated circuits, MOS and hybrid devices shall bear the reference designation "U", Reference designations shall be assigned to all parts subject to replacements, including mechanical parts. All PWA's shall also have a revision code marked on the board which shall be changed when the conductor pattern is changed. This revision code marked on the board shall be in agreement with the revision level being used on the applicable drawing.

3.5.5.1 Visibility. Whenever practicable, parts shall be so mounted that their identification markings will be readily visible with minimum disassembly of the equipment.

3.5.6 Serialization. Printed wiring assemblies, subassemblies and ancillaries shall be serialized. The serial designator shall consist of a multi-digit number. The marking shall also conform to NSA-2, Group I, or III. Traceability Contract Code Letters shall also be provided, when specified. The specified information may include a code system to reflect uniquely each combination of drawing revision levels contributing to the equipment status.

3.5.7 Accounting numbers. All equipments shall receive an accounting number as specified in NSA-2, Accounting Numbers. The accounting number shall be permanently marked on the nameplate and duplicated on the surface underneath the equipment nameplate using a marking technique in accordance with NSA-2, Group I.

3.5.8 Modification record.

3.5.8.1 Equipment. A modification plate shall be mounted on each production equipment delivered by the contractor. The plate shall conform to NSA-2, Type A, Class 9, Figure 11. The plate shall reflect an accurate marked record of both the optional and mandatory modifications which have been incorporated into the equipment by the contractor.

3.5.8.2 Subassembly or element. When a subassembly or element is modified with an optional or mandatory modification which has been incorporated into the equipment by the contractor, it shall be identified with a modification plate or mark in accordance with NSA-2, Group II, or III.

3.5.9 Luminescent front panel connector and control marking. Luminescent paints shall be in accordance with MIL-L-3891. The use of radioactive material as an exciter for luminescent paint is prohibited.

3.6 Identification of wiring. Wiring shall be identified by color-coding or, if approved by the contracting officer, may be identified by other means such as marking of terminals at both ends of each lead. Color-coding for chassis wiring shall conform to MIL-STD-681 (see 4.4).

3.7 Interchangeability. Like units, subassemblies and replaceable parts shall conform to requirement 7 of MIL-STD-454 (see 4.12).

3.8 Air seal test, provision for. The case of the KY-67, the battery box, and the HYP-67 shall provide means for enabling performance of the air seal test (see 4.7).

3.9 Battery box pressure relief valve. The battery box pressure relief valves shall be set to open at an internal over pressure of 0.2 psi and shall conform to the requirements of MIL-V-53341 (see 4.8).

3.10 Service conditions. The equipment shall meet the requirements contained herein under the following service conditions. Where a test is referenced, meeting the test shall be considered as compliance with the requirement.

3.10.1 Temperature. (see 4.13.1).

a. Low

(1) Operating: The KY-67 and HYP-67 shall meet the performance requirements for the tests specified in 4.19, at ambient temperatures as low as -50°F (-46°C).

(2) Storage and transportation: The KY-67 and HYP-67 shall withstand exposure to ambient air temperatures as low as -70°F (-57°C).

b. High

(1) Operating: The KY-67 and HYP-67 shall meet the performance requirements for the tests specified in 4.19, at ambient temperatures as high as 160°F (71°C).

(2) Storage and transportation: The KY-67 and HYP-67 shall withstand exposure to ambient temperatures as high as 160°F (71°C) (includes affect of solar radiation).

c. Thermal shock. The equipment shall not be damaged by the effects of temperature shock. The equipment shall meet the performance requirements for the tests specified in 4.19 before and after thermal shock.

3.10.2 Humidity. The equipment shall be operable without degradation in specified performance, and shall sustain no physical damage, during and after prolonged exposure to extreme high humidity levels as encountered in tropical areas. All humidity testing shall be done with the equipment covers in place (see 4.13.2).

3.10.3 Altitude. The equipment shall be operable without degradation in specified performance at altitudes up to 15,000 feet above sea level and shall withstand transportation at altitudes up to 40,000 feet above sea level (see 4.13.3).

3.10.4 Immersion. The equipment shall show no evidence of leakage when immersed to a covering depth of three feet of water for a period of two hours (see 4.13.4).

3.10.5 Orientation. When tested as specified in 4.13.5, the equipment shall meet the performance requirements of 3.18.2.1 (see 4.13.5).

3.10.6 Dust. The equipment shall withstand, in both operating and non-operating condition, exposure to fine dust particles with wind speeds of 17.5 ±2.5 knots. There shall be no clogging or binding of controls or other moving parts and no evidence of dust within the KY-67 or HYP-67 equipments (see 4.13.6).

3.10.7 Salt fog. After the salt fog test of 4.13.7 the equipment, when examined visually with the aid of a 10-power magnifier, shall show no evidence of degradation, such as flaking, pitting, blistering or loosening of finish or metal surface; or exfoliation (see 6.4) of metal. There shall be no clogging or binding of controls or other moving parts after subjecting the equipment to the 48-hour salt fog exposure period or after subjection to the subsequent 48-hour drying period. Electrical operation is not required (see 4.13.7).

3.10.8 Vibration and shock. The equipment shall withstand shock and vibration induced during field transport by military vehicle over all types of roads and cross-country terrain. It shall also withstand this environment when installed in a military wheeled or armored vehicle on the vehicle mounting base. It shall also withstand the shocks induced during rough handling and servicing.

3.10.8.1 Vibration. After testing in accordance with 4.13.8 the equipment shall meet the performance requirements of 3.18.1.8, 3.18.2.2 and 3.18.2.3 (see 4.13.8).

3.10.8.2 Bounce, loose cargo. After testing in accordance with 4.13.9 the equipment shall meet the performance requirements for the tests specified in 4.19. Physical damage shall be minor only as defined in MIL-STD-252 (see 4.13.9).

3.10.8.3 Shock-bench handling. After testing in accordance with 4.13.10.1 the equipment shall meet the performance requirements for the tests specified in 4.19 (see 4.13.10.1).

3.10.8.4 Shock-drop. After testing in accordance with 4.13.10.2 the equipment shall meet the performance requirements for the tests specified in 4.19. Physical damage shall be minor only as defined in MIL-STD-252 (see 4.13.10.2).

3.10.8.5 Shock-ballistic. After testing in accordance with 4.13.10.3 the equipment shall meet the performance requirements for the tests specified in 4.19. Physical damage shall be minor only as defined in MIL-STD-252 (see 4.13.10.3).

3.10.9 Fungus. After the fungus test of 4.13.11, the equipment shall be visually examined, using a 10-power magnifier. The equipment shall show no more than six minute unrelated spots, each no greater than 0.015 square inch in area, of sparse microbial growth (see 6.4) as evidenced by growth colonization (see 6.4) (which includes branching (see 6.4) and sporulation (see 6.4)) on or within each cubic foot, or fraction thereof, of equipment assembly volume. Isolated instances of partial tubular germination (see 6.4) shall not be included in this evaluation (see 4.13.11).

3.10.10 Rain. After testing as specified in 4.13.12 the equipment shall meet the performance requirements for the tests specified in 4.19 (see 4.13.12).

3.11 Preconditioning.

3.11.1 Bounce preconditioning. Each KY-67 and HYP-67 shall meet the requirements herein, without subsequent processing, after subjection to the bounce preconditioning of 4.6.1.

3.11.2 Electrical preconditioning (burn-in). Each complete equipment and all spare parts and assemblies shall be subjected to at least four temperature cycles as defined in 4.15.1 with the last two cycles being failure free (see 4.6.2).

3.12 Operational.

3.12.1 KY-67. Each KY-67 shall be subjected to a final operational test in accordance with 4.18.1 after all other inspections and tests are completed to determine that the KY-67 is operational prior to packaging (see 4.18.1).

3.12.2 HYP-67. Each HYP-67 shall be subjected to a final operational test in accordance with 4.18.2 after all other inspections and tests are completed to determine that the HYP-67 is operational prior to packaging (see 4.18.2).

3.13 Reliability. The equipment consisting of the complete KY-67 and the complete HYP-67 shall demonstrate a specified mean-time-between-failure (MTBF) (θ_o) of 500 hours when tested in the vehicular system configuration in accordance with 4.15.

3.14 Nuclear survivability. All contractor furnished mechanical configurations, electronic assemblages, electronic equipment, electronic circuits and electronic components shall withstand the nuclear environment as specified in MIL-T-49130(EL) The equipment shall meet the operational requirements of Section 3 herein immediately after being subjected to the specified nuclear environments. The equipment shall be energized during exposure (see 4.10).

3.15 TEMPEST. TEMPEST requirements shall be in accordance with MIL-T-49131(EL) (see 4.11).

3.16 Electromagnetic compatibility. The equipment shall meet the interference emission and susceptibility requirements of MIL-STD-461, Notice 1, for Class I equipments as specified hereinafter: (see 4.9)

CE01	CS01	RE02	RS02
CE02	CS02		RS03
CE03	CS03		
CE04	CS04		
CE06	CS06		

3.17 Systems safety engineering. (see 4.14).

3.17.1 Personnel hazards. Personnel hazards shall be kept to a minimum through compliance of configuration changes and parts selection with Requirement 1 of MIL-STD-454. Compliance with these requirements will be verified through a visual inspection.

3.17.2 Edge rounding. Exposed edges shall be rounded to a minimum radius of 0.04 inch (1 mm), and exposed corners rounded to a minimum radius of 0.2 inch (5 mm).

3.17.3 Radioactive materials. Radioactive materials shall not be used (e.g. luminous dials/markings, electron tubes, surge arrestors and lenses) in the equipment.

3.18 Performance characteristics.

3.18.1 Receiver.

3.18.1.1 Sensitivity. Using a 500 Hz tone to frequency modulate an RF signal with a deviation of 8 kHz ±1.5 kHz to either side of the carrier and with the KY-67 in the plain text mode, the alert signal disabled, and the mode switch set to the SQUELCH OFF position, an input level of 0.5 microvolts across the 50 ohm input terminals of the receiver shall produce a signal plus noise plus distortion to noise plus distortion ratio of at least 10 dB in the demodulated 500 Hz signal at any frequency in the range of 30.0 to 75.975 MHz (see 4.16.1.1).

3.18.1.2 Selectivity. With the KY-67 in plain text and with the mode switch set to the SQUELCH OFF position, the receiver intermediate frequency selectivity shall be as follows: (see 4.16.1.2)

a. 15 kHz minimum bandwidth at the 6 dB points.

b. 90 kHz maximum bandwidth at the 60 dB points.

c. Within a 25 kHz range beyond the 60 dB points in both the positive and negative directions, there shall be no returns above the 60 dB response.

d. Response characteristics in the pass band shall have no irregularities greater than 2 dB.

3.18.1.3 Limiting. The limiting characteristics of the receiver shall be such that the audio signal output shall not vary more than 3 dB when a 500 Hz frequency modulated RF input signal with a deviation of 8 kHz ±1.5 kHz either side of the carrier and with the KY-67 in the plain text mode and the mode switch set to the SQUELCH OFF position is varied from 1.0 microvolts to 100,000 microvolts (see 4.16.1.3).

3.18.1.4 Spurious responses. The response to any RF signal, including the image frequency, differing in frequency from the tuned center frequency by more than 200 kHz shall be a minimum of 80 dB below the level of the center frequency. Within 200 kHz the spurious responses shall be at least 60 dB below the level of the center frequency (see 4.16.1.4).

3.18.1.5 Desensitization. An RF signal which is 130 dB stronger than the desired signal and is removed by ±10 percent in frequency from the desired RF signal, shall not degrade a 26 dB signal plus noise to noise ratio signal by more than 6 dB. An RF signal which is 55 dB stronger than the desired signal and is removed by ±50 kHz in frequency from the desired RF signal, shall not degrade a 26 dB signal plus noise to noise ratio signal by more than 6 dB. The desired RF input shall be a 500 Hz frequency modulated RF signal in the plain text mode, with the mode switch set to the SQUELCH OFF position and with a deviation of 8 kHz ±1.5 kHz either side of the carrier set to a level which produces a 26 dB signal plus noise to noise ratio on the demodulated 500 Hz tone (see 4.16.1.5).

3.18.1.6 Intermodulation. Any intermodulation distortion resulting from two undesired carrier frequencies of the same level shall be at least 66 dB down from the desired response (see 4.16.1.6).

3.18.1.7 Offset. Receiver performance in the plain text mode shall not be degraded by more than 1 dB as the input signal frequency is offset by the transmitter frequency stability of ±2.5 kHz (see 4.16.1.7).

3.18.1.8 Audio distortion. The total audio distortion in the receiver output shall not exceed ten percent at full audio output while receiving a 1.0 microvolt 500 Hz frequency modulated RF signal with a deviation of 8 kHz ±1.5 kHz either side of the carrier. This measurement shall be made in the plain text mode with the alert signal disabled and with the mode switch set to the SQUELCH OFF position (see 4.16.1.8).

3.18.1.9 Squelch sensitivity. In the plain text mode, the squelch shall open on signals which produce a signal plus noise plus distortion to noise plus distortion ratio of 10 dB. False operation of the squelch shall not occur when the incoming signal is voice modulated. The squelch, once opened, shall hold when the signal plus noise plus distortion to noise plus distortion ratio is reduced to 7 dB. Squelch performance shall be measured with a 150 ±1.5 Hz squelch tone present on the received signal (see 4.16.1.9).

3.18.1.10 Squelch operating time. In the plain text mode, the squelch shall open on a signal which produces a signal plus noise plus distortion to noise plus distortion ratio of 26 dB in less than 50 milliseconds. Under this input signal condition, the squelch shall turn off in less than 100 milliseconds and shall have a turn around time (release of PTT to squelch turn on) of less than 175 milliseconds (see 4.16.1.10).

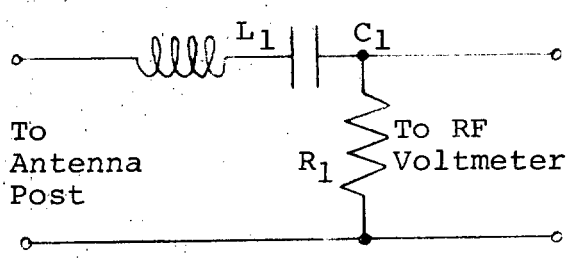
3.18.1.11 Audio response. The receiver audio response in the plain text mode shall be within ±2 dB from 300 to 3000 Hz (see 4.16.1.11).

3.18.1.12 Wide band response. The response at 15 Hz shall be within 0.0 dB and -3.0 dB of the 1000 Hz reference. The frequency response from 100 to 10,000 Hz shall be within +1.5 dB of the 1000 Hz reference. The response at 15 kHz shall be within +2.0 dB to -6.0 dB of the 1000 Hz reference. The response at 20 kHz shall be within -6 dB to -14 dB of the 1000 Hz reference (see 4.16.1.12).

3.18.1.13 Audio output. Receiver audio output shall be adjustable using the Volume Control between 0.6 and 1.2 mW and at least 12 mW into 1000 ohms (see 4.16.1.13).

3.18.2 Transmitter.

3.18.2.1 Power output. With the antenna selector switch set to the BNC position, the RF power output delivered to the 50Ω BNC connector shall be not less than 2 watts over the frequency range of 30.000 to 75.975 MHz. With the antenna selector switch set to the mounting post position, the RF power output to the manpack antenna stud shall be measured using an antenna load simulator in accordance with the following:



L_1 - 10 turns No. 26 wire on Micrometals T30-10 core Adjust to 59 ohms (.26 microhenry) at 36 MHz.

C_1 - JFD VC32GW adjust to 390 ohms (11.34 picofarad) at 36 MHz.

R_1 - 50 ohms.

This load simulates the manpack antenna used with the KY-67, the AT-892 3 foot tape as defined in SC-DL-135893. An antenna matching network shall be provided to automatically match the power amplifier to the AT-892 over the operating frequency range of 30 to 76 MHz. The power amplifier shall not be damaged due to impedance mismatch causing high VSWR conditions (see 4.16.2.1).

3.18.2.2 Modulation distortion. Total distortion in the transmitter output shall be less than 5 percent when the system is in the plain text mode and the audio input is below the AGC threshold level (see 4.16.2.2).

3.18.2.3 Spurious outputs. Spurious outputs from the transmitter shall be at least 75 dB below the carrier level, except as follows:

a. 2nd and 3rd harmonics, -55 dB.

b. Band switching crossover spurious within ±500 kHz of the desired frequency when the desired frequency output is set within 500 kHz of the crossover frequency, -55 dB (crossover frequencies are 34.5, 46.0, 57.5 and 69.0 MHz) (see 4.16.2.3).

3.18.2.4 Deviation. The transmitter RF output signal deviation to either side of the carrier shall be as follows: (see 4.16.2.4)

a.	Plain text Composit (audio plus squelch tone)	10.5 kHz ±2.0 kHz
b.	Cipher text (16 kbps)	5.5 kHz ±1.0 kHz
c.	Squelch tone (150 Hz ±1.5 Hz)	2.5 kHz ±0.5 kHz

3.18.2.5 Frequency stability. The carrier frequency of the transmitter shall be not more than ±2.5 kHz from the indicated channel frequency (see 4.16.2.5).

3.18.2.6 Sidetone. Transmit sidetone shall include the alert and alarm tones and shall be 6 dB lower than the received audio for the same volume control setting (see 4.16.2.6).

3.18.2.7 Transmit spectrum. Pre-mod filtering shall limit the spectrum of the transmitted RF signal such that 99 percent of the energy or the 18 dB point is within the 25 kHz channel selected. This shall apply to both the plain and cipher mode (see 4.16.2.7).

3.18.3 Digital subsystem.

3.18.3.1 Alarms. During an alarm condition, cipher text operation shall be precluded, however plain text operation shall be possible unless the digital subsystem failure has occured in the shared audio, power supply or control circuitry. In the alarm condition, cipher text RF transmission shall be inhibited until the condition is cleared or the plain text mode is selected (see 4.16.3.1).

3.18.3.2 Plain-cipher mode selection. The strapable options provided on the digital subsystem shall be arranged to provide the capability to receive either plain text or cipher text in any mode switch position. Transmit plain text or cipher text mode selection shall be provided by the preset frequency control switch (see 4.16.3.2).

3.18.3.3 Alerts. Alert signals shall be separately strap selectable and shall be provided as side tone in transmit or along with receive audio. (The alert signals shall not be transmitted except when there is excessive crosstalk in the associated audio accessories or ICS.) Anytime the equipment is actually receiving or transmitting in plain text, a 1200 Hz ±10 percent audio frequency tone shall be added to the side tone or received audio. This alert signal shall be 6 dB less than the audio signal and shall be on for 50 ms ±10 percent and off for 800 ms ±10 percent. When the equipment receives a cipher text transmission and is not in the cipher

mode position on the front panel selector switch, an alternating high low tone (600 Hz ±10 percent and 1200 Hz ±10 percent) shall be added to the receive audio. It is not intended that the operator be able to monitor the received traffic under this condition as it is in the case of plain text but rather than he switch the mode selector switch to the proper mode for operation, for this reason, the plain text slow beep may also be present. The cipher text alert signal shall be 6 dB less than the audio signal level and shall be alternately keyed on for 50 ms ±10 percent (see 4.16.3.3).

3.18.3.4 Retransmission delay. When the KY-67 is to be used through a retransmission station in the cipher mode the initial phasing interval shall be extended through the use of the delay in position of the power control switch on the front panel of the KY-67 (see 4.16.3.4).

3.18.3.5 Data. The digital subsystem shall accept data as well as voice input signals using the front panel 6 pin audio connector as defined on ON241775. Analog or digital data may be used dependent on how the 6 pin audio connector is programmed by the external input/output equipment. Normal voice operation shall be possible using the standard H-138 handset or equal per MIL-H-55380. Analog or digital data operation shall be possible with the connector programming and input/output signal characteristics specified in CSESD-4 (see 4.16.3.5).

3.18.3.6 GFE boards. The Government will provide the contractor with 8 printed wiring boards which make up the digital portion of the KY-67. The electrical and mechanical function and interconnection shall be in accordance with the NSA drawings listed in TABLE I. The contractor shall be responsible for proper electrical and mechanical interfacing of the GFE boards in accordance with the NSA drawing set for each board. In each case, the drawing set consists of the necessary electrical, mechanical and interface tests drawings. Performance testing of the integrated Bancroft equipment shall show proper interfacing of the digital subsystem (see 4.18).

TABLE I. NSA drawings for GFE boards

Board Title	NSA Drawing Package Number
Trans Alarm	ON241622
Power Supply	ON241635
Input Recovery	ON241618
VPRC	ON241620
ISSR	ON241628
Clock Control	ON241626
CVSD	ON241624
Audio	ON241639
Interconnect	ON241641

3.18.3.7 Cipher text performance degradation. In the secure mode, operating range reduction shall be kept to an absolute minimum when compared to operation in the plain text mode. The maximum range reduction shall be less than two (2) dB (see 4.16.3.6).

3.18.3.8 Retransmit operation. Two KY-67 equipments with batteries and battery boxes shall provide operation in the retransmit mode when the two units are interconnected with cable assembly CX-13016 (see 4.16.3.7).

3.18.3.9 Interlocks. Circuitry shall be provided to zeroize all fill positions if the top, front or bottom equipment case covers are removed (see 4.16.3.8).

3.18.4 Supply voltage range. In the manpack configuration the equipment shall meet specified performance when operating over the maximum to minimum voltage range of the main battery BA-5590 as specified in SC-S-459 or the memory battery BA-1372 as specified in MIL-B-18 (see 4.16.4).

3.18.4.1 Power consumption. The maximum input current at nominal input voltage shall be as follows: (see 4.16.4.1)

	Receive	Transmit	Standby
Radio Portion (12.5 volts)			
Display off	175 ma	2 Amps	175 ma
Display on maximum brightness	800 ma	2.8 Amps	800 ma
Interface Circuitry (25 volts)	45 ma	70 ma	5 ma

3.18.5 Vehicular adapter. The HYP-67 vehicle adapter shall mate with the MT-1029 shock mount as defined in SC-DL-414975 and shall contain circuitry to provide the capabilities specified in 3.18.5.1 through 3.18.5.9.

3.18.5.1 Radio power supply. The HYP-67 shall provide +12 $\pm$1.5 Vdc to power the radio portion of the KY-67. The voltage regulator shall be capable of operating under normal vehicle battery conditions as described in MIL-STD-1275 (see 4.16.5.1).

3.18.5.2 Speaker amplifier. The HYP-67 shall provide at least 2 watts of audio output into the associated loudspeaker load derived from the fixed level audio output signal from the KY-67. There shall be no speaker output during transmit. When the HYP-67 speaker volume control is in the full counter clockwise position the two watts of receive audio shall be provided to a 150 ohm load simulating the intercom system load. This two watt audio level shall be derived from the fixed level receive audio output. This audio output level shall be adjustable by each vehicle operator using the individual C-2298 control boxes (see 4.16.5.2).

3.18.5.3 Vehicle intercommunication system interface. The HYP-67 shall provide audio and control signals necessary to properly interface with the VIC-1 intercom system as defined in MIL-A-55129(EL), MIL-C-55126(EL) and SC-DL-414975. Audio in/out, push-to-talk, d.c. power control, high-lower RF power control and remote pre-set frequency selection shall be included. Remote d.c. power control shall be provided as part of the HYP-67 by using the AM-1780 or C-2742 control boxes (part of the VIC-1 ICS) (see 4.16.5.3).

3.18.5.4 Transmit audio processing. A high pass filter shall be included in the HYP-67 to reduce the noise level in the transmit audio input due to generator/alternator hash. The filter shall have less than 1.5 dB ripple between 300 Hz and 4000 Hz and shall be at least 20 dB down at 100 Hz (see 4.16.5.4).

3.18.5.5 Vehicle antenna tuning switch. The HYP-67 shall automatically provide the control signals necessary to properly tune the AS-1729 or equal Vehicular Antenna as defined in MIL-A-55288 based upon frequency information from the KY-67 (see 4.16.5.5).

3.18.6 RF power amplifier (RFPA). The HYP-67 shall include an RF power amplifier. The power amplifier shall be capable of increasing the RF output of the KY-67 from 2 watts to 10 watts ±1 dB or 40 watts ±1 dB into a 50 ohm load. Maximum power output shall be switch selectable from the front panel or remotely controlled using the C-2742 control box. For remote control operation, the high power position on the C-2742 shall provide whatever power output is selected on the HYP-67 front panel. The power amplifier mounted on the HYP-67 shall be capable of continuous operation under high temperature conditions at the 40 watt power setting. The power amplifier shall not be damaged due to impedance mismatch causing high VSWR conditions (see 4.16.6).

3.18.6.1 Noise floor. The noise floor of the power amplifier at the 40 watt level shall be greater than 140 dB below the carrier level at frequencies ±20 percent removed (see 4.16.6.1).

3.18.6.2 Spurious outputs. Spurious outputs of the transmitter shall be at least 80 dB down except for the second and third harmonics which shall be at least 60 dB down (see 4.16.6.2).

3.19 Size and weight. The weight of the equipment shall be not greater than the following: (see 4.17)

Item	Weight (pounds)
KY-67	14.0
HYP-67	42.0
Retransmit cable	2.5
Battery box	2.0
Audio adapter	1.0

When the KY-67 is properly installed in the HYP-67 the overall dimensions (including the hold down clamps) of the two equipments shall be not greater than the following:

Height - 6.7 inches
Width - 15.3 inches
Length - 13.8 inches

3.20 Workmanship. The equipment shall be manufactured and assembled in accordance with requirement 9 of MIL-STD-454 and the applicable portions of the following paragraphs in MIL-P-11268: (see 4.20)

Brazing
Capacitors
Cleaning
Connectors (electrical)
Contacts, electrical
Plastic materials and parts
Relays
Resistors
Screws, other threaded devices, and related parts
Semiconductor devices
Soldering
Transformers, inductors and coils
Waveguides, waveguide assemblies, coaxial transmission lines
Welding
Wiring and cabling
  Slack
  Protection
  Clearance
  Splicing and stretching

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by 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 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.3). Does not include packaging.

b. Inspections covered by subsidiary documents (see 4.4).

c. Quality conformance inspections.

(1) Quality conformance inspection of equipment before packaging (see 4.5).

(2) Quality conformance inspection of packaging (see 4.21).

4.3 First article. Unless otherwise specified in the contract or purchase order, the first article inspection shall be performed by the contractor (see 3.1).

4.3.1 First article units. The contractor shall furnish the number of first article units in accordance with the following:

a. KY-67 - 40 each

b. HYP-67 - 40 each

c. CX-13016 - 5 each

d. CY-7518 - 25 each

e. MX-9733 - 5 each

4.3.2 First article inspection. The first article inspection shall consist of the inspections specified in TABLE II, and shall be performed in the order specified therein.

4.3.3 First article data. The first article test plan and test report(s) shall be as required in the contract or purchase order.

TABLE II. First article inspection

Inspection 1/	Req. Para.	Test Para.	Unit 2/											
			1	2	3	4	5	6	7	8	9	10& 11	12& 13	14-40
1. Inspection covered by subsidiary documents	3.3 3.3.1 3.3.2 3.3.3 3.3.4 3.4 3.5 3.6	4.4	Inspection to be performed on all units											
2. Bounce pre-conditioning	3.11.1	4.6.1	Inspection to be performed on all units											
3. Electrical precondi-tioning (burn-in)	3.11.2	4.6.2	Inspection to be performed on all units											
4. Group A inspection	See TABLE III		Inspection to be performed on all units											
5. Group B inspection	See TABLE IV		Inspection to be performed on all units											
6. Group C inspection														
Temperature														
Low	3.10.1a	4.13.1a		1										
High	3.10.1b	4.13.1b		2										
Thermal Shock	3.10.1c	4.13.1c		3										
Humidity	3.10.2	4.13.2								2				
Altitude	3.10.3	4.13.3	1											
Orientation	3.10.5	4.13.5		4										
Dust	3.10.6	4.13.6				1								
Salt fog 3/	3.10.7	4.13.7	2											
Vibration	3.10.8.1	4.13.8					1							
Bounce, loose cargo	3.10.8.2	4.13.9								1				

TABLE II. First article inspection - cont'd

Inspection 1/	Req. Para.	Test Para.	Unit 2/											
			1	2	3	4	5	6	7	8	9	10& 11	12& 13	14-40
Shock Bench handling	3.10.8.3	4.13.10.1					2							
Shock drop	3.10.8.4	4.13.10.2						1						
Shock ballistic	3.10.8.5	4.13.10.3						2						
Fungus 3/	3.10.9	4.13.11							1					
Rain	3.10	4.13.12			1									
Safety	3.17	4.14									1			
Nuclear	3.14	4.10										1		
TEMPEST	3.15	4.11											1	
EMC	3.16	4.9											2	
7. Group D inspection Reliability	See TABLE VI													4/

NOTES

1/ The inspection 1 through 6, in the order shown, shall be performed on all first article units before subjecting these units to any other inspection requirements specified in the table.

2/ The numbers in the unit columns in the table specify the order of inspections for the indicated unit.

3/ The equipment shall be thoroughly washed, cleaned, dried and refurbished after this inspection before proceeding with subsequent inspections.

4/ Four units shall be selected at random for Group D testing, the remaining twenty-three units shall be used for contractor training and TECOM testing as specified in the contract.

4.4 Inspections covered by subsidiary documents. The following shall be inspected under the applicable subsidiary documents as part of the inspection required by this specification, and the inspection requirement specified in the contract or purchase order.

Item	Where Required
Parts, materials and processes-general	3.3
Printed wiring	3.3.1
Castings	3.3.2
Conformal coating	3.3.3
Micro-electronic devices	3.3.4
Finish, protective	3.4
Marking	3.5
Identification of wiring	3.6

4.5 Quality conformance inspection of equipment before packaging. The contractor shall perform the inspections specified in 4.4, 4.6, 4.5.1 through 4.5.5. This does not relieve the contractor of his responsibility for performing any additional inspection which is necessary to control the quality of the product and to assure compliance with all specification requirements.

4.5.1 Group A inspection. Each unit on contract or purchase order shall be inspected for conformance to the inspections specified in Table III. Discrete lots shall be formed from units that pass this inspection. Factors of lot composition not defined herein, or in the contract or purchase order, shall be in accordance with MIL-STD-105. Contractor shall subject each lot to sampling inspection, utilizing the procedures of MIL-STD-105, using the general inspection levels, and AQL's indicated in Table III.

4.5.1.1 Order of inspection within Group A. Group A inspection shall be performed in an order satisfactory to the Government except that the airseal test shall be next to last and the operational tests shall be last (see 6.6).

TABLE III. Group A inspection

Inspection	Req. Para.	Ref. Fig.	Insp. Para.	AQL Major	AQL Minor
Visual and Mechanical					
Module subassemblies	3.20	-	4.20	1.0%	4.0%
Case	3.20	-	4.20	1.0%	4.0%
KY-67 assembly	3.20	-	4.20	1.0%	4.0%
HYP-67 assembly	3.20	-	4.20	1.0%	4.0%
Electrical performance					1/
Receiver					
Sensitivity	3.18.1.1	1	4.16.1.1	1.0%	
Limiting	3.18.1.3	1	4.16.1.3	1.0%	
Offset	3.18.1.7	1	4.16.1.7	1.0%	
Audio distortion	3.18.1.8	1	4.16.1.8	1.0%	
Squelch sensitivity	3.18.1.9	4	4.16.1.9	1.0%	
Squelch operating time	3.18.1.10	4	4.16.1.10	1.0%	
Audio response	3.18.1.11	1	4.16.1.11	1.0%	
Wide band response	3.18.1.12	1	4.16.1.12	1.0%	
Audio output-Plain text	3.18.1.13	5	4.16.1.13.1	1.0%	
Audio output-Cipher text	3.18.1.13	5	4.16.1.13.2	1.0%	
Transmitter					
Power output	3.18.2.1	6&7	4.16.2.1	1.0%	
Modulation distortion	3.18.2.2	8	4.16.2.2	1.0%	
Spurious outputs	3.18.2.3	9&10	4.16.2.3	1.0%	
Deviation	3.18.2.4	11	4.16.2.4	1.0%	
Frequency stability	3.18.2.5	11	4.16.2.5	1.0%	
Sidetone	3.18.2.6	6	4.16.2.6	1.0%	
Vehicular adapter					
Radio power supply	3.18.5.1	2	4.16.5.1	1.0%	
Speaker amplifier	3.18.5.2	5	4.16.5.2	1.0%	
Vehicle antenna tuning switch	3.18.5.5	6	4.16.5.5	1.0%	
RF power amplifier	3.18.6	6	4.16.6	1.0%	

TABLE III. Group A inspection - Continued

Inspection	Req. Para.	Ref. Fig.	Insp. Para.	AQL	
				Major	Minor
Operational					
KY-67 assembly	3.12.1	5	4.18.1	1.0%	
Transmit and receive	3.12.1	5	4.18.1.1	1.0%	
Fill	3.12.1	5	4.18.1.2	1.0%	
HYP-67 assembly					
Transmit	3.12.2	6	4.18.2.1	1.0%	
Receive	3.12.2	13	4.18.2.2	1.0%	
Air seal test	3.8	-	4.7	1.0%	

1/ All electrical defects are considered major.

4.5.2 Group B inspection. Group B inspection shall normally be performed in inspection lots that have passed Group A inspection and on samples selected from units that have been subjected to and met the Group A inspection. This inspection shall conform to Table IV and to the special inspection levels of Table I of MIL-STD-105.

4.5.2.1 Group B sampling plans. The Group B sampling plans, for the AQL's listed in Table IV, shall be as follows:

AQL	Inspection level
4.0 percent	S-4
6.5 percent	S-4

4.5.2.2 Order of inspection within Group B. Group B inspection shall be performed in an order satisfactory to the Government.

TABLE IV. Group B inspection

Inspections	Req. Para.	Ref. Fig.	Test Para.	AQL
KY-67				
Receiver				
Selectivity	3.18.1.2	1	4.16.1.2	4.0%
Spurious responses	3.18.1.4	1	4.16.1.4	4.0%
Desensitization	3.18.1.5	2	4.16.1.5	4.0%
Intermodulation	3.18.1.6	3	4.16.1.6	4.0%
Transmitter				
Transmit spectrum	3.18.2.7	9	4.16.2.7	4.0%
Digital subsystem				
Alarms	3.18.3.1	5	4.16.3.1	4.0%
Plain-cipher mode select	3.18.3.2	5	4.16.3.2	4.0%
Alerts	3.18.3.3	5	4.16.3.3	4.0%
Retransmission delay	3.18.3.4	1	4.16.3.4	4.0%
Data	3.18.3.5	5	4.16.3.5	4.0%
Cipher test performance degradation	3.18.3.7	-	4.16.3.6	4.0%
Retransmission	3.18.3.8	-	4.16.3.7	4.0%
Interlocks	3.18.3.9	6	4.16.3.8	4.0%
Supply voltage range	3.18.4	12	4.16.4	4.0%
Power consumption	3.18.4.1	12	4.16.4.1	4.0%
Vehicular adapter				
Vehicle intercommunication system interface	3.18.5.3	13	4.16.5.3	4.0%
Transmit audio processing	3.18.5.4	13	4.16.5.4	4.0%
RF watt power amplifier				
Noise floor	3.18.6.1	14	4.16.6.1	4.0%
Harmonic output	3.18.6.2	15	4.16.6.2	4.0%
Immersion	3.10.4	-	4.13.4	4.0%
Dimensional interchangeability	3.7	-	4.12	6.5%
Weight-form	3.19	-	4.17	6.5%

4.5.3 Group C inspection. Group C inspection shall be performed on units that have passed Group A and Group B inspection. The inspection shall consist of the inspections specified in Table V. Samples shall be selected in accordance with 4.5.3.1.

4.5.3.1 Sampling for Group C inspection.

4.5.3.1.1 Subgroup I. For this subgroup, two units shall be selected at random from the first production lot. For subsequent Group C inspection, two units shall be selected every two months.

4.5.3.1.2 Subgroup II. For this subgroup, two units shall be selected at random from the first production lot. For subsequent Group C inspection, two units shall be selected every four months.

4.5.3.1.3 Subgroup III. For this subgroup, two units shall be selected at random from the first production lot. For subsequent Group C inspection, two units shall be selected every eight months.

TABLE V. Group C inspection

Inspection	Req. Para.	Test Para.	Unit 1	Unit 2
Subgroup I				
Temperature				
Low	3.10.1a	4.13.1a	1	1
High	3.10.1b	4.13.1b	2	2
Thermal Shock	3.10.1c	4.13.1c	3	
Vibration	3.10.8.1	4.13.8	4	
Bounce, loose cargo	3.10.8.2	4.13.9		3
Subgroup II				
Shock bench handling	3.10.8.3	4.13.10.1	1	
Shock drop	3.10.8.4	4.13.10.2	2	
Shock ballistic	3.10.8.5	4.13.10.3	3	
Orientation	3.10.5	4.13.5		1
Humidity	3.10.2	4.13.2		2
Subgroup III				
Fungus 1/	3.10.9	4.13.11	2	
Salt Fog 1/	3.10.7	4.13.7		5
Rain	3.10.10	4.13.12		4
Dust	3.10.6	4.13.6		3
Altitude	3.10.3	4.13.3		2
TEMPEST	3.15	4.11	1	
Electromagnetic compatibility	3.16	4.9		1

1/ The equipment shall be thoroughly washed, cleaned, dried and refurbished after this inspection before proceeding with subsequent inspection.

4.5.3.2 Order of inspection within Group C. Group C inspection shall be performed on sample units in the order shown in Table V.

4.5.3.3 Group C failures. Actions required relative to Group C failures shall be as specified in the contract.

4.5.4 Reinspection of conforming Group B and C sample units. Unless otherwise specified, sample units which have been subjected to and passed both Group B and Group C inspection may be accepted on contract, provided all damage is repaired and the sample units are resubjected to and pass Group A inspection.

4.5.5 Group D inspection. This inspection shall consist of the tests specified in Table VI and shall be performed on units from lots which have been subjected to and met Group A and Group B inspection.

TABLE VI. Group D inspection

Inspection	Req. Para.	Test Para.
Reliability	3.13	4.15

4.5.5.1 Group D failures. Actions required relative to Group D failures shall be as specified in the contract or purchase order.

4.5.5.2 Reinspection of conforming Group D sample units. Unless otherwise specified, sample units which have been subjected to and passed Group D inspection may be accepted on the contract or purchase order provided all visible and known damage is repaired and the sample units are resubjected to and pass Group A inspection.

4.5.5.3 Sampling for Group D inspection. For reliability purposes a lot shall be defined as one month's production.

4.6 Preconditioning.

4.6.1 Bounce preconditioning. The unit, with shock mounts (if any) removed or blocked, shall be placed in its normal operation position on the table of the Package Tester, Type 1000-SC, as made by the L.A.B. Corporation, Skaneateles, New York, or equal. The package tester, shafts in phase, shall have a speed such that it is just possible to insert a 1/32-inch-thick strip of material under one corner or edge of the unit to a distance of 3 inches as the unit bounces. The unit shall be subjected to this preconditioning for 1 minute. After bounce preconditioning, the unit shall not be repaired, aligned, cleaned, or otherwise changed prior to subjection to inspection (see 3.11.1).

4.6.2 Electrical preconditioning (burn-in). All complete equipments and all spare parts and assemblies submitted for Government acceptance shall be subjected to and pass a burn-in period. The burn-in period will consist of at least four temperature cycles as defined in 4.15.1 with the last two cycles failure free. Equipments shall be operated in the same manner and under the same environmental conditions as during reliability testing. During the last two temperature cycles the measurements of 4.15.6 shall be performed. Non-compliance will be considered a failure. If a unit fails testing during the last two cylces it shall be repaired and returned to testing until it has completed two cycles failure free. Failures in either the radio or digital portion shall be recorded and analyzed, but neither burn-in time nor burn-in failures shall be used to calculate the equipment MTBF. Burn-in testing shall be performed prior to Group A testing. The equipment, including spare parts and assemblies shall have no less than 4 cycles nor more than 12 cycles of burn-in (exclusive of production test time) (see 3.11.2).

4.7 Air-seal test. The KY-67 with and without the battery box and the HYP-67 shall be opened and closed again in such manner as to break and remake the seal. Immediately thereafter, the equipment as field transported shall be subjected to a vacuum of 1 pound per square inch (1 pound per square inch less than the atmospheric pressure surrounding the equipment) applied to the interior of the transit case or to the interior of the equipment inclosure when no transit case is provided. The vacuum then shall be valved-off and the interior pressure measured during the ensuing period of 1 minute. During this 1-minute period the decrease in vacuum shall not exceed 0.01 pound. The gauge used for measurement of the vacuum shall be of such accuracy that a difference of 0.01 pound can be determined readily (see 3.8).

4.8 Battery box one way pressure relief valve. The battery box shall be fastened to the KY-67 after the basic unit has passed the air-seal test. The equipment shall be subjected to a vacuum at a rate of 0.01 PSI/Sec. As the vacuum is valved off, ensure that each of the two battery vents open at 0.2 PSI. The gauge used for measurement of vacuum shall be such that a difference of 0.01 pound can be readily determined (see 3.9).

4.9 Electromagnetic compatibility. The equipment shall be tested for compliance with the requirements of 3.16, using the approved measurement techniques of MIL-STD-462, Notice 2 as implemented by a contractor prepared, Government approved test plan. The test plan shall comply with 4.3 of MIL-STD-461, Notice 1 and have been approved by the Government prior to initiation of the test. The unit shall be tested in both receive and transmit modes of operation at the frequencies listed below: (see 3.16)

a. CE01, CE03, and CE06
   Transmit: Three frequencies; 32.3, 53, and 73.7 MHz.
   Receive: One frequency, 53 MHz.

b. CE02 and CE04, retransmission cable
   Transmit: Three frequencies; 32.2, 53 and 73.7 MHz.

c. CS01 and CS02
   Transmit: One frequency; 53 MHz
   Receive: Three frequencies; 32.3, 53 and 73.7 MHz.

The susceptibility signal shall be applied to the positive power lead only. For CS02 the interfering signal shall be amplitude modulated 30%, with a 1000 Hz sine wave.

d. CS03 and CS04
Receive: Three frequencies; 32.3, 53 and 72.7 MHz.

e. CS06
Transmit: One frequency; 53 MHz
Receive: One frequency; 53 MHz

The susceptibility signal shall be applied to the positive lead only.

f. RS02
Transmit: One frequency; 53 MHz
RECEIVE: One frequency; 53 MHz

The susceptibility signal shall be 20 amperes at 60 Hz. Both the steady state 20 ampere test and spike test shall be performed.

g. RS03
Transmit: One frequency; 53 MHz
Receive: Three frequencies; 32.3, 53 and 73.7 MHz

The interfering signal shall be amplitude modulated 50% with a 1000 Hz sine wave.

h. RE02
Transmit: One frequency; 32.3 MHz
Receive: One frequency; 53 MHz

Receiver susceptibility criteria shall be that the 500 Hz audio output SINAD shall not be degraded below 10dB with an RF input signal of -113dBm using an FM deviation of 8 kHz +1.5 kHz in plain text and with the mode switch set to the SQUELCH OFF position. Transmitter susceptibility criteria shall be that the total distortion on the transmitted output shall not be degraded to more than 5%. The test setup for all susceptibility tests shall include a suitable low pass filter to reject harmonics and spurious outputs of the RF signal generators used.

4.10 Nuclear test. Nuclear tests (blast, thermal, EMP, initial nuclear radiation) shall be performed on the equipment in accordance with MIL-T-49130(EL). The equipment shall meet the operational requirements of Section 3 herein following each test (see 3.14).

4.11 TEMPEST test. TEMPEST tests shall be performed in accordance with MIL-T-49131(EL). (see 3.15).

4.12 Inspection for dimensional interchangeability. The dimensions listed below shall be measured to determine conformance to the physical interchangeability requirement of 3.7. When a listed dimension is not within specified or design limits, it shall be considered a major defect (see 3.7).

a. External and internal dimensions of cases, covers, and insertable assemblies, when such dimensions affect mating of parts.

b. Dimensions of cavities, when such dimensions affect insertion of items.

c. Location of hinges and fasteners on separable parts or assemblies which must mate, such as cases, covers, and mountings.

d. Location of connectors, locking pins, fasteners, slides, and mountings which receive mating parts of plug-in assemblies and major units; and location of the mating parts on the plug-in assembly or major unit.

e. Size and form of special threads.

4.13 Service conditions test. The following service condition tests shall be performed on the equipment (see 4.19).

4.13.1 Temperature (see 3.10.1).

a. Low temperature. The equipment shall be subjected to the test of Method 502.1, Procedure I of MIL-STD-810. The storage temperature (Step 2) shall be -70°F (-57°C), and shall be maintained for a period not less than two hours following stabilization of the test item. Low operating temperature (Step 4) shall be -50°F (-45°C). For low temperature storage and operation testing the memory battery will be replaced with a suitable power supply.

b. High temperature. The equipment shall be subjected to the test of Method 501.1, Procedure II of MIL-STD-810. For Step 4 the chamber temperature shall be 160°F (71°C). For Step 7 the chamber temperature shall be adjusted to 160°F (71°C) for test item operation. This includes the effects of solar radiation.

c. Thermal shock. The equipment shall be subjected to the test of Method 503.1, Procedure I, of MIL-STD-810.

4.13.2 Humidity. The equipment shall be tested in accordance with Method 507.1, Procedure III, of MIL-STD-810. In Step 7, the chassis shall not be removed from its enclosure or the test item shall not be otherwise opened so as to expose the normally sealed areas to the chamber environment. In Step 6, measurements shall be taken during the last five hours of the last cycle. Prior to, during and after testing, the equipment shall meet full specification performance for the measurements specified in 4.19. If the equipment fails to meet specified performance during cycling or fails subsequently, it does not pass the test. In addition, if the equipment fails to meet specified requirements after final conditioning and adjustment, it does not pass the test (see 3.10.2).

4.13.3 Altitude. The equipment shall be subjected to Test Method 500.1, Procedure I of MIL-STD-810 (see 3.10.3).

4.13.4 Immersion. The equipment shall be subjected to Test Method 512.1, Procedure I of MIL-STD-810 (see 3.10.4).

4.13.5 Orientation. The KY-67 shall be orientated with each of its six sides downward and tested for power output (see 4.16.2.1) degradation in each of the orientations. Degradation shall be less than 1 db into a 50 ohm load. (see 3.10.5).

4.13.6 Dust. The equipment shall be subjected to Test Method 510.1, Procedure I of MIL-STD-810 (see 3.10.6).

4.13.7 Salt fog. The equipment shall be subjected to Test Method 509.1, Procedure I of MIL-STD-810. Operation of the equipment shall not be required and failure criteria shall be limited to corrosion of finishes and metals only. Such corrosion shall be defined as any visible degradation of the equipment surfaces that can be attributed to flakey, pitted, blistered or otherwise loosened finish or metal surface (see 3.10.7).

4.13.8 Vibration. The KY-67, including the HYP-67 vehicle adapter and mounting base, MT-1029, shall be subjected to the test of Method 514.2, Procedure VIII, Curve W of MIL-STD-810. The equipment shall be operated during the last cycle of each axis and meet the performance requirements of 3.18.1.8, 3.18.2.2 and 3.18.2.3 (see 3.10.8.1).

4.13.9 Bounce loose cargo. The KY-67 in the manpack configuration with batteries and battery box attached and the HYP-67 alone, shall be subjected to Test Method 514.2, Procedure XI, Part 2 of MIL-STD-810. If desired, a different sample test item may be used other than the one subjected to Procedure VIII since it is not intended that one item must survive both tests (see 3.10.8.2).

4.13.10 Shock.

4.13.10.1 Bench handling. The equipment shall be subjected to Test Method 516.2, Procedure V of MIL-STD-810 (see 3.10.8.3).

4.13.10.2 Drop. The equipment shall be subjected to Test Method 516.2, Procedure II of MIL-STD-810 (see 3.10.8.4).

4.13.10.3 Ballistic. The test shall be conducted on the "Shock Testing Machine for Light Weight Equipment" shown in MIL-S-901. The equipment, including shock mounts (if any), shall be secured in its normal operating position to the steel test plate by means of the same fasteners used for vehicular installation of the equipment. The test shall consist of a total of 9 blows: one each 1-foot blow, 3-foot blow, and 5-foot blow on the back, side, and top of the test plate. As an alternative to reorienting the test plate for the blows on the side of the plate, equivalent rotation of the equipment under test is permissible. Prior to and after testing, the equipment shall meet full specification performance for the measurements specified in 4.19 (see 3.10.8.5).

4.13.11 Fungus test. The equipment shall be subjected to the fungus test specified in Method 508.1, Procedure I of MIL-STD-810. There shall be abundant growth colonization (see 6.4) on 50 percent or more of the area of the control item after 14 and 28 days. No cleaning of the equipment is permitted for 72 hours prior to the fungus test. Handling prior to and during testing, shall be accomplished without contamination of the equipment. Inability of the equipment to meet the requirements of 3.10.9 shall constitute failure of this test (see 3.10.9).

4.13.12 Rain. The equipment shall be subjected to the test of Method 506.1, Procedure I of MIL-STD-810. The equipment shall be operated during the last 10 minutes of the 30 minute period (see 3.10.10).

4.14 Safety inspection. An inspection shall be performed to verify compliance with those portions of 3.17 (Systems Safety Engineering) which can be determined visually.

4.15 Reliability. The equipment shall demonstrate a specified (θo) mean time between failures (MTBF) of 500 hours when operated under the conditions defined in 4.15.1 in the vehicular configuration (see 3.13).

4.15.1 Reliability test condition. All reliability testing shall be conducted under the environment listed below:

Temperature Operation	-32°C to +55°C
Temperature Non-operation	-57°C to + 71°C
Cycle Time	14 hours (see cycling description below)
Rate of Change	5°C/minute

Vibration	1" Double Amplitude 5-6.3 Hz 2G Sine Sweep 6.3-500 Hz
Vibration Cycle Time	15 minute sweep rate from 5 to 500 and back to 5 Hz
Vibration Duration	15 minutes/operating hour
Input Voltage	Nominal
Voltage Cycling	One cycle at +17 Vdc, one cycle at nominal voltage and one cycle at +36 Vdc
Voltage Spikes	Per Method CS06, MIL-STD-461 Once every 200 hours
Humidity	Condensation and/or freezing once per temperature cycle
Duty Cycle	During on-time receive 9 minutes transmit, constant key down, 1 minute, operate continuously in cipher text with daily check in plain text and daily changes in full variables
Temperature Cycling	The procedure outlined below shall be used throughout the reliability test

Temperature cycling procedure:

Step 1. With the equipment OFF, lower the chamber temperature to -57°C ±2°C.

Step 2. Maintain the chamber temperature at -57°C ±2°C for a period of one hour.

Step 3. Raise the chamber temperature to -32°C ±2°C at a rate of temperature change not less than 5°C/minute. When the chamber temperature reaches -32°C ±2°C turn the equipment ON.

Step 4. Maintain the chamber temperature at -32°C ±2°C for a period of 2½ hours.

Step 5. Raise the chamber temperature to 55°C ±2°C at a rate of temperature change not less than 5°C/minute.

Step 6. Maintain the chamber temperature at 55°C ±2°C for a period of 3 hours.

Step 7. Turn the equipment OFF and raise the chamber temperature to 71°C ±2°C.

Step 8. Maintain the chamber temperature at 71°C ±2°C for a period of one (1) hour.

Step 9. Lower the chamber temperature to 55°C ±2°C and turn the equipment ON.

Step 10. With the equipment ON, maintain the chamber temperature at 55°C ±2°C for a period of 2½ hours.

Step 11. Lower the chamber temperature to -32°C ±2°C at a rate of temperature change not less than 5°C/minute.

Step 12. Maintain the chamber temperature at -32°C ±2°C for a period of 3 hours.

Step 13. Turn the equipment OFF and lower the chamber temperature to -57°C ±2°C.

Repeat Steps 2 through 13 throughout the reliability test. Completion of Steps 2 through 13 shall herein be referred to as one temperature cycle. If the thermal survey indicates that the soak periods called for in Steps 2, 4, 6, 8, 10 and 12 are insufficient for equipment thermal stabilization, these soak periods shall be modified so that stabilization is obtained.

4.15.1.1 Humidity procedure. Humidity shall be injected into the chamber at least once per temperature cycle in such a way that condensation shall form on the equipment and form frost.

4.15.2 Failure definition. For reliability purposes a failure shall be defined as inability of the equipment to meet any of the requirements of this specification. Proper instrumentation shall be provided to assure detection of a failure. A failure will be considered to have occurred at the time the equipment was last known to be operating properly. Total test time per equipment shall be in accordance with paragraph 4.2.2.4 of MIL-STD-781. Paragraphs 5.5 through 5.9 of MIL-STD-781 shall also apply. The presence of a pattern failure as defined by MIL-STD-781 shall result in a reject decision. Failures occurring in the eight GFE Digital COMSEC Boards shall be counted toward the calculation of the demonstrated MTBF.

4.15.3 First article reliability acceptance test. A sample of a maximum of 4 equipments shall be subjected to reliability testing in accordance with the accept/reject criteria of Test Plan XX of MIL-STD-781.

4.15.4 Production reliability qualification test. A random sample of a maximum of 4 equipments shall be selected from the first months production and subjected to reliability testing in accordance with the accept/reject criteria of Test Plan XX of MIL-STD-781.

4.15.5 Production reliability sampling test. From each fourth lot or 400 units, whichever is sooner, a random sample of a maximum of 4 equipments shall be selected and subjected to reliability testing in accordance with the accept/reject criteria of Test Plan XX of MIL-STD-781.

4.15.6 Reliability performance measurements. During the reliability testing and burn-in, the following parameters shall be measured at least daily. Measurements shall be taken at various points throughout the temperature cycling (high temperature, low temperature, midrange temperature) and during vibration. The number of times measurements are taken at the various points should be approximately equal. If a failure is detected, it shall be presumed to have occured immediately after the last successful measurement of the same parameter. The following parameters shall be measured as a minimum:

4.16.1.1	Receive Sensitivity Test
4.16.1.13.1	Audio Output-Plain Text
4.16.1.13.2	Audio Output-Cipher Text
4.16.2.1	R.F. Power Output Test
4.16.2.3	Spurious Outputs Test
4.16.2.5	Frequency Stability Test
4.16.3.3	Alerts Test

4.16 Electrical performance.

4.16.1 Receiver.

4.16.1.1 Sensitivity test. Connect the equipment as shown in Figure 1. Set the HP-8640B to 8 kHz ±1.5 kHz deviation at a 500 Hz rate. Set the output to -93 dBm (-113 dBm at output of 20 dB pad). Measure the SINAD with the KY-67 audio output set for 2 Vrms at the following frequencies: 30.000, 33.000, 35.500, 37.500, 40.975, 41.000, 44.000, 47.5000, 51.500, 55.975, 56.000, 61.000, 65.500, 70.500 and 75.975 MHz (see 3.18.1.1).

4.16.1.2 Selectivity test. Connect the equipment as shown in FIGURE 1. Set the HP-8640B to CW (no modulation). Reduce HP-8640B output attenuator to minimum output. Set HP-8640B and KY-67 to 31.000 MHz. Monitor audio output of KY-67 with HP-330B. Adjust the HP-8640B output level to obtain a 10 dB reduction in the noise output. Increase the HP-8640B output 6 dB. Increase the HP-8640B frequency until the noise increases to the 10 dB reduced level as obtained above, and record the frequency. Reduce the HP-8640B frequency to again obtain the 10 dB reduced level and record the frequency. Increase the HP-8640B output 54 dB and repeat the upper and lower bandwidth measurements (total of 60 dB). Tune the HP-6840B 50 kHz above and below the 60 dB frequencies and check that no flybacks above the 60 dB rejection are present (see 3.18.1.2).

4.16.1.3 Limiting test. Connect the equipment as shown in FIGURE 1 with the KY-67 volume control set at mid position. Set the HP-8640B to 8 kHz ±1.5 kHz deviation at a 500 Hz rate. Set the output to 10 µV (1.0µV at output of 20 dB pad). Note KY-67 audio output level on HP-330B. Increase HP-8640B output in 10 dB steps to 1 volt. Note any changes in audio level from that noted above during the increase in output level. Record the maximum dB increase and decrease in level on the data sheet (see 3.18.1.3).

4.16.1.4 Spurious responses test. Connect the equipment as shown in FIGURE 1. Set the HP-8640B output to -13 dBm (-33 dBm at the output of the 20 dB pad), and measure the SINAD ratio of the KY-67 audio output. The radio passes this test if the SINAD is less than that recorded at the corresponding KY-67 frequency in 4.16.1.1 (see 3.18.1.4).

KY-67 Frequency:	30.000 MHz
Test Frequency:	11.5, 53.0, 219.0, 426.5 MHz
KY-67 Frequency:	40.975 MHz
Test Frequency:	11.5, 63.975, 250.875, 408.5 MHz
KY-67 Frequency:	41.000 MHz
Test Frequency:	11.5, 64.0, 251.0, 408.5 MHz
KY-67 Frequency:	55.975 MHz
Test Frequency:	11.5, 32.975, 233.875, 255.35 MHz
KY-67 Frequency:	56.999 MHz
Test Frequency:	11.5, 33.0, 234.0, 255.5 MHz
KY-67 Frequency:	75.975 MHz
Test Frequency:	11.5, 56.975, 269.4, 310.825 MHZ

For the first article testing, in addition to the above, the signal generator shall be swept through a frequency range of 10 to 500 MHz and any responses noted. The signal generator level shall be reduced 20 dB within 200 kHz of the center frequency.

4.16.1.5 Desensitization test (see 3.18.1.5).

a. Connect the equipment as shown in FIGURE 2. Set the HP-8640B to the signal level in dBm at the output of the 20 dB attenuator necessary to produce a 26 dB SINAD ratio in the KY-67 output for each of the following KY-67 frequencies: 30.0, 40.975, 41.0, 55.975, 56.0 and 75.975 MHz.

b. Set the KY-67 and the HP-8640B to the listed KY-67 frequency. Set the HP-608 to the listed desensitized frequency and set its output to minimum. Remove the power hybrid from J1 and connect it to the Boonton 91H 50 ohm probe. Tune the bandpass filter to the desensitization frequency. Increase the HP-608 output to obtain a reading on the Boonton 91H. Adjust the bandpass filter to obtain maximum indication on the Boonton 91H. Return the HP-608 output to minimum. Reconnect the hybrid to J2. Set the HP-8640B output to obtain a 26 dB SINAD ratio in the KY-67 audio output. Increase the HP-608 output until the 26 dB SINAD is reduced to 20 dB. Remove the hybrid from J2 and connect it to the Boonton 91H 50 ohm probe. Note the Boonton 91H reading for reference. Remove the hybrid from the Boonton 91H and connect the HP-8640B. Adjust the HP-8640B to obtain the reference reading on the Boonton 91H. Record the HP-8640B output reading as the desensitization level. Reduce the HP-608 output to minimum. Calculate the desensitization ratio by the following formula:

Desensitization = Desensitization Level - 26 dB SINAD Sensitivity Ratio

KY-67 Frequency (MHz)	Desensitization Frequency (MHz)
30.000	33.000
40.975	36.880
40.975	45.070
41.000	36.900
41.000	45.100
55.975	50.380
55.975	61.570
56.000	50.400
56.000	61.600
75.475	68.380

4.16.1.6 Intermodulation test. Connect the equipment as shown in FIGURE 3. Set the HP-8640B generators to -44 dBm output. Set HP-8640B No. 1 to 8 kHz ±1.5 kHz deviation at a 500 Hz rate and No. 2 to CW. Set the KY-67 and HP-8640B frequencies as indicated. Set the KY-67 to plain text and the mode switch to the SQUELCH OFF position. For each combination of frequencies listed measure the SINAD ratio of the audio output. The radio passes this test if the SINAD is less than that previously recorded at the corresponding KY-67 frequency on the 4.16.1.1 data sheet. Perform this measurement at each of the following combinations of frequencies: (see 3.18.1.6)

KY-67 Frequency (MHz)	HP-8640B #1 Frequency (MHz)	HP-8640B #2 Frequency (MHz)
31.000	31.100	31.200
40.000	40.100	40.200
41.000	39.900	39.800
55.000	55.100	55.200
56.000	55.900	55.800
75.000	75.100	75.200

4.16.1.7 Offset test. Connect the test equipment as shown in FIGURE 1. Set the HP-8640B to 8 kHz ±1.5 kHz deviation at a 500 Hz rate. Set the output level to -92 dBm (-112 dBm at output of 20 dB pad). Measure the SINAD ratio of the KY-67 audio output and determine that it does not go below 10 dB at the following frequencies: Each 25 KHz step from 30.00 to 30.95 MHz. Each 25 KHz step from 41.00 to 41.95 MHz and from 51.00 to 53.95 MHz. Change the HP-8640B frequency ±2.5 kHz from the listed frequencies and record any change in SINAD (see 3.18.1.7).

4.16.1.8 Audio distortion test. Connect the equipment as shown in FIGURE 1. Set the HP-8640B to 10 mV output, and 31.00 MHz. Set the KY-67 to 31.000 MHz. Adjust the KY-67 volume control to obtain 2.5 Vrms output as indicated on the HP-330B used as an audio voltmeter. Measure the distortion of the KY-67 output with the HP-330B (see 3.18.1.8).

4.16.1.9 Squelch sensitivity test. Connect the test equipment as shown in FIGURE 4. Set HP-200 CD No. 1 to 150 Hz ±1 Hz and No. 2 to 500 Hz ±5 Hz. Adjust the outputs to produce 2.5 kHz ±.5 kHz of 150 Hz deviation and 8 kHz ±1.5 kHz of 500 Hz deviation. Set the KY-67 to a plain test frequency position. Set the KY-67 and HP-8640B to each frequency listed. At each frequency, start with the HP-8640B output at -110 dBm and slowly increase the output until the KY-67 unsquelches. Measure the SINAD ratio of the audio output of the KY-67 with the HP-330B. Slowly reduce the HP-8640B output until the KY-67 squelches. Switch to SQUELCH OFF mode and measure the SINAD ratio of the KY-67 audio output with the HP-330B. Perform this measurement at each of the following frequencies: 31.000, 40.000, 41.000, 55.000, 56.000 and 75.000 MHz (see 3.18.1.9).

4.16.1.10 Squelch operating time test. Repeat the test of 4.16.1.9 at 41.000 MHz and measure the squelch turn on, turn off and turn around times by adding a Tektronics 547 scope in place of the HP-330B (see 3.18.1.10).

a. Turn on time shall be measured using the squelch tone test box (see 6.4) to simultaneously provide the composit RF signal to the KY-67 and trigger the trace on the scope. Measure the interval between signal input and 500 Hz audio tone output.

b. Turn off time shall be measured using the squelch time test box to disconnect the RF signal while simultaneously triggering the trace on the scope and measuring the audio output noise interval.

c. Turn around time shall be measured using the squelch tone test box to simultaneously disconnect a 50 ohm load from the KY-67 antenna and connect the RF input signal source. Initially, the KY-67 shall be transmitting into the 50 ohm load and turn around time shall be measured using the trace on the scope as the interval between release of KY-67 push-to-talk (which must then remotely control the squelch tone test box) and start of the 500 Hz audio signal.

4.16.1.11 Audio response test. Connect the equipment as shown in FIGURE 1 with the KY-67 in plain text and the mode switch in the SQUELCH OFF position. Measure the audio output of the KY-67 using the HP-330B in the set level mode. Adjust the set level control to obtain a zero dB reading on the 1 volt scale at 500 Hz. Set the HP-8640B to each audio frequency keeping the output at 200 mV and record the output of the KY-67 in dB relative to the 500 Hz reference. Perform this measurement at each of the following frequencies: 50, 100, 150, 200, 300, 400, 500, 600, 900, 1500, 2000, 2500, 3000, 4000, 5000, 10,000 Hz (see 3.18.1.11).

4.16.1.12 Wide band response test. Connect an HP-8640B signal generator as shown in FIGURE 1. Set the deviation to 5.5 kHz ±0.5 kHz at 1000 Hz. Frequency response shall be measured at the input to the GFE digital subsystem (RWBA with the subsystem connected) at the following frequencies: 15 Hz, 100 Hz, 1,000 Hz, 10,000 Hz, 15,000 Hz and 20,000 Hz to establish compliance with 3.18.1.12. Measure for compliance at 35 and 65 MHz. RF input level shall be 1 millivolt ±1 dB (see 3.18.1.12).

4.16.1.13 Audio output test (see 3.18.1.13).

4.16.1.13.1 Plain text test. Connect the equipment as shown in FIGURE 5. Set the HP-200 CD to 500 Hz and 200 mV output. Set both KY-67's to PT mode and turn PTT on test box No. 1 on. Adjust the volume control on KY-67 No. 2 to obtain maximum audio output without clipping. Measure the audio output level on the HP-330B using as an audio voltmeter. Turn the volume control fully CCW and measure the audio output level. Turn PTT switch off.

4.16.1.13.2 Cipher text test. Connect the equipment as shown in Figure 5. Set the HP-200 CD to 500 Hz and 200 mV output. Switch both KY-67 mode switches to CT. Verify that the KY-67 under test has retained the variables stored in all six positions. Turn the PTT switch on. Adjust the volume control on KY-67 No. 2 to obtain maximum audio output without clipping. Measure the audio output level on the HP-330B used as an audio voltmeter. Turn the PTT switch off. Turn volume control fully counter-clockwise and measure audio output level.

4.16.2 Transmitter.

4.16.2.1 Power output test (see 3.18.2.1).

a. Connect the equipment as shown in FIGURE 6. Set antenna switch to the BNC position. Verify there is not less than 2 watts output into 50 ohms at the following frequencies: 32.000, 36.000, 45.000, 52.000, and 65.000 MHz. Verify that neither a short circuit or open circuit condition damages the power amplifier.

b. Connect the equipment as shown in FIGURE 7. Set antenna switch to the manpack position. Verify that the RF voltage is not less than the following:

Band	Frequency MHz	Volts rms
1	30.000	5.5
1	33.975	5.5
2	34.000	5.5
2	39.975	5.5
3	40.000	5.9
3	47.975	5.9
4	58.000	6.6
4	58.975	6.6
5	59.000	6.3
5	75.975	6.3

Verify that neither a short circuit or open circuit condition damages the power amplifier.

4.16.2.2 Modulation distortion test. Connect the equipment as shown in FIGURE 8. Set the signal generator to 500 Hz and measure the distortion at the output of the deviation meter. The equipment shall be rejected if the distortion is greater than 5% for any of the following frequencies: 31.0, 35.0, 38.0, 42.0, 49.0, 53.0, 57.0, 60.0, 66.0, 68.0, and 71.0 MHz (see 3.18.2.2).

4.16.2.3 Spurious outputs test (see 3.18.2.3).

a. Connect the equipment as shown in FIGURE 9. Set the KY-67 frequency to 34.500 MHz. Depress the PTT switch. Set the analyzers bandwidth to 3 kHz and the scanwidth to 50 kHz per division. Tune the analyzer until the transmitted carrier is in the center of the screen. Adjust the analyzer attenuators until the transmitted carrier just touches the top of the grid of the screen. Set the KY-67 frequency 100 kHz higher. A spur should appear in the center of the screen. Measure the number of dB's down from the top grid. Repeat the above procedure for each of the following frequencies: 34.000, 46.000, 57.500 and 69.000 MHz.

b. Connect the equipment as shown in FIGURE 10. Set KY-67 500 kHz above the frequencies listed. Set the HP-8640B to the frequency listed, put in 10 dB 5 watt pad and adjust the frequency of the field intensity meter to get a maximum deflection of the needle. Remove the HP-8640B, connect the KY-67 through pads to the field intensity meter. Depress the PTT switch. Adjust the field intensity attenuator to obtain a convenient reference. Release the PTT switch. Reconnect the HP-8640B to pad and adjust the level to obtain a reference. Read dBm level of spurious output on the HP-8640B. Connect the KY-67 to the wattmeter and measure the power output. Convert to dBm as follows:

$$dBm = 10 \text{ Log } \frac{\text{Power Out (watts)}}{.001}$$

Subtract spurious level from power output to obtain spurious rejection. Perform this measurement at each of the following frequencies: 34.500, 46.000, 57.500 and 69.000 MHz.

4.16.2.4 Deviation test. Connect the equipment as shown in FIGURE 11. Set the KY-67 to 31.000 MHz PT-mode and disconnect the HP-200CD. Turn the PTT switch ON and measure the deviation of the 150 Hz squelch tone with the TF-791D. Measure the frequency of the squelch tone at the output of the TF-791D with the HP-5248L. Connect the HP-200CD, set to 500 Hz and 200 mV output. Measure the deviation of the composit modulation and measure the distortion with the 150 Hz component removed by the high pass filter. Change to cipher text and measure the carrier deviation. Measurements shall be made at the following frequencies: 31.0, 35.0, 38.0, 42.0, 49.0, 53.0, 57.0, 60.0, 64.0, 68.0, 71.0 and 75.0 MHz (see 3.18.2.4).

4.16.2.5 Frequency stability test. Connect the equipment as shown in FIGURE 11. At KY-67 frequencies listed below, measure the transmitted frequency to the nearest 100 Hz. Use the PT mode with the HP-200 CD disconnected. Perform this measurement at each of the following frequencies: 30.000, 30.025, 30.050, 30.075, 30.100, 30.200, 30.300, 30.400, 30.500, 30.600, 30.700, 30.800, 30.900, 31.000, 32.000, 33.000, 34.000, 35.000, 36.000, 37.000, 38.000, 39.000, 40.000, 50.000, 52.000, 53.000, 60.000, 70.000, 75.000 MHz (see 3.18.2.5).

4.16.2.6 Sidetone test. Connect the equipment as shown in FIGURE 6. Depress the PTT switch, set the audio input level and measure sidetone using the HP-330B. Repeat for CT mode (see 3.18.2.6).

4.16.2.7 Transmit spectrum test. Connect the equipment as shown in FIGURE 9. Operate the equipment in the cipher text mode and display the transmitted signal using the spectrum analyzer. The spectrum shall be below 18 dB at the ±12.5 kHz points (see 3.18.2.7).

4.16.3 Digital subsystem.

4.16.3.1 Alarms test. Connect the equipment as shown in FIGURE 5. Load known good variables in fill positions 1-6. Set KY-67 power switch to OFF then ON. Set preset to manual positions, listen to handset and set channel switch to plain text. Check that the high rate system alarm beeping is heard in earphone. Depress and release PTT switch on handset and check that beeping stops. Switch to cipher text and check for good variables (no parity alarm when PTT is depressed) in fill positions 1-6. Turn FILL SEL to Z5 and then to 1. Check for parity alarm when PTT is depressed with FILL SEL in positions 1-5 and no alarm in position 6. Reload good variables in positions 1-5 and verify as above. Turn FILL SEL to Z6 and then to 6. Check for parity alarm in all 6 positions as above (see 3.18.3.1).

4.16.3.2 Plain-cipher select test. Connect the equipment as shown in FIGURE 5. Perform the following tests: (see 3.18.3.2)

a. Place set No. 1 in plain text and set No. 2 in cipher text. Use a common fill between set No. 1 and set No. 2. Key set No. 1 using a 500 Hz tone which shall be heard on set No. 2 along with the plain text cross mode alert signal per 3.18.3.3. Change set No. 1 to cipher, key the transmitter and listen for the 500 Hz tone.

b. Place set No. 2 in plain text and repeat the above test listening for the cipher test cross mode alert signal.

c. Strap out the alert signals and repeat a and b.

4.16.3.3 Alerts test. Connect the equipment as shown in FIGURE 5 except omit the HP-200CD and HP-330B. Set both KY-67 radios to 31.000 MHz and PT mode. Listen to the handset of KY-57 No. 2 (unit under test). Depress the PTT on KY-67 No. 1. Check that the slow PT alert tone is heard. Release PTT Switch KY-67 No. 2 to CT and repeat. Switch KY-67 No. 1 to CT and repeat, noting initial ready beep only. Switch KY-67 No. 2 to PT and depress PTT of KY-67 No. 1. Note high duty cycle CT cross mode alert beeping. Release PTT of No. 1 and depress PTT of No. 2. Note PT alert and release PTT. Switch No. 2 to CT and depress PTT. Note initial ready beep only (see 3.18.3.3).

4.16.3.4 Retransmission delay test. Connect the equipment as shown in FIGURE 1. Set the equipment power switch to the TD (time delay) position. Key the KY-67 and determine that the phasing interval is extended in the TD position (see 3.18.3.4).

4.16.3.5 Data test. Connect the equipment as shown in FIGURE 5 at 31.000 MHz. The audio test box (see 6.4) shall provide the voice analog data and digital data audio connector programming (see 3.18.3.5).

a. Set the audio signal generator to 500 Hz at 200 millivolts rms and key the transmitter. Verify that the 500 Hz signal is received at set No. 2 in both plain and cipher mode.

b. Set the signal generator to 1 kHz at 200 millivolts rms and program both set No. 1 and set No. 2 to the analog data mode. Verify that the 1000 Hz signal is received at set No. 2 in the cipher text mode.

c. Set the data signal generator to 4 kHz at 2 volts rms and program both set No. 1 and set No. 2 to the digital data mode. Key set No. 1 and verify that a jittery 4 kbps signal is received at set No. 2 on the cipher mode and that a 16 kHz clock is available at the proper pin on the audio connector at both set No. 1 and set No. 2. The audio test box shall provide an unattenuated input to the digital input pin on the audio connector for the 2 volt simulated input signal. Verify that the digital data signal is not inverted between the transmitting and receiving KY-67.

4.16.3.6 Cipher text performance degradation. Two equipments shall be utilized, one inside a screen room operating as a receiver, and one outside the screen room operating as a transmitter. The transmitter output shall be connected to the receiver input through suitable RF attenuators. The equipment shall be operated in the plain text mode. The transmitter shall be modulated by a 500 Hertz tone and the output of the receiver shall be connected to a HP-330B distortion meter. Sufficient attenuation shall be added between the transmitter and receiver to produce a 10 dB signal plus noise plus distortion to noise plus distortion ratio (SINAD). The sets shall then be operated in the secure mode and the attenuation adjusted to again produce a 10 dB SINAD ratio. The difference in the path loss shall not exceed 2 dB (see 3.18.3.7).

4.16.3.7 Retransmission. Verify operation in the retransmission mode using four KY-67 equipments as: distant transmitter on frequency F_1, retransmission receiver on frequency F_1, retransmission transmitter on frequency F_2 and distant receiver on frequency F_2. Both cipher and plain text operation shall be possible with F_1 and F_2 frequencies separated by a minimum of $\pm 10\%$. Verify that in the digital data configuration, data is not inverted between the distant trnamsitting and receiving KY-67's when going through the retransmission station (see 3.18.3.8).

4.16.3.8 Interlocks. Connect the equipment as shown in FIGURE 6. Establish a good variable in fill position 1 and verify by absence of parity alarm. Remove the bottom cover and verify that the KY-67 will not operate. Reinstall the cover and verify, by parity alarm, that the variable has been removed. Reestablish a good variable in fill position 2. Remove the front cover and verify that the KY-67 will not operate. Reinstall the cover and verify, by parity alarm, that the variable has been removed. Reestablish a good variable in fill position 2. Remove the top cover and verify that the KY-67 will not operate. Install an interlock switch depressor and reestablish a good variable in fill position 3. Remove a card (any card from the digital subsystem). Verify that the KY-67 will not operate with card removed. Remove switch depressor and reinstall card and cover (see 3.18.3.9).

4.16.4 Supply voltage range test. Connect the equipment as shown in FIGURE 12. Set the voltages at J5 and J6 respectively to +11.0 ±.1 and +20.0 ±.2 Vdc. Depress the PTT switch on the handset and speak into the microphone. Check that transmit power is at least 2 watts, voice sidetone is normal, and no alarms are heard. Set the voltages at J7 and J6 respectively to +17.0 ±.1 and +34.0 ±.2 Vdc. Repeat the above check (see 3.18.4).

4.16.4.1 Power consumption test. Connect the equipment as shown in FIGURE 12. Measure the current drain on each supply line with the KY-67 in receive, but no signal being received. Depress the PTT switch on the handset and measure the current on both lines. Be sure that the voltage at J7 is set to 12.5 ±.1 Vdc and at J6 is set to 25 ±.2 Vdc during current measurements. In addition, current to the GFE digital subsystem must be subtracted from the current measured on the 25 volt line. Release the PTT switch (see 3.18.4.1).

4.16.5 Vehicular adapter tests.

4.16.5.1 Radio power supply test. Connect the equipment as shown in FIGURE 2. Measure the voltage of the radio power adapter. Verify voltage to be +12 ±1.5 Vdc while the supply voltage is varied (see 3.18.5.1).

4.16.5.2 Speaker amplifier test. Connect the equipment as shown in FIGURE 5. Key set No. 1 and insert a 500 Hz tone at 200 millivolt rms. Turn on the speaker in set No. 2 and verify the two watt output of the speaker by opening the HYP-67 and measuring the voltage across the speaker terminals (see 3.18.5.2).

4.16.5.3 Vehicle intercommunication system interface test. Connect the equipment as shown in FIGURE 13 and perform the following tests: (see 3.18.5.3)

a. With the AM-1780 power switch in the OFF position verify no power to the HYP-67. Turn the AM-1780 power switch to NORMAL and verify the power up mode of the HYP-67.

b. With the AM-1780 ON, key headset No. 2 and speak into the microphone. Verify the keying action of the transmitter and reception of audio at set No.1.

c. With the AM-1780 ON and in the CDR and CREW position key set No. 1 and transmit a 500 Hz tone through the pad to set No. 2 with the C-2298 in position A. Verify that the C-2298 receives 500 milliwatts of audio from the HYP-67. Switch the C-2298 to the ALL position. Verify that the C-2298 receives 500 milliwatts of audio from the AM-1780.

d. Connect the deviation meter and distortion analyzer to set No. 1 in place of the audio signal generator. Connect the audio signal generator to headset No. 1. With the C-2298 in the ALL position, key headset No. 1 and modulate with a 500 Hz audio signal. Verify that this produces 220 millivolts into the HYP-67. With set No.2 KY-67 in PT, measure the modulation distortion received at set No. 1. Verify compliance with 3.18.5.3.

4.16.5.4 Transmit audio processing. Set up the equipment as shown in FIGURE 13 with the audio signal generator connected to the C-2298 control box through the audio test box. Output level from the signal generator at 1 kHz shall be adjusted so the transmit KY-67 drops out of the AGC range. With set No. 2 in transmit measure the audio output from set No. 1 at the following frequencies: 50, 100, 200, 300, 1000, 2000 and 3000 Hz. Set No. 1 and set No. 2 shall be at 31.000 MHz and set No. 2 power output shall be in the low power (2 watt) position (see 3.18.5.4).

4.16.5.5 Vehicle antenna tuning switch test. Connect the equipment as shown in FIGURE 6. and measure the tune signals to the AS-1729 at the antenna tune connector (C-4722) at the following frequencies: 31.0, 35.0, 38.0, 46.0, 50.0, 55.0, 57.0, 64.0, 68.0 and 71.0 MHz. Tuning information shall be in accordance with the following: (see 3.18.5.5)

Band	Frequency (MHz)	Voltage at pins (24 Vdc ±1 Vdc)		
1	30-33	A to C	D to C	N to C
2	33-37	A to C	E to C	N to C
3	37-42	A to C	F to C	N to C
4	42-47	A to C	H to C	N to C
5	47-53	A to C	J to C	N to C
6	53-56	B to C	D to C	N to C
7	56-60	B to C	E to C	N to C
8	60-65	B to C	F to C	N to C
9	65-70	B to C	H to C	N to C
10	70-76	B to C	J to C	N to C

4.16.6 RF power amplifier test. Connect the equipment as shown in FIGURE 6.. Set the output power selector switches to HI and MED power. Key the transmitter via the handset and measure the power output at the following frequencies: 31.0, 35.0, 38.0, 42.0, 46.0, 49.0, 53.0, 57.0, 60.0, 64.0, 68.0, 71.0, and 75.0 MHz. Power output shall be 40 watts ±1 dB and 10 watts ±1 dB into a 50 ohm load with input voltage between 36 and 22 volts d.c. Power output shall not be reduced by more than 4 dB between 20 and 22 volts d.c. nor more than 6 dB from 17 to 20 volts d.c. Verify that neither a short circuit or open circuit condition damages the power amplifier (see 3.18.6).

4.16.6.1 Noise floor test. Connect the equipment as shown in FIGURE 14. The bandstop filter is provided to attenuate the carrier sufficiently to utilize the dynamic range of the spectrum analyzer. Insure that the noise floor is 140 dB down at +20% of the following frequencies: 31.0, 35.0, 38.0, 42.0, 46.0, 49.0, 53.0, 57.0, 60.0, 64.0, 68.0, 71.0 and 75.0 MHz (see 3.18.6.1).

4.16.6.2 Spurious output test. Connect the equipment as shown in FIGURE 15. Key the 40 watt RFPA module in the HYP-67. At each frequency measure the amplitude of the second through fifth harmonics of the RF output by obtaining a reference reading on the NF-105 and then by connecting the 50 watt pad to the HP-8640B and setting the HP-8640B to obtain the reference reading. Record the HP-8640B output as the harmonic level in dBm and calculate dB below carrier level. Make this measurement on the following frequencies: 31.0, 35.0, 38.0, 42.0, 46.0, 49.0, 53.0, 57.0, 60.0, 64.0, 68.0, 71.0 and 75.0 MHz (see 3.18.6.2).

4.17 Weight-form. The equipment shall be weighed and measured to show compliance with 3.19.

4.18 Operational test.

4.18.1 KY-67. Connect the equipment as shown in Figure 5 (see 3.12.1).

4.18.1.1 Transmit and receive test (CT and PT). Operate the KY-67 in the manpack configuration in the plain and cipher text modes (voice) for a minimum of 30 seconds each. Send 3 ten second messages, at each of the following frequencies: 36, 46 and 56 MHz. Perform test for both plain and cipher text, transmit and receive.

4.18.1.2 Fill test. The KY-67 test unit shall be fully operational complete with fills. The equipment under test shall be filled as the KY-67 test unit is. Cipher text transmission and reception shall take place between the equipments, verifying that the equipment under test has properly received, stored and processed the fill.

4.18.2 HYP-67 (see 3.12.2).

4.18.2.1 Transmit (HYP-67). Connect the equipment as shown in FIGURE 6. The regulated d.c. power supply shall be set to 24 volts. A properly operating KY-67 shall be secured to the HYP-67. Use the handset to key the transmitter and insure that the output is not less than 2 watts at 36, 46, and 56 MHz. Reduce the input voltage to the HYP -67 to 18 volts and repeat the test. Increase the input voltage to the HYP-67 to 36 volts and repeat the test. The KY-67 shall provide not less than 2 watts RF output under all the above conditions for both plain and cipher modes.

4.18.2.2 Receive (HYP-67). Connect the equipment as shown in FIGURE 13. Set the d.c. power supply to 24 volts. The transmit KY-67 shall run off battery power and transmit via the handset to the receive KY-67 at each of the following frequencies: 36, 46 and 56 MHz. The speaker of the HYP-67 shall be on. Insure that the HYP-67 provides audio from its speaker. Reduce the input voltage to 18 volts and repeat the test. Increase the input voltage to 36 volts and repeat the test. The HYP-67 shall power the KY-67 in the receive mode and provide speaker audio output for each voltage.

4.19 Environmental electrical performance test. Unless otherwise specified the following tests shall be performed to determine satisfactory operation of the equipment before, during and after the environmental tests required in 4.13 (see 3.10).

Test	Para. No.
Sensitivity	4.16.1.1
Audio output (PT and CT)	4.16.1.13
Power output	4.16.2.1
RF stability	4.16.2.5
Alarms	4.16.3.1
Alerts	4.16.3.3
Power consumption (PT and CT receiver CT and PT transmit)	4.16.4.1

4.20 Visual and mechanical inspection. The equipment shall be examined for the defects listed in MIL-STD-252 (see 3.20).

4.21 Quality conformance inspection of packaging. Packaging shall be inspected in accordance with MIL-P-116 to determine conformance to the requirements of Section 5.

4.22 Rough handling test packaging. When rough handling test in accordance with MIL-P-116 is required by the contract (see 6.2), the electrical operation performance tests (4.18) shall be conducted to determine freedom from operational malfunction caused by rough handling.

5. PACKAGING

5.1 Preservation. Preservation shall be level A, B or Commercial as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Cleaning. The KY-67 shall be cleaned in accordance with process C-1 of MIL-P-116.

5.1.1.2 Drying. The KY-67 shall be dried in accordance with the applicable procedure of MIL-P-116.

5.1.1.3 Preservative application. Preservatives shall not be used.

5.1.1.4 Unit packing. Unit packing shall be in accordance with the methods prescribed in MIL-P-116 as specified herein.

5.1.1.4.1 Technical literature. Each operators manual shall be individually unit packed method 1C-1.

5.1.1.4.2 Handset. Each handset shall be individually unit packed in accordance with MIL-H-55380.

5.1.1.4.3 Cable assemblies. Each CX-13016( )/U cable assembly shall be individually unit packed in accordance with MIL-C-55442.

5.1.1.4.4 Antenna element. Each antenna element shall be individually unit packed method III as follows: Wrap the item in paperboard conforming to PPP-P-291, type 1 and secure with tape conforming to PPP-T-45. Place the item within a close-fitting fiberboard box conforming to PPP-B-636, W5c. Closure shall be in accordance with the appendix of the box specification.

5.1.1.4.5 Dual audio adapter. Each dual audio adapter shall be individually unit packed method III as follows: Wrap the item in paperboard conforming to PPP-P-291, type 1 and secure with tape conforming to PPP-T-45. Place the item within a close-fitting fiberboard box conforming to PPP-B-636, W5c. Closure shall be in accordance with the appendix of the box specification.

5.1.1.4.6 Receiver-transmitter with battery box. Each receiver-transmitter with battery box shall be individually unit packed method III as follows: Secure the battery box to the receiver-transmitter with fasteners provided. Cushion each unit on all surfaces with cells or pads or both fabricated of fiberboard conforming to PPP-F-320, type CF, class weather-resistant, variety SW, grade W5c, designed to protect all projections and absorb the shock of impact in handling and transit. As an alternate, cushioning material may be fabricated of plastic molding material conforming to MIL-P-19644 or polyurethane foam conforming to MIL-P-26514. Place the cushioned unit within a close-fitting fiberboard box conforming to PPP-B-636, W5c. Closure shall be in accordance with the appendix of the box specification.

5.1.1.4.7 Vehicular amplifier-power adapter. Each vehicular amplifier-power adapter shall be individually unit packed method III as follows: Cushion each unit on all surfaces with cells or pads or both fabricated of fiberboard conforming to PPP-F-320, type CF, class weather-resistant, variety SW, grade W5c, designed to protect all projections and absorb the shock of impact in handling and transit. As an alternate, cushioning material may be fabricated of plastic molding material conforming to MIL-P-19644 or polyurethane foam conforming to MIL-P-26514. Place the cushioned unit within a close-fitting fiberboard box conforming to PPP-B-636, W5c. Closure shall be in accordance with the appendix of the box specification.

5.1.1.4.8 Consolidation. Consolidate the items, unit packed as specified in 5.1.1.4.2 through 5.1.1.4.7, with a close-fitting fiberboard box conforming to PPP-B-636, W5c. Place the technical literature, unit packed as specified in 5.1.1.4.1, on top of the contents directly under the lid of the box. Closure shall be in accordance with the appendix of the box specification.

5.1.2 Level B. Cleaning, drying, preservation application, unit packing and consolidation shall be as specified in 5.1.1.

5.1.3 Commercial preservation. Preservation shall be in accordance with FED-STD-356.

5.2 Packing. Packing shall be level A, B or Commercial, as specified (see 6.2). Shipping containers for level A and B shall be capable of stacking and supporting superimposed loads during shipment and storage without damaging the container(s) or its contents.

5.2.1 Level A. A quantity of KY-67's, unit packed as specified in 5.1, shall be packed within a closs-fitting box conforming to PPP-B-601, overseas type; PPP-B-621, style 4, class 2; or PPP-B-585, style 2 or 3, class 3. When the gross weight exceeds 200 pounds, or the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, 3 x 4 inch skids, laid flat, shall be applied in accordance with the requirements of the container specification, or if not specified in the specification, in a manner which will adequately support the item and facilitate the use of material handling equipment. Closure and strapping shall be in accordance with the applicable container specification or appendix thereto except that metal strapping shall conform to QQ-S-781, type 1, finish A.

5.2.1.1 Unitization. Palletization shall be required when: containers specified in 5.2.1 do not require skids; quantities per destination comprise a pallet load; and container size permits use of one of the pallet patterns of MIL-STD-147. A quantity of containers packed as specified in 5.2.1, except that container strapping may be omitted, shall be placed on a pallet, load type 1, conforming to MIL-STD-147. The pallet shall conform to NN-P-71, type IV, group I or II woods. The load shall be "bonded" to the pallet by strapping conforming to QQ-S-781, type 1, finish A, or shrink film.

5.2.2 Level B. A quantity of KY-67's, unit packed as specified in 5.1, shall be packed within a close-fitting fiberboard box conforming to PPP-B-640, class 2, style E, or PPP-B-636, type CF, class weather-resistant. The gross weight of boxes conforming to PPP-B-640 shall not exceed 250 pounds. Closure shall be in accordance with the appendix of the applicable box specification. Reinforcing shall be by pressure-sensitive filament tape banding or nonmetallic strapping conforming to PPP-T-97 and PPP-S-760, respectively: selection of the material and application shall be in accordance with the appendix of the applicable box specification. When the gross weight exceeds 200 pounds, or the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, containers will be pallet-mounted on pallets conforming to NN-P-71, group I or II woods. The load shall be "bonded" to the pallet by strapping conforming to QQ-S-781, type I, finish A, or shrink film. When a single unit is shipped to a single destination no packing is required; the unit container shall serve as the shipping container. Reinforcing shall be as specified above.

5.2.2.1 Unitization. Palletization shall be required when quantities per destination comprise a pallet load. A quantity of KY-67, unit packed as specified in 5.1, shall be placed on a pallet, load type I, conforming to MIL-STD-147. The pallet shall conform to NN-P-71, type IV, group I or II woods. A fiberboard cap shall be employed over the load having two sides extending down the stacked load at least 12 inches to accommodate marking requirements. The cap shall be fabricated of fiberboard conforming to PPP-F-320, class weather-resistant, W5s or V3c. The load shall be "bonded" to the pallet by strapping conforming to QQ-S-781, type I, finish A, or shrink film.

5.2.3 Commercial packing. Packing shall be in accordance with FED-STD-356.

5.3 Marking.

5.3.1 Military marking. In addition to any special marking required by the contract or order, interior packs and exterior shipping containers shall be marked in accordance with MIL-STD-129. The requirements of MIL-STD-129 shall not conflict with special marking requirements of NSA-2.

5.3.2 Commercial marking. In addition to any special marking required by the contract or order, interior packs and exterior shipping containers shall be marked in accordance with FED-STD-356. The requirements of FED-STD-356 shall not conflict with special marking requirements of NSA-2.

6. NOTES

6.1 Intended use. The BANCROFT system is composed of the KY-67 plus several ancilliary equipments. The KY-67 shall transmit and receive cryptographically secure and plain text voice information as well as analog and digital data. In the secure mode the KY-67 shall intercommunicate with other tactical VHF/FM radio equipment compatible with the SAVILLE-VINSON Applique devices (i.e. AN/PRC-77 and TSEC/KY-57). In the plain text mode the KY-67 shall intercommunicate with other tactical VHF/FM radios (i.e. PRC-77). The HYP-67 Vehicular Amplifier Power Adapter provides the necessary interface circuitry to allow use of the KY-67 in vehicular configurations. The HYP-67 includes the Radio Power Supply, Speaker Amplifier, and Power Supply, Vehicle Intercommunication System Interface Circuitry, Vehicle Antenna Tuning Circuitry and an RF Power Amplifier.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number and date of this specification and any amendment thereto.

b. Ancilliary equipments required (see 1.1).

c. Environmental test requirements for ancilliary items (see 1.1).

d. Level A, level B or Commercial preservation and packing (see Section 5).

e. First Article required (see 3.1).

f. Marking and shipping of samples.

g. If the rough handling and functional tests are required (see 4.22).

6.3 Verification inspection. Verification by the Government will be limited to the amount deemed necessary to determine compliance with the contract and will be limited in severity to the definitive quality assurance provision established in this specification and the contract. The amount of verification inspection by the Government will be adjusted to make maximum utilization of the contractor's quality control system and the quality history of the product.

6.4 Definitions.

6.4.1 Branching. Branching is a connected arrangement of (hyphae) formed by shoots or secondary stems growing from the main stem or filament (hypha).

6.4.2 Growth colonization. Growth colonization is a mass of individual plants, generally of one species, living together; or a group of hyphae which is formed from one spore or cell and may be one individual plant. Colonization which completely covers the surface of the nutrient material constitutes abundant growth.

6.4.3 Microbial growth. Microbial growth is the growth of very minute organisms. Such organisms when present in large numbers may provide a colony visible to the naked eye.

6.4.4 Sporulation. Sporulation is the formation of minute unicellular reproductive or dormant bodies, called spores.

6.4.5 Tubular germination. Tubular germination is partial growth by the production of hyphae, which are tubular shaped fungal filaments. Tubular germination constitutes restricted individual spore growth not proceeding to colonization.

6.4.6 Exfoliation. Exfoliation is corrosion along the grain boundries of the metal resulting in the peeling or separating, or both, of successive layers of the metal. The appearance resembles loose book pages or onion skin peeling.

6.4.7 Memory battery. A battery is required to hold the fill and frequency information when the main batteries are removed in the manpack configuration or when vehicle power has been turned off. A single BA-1372 battery shall be provided as the memory battery. Provisions shall be made to allow replacement of this battery without opening the equipment case. Information shall not be lost if the memory battery is removed while the equipment is being powered by the main battery or vehicle power.

6.4.8 Main battery. The main battery consists of two battery packs using the manpack configuration, one for the radio portion and one for the digital portion. Lithium organic BA-5590 battery packs conforming to SC-S-459 are used.

6.4.9 Audio test box. The audio test box provides input-output test points, connections for the standard test equipment, and a pad to reduce the transmit audio input level from 200 mV at the signal generator to the 1.4 mV required at the microphone input. A momentary and a single pole push-to-talk switch and a standard five pin audio connector to interface with the hand-set is also provided. Voice, analog and digital data programming is also provided.

6.4.10 Squelch tone test box. The squelch tone test box provides suitable summing network to add the audio test tone and squelch tones together to form a composit audio input signal. The box also provides local and remote control of the RF input to the Bancroft and contains a 50 ohm dummy load.

6.4.11 Limited maintenance test box. The limited maintenance test box provides an attenuated input signal from the normal 2 watt output.

6.5 Environmental. Environmental pollution prevention measures are contained in the packaging material specification referenced herein. Refer to material specifications or preparing activity for recommended disposability methods.

6.6 Location of operational inspection and air-seal test. It is desirable that the Operational Test (paragraph 4.18) and the Air Seal Test (paragraph 4.7) be performed at a location that will minimize handling (which might cause damage to the equipment) after this inspection is completed. Any preparation for shipment which would require breaking of the equipment seal should be accomplished prior to the Air-Seal test so that the seal may remain intact thereafter. It is recommended that the entire lot (including all previously inspected sample units) be sampled and inspected immediately prior to packaging.

6.7 Test equipment. The following test equipment (or equal substitute) is required to test the KY-67 and ancilliary equipment:

Power Supply	Trygon HR40-5B	
RF Signal Generator	HP-8640B	(2 required)
Attenuator, 20 dB	GR-875-G20	
Test Box, Audio		(2 required)
Handset	H-138/B	(2 required)
Distortion Analyzer	HP-330B	
Oscilloscope	Tektronix 547	
Oscilloscope Plug In	Tektronix 1A1	
Hybrid Power Splitter	EIN PM40-2	
Attenuator 13dB 10W		
Bandpass Filter	Telonic	
RF Power Amplifier	RF Comm 805	
RF Signal Generator	HP-608	
RF Voltmeter	Boonton 91H (with probes and divider)	
Wattmeter (5 watts)	Bird 61	
Audio Signal Generator	HP-200CD	
Limited Maintenance Test Box		
Battery 12/24V	BA-1590	(2 required)

Squelch Tone Text Box		
Dummy Antenna		
Attenuator 10dB 5W		
Attenuator, Variable	Kay 30-0	
Field Intensity Meter	Empire NF-105	
Tuning Head (20-200MHz)	Empire NF-105/T1	
Tuning Head (200-400MHz)	Empire NF-105/T2	
Frequency Counter	HP-5248L	
Carrier Deviation Meter	Marconi TF-791D	
Low Pass Filter	Allison	
Ammeter	SRT Polyranger	(2 required)
Ammeter	Weston 901 with 10A shunt	
Audio Voltmeter	HP-400A	
Power Supply	Power Designs 5005R	
Electronic Xfer Device	KYK-13	
Digital Voltmeter	HP-34701A	
Display Unit	HP-34740A	
VOM	Simpson 260	
Noise Generator	Rohde-Schwarz SKTU-BN 4151/2/50	
Spectrum Analyzer	HP-141T	
Spectrum Analyzer	HP-8552B	
Spectrum Analyzer	HP-8553B	

Custodian:

Army - EL

Preparing Activity:

Army - EL

Project No. 5810-A035-1

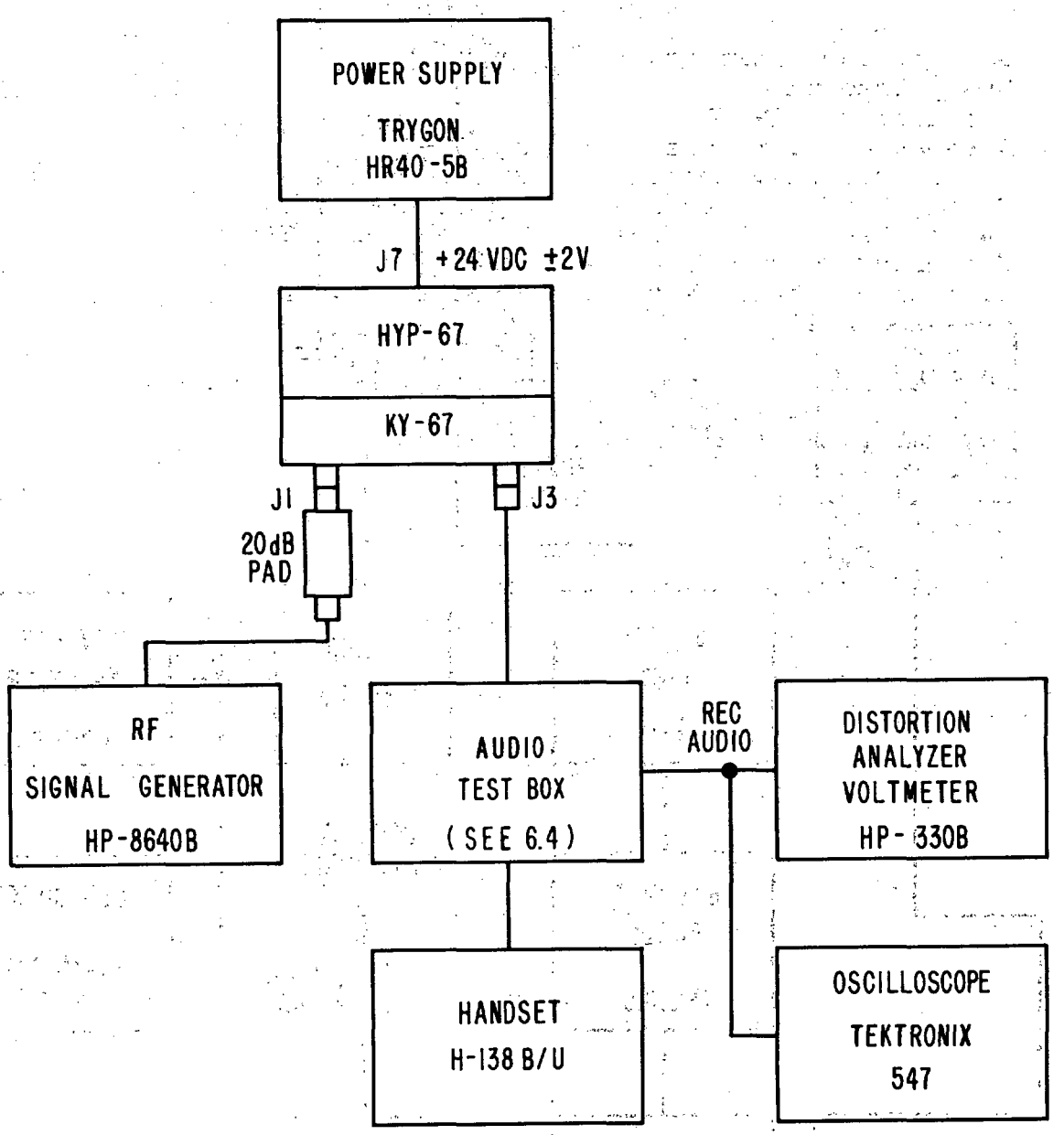


FIGURE 1. SENSITIVITY, SELECTIVITY TEST

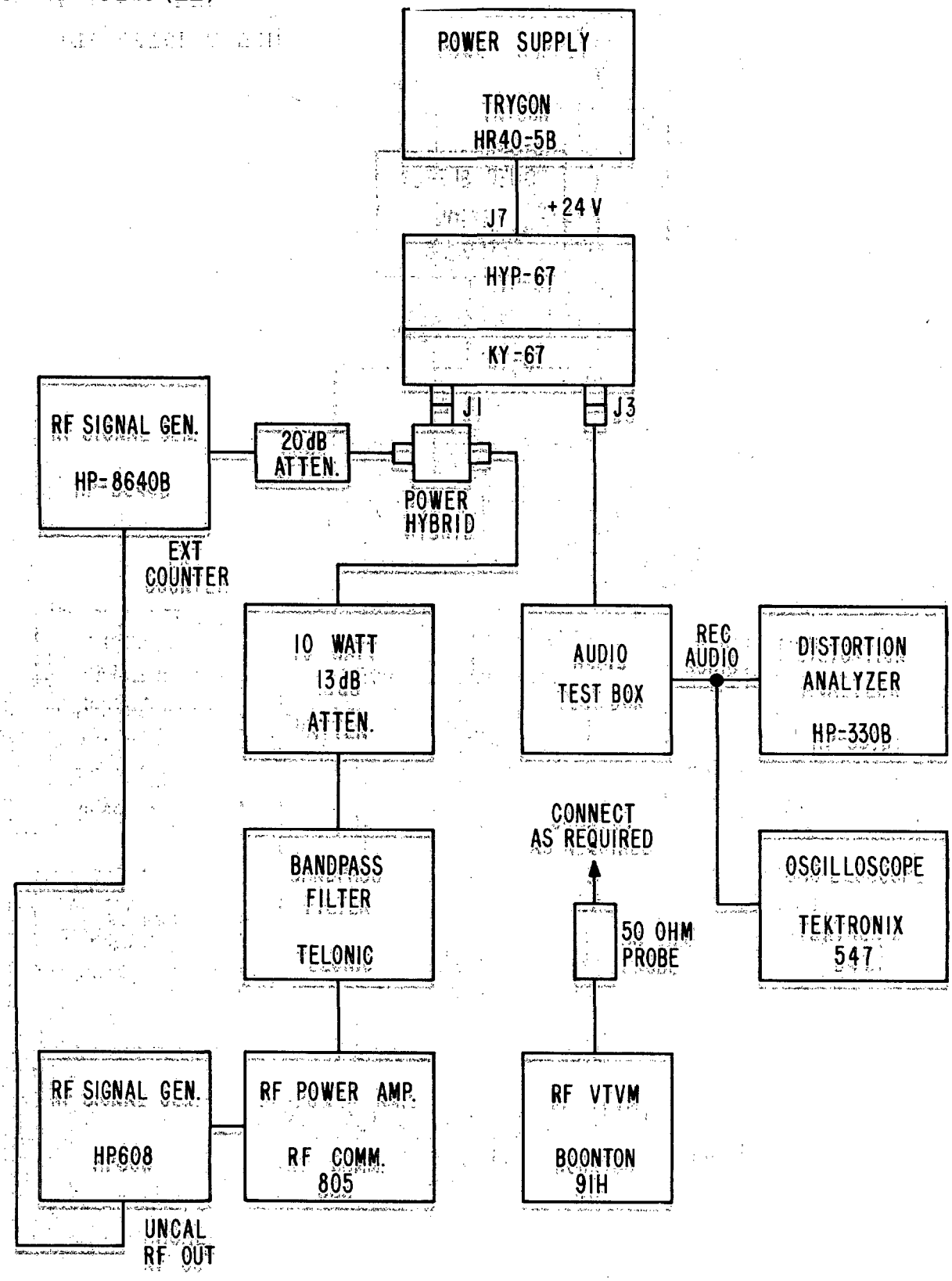


FIGURE 2. DESENSITIZATION MEASUREMENT

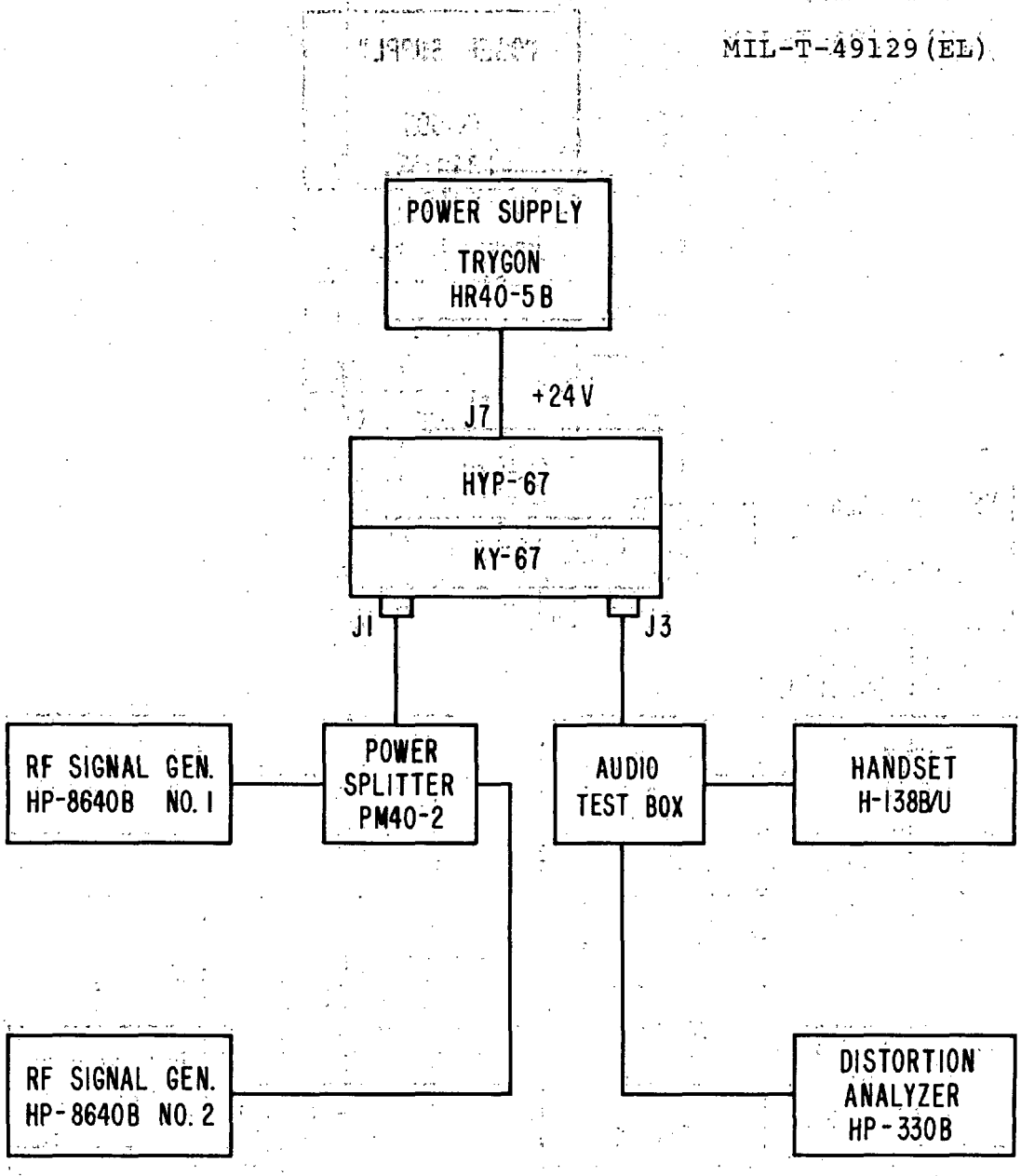


FIGURE 3. INTERMODULATION TEST

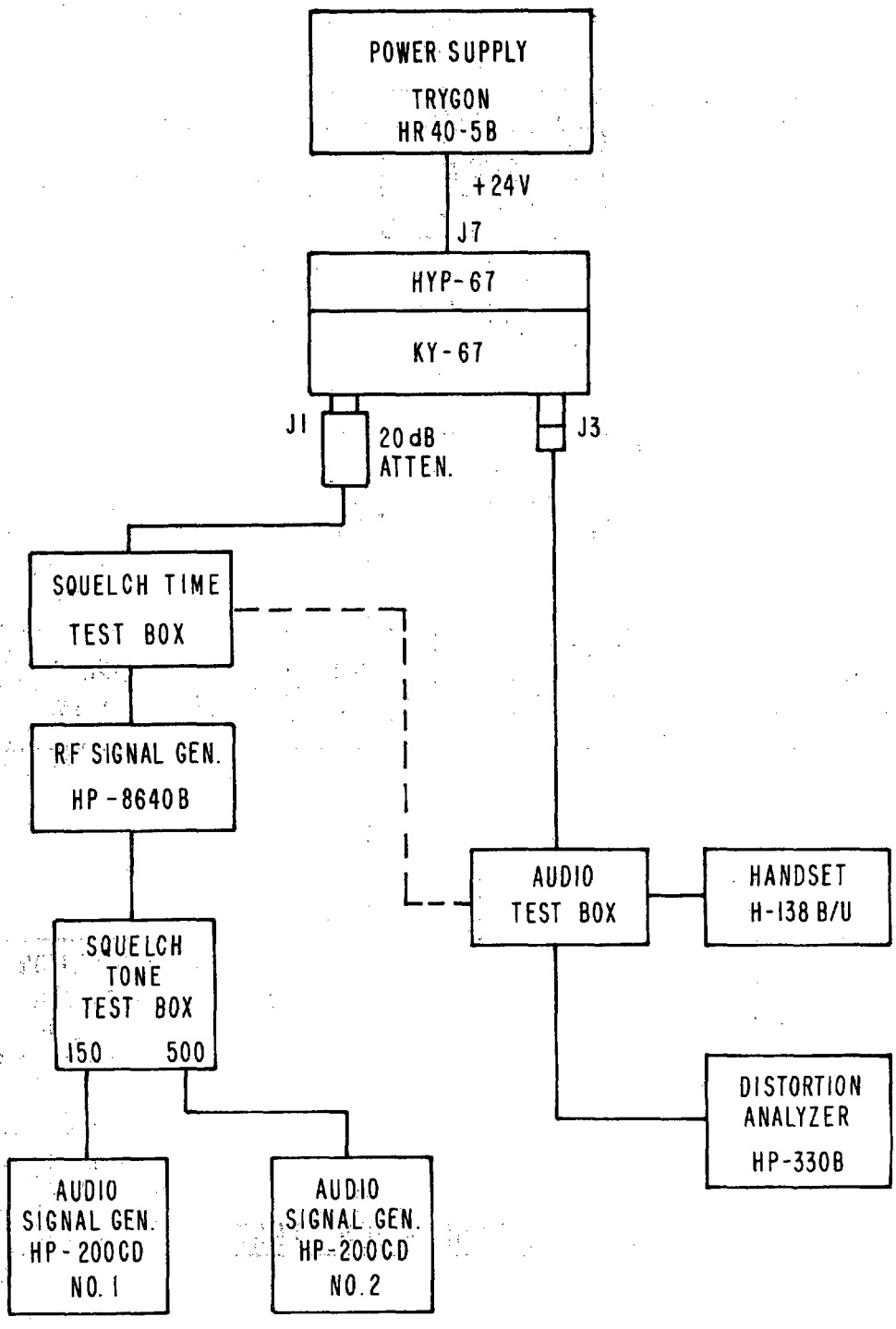


FIGURE 4 SQUELCH SENSITIVITY TEST

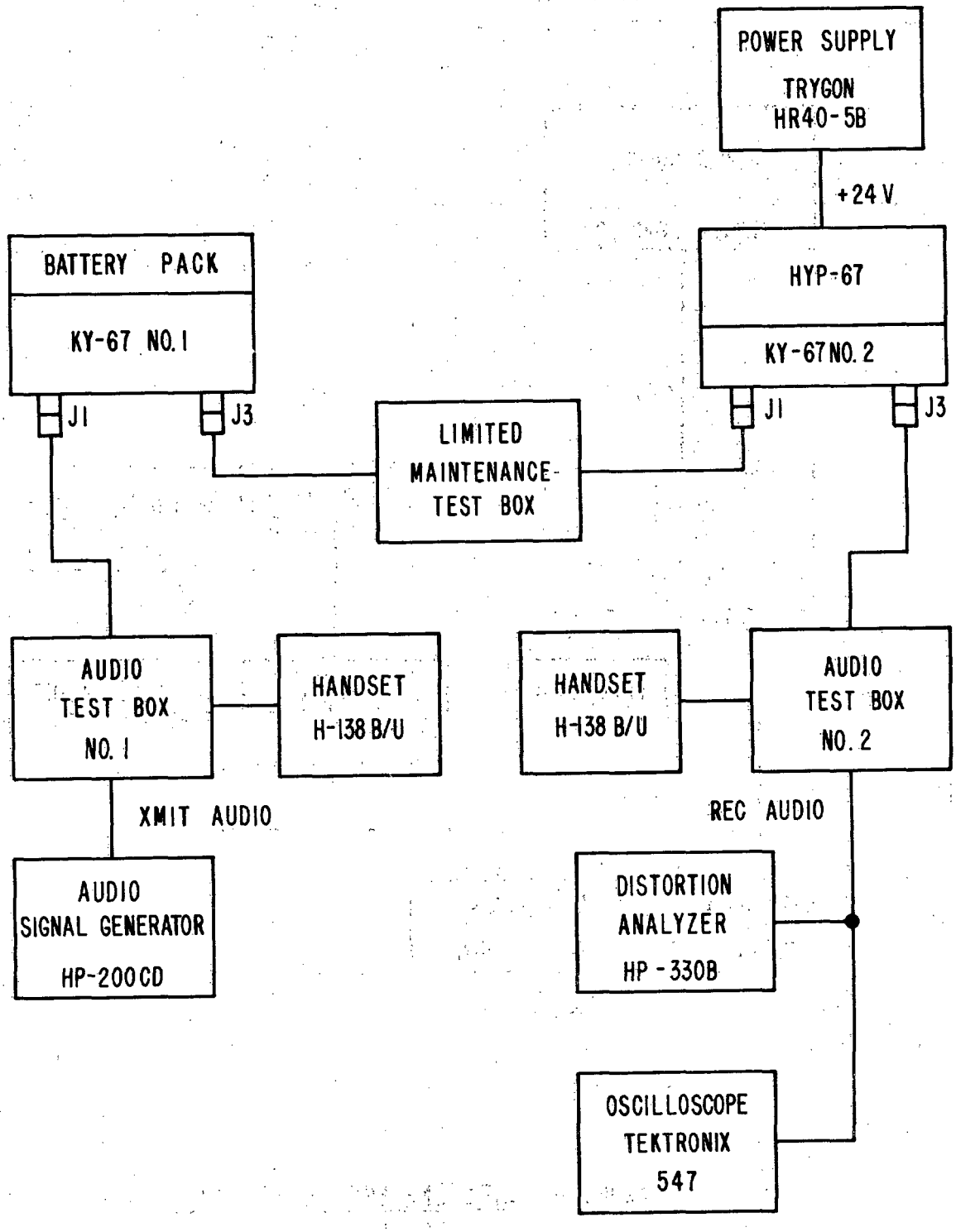


FIGURE 5. AUDIO OUTPUT TEST

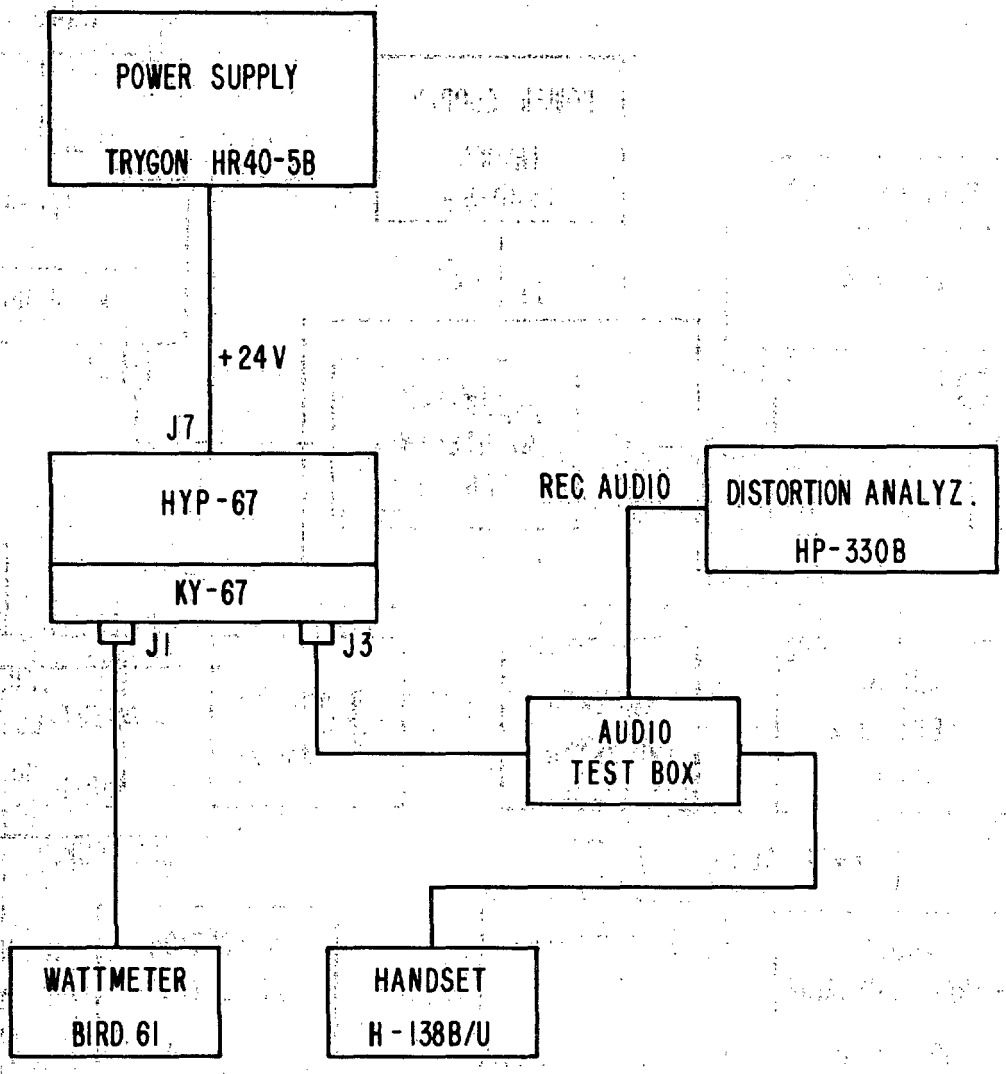


FIGURE 6 SIDETONE AND ALARM TEST

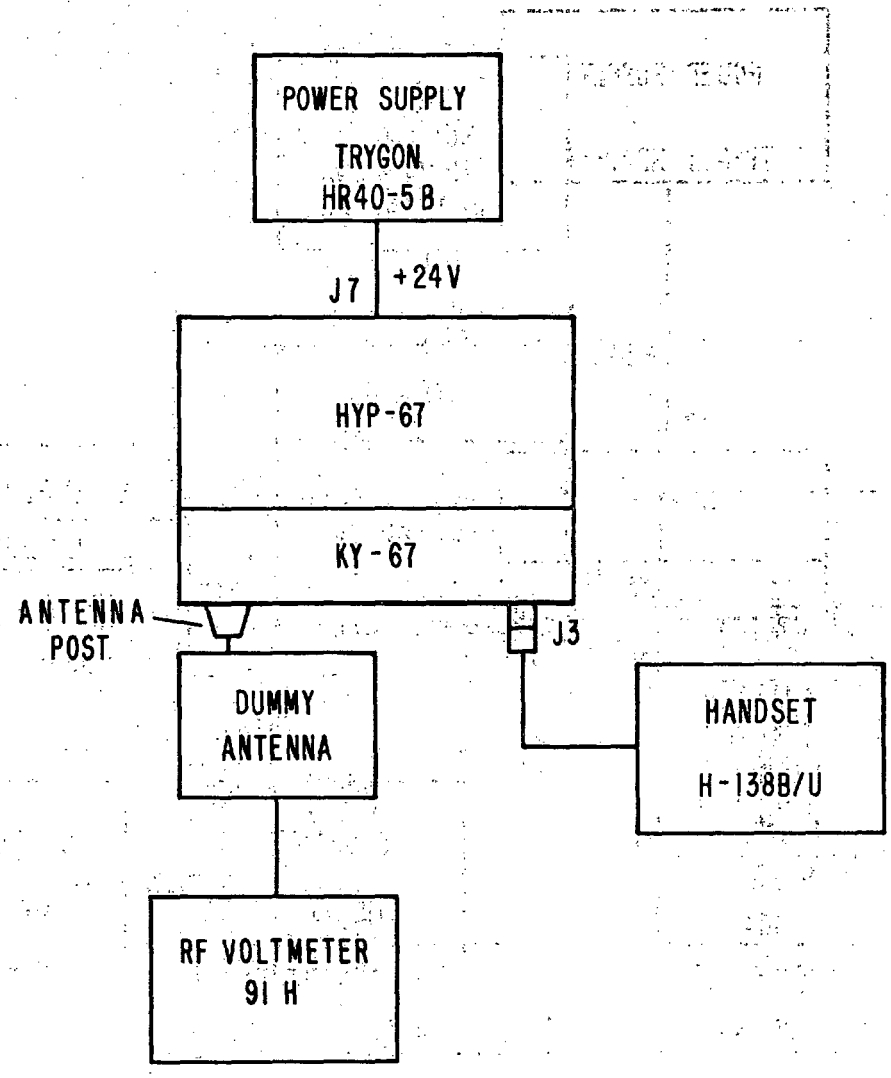


FIGURE 7. POWER OUTPUT TEST

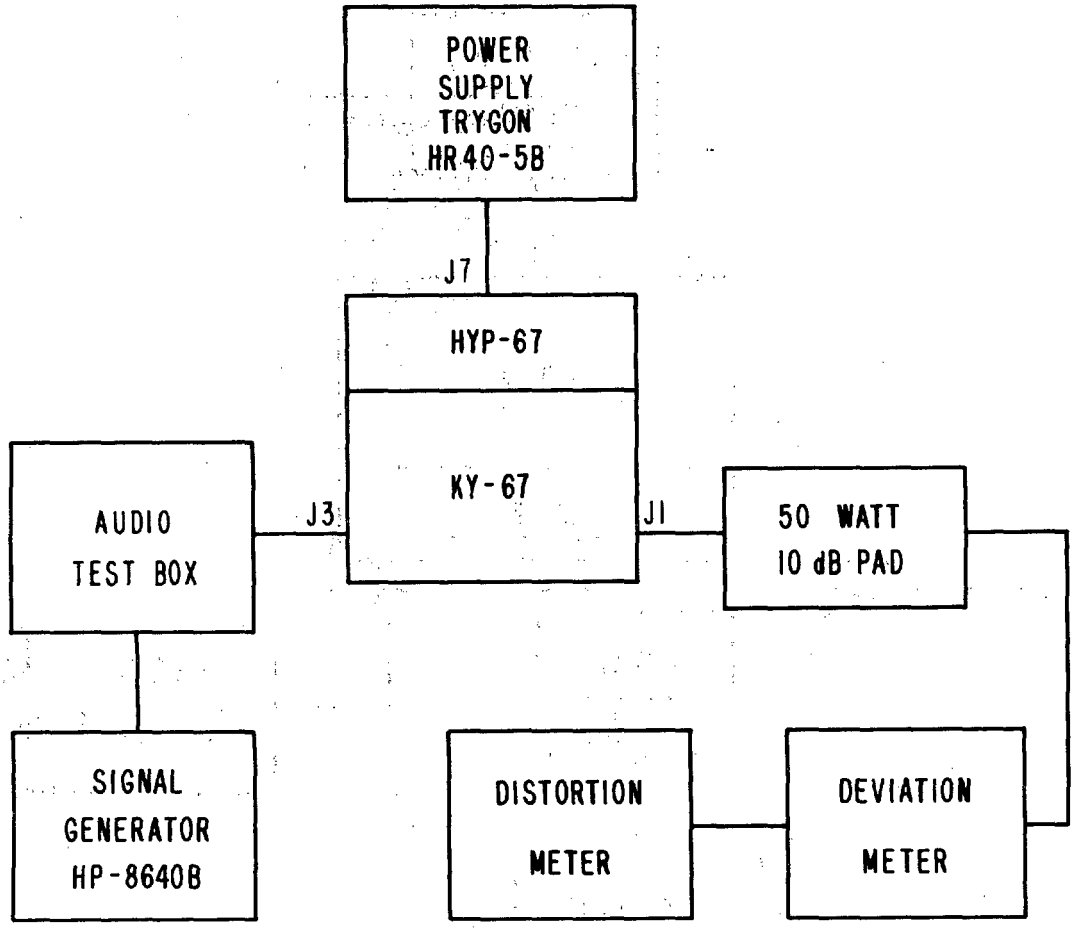


FIGURE 8. MODULATION DISTORTION TEST

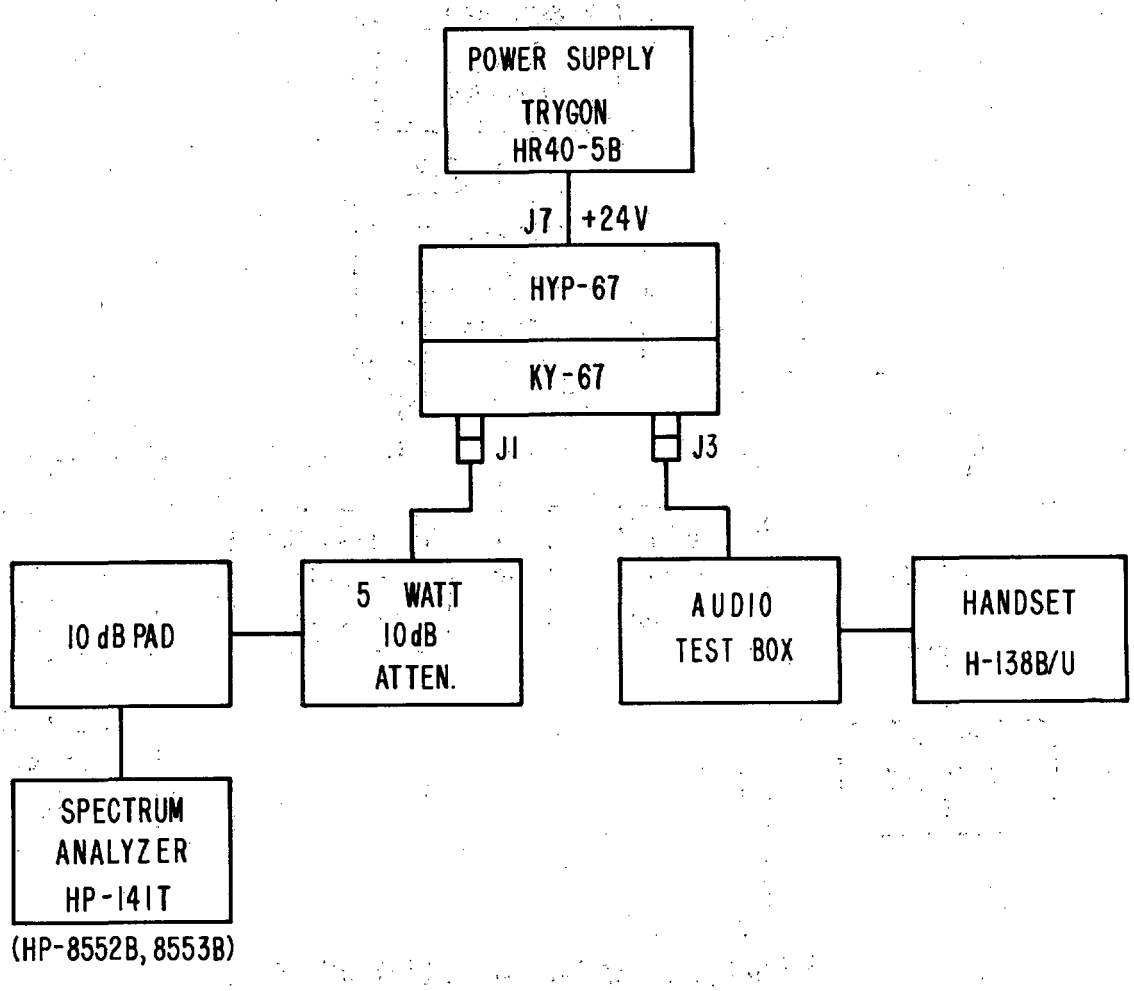


FIGURE 9. SPURIOUS OUTPUTS TEST

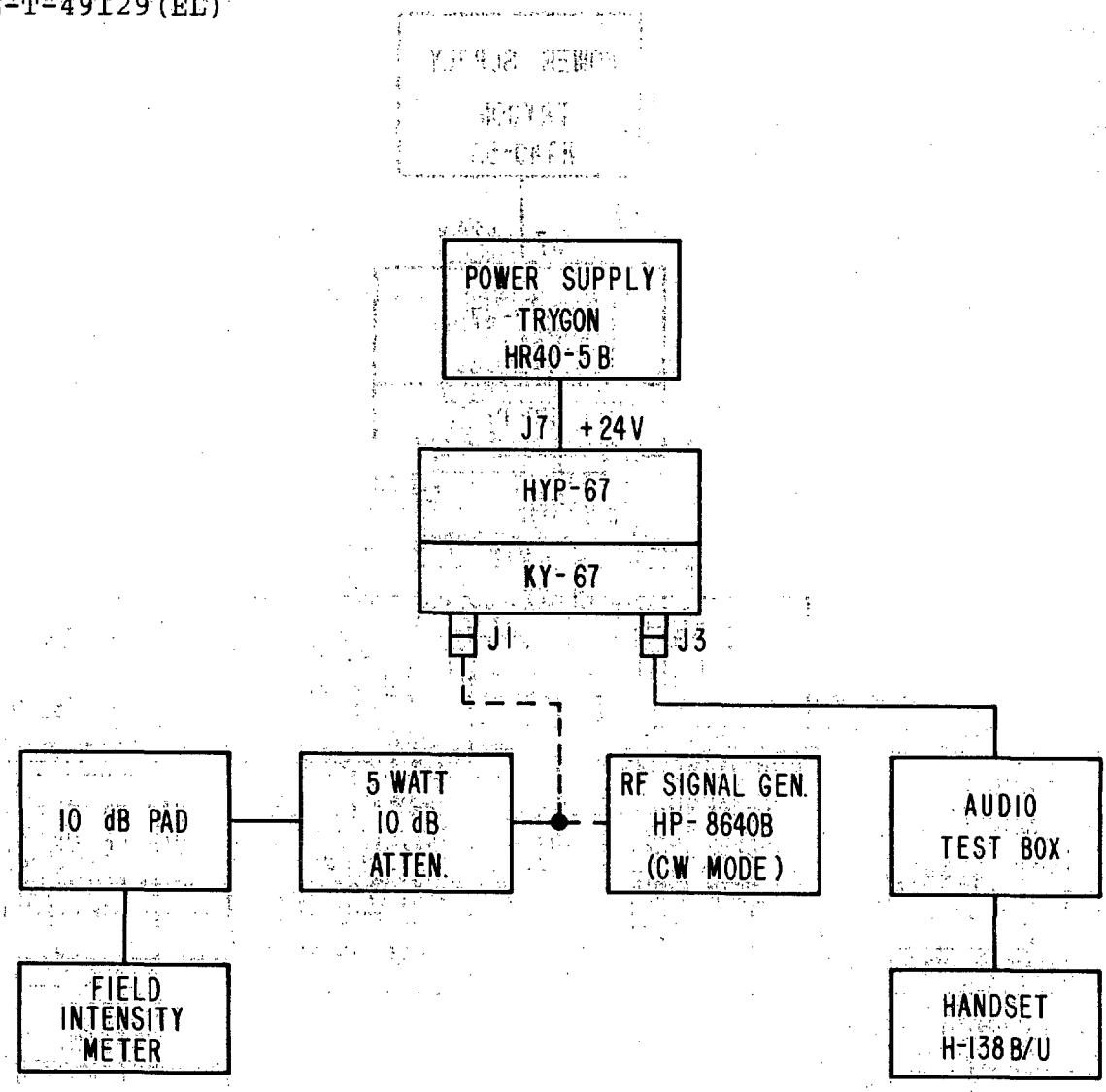


FIGURE 10. HARMONIC RADIATION TEST

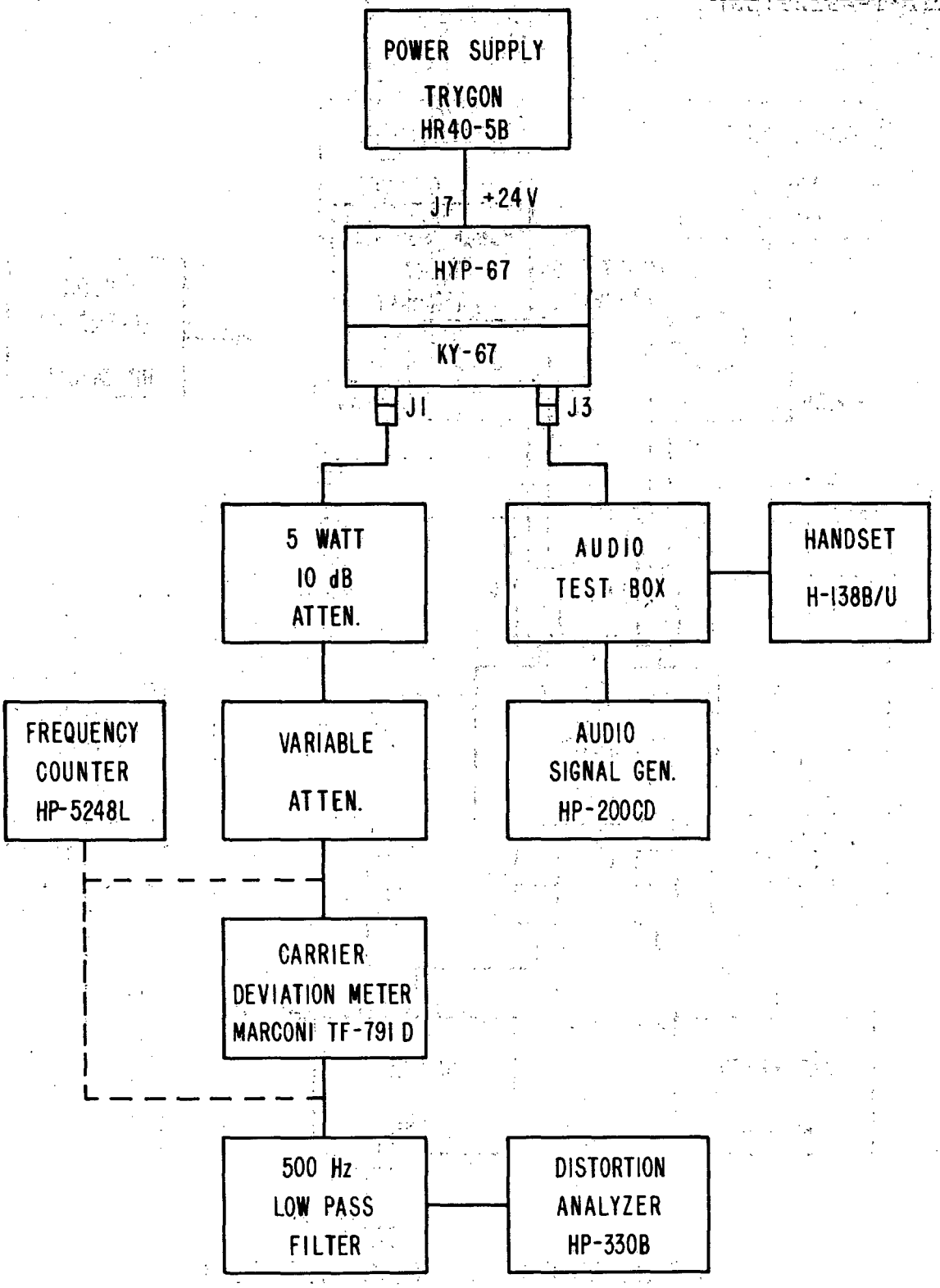


FIGURE 11 DEVIATION TEST

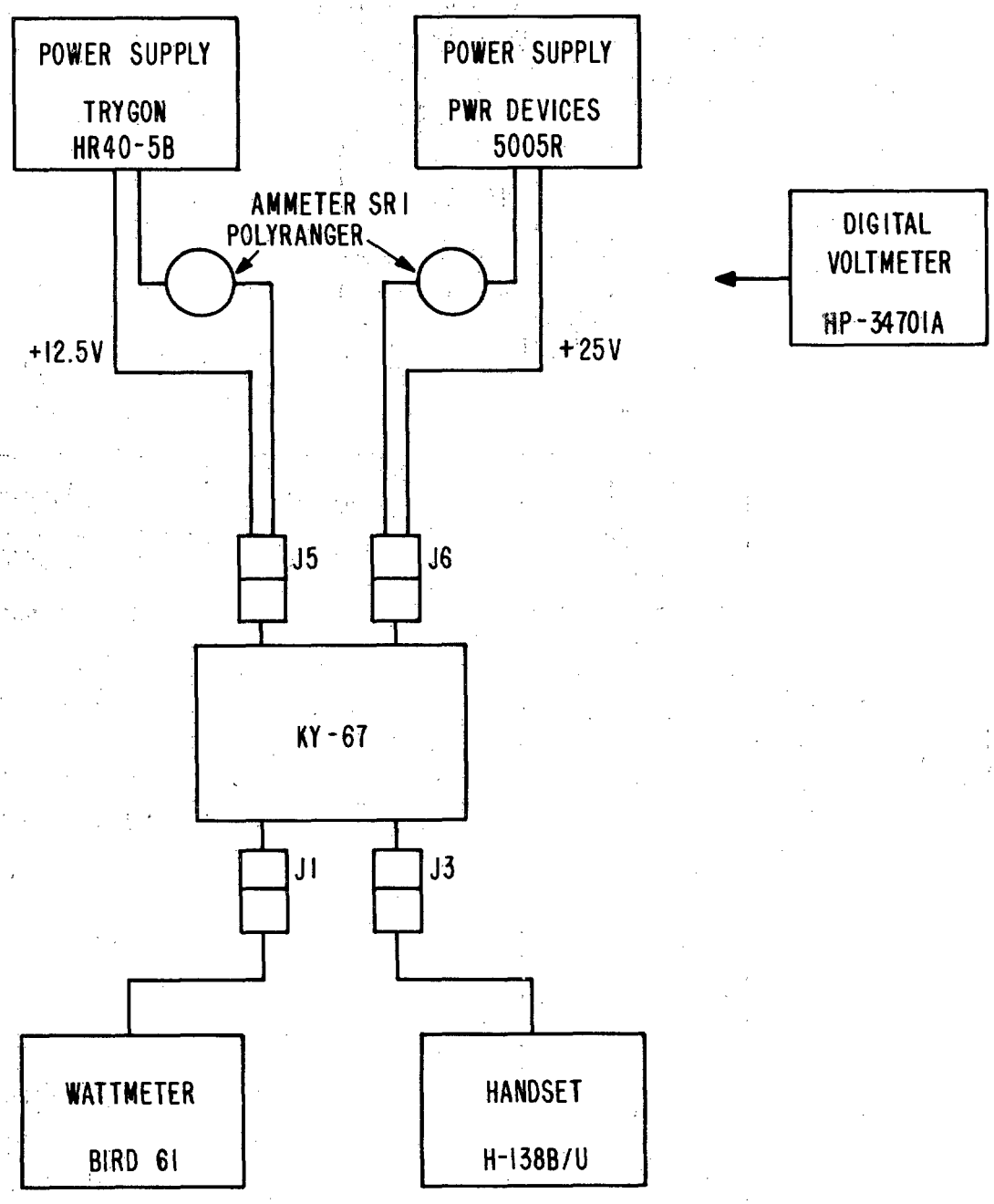


FIGURE 12. SUPPLY VOLTAGE RANGE TEST

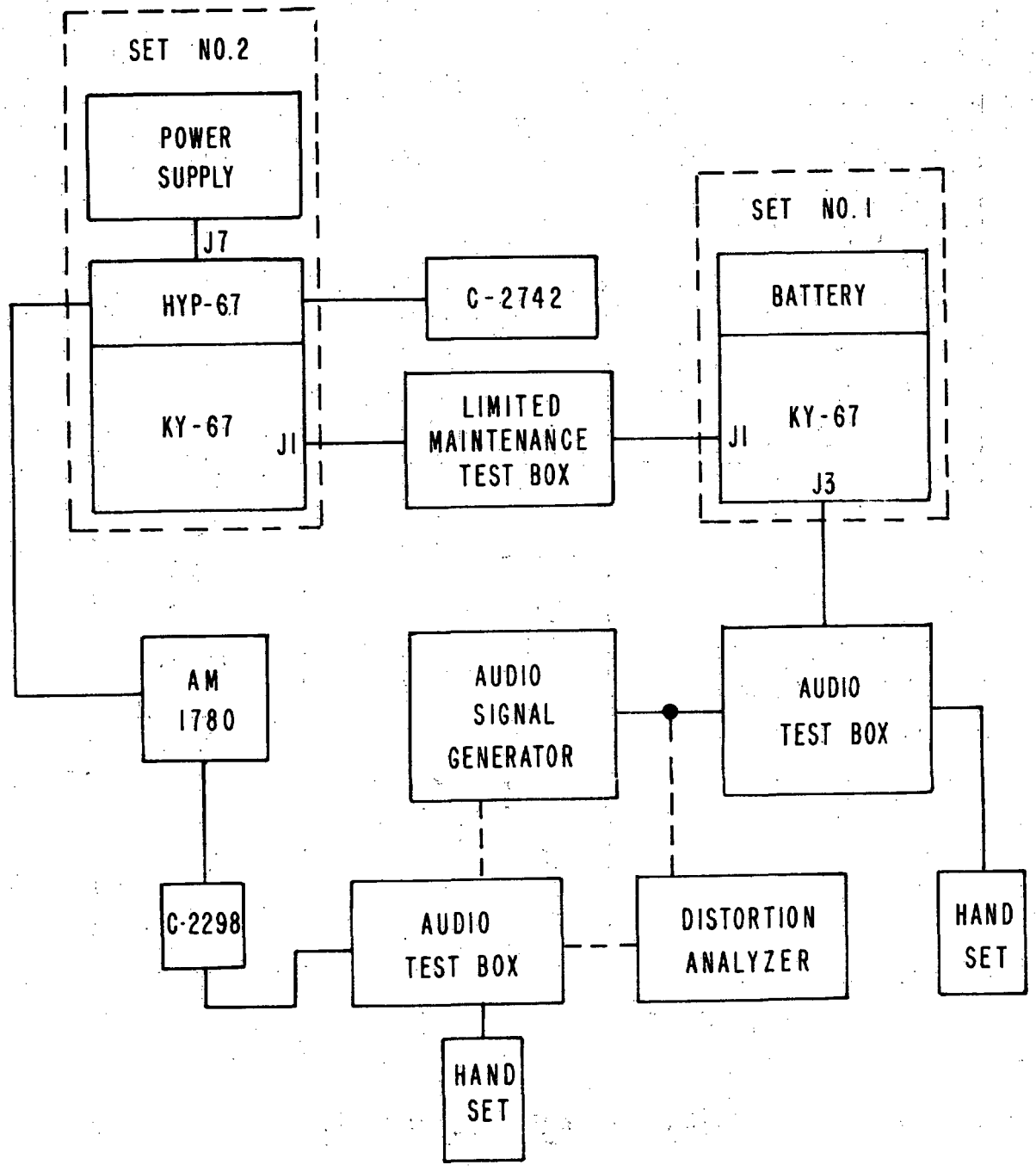


FIGURE 13. VEHICLE INTERCOMMUNICATION SYSTEM INTERFACE TEST CONFIGURATION

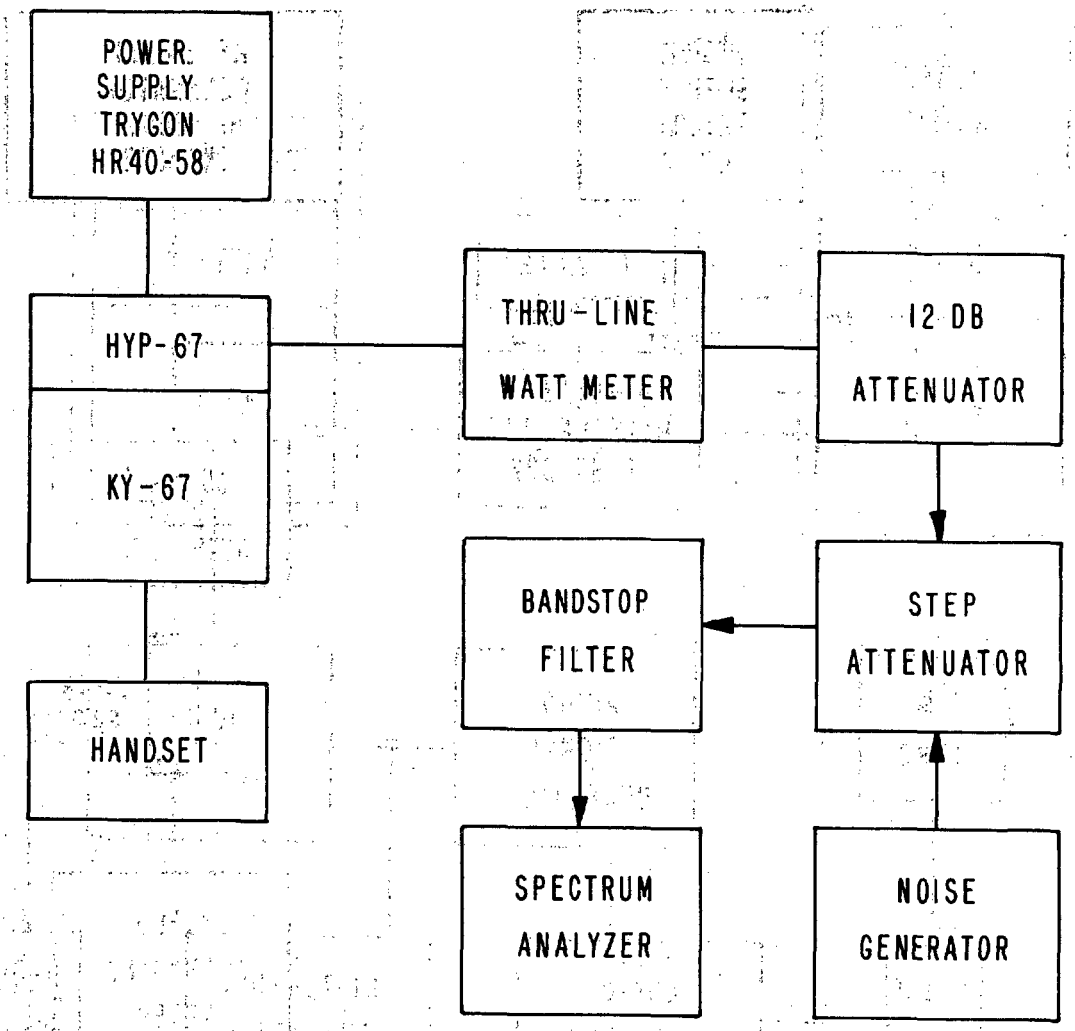


FIGURE 14. NOISE FLOOR TEST

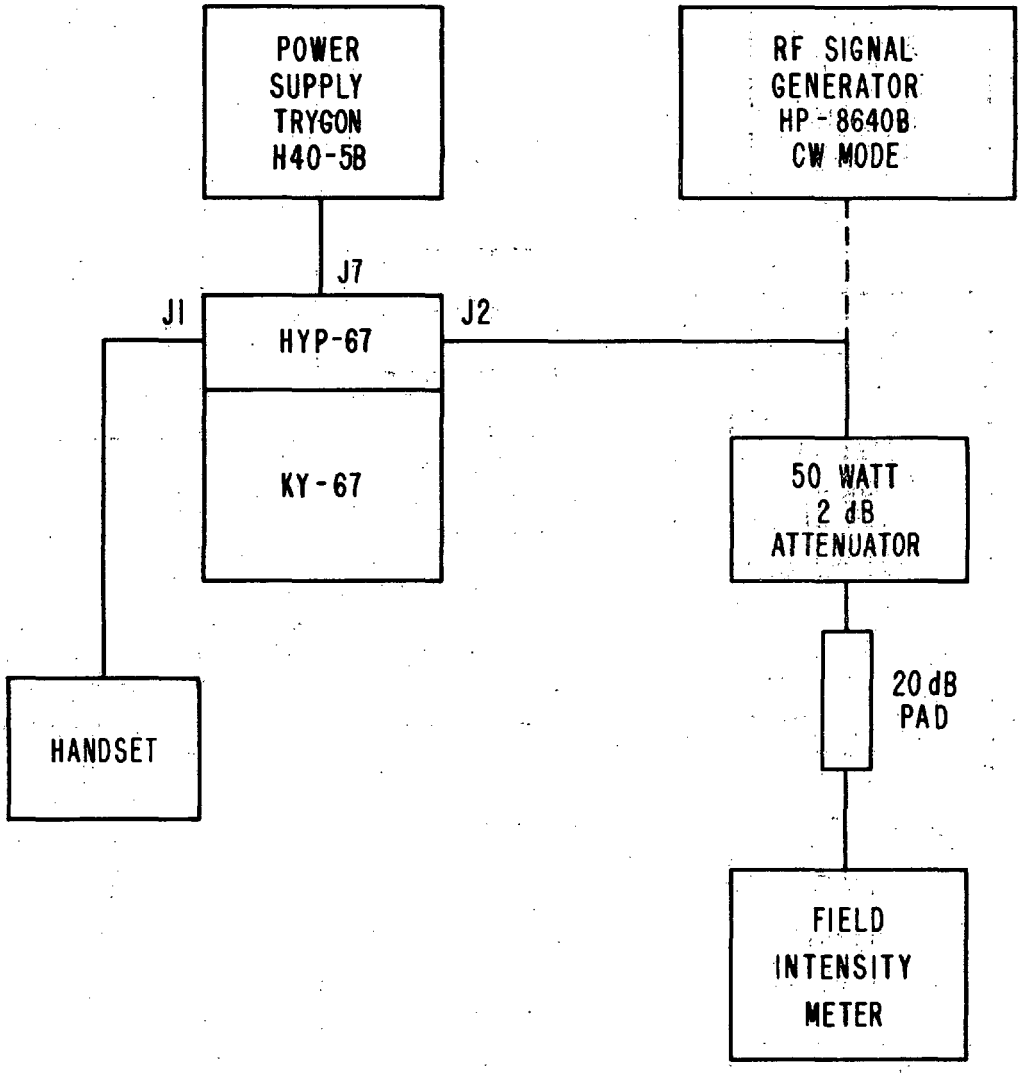


FIGURE 15. HARMONIC OUTPUT TEST