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PERFORMANCE SPECIFICATION
RADIO SET, AN/PRC-70( ) and (UNITS OF)

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

1. SCOPE

1.1 Scope. This performance specification covers the Radio Set, AN/PRC-70 and units of the set.

2. APPLICABLE DOCUMENTS

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

2.2 Government documents.

2.2.1 Specifications, standards and handbooks. The following specifications, standards and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2). Handbooks are for guidance only and therefore are not mandatory.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: HQ, USA Communications-Electronics Command, ATTN: AMSEL-LC-LEO-E-EP, Fort Monmouth, NJ 07703 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 5820

HANDBOOKS

DEPARTMENT OF DEFENSE

MIL-HDBK-454	- Standard General Requirements for Electronic Equipment.
MIL-HDBK-781	- Reliability Testing for Engineering Development, Qualification & Production.

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

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

DRAWINGS

USA CECOM

DL-SM-B-745600	- AN/PRC-70 Radio Set
DL-SM-B-745601	- Receiver Transmitter RT-1133/PRC-70

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

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/ASQC Z 1.4	- Sampling Procedure and Tables for Inspection

(Application for copies should be addressed to the American National Standards Institute, Inc. 1430 Broadway, New York, NY, 10018).

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this

document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order the contractor shall furnish first article units in accordance with 4.2.

3.2 Materials. The contractor shall select materials that are fully capable of meeting all of the operational and environmental requirements specified herein. The materials specified in the applicable drawings are recommended, but are not mandatory. Selection criteria of the class, grade or type part shall be that the material will be able to perform its intended function when it is assembled. Verification of the supplier meeting the overall performance requirements shall be the governing acceptance standard. Recovered materials shall be used to the maximum extent possible.

3.3 Design. The Receiver-Transmitter RT-1133( ), PRC-70, hereafter referred to as the "Radio Set" shall meet the requirements as specified herein.

3.3.1 Weight. The total weight of the Radio Set shall not exceed 21 pounds when weighed with a scale having an accuracy of 1% or better.

3.3.2 Dimensions. The Radio Set shall meet the dimensions and dimensional tolerances of DL-SM-B-745600 nd DL-SM-B-745601 to ensure proper physical interface with previously existing hardware.

3.4 Mechanical. The Radio Set enclosure and front panel controls shall possess the following physical characteristics:

3.4.1 Finish. The Radio Set finish shall be able to withstand chipping, cracking or peeling and shall protect against corrosion when subjected to the environmental requirements herein.

3.4.2

3.4.2.1 Air seal. When tested in accordance with 4.535, a vacuum of 1.0 psig is applied to the inside of the case.

3.4.3 Front panel. All rotary switches and controls shall be located on the front panel and shall be readily accessible and resistant to physical damage when in use.

3.4.3.1 Controls. All rotating switch controls shall withstand a force of ten (10) inch-pounds in each direction without permanent deformation to the end stops. The volume control shall withstand a force of three (3) inch-pounds in each direction without permanent deformation to the end stops.

3.5 Performance characteristics.

3.5.1 Sensitivity (Receiver). The receiver shall meet the following sensitivity requirements on any frequency within the specified ranges. All sensitivity measurements shall be made at an audio output power of ten (10) milliwatts and the signal generator shall be connected to the 50-ohm BNC connector on the front panel. Service condition limits shall apply to all tests performed in receive only mode.

3.5.1.1 FM. The signal-plus-noise-plus-distortion to noise-plus-distortion ratio shall be at least 10 dB when an RF signal of 0.6 microvolt, modulated with 1000 Hz, ± 8 KHz, deviation is applied to the receiver on any frequency in the 30.0000 to 75.9999 MHz range. At temperatures greater than 100^{o} F and below 0^{o} F, the signal-plus-noise-plus-distortion to noise-plus-distortion ratio shall be at least 10 dB when an RF signal of 0.8 microvolts modulated as above is applied to the receiver in the 30.0000 to 75.9999 MHz range.*

3.5.1.2 SSB, FSK and CW. The signal-plus-noise-plus-distortion to noise-plus-distortion 0 ratio shall be at least 10 dB when an RF signal of 0.45 microvolts in the 2.0000 to 75.9999 MHz range is applied to the receiver. At ambient temperatures greater than 100° F and below 0°F, the signal-plus-noise-plus-distortion to noise-plus-distortion ratio shall be at least 10dB with an RF signal of 0.5uv applied to the receiver over the entire frequency range. In all cases, the frequency of the RF signal shall be such that the recovered audio is 1000 Hz.*

3.5.1.3 AM. The signal-plus-noise-plus-distortion to noise-plus-distortion ratio shall be at least 10 dB when an RF signal of 2.5 microvolts in the 2.000 to 19.9999 MHz range and 1.95 microvolts in the 20.000 to 75.9999 MHz range is applied to the receiver. At temperatures greater than 100° F and below 0° F, the signal-plus-noise-plus-distortion to noise-plus-distortion ratio shall be at least 10 dB when an RF signal of 2.5 microvolts is applied to the receiver over the entire frequency range. The RF signal in all cases shall be 30 percent modulated by a 1000 Hz tone. If necessary, at temperatures above 100° F and below 0° F, the percent of modulation may be increased up to a maximum of 80% to obtain the necessary audio output level to attain these measured service condition limits.

*NOTE: Service condition limits.

3.5.2 IF selectivity (Receiver). The bandwidth in the respective modes of operation shall be as follows:

a. FM

Bandwidth 6 dB points	32 KHz minimum
Bandwidth 60 dB points	70 KHz maximum

Within a 50 KHz range beyond the 60 point on both sides of the response curve, there shall be no returns above the 60 dB response. Ultimate attenuation is 70 dB minimum. Once the

70 dB point is reached, there shall be no returns above 70 dB.

b. SSB, CW and FSK

Bandwidth 6 dB points	2.8 KHz minimum
Bandwidth 26 dB points	4.0 KHz maximum
Bandwidth 60 dB points	6.0 KHz maximum

c. AM

Bandwidth 6 dB points	6 KHz minimum
Bandwidth 60 dB points	14 KHz maximum

3.5.3 Automatic gain control (receiver). The automatic gain control (AGC) shall maintain the audio output to within 0 dB to +6 dB when the signal to the receiver is reduced from 100 microvolts to the referenced sensitivity level (see 3.5.1). The AGC shall not change more than 3 dB when the signal to the receiver is increased from 100 microvolts to 0.150 volt. The AGC attack time shall be 20 milliseconds -10, +15 milliseconds. The discharge time constants shall be 1.5 seconds, ± 0.5 seconds for SSB operation and 0.75 seconds, ± 0.25 seconds for AM, FSK and CW operation.

3.5.4 Squelch control (receiver). The squelch control shall operate with a received signal producing a 4 dB to 10 dB signal-plus-noise to noise ratio at the audio output of the receiver. The attack time for AM, SSB and FM operation shall be no more than 110 milliseconds and the decay time shall be 800 milliseconds minimum and 3000 milliseconds maximum.

3.5.5 Audio output power (Receiver). The receiver shall deliver a minimum of 10 milliwatts of audio power at 1000 Hz into a 500 ohm ±20 percent resistive load for a received signal-plus-noise to noise ratio of 10 dB or better in all modes of operation (see 4.5.5).

3.5.6 Audio distortion (Receiver). The total harmonic distortion of the receiver with 10 milliwatts output in the SSB and AM modes shall not exceed 5 percent at any audio frequency between 500 to 3000 Hz for RF signals up to 0.150 volt. Between 0.151 and 0.200 volts the distortion shall not exceed 10 percent in the SSB mode. In the FM mode, the total harmonic distortion of the receiver shall not exceed 7 percent when receiving signals deviated ±8 KHz and 15 percent when receiving signals deviated ±12 for KHz for RF signals up to 0.3 volt (see 4.5.6).

3.5.7 Audio frequency response (Receiver). The audio frequency response of the receiver from antenna input to audio output shall be as follows:

500 to 3000Hz	Peak to valley ratio less than or equal to 4 dB
300 Hz	At least 6 dB below 1000 Hz reference
250 HZ	At least 10 dB below 1000 Hz reference

3.5.8 Wideband audio frequency response (Receiver). The audio response of the receiver from the antenna input to audio output terminating in the security connector shall be 3 dB maximum variation (from Maximum to Minimum audio output) over 10 Hz to 5 KHz. The attenuation shall be less than 3.5 dB at 8 KHz, less than 5 dB at 10 KHz and less than 8.5 dB at 13 KHz. The attenuation shall be no more than 20 dB at 21 KHz. The output level shall be one (1) volt peak to peak minimum with a source impedance of 100 ohms maximum and a load impedance of 50 K ohms in parallel with 1000 pf (see 4.5.8).

3.5.9 Spurious response (Receiver). Receiver spurious response shall be at least 80 dB down from the signal levels (with the exception of five allowable in the 60 dB to 70 dB range and five allowable in the 70 dB to 80 dB range) which are required to produce one 10 dB signal-plus-noise-to-noise-plus-distortion to noise-plus-distortion ratio in the respective modes of operation in the desired channel.

3.5.9.1 Internally generated spurious responses (Receiver). The level of internally generated spurious responses shall not cause the receiver AGC voltage to be less then the value obtained with an equivalent RF input of 0.25 uV, except as follows: When measured in the SSB mode, 0.6% of the channels may have an internally generated spurious response equivalent to a signal level between 0.25 uV (-119 dBm) and 1.0 uV (-107 dBm); 0.1% of the channels may have an internally generated spurious response equivalent to a signal input between 1 uV (-107 dBm) and 4 uV (-95 dBm); and five channels may have an internally generated spurious response equivalent to a signal level between 4 uV (-95 dBm) and 10 uV (-87 dBmW). If the internal spurious responses occur at two or three adjacent 1khz settings, this group of two or three responses shall be counted as one spurious response (see 4.5.9).

3.5.10 Intermodulation (Receiver). Third order intermodulation products shall be down at least 60 dB from either of two equal amplitude RF signals of 1 mV each. In addition, the requirements of 4.5.10 shall apply for all other intermodulation products.

3.5.11 Cross modulation (Receiver). With the receiver operating in the AM mode, an interfering signal, which is modulated 30 percent with a 400 Hz tone, shall not produce more than 10 percent cross modulation on a 4 microvolt desired carrier under the following conditions (see fig.1).

Frequency separation between desired and undesired signals	Level of undesired signals
0.5% (but not less than 20 KHz)	7.0 millivolts
See 4.5.11	0.1 volt
1.0 MHz	0.7 volt

3.5.12 Desensitization (Receiver). The signal plus-noise-distortion to noise-plus-distortion ratio, produced by a 5 uV signal in the 2.0000 to 19.9999 MHz tuning range and a 3.75 uV signal in the 20.0000 to 75.9999 MHz range, shall not be degraded to less than 20 dB by an interfering carrier signal of 50 millivolts which is removed as shown in fig.2 from the desired frequency.

3.5.13 Power Output (Transmitter).

3.5.13.1 High power mode. The RF power delivered to a 50 ohm load connected to the appropriate output terminals shall be as follows:

FM	30 watts average (30.0000 to 75.9999 MHz)
CW	30 watts average
FSK	30 watts average
SSB	30 watts PEP
AM	30 watts PEP

The above values shall be maintained within +2dB and -1.5dB over the complete tuning range of the transmitter; except at 75.9999 where the value shall be maintained within ±2dB. Over the ambient temperature range -50 degrees F to + 160 degrees F (including the effect of unload) and over an input voltage range of 20 to 32 volts DC, the transmitter power variation shall not exceed +2.0 dB, -3.0 dB. For continuous key-down operation in excess of 3 minutes but less than 10 minutes under the same conditions, the output power shall be within 2 dB of the nominal value. For continuous key down operation in excess of 10 minutes, under the same conditions, the output power may be considerably less than the nominal value, however, no permanent degradation in performance shall result (see 4.6.3).

3.5.13.2 Low power mode. On low power, the output of the transmitter shall be 3 Watts + 2dB, -2.5dB below the high power output in all modes.

3.5.14 FM deviation. When operating in the FM mode, the deviation level of the carrier shall be between ±11 KHz and ±12 KHz with levels corresponding to normal speech into the handset H-250 ( )/GR. The 150 Hz, ±2 Hz tone oscillator shall frequency modulate the transmitter in the FM mode to a deviation of 3KHz, ± 0.5 KHz (see 4.5.14).

3.5.15 Burst transmission modes. The delay between initial keying at the transmitter input and producing 90 percent full power output shall be less than 30 milliseconds. The transmitter shall remain in the transmit mode during pauses in code transmission for a period of 1.2 seconds, ± 0.2 seconds. During transmission at rates up to 300 words per minute, the rise time of the keyed envelope (10% to 80%) shall be 200 microseconds or less. The fall time (100 to 20%) shall be 175 microseconds or less (see 4.5.15).

3.5.15.1 Frequency shift keying. The mark signal shall be 1575 Hz, ± 25 Hz and the space signal shall be 2425 Hz, ± 25 Hz.

3.5.15.2 CW keying. The CW signal shall be 2000 Hz, ± 25 Hz.

3.5.16 Transmitter spurious. The level of antenna radiated or antenna terminal conducted emissions, other than the desired output frequencies at high or low power when loaded into one of the antennas or into a 50 ohm resistive load, shall conform to the following (see 4.5.16):

3.5.16.1 Suppressed carrier (SSB, CW and FSK). Suppressed carrier shall be at least 45 dB below the PEP.

3.5.16.2 Lower sidebands. Lower sidebands shall be at least 50 dB below the PEP.

3.5.16.3 Intermodulation Distortion Products (IDP). IDP shall be at least 25 dB below the two equal amplitude tones modulating the transmitter to the rated PEP in the 2 to 29.9999 MHz range. The IDP shall be 20 dB below the two equal amplitude tones in the 30.0 to 75.9999 frequency range. When tested in accordance with paragraph 4.5.16, 10% of all IDP data points (3rd and 5th order both high and low products over the 2 to 75.9999 MHz range) can be up to 3 dB above the specified minimum IDP suppression level and 1% of all data points (3rd and 5th order, high and low products 2 to 76 MHz range) can be up to 5 dB above the specified IDP suppression level.

3.5.16.4 Harmonics. The level of harmonics and all other spurious outputs other than those described above shall be in accordance with 3.7.

3.5.17 Hum and noise. The hum and noise level shall be measured for the inputs and frequencies of 4.5.16. Hum, ripple and other extraneous noise shall be at least 40 dB below the output level of either of two equal amplitude tones modulating the transmitter to rated PEP power for high or low power operation (see 4.5.17).

3.5.18 Transmitter audio frequency response. The audio frequency response shall be within 4 dB peak-to-valley from 500 Hz to 3000 Hz in all modes of operation. The response at 250 Hz shall be down at least 10 dB from a 1.0 KHz reference and the response at 300 Hz shall be down at least 6 dB from a 1.0 KHz reference (see paragraph 4.5.18).

3.5.19 Overall wideband response. The overall wideband performance from the transmitter input, terminating in the security connector to the audio output of an AN/PRC-70 receiver, shall exhibit no more than one error in 10^5 bits at a 16 KBIT rate with a receiver input set to 15 dB above the minimum (10dB) SINAD value (see 4.5.19).

3.5.20 Transmitter distortion. The distortion shall be 7% maximum in the FM mode (see 4.5.20).

3.5.21 Audio processing. The gain compression shall be such that when the audio input is increased 20 dB above the nominal level (-52 dBm) the input to the respective modulation circuits shall not increase more than 3 dB (see 4.5.21).

3.5.22 Sidetone. The transmit audio sidetone level shall be within the range of 4 to 11 dB below the normal receive levels for voice modes and 0 to 7 dB below receive levels for the FSK and CW modes.

3.5.23 Overall frequency tolerance. The overall frequency tolerance for the Radio Set shall be less than ± 1.66 ppm/yr. Overall tolerance is defined to include the combined effects of initial

calibration error, stability versus service conditions and aging. The initial calibration error (frequency error measured at time of Group A acceptance) shall be less than ± 0.3 ppm referenced to the TCXO offset frequency at 30° C (see 4.5.23). (Radio must be temperature stabilized before "A" test can be run).

3.5.24 Frequency stability.

3.5.24.1 Long term stability. The frequency drift due to aging of the reference 4.5 MHz frequency standard shall not exceed 0.6 ppm per year when tested in accordance with 4.5.24.

3.5.24.1.1 Aging preconditioning requirement. This requirement is a prerequisite for paragraph 3.5.24.1.2 and shall measure the absolute frequency error after a full 24 hour soak in accordance with 4.5.24.1. The frequency shall be within ± 1.0 ppm of the dial frequency after the 24 hour interval.

3.5.24.1.2 Aging, long term aging. A prerequisite for this check shall be the successful completion of 3.5.24.1.1. When tested in accordance with 4.5.24.2, the frequency drift due to aging of the TCXO shall be less than ±0.3 ppm at any time during the 30 day period of the test.

3.5.24.2 Stability vs service conditions. The frequency of the Radio Set (3 minute transmit and 27 minute receive) shall remain within ± 1.0 ppm of the dial frequency when subjected to the combined effects of temperature, humidity and voltage variation. Tests such as humidity, which are performed at elevated temperature over prolonged periods of time, shall also consider the effects of TCXO aging to determine compliance with this requirement (the aging effect for the 20 day humidity requirement shall be less than or equal to ± 0.2 ppm). This requirement shall also be met when the Radio Set is operated in a continuous 24 hour key down condition at rated power output at ambient temperatures up to 160° F when a means of external forced air cooling is applied to the heat sink (see 4.5.24.3).

3.5.24.3 Warm-up. The frequency accuracy of 3.5.23 shall be met within five seconds after the radio set has been turned on over the entire operating temperature range of the radio set (see 4.5.24.4).

3.5.25 Phase and frequency jitter. The difference of the phase averaged over a 10 millisecond or a 13.33 millisecond period to the phase averaged over the successive 10 millisecond or 13.33 millisecond period shall not exceed five degrees when measured between the signal input and output terminals of the transmitter or receiver. Phase and frequency variation produced during bounce shall not degrade the maximum signal-plus-noise-plus-distortion to noise-plus-distortion ratio of either the receiver of transmitter by more than 1dB (see 4.5.25).

3.5.26 Input power. The input power to the receiver shall not exceed 7 watts in any mode of operation. In the high power transmit mode, the maximum input power requirements shall be:

Mode	2-7.999 MHz	8-9.999 MHz	10-76 MHz

FSK & CW (Continuous Key Down)	165W	165W	160W
FM & AM (Single Tone Modulation)	165W	165W	160w
SSB (Two Tone Modulation)	127W	120W	115W

In the low power transmit mode the input power shall not exceed 50 watts in any mode (see 4.5.26).

3.5.27 Input voltage. For input voltages in the range of 20 to 32 VDC, the Radio Set shall meet the following requirements (see 4.5.27):

Paragraph	Measurement	Performance
3.5.1	Sensitivity	Full specification performance
3.5.10	Intermodulation	Full specification performance
3.5.13	Transmitter power output	As specified in 3.5.13
3.5.16.3	Transmitter intermodulation	As specified in 3.5.16.
3.5.24.2	Stability vs service conditions	Full specification performance

3.5.28 Retransmission operation. Two (2) separate Radio Sets shall operate satisfactorily when they are interconnected using a retransmission cable kit, MK-456/GRC and tested as above. The overall distortion, as measured at the end of the link radio, shall be 8% maximum. The receiver, in the retransmission configuration only, shall remain unsquelched for 3.5 seconds maximum following receipt of a signal when in the SSB mode.

3.5.29 Antenna matching network. The antenna matching network shall match the transmitter output stage and receiver input stage to the following antennas, in the indicated frequency ranges, such that the VSWR between these stages and the matching network is 1.5 to 1 or less.

Antenna	Frequency range
AS-2974/PRC-70	
6 ft whip	4-76 MHz
9 ft whip	3-76 MHz
AS-2975/PRC-70	2-30 MHz

The maximum time required to tune shall be 10 seconds, except for the AS-2974 in the 3 Mhz and 4 MHz range the maximum tune time shall be 18 seconds. During tuning, an audio tone shall be present in the handset or headset which automatically turns off at the end of the tuning cycle. A low duty cycle tone shall be superimposed on the sidetone audio to alert the operator that the RT unit should be retuned. This tone shall be enabled before the VSWR

detected between the power amplifier and coupler stagers exceeds 5.5 to 1 and inhibited when the VSWR remains less than 2.5 to 1 (see 4.5.29).

3.5.30 Operational inspection. Perform the operational test specified in 4.5.30 in order to ascertain that the Radio Set is completely operable prior to preparation for delivery.

3.5.31 Interchangeability. Like units of radio sets, assemblies, subassemblies, modules and replaceable components shall be mechanically and electrically interchangeable without modification of such items or the radio set as determined by the tests in 4.5.31 for mechanical and electrical interchangeability (4.5.31.1 and 4.5.31.2). Exception is made to electrical retuning and realignment of modules during production assembly operations. Such retuning may be expected as part of the assembly procedure and is permissible.

3.5.32 Electromagnetic interference. The radio set shall comply with the EMI requirements set forth in Appendix A.

3.5.33 Visual and mechanical. The radio set shall be free of any physical and mechanical defects that can be detected either visually or by the operation of the equipment. Inspect per 4.5.33.

3.5.34 Reliability. The radio set shall have a specified Mean Time Between Failure (MTBF) of no less than 1880 hours. Reliability testing as specified per 4.5.34 shall be conducted to determine compliance with this requirement.

3.5.35 Burn-in. Every radio set shall be subjected to a forty-eight (48) hour burn-in period. The last twenty-four hours of burn-in shall be failure free. The duty cycle shall be 1 minute transmit and 9 minutes receive. The Radio Set shall be exercised and monitored in the same manner as during reliability testing. The failures shall be recorded and analyzed but shall not be considered relevant for computation of the equipment MTBF.

3.6 Environmental conditions.

3.6.1 Low temperature. The Radio Set shall not be damaged or be degraded in its performance when subjected to temperatures as low as -70°F for storage and -50°F for operation (see 4.6.1).

3.6.2 Temperature shock. The Radio Set shall not be damaged or be degraded in its performance when subjected to temperature fluctuations of between -70°F to + 160°F for storage and -50°F to +125°F for operation (see 4.6.2).

3.6.3 High temperature. The Radio Set shall not be damaged or suffer degradation of performance when subjected to high temperatures of +160°F for storage and +125°F for operation (see 4.6.3).

3.6.4 Humidity. The Radio set on its vehicuar mounting shall not be damaged or suffer any degradation of performance when subjected to relative humidity of 90% during storage, transportation or operational conditions (see 4.6.4).

3.6.5 Bounce, vehicular. The Radio Set shall not be damaged nor shall it suffer any degradation of performance during and after vibration resulting from the interaction of truck vehicle suspension and structures with road and surface discontinuities (see 4.6.5).

3.6.6 Bounce (vehicular) shock. The Radio Set shall not be damaged nor shall the equipment suffer any degradation of performance during and after shock resulting from being transported by truck or rail car (see 4.6.6).

3.6.7 Bench-handling shock. The Radio Set shall not be damaged nor shall the set suffer any degradation of performance when subjected to the shocks to be encountered during normal bench handling during repair, maintenance and the servicing of the set (see 4.6.7).

3.6.8 Altitude. The Radio Set shall not be damaged or suffer any degradation of performance when transported via aircraft at altitudes of 40,000 feet (non-operating) or 0,000 feet (operating) (see 4.6.8).

3.6.9 Dust. The Radio Set shall not be damaged or suffer any degradation of performance when subjected to dust particles or sand contamination in the atmosphere (see 4.6.9).

3.6.10 Leakage (immersion). The Radio Set shall not be damaged or suffer any degradation of performance when immersed in fresh water at a depth of 3 feet for 30 minutes (see 4.6.10).

3.6.11 Salt fog. The Radio Set shall not be damaged or suffer any degradation of performance when subjected to a salt fog atmosphere for 3 hours (see 4.6.11).

3.6.12 Fungus. The Radio Set shall not be damaged or suffer any degradation of performance when subjected to exposed to fungus spores over a 28 day period (see 4.6.12).

3.7 Systems safety engineering.

3.7.1 Personnel hazards. Personnel hazards shall be kept to a minimum and shall follow the requirements delineated herein.

3.7.2 Edge rounding exposed. Exposed edges shall be rounded to a minimum radius of 0.04 inch (1mm), and exposed corners to a minimum of 0.5 inch (13 mm).

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

3.8 Marking.

3.8.1 General. MIL-HDBK-454 may be used as guidance for marking the identifying part number and control labels on the radio(s).

3.8.2 Visibility. Wherever practicable, parts shall be so mounted that their identification marking will be readily visible with a minimum of equipment disassembly.

3.8.3 Serial numbers. Completed assemblies of the receiver-transmitter shall be serial numbered in accordance with the contract.

3.9 Workmanship. All electronic parts, components, assemblies or sub-assemblies shall be free of smudges, excess solder, metal chips or the existence of any foreign material on any surface. Bearing assemblies shall be free from rust, dirt or tool marks. Wires and integrated circuitry shall be protected from contact with rough or irregular surfaces and be shielded from shorting.

4. VERIFICATION

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

a. First Article inspection (see 4.2)

(1) Inspections covered by subsidiary documents (see 4.3)

b. Conformance inspection (see 4.4)

4.2 First article. First article inspection shall be performed on a specified number per the contract when a first article inspection is required. This inspection is required. This inspection shall include the inspections specified in subsidiary documents (see 4.3), preconditioning, and Groups A, B, C and D (see Tables II, III, IV, and V, respectively). Inspections shall follow this same sequential order starting with 4.4. Conforming units completing Group C inspection shall be required to pass Group A inspection prior to delivery acceptance.

4.2.1 First article units. The contractor shall furnish the quantity of first article units of the Radio Set AN/PRC-70 specified in the contract or purchase order (see 6.3).

4.2.2 First article inspection. The first article inspection shall consist of the inspections specified in subsidiary documents covering the items listed in 4.3, preconditioning, and the inspections specified for Group A, Group B, Group C and Group D (see Tables II, III, IV, and

V, respectively). Group C tests as specified in Table I furnish the necessary sequence of group C (environment) tests on the 4 first article units.

TABLE I. First article inspection.

Inspection (see Note)	Unit 1	Unit 2	Unit 3	Unit 4
Elevation	1			
Dust		2		
Salt fog		4		
Fungus	4			
Humidity Orientation		1		3
Shock; drop	2			
Shock; bench-handling				1
Low temperature			1	
Temperature creep			2	
High temperature			3	
Bounce; vehicular				2
Bounce; loose cargo		3		
Leakage	3			

NOTE: Other Group C inspection shall be performed on all units and may be performed in any order.

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

4.3 Inspection 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
Mechanical	3.4.1
Marking	3.8

4.4 Conformance inspection. The contractor shall perform the inspections specified in 4.3 and 4.4.1 through 4.4.5. 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 ensure

compliance with all specifications requirements. Unless otherwise specified, standard test conditions shall apply as follows:

Temperature:	23°C ± 10°C (73°F ± 18°F)
Relative humidity:	50 percent ± 30 percent
Atmospheric pressure:	725 + 50 -70mm Hg (28.5 + 2.0 -3.0 Hg)
Vibration:	None
Input voltage:	24 ± 0.3 Vdc
Duty cycle:	One minute transmit + nine minutes receive

4.4.1 Group A inspection. Each unit on contract or purchase order shall be inspected for conformance to the inspections specified in Table II. Discrete lots shall be formed from units that pass this inspection. Each lot shall be subjected to sampling inspection. Sampling shall be as specified by the acquisition activity in accordance with ANSI/ASQC Z 14. Lots in which samples exhibit any failures shall be screened for that failure prior to being subjected to Group B inspection.

TABLE II. Group A inspection.

Inspection	Requirement paragraph	Verification paragraph
Visual and mechanical Receiver-Transmitter, RT-1133( )/PRC-70 (1A1) modules:	3.9	4.5.33
Frequency Selector (1A1A1)		
PWR & TR Relay Assy (1A1A2)		
455 kHz IF Gain Assy (1A1A3)		
P.S., 10V Regulator (1A1A4)		
P.S., 5V Regulator (1A1A5)		
Translator (1A1A6)		
Upper Loop Divider (1A1A7)		
Upper Loop Phase Detector (1A1A8)		
Lower Loop Assy (1A1A9)		
Oscillator Distributor (1A1A10) Oscillator Digital Divider (1A1A11)		
Transmit Broadband Assy (1A1A12)		

TABLE II. Group A inspection - Continued.

Inspection	Requirement paragraph	Verification paragraph
Up Converter (1A1A13)		
First IF Selectivity Assy (1A1A14)		
First IF AGC and Gain Assy (1A1A15)		
Second Mixer (1A1A16)		

Second IF Assy (1A1A17)		
Pump VFO Assy (1A1A18)		
IF Selectivity Assy (1A1A19)		
DC Control Assy (1A1A20)		
Modulator Squelch Assy (1A1A21)		
455 kHz IF Detector (1A1A22)		
Audio Module Assy (1A1A23)		
Coupler Assy (1A1A24)		
ALC Assy (1A1A25)		
Bandswitch Assy (1A1A26)		
Detector Assy (1A1A27)		
Harmonic /filter Assy (1A1A28)		
Driver & Power Amplifier Assy (1A1A29)		
Case Assy (1A1A30)		
Rec/Exc Interconnection Board (1A1A31)		
Coupler Interconnection Board (1A1A32)		
Quad Assy (1A1A33)		
Bandpass Filter (1A1FL1)		
Antenna, AS-2975 ( ) /PRC-70 (1A2)		
Antenna, AS-2974 ( ) /PRC-70 (1A3)		
Carrying Bag		
RT-1133 with case		
Air Seal	3.4.2.1	4.5.35
Electrical		
Sensitivity	3.5.1 et al	4.5.1
Audio power output	3.5.5	4.5.5
Audio Distortion	3.5.6	4.5.6
Audio frequency response Wideband audio frequency response Transmitter power output	3.5.7 3.5.8 3.5.13	4.5.7 4.5.8 4.5.13
FM deviation	3.5.14	4.5.14
Sidetone	3.5.22	4.5.22
Overall frequency tolerance	3.5.23	4.5.23
Input power	3.5.26	4.5.26
Antenna matching	3.5.29	4.5.29
Operational	3.5.30	4.5.30

4.4.2 Group B inspection. Group B inspection shall be performed on inspection lots that have passed Group A inspection. This inspection shall conform to Table III and each lot shall be subjected to sampling inspection. Sampling and sample size shall be per ANSI/ASQC Z 1.4. Electrical and mechanical interchangeability tests may be performed at any convenient point in the Group A and B inspection processes, provided the following prerequisites are satisfied:

a. All interchangeability tests must be completed prior to Group C tests.

b. Electrical interchangeability tests require the RT units selected for test to have

completed the RT alignment process.

c. In the event that electrical interchangeability tests are performed on an RT unit prior to Group A acceptance of that unit; a Group A failure will require that the RT unit be retested for electrical interchangeability.

d. Once a unit has been submitted for mechanical interchangeability tests, the configuration of that unit must be preserved throughout the remaining inspection and acceptance process. In the event that modules or chassis must be replaced/repaired on units having passed interchangeability test, a limited retest of affected areas must be performed.

TABLE III. Group B inspection.

Inspection	Requirement paragraph	Verification paragraph
Overall frequency tolerance	3.5.23	4.5.23
IF selectivity (Receiver)	3.5.2	4.5.2
Transmitter audio frequency response	3.5.18	4.5.18
Overall wideband audio frequency response	3.5.19	4.5.19
Transmitter distortion	3.5.20	4.5.20
Burst transmission	3.5.15	4.5.15
Automatic gain control (Receiver)	3.5.3	4.5.3
Audio processing	3.5.21	4.5.21
Phase and frequency jitter	3.5.25	4.5.25
Leakage	3.6.10	4.6.10
Squelch	3.5.4	4.5.4
Interchangeability Mechanical Electrical	 3.5.31 3.5.31	 4.5.31.1 4.5.31.2

4.4.2.1 Order of inspection within Group B. Group B inspection shall be performed in any order which is acceptable to the Government, except that the leakage test shall be last.

4.4.3 Group C inspection. Group C inspection may be performed on units that have passed Group A and Group B inspection less interchangeability and leakage testing. The inspection shall consist of the inspections specified in Table IV. Sampling and sample size shall be per ANSI/ASQC Z 1.4.

4.4.3.1 Order of inspection within Group C. Group C inspection shall be performed in an order which is satisfactory to the government.

TABLE IV. Group C inspection.

Inspection	Requirement	Verification

	paragraph	paragraph
Subgroup 1		
Altitude	3.6.8	4.6.8
Dust	3.6.9	4.6.9
Salt fog	3.6.11	4.6.11
Fungus	3.6.12	4.6.12
Subgroup 2		
Bench-handling shock	3.6.7	4.6.7
Bounce; vehicular	3.6.5	4.6.5
Subgroup 3		
Low temperature	3.6.1	4.6.1
High temperature	3.6.2	4.6.2
Bounce	3.6.6	4.6.6
Subgroup 4		
Control stop	3.4.3.1	4.5.36
Cross modulation	3.5.11	4.5.11
Desensitization	3.5.12	4.5.12
Hum and noise	3.5.17	4.5.17
Input voltage	3.5.27	4.5.27
Retransmission	3.5.28	4.5.28
Weight	3.3.1	4.5.37
Input power	3.5.26	4.5.26
Subgroup 5		
Spurious response	3.5.9	4.5.9
Intermodulation	3.5.10	4.5.10
Transmitter spurious	3.5.16	4.5.16
Electromagnetic interference	3.5.32	4.5.32
Subgroup 6		
Long term stability	3.5.24.1	4.5.24
Humidity	3.6.4	4.6.4
Temperature Creep	3.6.2	4.6.2

NOTE 1: The radio set shall be thoroughly washed, cleaned, dried and refurbished after this inspection before proceeding with subsequent inspections.

NOTE 2: The radio set shall be subjected to and pass the leakage test of 4.6.10.

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

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

4.4.5 Group D inspection. Group D inspection shall be performed on the first, second and third production lots. Subsequent Group D inspection shall be performed on every third production lot. One final Group D inspection shall be performed on a sample from the last 50 units produced, if the number of production units produced since the most recent production lot that was subjected to Group D inspection exceeds 49. A production lot is defined as one month's production or 50 units, whichever is greater. The Group D inspection shall consist of the test specified in Table V and may be performed on units from burned-in lots which have passed Group A inspection, less air seal and operational testing. Test conditions, methods and procedures shall be in accordance with paragraph 4.5.34. Individual units which have been subjected to potentially damaging environmental tests will not be selected for reliability testing.

TABLE V. Group D inspection.

Inspection	Requirement paragraph	Verification paragraph
Reliability	3.5.34	4.5.34

4.4.5.1 Sampling for Group D inspection. Use sampling size per ANSI/ASQC Z 1.4

4.4.5.2 Noncompliance. In case of a Group D failure occurrence, procedures and requirements specified in the contract shall be followed.

4.4.5.3 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 Electrical inspections.

NOTE: Test frequency deviations of ± 25 KHz are allowable if any spurious responses interfere with the measurements.

4.5.1 Sensitivity test. With the equipment set up as in fig 3 and the appropriate inputs applied (see 3.5.1), the signal-plus-noise-plus-distortion to noise-plus-distortion ratio shall be measured for the frequencies and modes listed below. The test shall be performed with the radio in the low power mode. The radio shall be tuned at each new frequency prior to taking measurements. The requirement of 3.5.1 shall be met.

MODE	FREQUENCY (MHz)
AM, SSB	2.0160
SSB	2.9071, 3.0201, 3.9811, 4.0321, 9.9631, 10.0531, 13.9581, 14.1542, 19.8543, 20.2544, 29.7545

FM, SSB	30.3546, 38.4947, 40.5948, 57.6949, 61.0959

The following frequencies shall be tested also in the receive only mode:

AM, SSB	2.0160
FM, SSB	30.3546, 38.4947, 40.5948, 57.6949, 61.0959

4.5.2 IF selectivity test. Set the receiver to the SSB mode at 36.000 MHz. Set the AGC switch to "OFF". Apply a 500 microvolt, 36.0010 MHz signal to the RF input and measure the IF input level at P1 of the Receiver IF and detector module. With this as the dB reference, increase and decrease the frequency about 36.0010 MHz to determine the 6 dB points. Repeat to determine the 26 dB and 60 dB points. Similarly, the bandwidths and flyback requirements in the FM mode and the bandwidths in the AM mode shall be measured (see 3.5.2).

4.5.3 Automatic gain control test. Set the receiver in the SSB mode at 29.7545 MHz and apply a 100 microvolt RF signal that produces a 1 KHz ±50 Hz audio output tone. Adjust the volume control for a 5 milliwatt audio output. Reduce the RF input to the sensitivity level (0.375 microvolts) and measure the audio output and the reference AGC voltage (AGC disable "B" on the receiver IF and detector module). Increase the RF input to 150 millivolts and measure the audio output. Reduce the RF input to 1 millivolt and note the AGC voltage on an oscilloscope. Reduce the RF input to zero and measure the time required for the AGC voltage to decay to the reference voltage. Apply and remove an RF input of 1 millivolt and measure the attack time (time required for the AGC voltage to reach 110% of the level at 1 millivolt). Repeat the above with the receiver in the AM mode at a frequency of 2.0160 MHz. The requirements of 3.5.3 shall be met.

4.5.4 Squelch control test. With the equipment set up as in fig 4, set the receiver to the SSB mode at 35.0 MHz, set the squelch switch to "ON" and set the RF input frequency to 35.0005 MHz. Increase the RF input until the set unsquelches. Measure the signal-plus-noise-plus distortion to noise-plus-distortion ratio. With the squelch in the "ON" position, apply a signal of 10 microvolts to unsquelch the receiver to observe the audio output on an oscilloscope. Remove the signal and measure the time required for the receiver noise to squelch (decay time). With the squelch in the "ON" position, trigger the oscilloscope on RF input and simultaneously apply a 10 microvolt RF input. Measure the time elapsed between application of the RF input and the appearance of the audio (attack time). Repeat the above with the RF input frequency set to 35.0000 MHz in the AM mode, 30% modulated with a 500 Hz audio frequency and in the FM mode using a ±8 KHz deviated 500 Hz audio frequency. The requirements of 3.5.4 shall be met.

4.5.5 Audio power output test. With the equipment set up as in fig. 3, set the receiver to the SSB mode at 38.4947 MHz. Apply an RF input of 0.5 microvolts to the receiver which produces a frequency of 1000 Hz ±50 Hz at the receiver audio output. With the volume control full CW, record the audio output. Repeat the above for RF frequencies of 5.000 and 61.015 MHz. The requirements of 3.5.5 shall be met.

4.5.6 Audio distortion test. Set the receiver to the SSB mode at 38.4947 MHz. Apply an RF input of 100,000 microvolts to the receiver which produces a 1 KHz audio output. Adjust the volume control for a 2.24 volt rms audio output. Measure the total distortion at the receiver audio output. Repeat the above for the following inputs and audio frequencies:

RF input (microvolts)	Audio frequency (Hz)
100,000	500 1000 - - - - 3000
200,000	500 1000 - - - - 3000

The above procedure shall be repeated for the frequency 38.4947 MHz in the deviation and the FM mode with ± 12 KHz deviation. In the AM mode, the procedure shall be repeated for an RF input level of 100,000 microvolts only, at a frequency of 2.016 MHz. The requirements of 3.5.6 shall be met.

4.5.7 Audio frequency response. With the equipment set up as in fig. 3, place the receiver in AM mode at 2.0160 MHz and the signal generator at 2.0160 MHz. Apply an RF signal of 100 microvolts. Set the audio oscillator at 1000 Hz 30% modulation. Adjust the radio volume control for 1 volt rms reference output. Repeat the measurement of audio output for audio frequencies of 750, 850, 1500, 2000 and 3000 Hz. Set the receiver to FM mode at 30.3546 MHz with an RF input of 100 microvolts, 8 KHz deviation at 1 KHz modulating frequency. Set the volume control for 1 volt rms audio output reference. Adjust the modulation frequency to 500, 850, 1500, 2000, 2500 and 3000 Hz maintaining constant deviation and determine audio response. The requirements of 3.5.7 shall be met.

4.5.8 Wide audio frequency response. With the equipment set up as in fig. 3, place the receiver in the FM mode at a frequency of 30.3546 MHz. Apply a 100 microvolt FM signal ±5 KHz deviation at the following frequencies and repeat the procedure of 4.5.7 above for the FM mode only at the wideband audio output:

40 Hz	3,500 Hz
100 Hz	4,500 Hz
500 Hz	5,000 Hz
1000 Hz	8,000 Hz
1500 Hz	10,000 Hz
2000 Hz	13,000 Hz
2500 Hz	21,000 Hz
3000 Hz	

Measure the recovered audio output. The requirement of 3.5.8 shall be met.

4.5.9 Spurious response test. Place the receiver in the Receive Only Mode at 2.000 MHz and terminate the BNC antenna connector in 50 ohms resistive. Tune the receiver in 1 KHz steps from 2.000 to 75.9990 MHz. Measure the resulting spurious response at each of the steps. The requirements of paragraph 3.5.9 and 3.5.9.1 shall be met.

4.5.10 Intermodulation test. Place the receiver in the SSB mode at 2.0510 MHz. Apply a 1 microvolt signal at 2.052 MHz (fo) to the receiver. Measure the signal-plus-noise-plus distortion to noise-plus-distortion ratio at the audio output. Apply two equal RF tones at approximately fo +200 KHz and fo +400 KHz such that a 1 KHz intermodulation tone is produced at the audio output. Adjust the input levels equally until the signal-plus-noise-plus-distortion to noise-plus-distortion ratio is the same as above. Repeat the above for the following frequencies:

3.5020 MHz	24.4343 MHz	47.3000 MHz*
4.8721 MHz	29.9999 MHz	50.0000 MHz*
5.6600 MHz	36.7777 MHz *	55.2200 MHz*
9.4321 MHz	37.2222 MHz *	62.4300 MHz*
12.5500 MHz	39.3333 MHz *	68.6600 MHz*
19.4000 MHz	41.7600 MHz *	75.9000 MHz*

Repeat the test with the receiver in the FM mode for the asterisked frequencies above. The dB of quieting at the audio output shall be measured instead of the signal-plus-noise-plus-distortion to noise-plus-distortion ratio. The requirement of 3.5.10 shall be met.

4.5.11 Cross modulation test. Place the receiver in the Receive Only AM mode at 2.5000 MHz. Apply a 4 microvolt 10% AM, 400 Hz signal to the RF input and measure the signal-plus-noise-plus-distortion to noise-plus-distortion ratio at the audio output as a reference. Remove this signal and apply a 4 microvolt CW signal at 2.5000 MHz and a 7.0 millivolt undesired signal at 2.4875 MHz modulated 30% AM at 400 Hz. Measure the signal-plus-noise-plus-distortion to noise-plus-distortion ratio at the receiver audio output. Repeat the above for the following input levels and frequencies:

Desired Signal		Undesired Signal	
4 uV at F (MHz)	7 millivolt at F (MHz)	0.1 V at F (MHz)	0.7 V at F (Mhz)
	2.5200	2.7780	3.4780
2.5000			
	2.4800	2.2220	1.5220
	4.0200	4.2780	4.9780
4.0000			
	3.9800	3.7220	3.0220
	9.0450	9.2780	9.9780
9.0000			
	8.9550	8.7220	8.0220
	16.0800	16.2980	16.9780
16.0000			
	15.9200	15.7020	15.0220
	20.1000	20.3780	20.9780
20.0000			
	19.9000	19.6220	19.0220
	25.1250	25.4780	25.9780
25.0000			
	24.8750	24.5220	24.0220
	36.1800	36.4780	36.9780
36.0000			
	35.8200	35.5220	35.0220
	42.2100	42.4780	42.9780
42.0000			
	41.7900	41.5220	48.0220
	49.2450	49.4780	49.9780
49.0000			
	48.7550	48.5220	48.0220
	54.2700	54.4780	54.9780
54.0000			
	53.7300	53.5220	53.0220
	60.3000	60.4780	60.9780
60,0000			
	59.7000	59.5220	59.0220
	64.3200	64.4780	64.9780
64.0000			
	63.6800	63.5220	63.0220
	70.3500	70.4780	70.9780
70.0000			
	69.6500	69.5220	69.0220

The requirements of 3.5.11 shall be met.

4.5.12 Desensitization. Place the receiver in the Receive Only SSB mode at 2.0510 MHz and apply an RF signal at approximately 2.0520 MHz which produces a 1 KHz audio output.

Adjust the RF input level to 5uV for measurements between 2 and 29.9999 MHz and 3.75uV for measurements between 30.0000 and 75.90000 MHz. Apply a second signal (CW) at 1.85200 MHz of 50 millivolts and measure the signal-plus-noise-plus distortion to noise-plus-distortion ratio. Repeat the above for the following frequencies:

Freq. sets Frequencies	Desired frequencies (In MHz)	Undesired (In MHz)
1	2.0510	2.2570
2	3.0510	3.3120
3	5.6600	5.8500
4	8.1000	7.9100
5	12.5500	12.8000
6	19.4000	19.0100
7	24.3000	24.7900
8	29.9890	29.4990
9	33.6660	34.1560
10	36.7770	36.2870
11	43.8600	44.3700
12	50.8000	50.3120
13	60.4000	60.9100
14	68.7000	68.2150
15	75.9000	76.3850

The requirement of 3.5.12 shall be met.

4.5.13 Transmitter power output. Place the transmitter in the SSB mode at 2.0510 MHz and apply two -1 millivolt audio signals at 1.5 KHz and 2.8 KHz to the audio input. Place the “tune” switch in the “tune” position. Key the transmitter and measure the RF output power for both the low and high power modes. Repeat for the following frequencies:

Mode	Frequency (MHz)
AM	2.0160
SSB	2.9071, 3.0201, 3.9811, 4.0321 5.9721, 6.0431, 9.9631
CW	10.0531, 13.9581, 14,1542, 19.8543, 20.2544, 29,7545
FM	29.7545, 61.0959, 30.3546, 57.6949
FSK	38.4947, 40.5948, 75.9999

Repeat the above procedure for the AM mode using a 1 millivolt, 2.5 KHz modulation; the FM mode frequencies above 29.9999 MHz using a 1 millivolt, 1 KHz modulation; and the CW mode (reference 3.5.13).

4.5.14 FM deviation. With the transmitter in the FM mode, set at 30.3546 MHz, low power, apply a 1 millivolt, 1 KHz audio input and measure the FM deviation at the transmitter output. Repeat for the 150 Hz tone deviation by removing the 1 KHz tone. The measurements shall be performed with a peak reading deviation meter. The requirements of para. 3.5.14 shall be met.

4.5.15 Burst transmission. With the transmitter in the CW mode measure the time required for the transmitter to reach 90% full power after the initial keying. Measure the hang time of the transmitter. With the KY-468/GRA-71 in the IDY mode measure the rise and fall times of the keyed envelopes. Measure the frequencies of the CW signal, FSK mark signal and the FSK space signal. The requirements of 3.5.15 et al. shall be met.

4.5.16 Transmitter spurious tests. With the transmitter in the SSB mode, high power at 2.000 MHz, apply two tones each approximately 1 millivolt in level at 1.5 KHz and 2.8 KHz at the transmit audio input. The ratio of the tone levels shall be such as to produce equal levels of desired frequency components at the transmitter RF output. Measure and record the third and fifth order intermodulation products. Repeat the measurements for the following frequencies:

2.5000	8.0000	29.9900
2.9900	9.9900	30.0000
3.0000*	10.0000*	35.0000*
3.5000	12.0000	39.9900
3.9900	13.9990	40.0000
4.0000	14.0000	47.0000
5.0000	19.9900	55.0000
5.9900	20.0000	60.022
6.0000*	25.0000*	75.022*

For the asterisked frequencies, the measurements shall be made with the transmitter in the low power mode as well as the high power mode. Measure the carrier suppression and the lower side band suppression at 5.0150 MHz only. The requirements of 3.5.16 et el. shall be met.

4.5.17 Hum and noise. The hum and noise level shall be measured for the inputs and frequencies of 4.5.16. The requirement of 3.4.17 shall be met.

4.5.18 Transmitter audio frequency response. Set the radio to 2.560 MHz in the AM mode. Perform coupler tuning and set the power switch to low power. Apply a 1 KHz tone at approximately 1 MV to Pin D of the audio input connector. Key the unit and observe the RF output on a spectrum analyzer. Set the amplitude of the audio tone to give an upper sideband output 10 dB down from the carrier. Sweep the audio oscillator from 1 KHz to 3 KHz noting the amount of change in the amplitude. Repeat this step, but sweep the audio from 1 KHz down to 250 Hz, again noting the change in the amplitude. The requirement of 3.5.18 shall be met.

4.5.19 Overall wideband response. Connect per test fig 8. In the FM mode, calibrate the receiver (unit #2) for a 10 dB SINAD value. Using the test set up per fig. 9 and a bit error rate analyzer, measure at a 16K bit rate for 100,000 bits. The requirements of 3.5.19 shall be met.

4.5.20 Transmitter distortion test. Connect per test set up as fig. 5, set up equipment and make all connections, except connect the UUT's BNC connector to the 50 ohm RF load. Select FM mode at 31.0000 MHz and perform coupler tuning. Set the radio to low power. Adjust the audio input at 1 KHz to provide approximately 1 MV to the transmit audio input. Key the UUT and observe that the deviation is between 8 and 11 KHz. Measure the distortion of the recovered audio. Repeat the above procedure using 750 Hz and 2000 Hz audio input. The requirements of 3.5.20 shall be met.

4.5.21 Audio processing. Place the transmitter in the FM mode at 35.500 MHz. Apply a 1 millivolt, 1 KHz signal to the transmitter audio input. Measure the audio output at the wideband audio output. Increase the input signal to 10 millivolts and measure the wideband audio output. The requirement of 3.5.21 shall be met.

4.5.22 Sidetone test. Place the RT unit in SSB receive mode at 2.0160 MHz. Apply an RF input signal of 100 microvolts at 2.016 MHz and adjust the receive audio output level for a nominal 2.24 volts, which will be the 0 dB reference level for sidetone measurement. Apply a nominal 1 millivolt, 1 kilohertz tone to the transmitter audio input and key the RT unit. Measure the level of sidetone for FM, CW and FSK modes at 30.3546 MHz. Reset the signal generator and RT unit for AM mode and repeat the sidetone test at 2.016 MHz. The receive level reference shall be set with a nominal 8 kilohertz deviation. The requirement of 3.5.22 shall be met.

4.5.23 Overall frequency tolerance. With the transmitter in the AM mode with no modulation and the radio set stabilized at 23 ±5°C, measure the carrier frequency (fc) at a dial setting of 45.0000 MHz. The measured fc shall be corrected to a 30°C temperature using the formula: fc(corrected) = fc(measured) + 1 Hz/°C (30°C-Tm), where Tm is the measured test temperature. The requirements of 3.5.23 shall be met.

4.5.24 Frequency stability tests.

4.5.24.1 Preconditioning. The unit shall undergo a 24 hour soak at a control temperature of 45±3°C. Stability of the control temperature shall be ±.25°C. Once the control temperature has been established, that same temperature shall be used in the long term aging test (see 3.5.24.1.2). The requirement of 3.5.24 shall be met. The long term stability test 4.5.24.2 shall follow the service condition test 4.5.24.3.

4.5.24.2 Long term aging test. Frequency measurements shall be made every 24 ± 0.5 hours for total time period of 30 days. The measurements shall begin after a 24 hour soak period but must start with an error no greater than 1.0 ppm. The control temperature established in 3.5.24.1 shall be met The long term stability requirement shall be considered met if the sum of the service test stability requirement shall be considered met if the sum of the service test condition error and the long term stability error does not exceed ± 1.3 ppm.

4.5.24.3 Stability vs service conditions test. With the transmitter in the AM mode with no modulation at 30.0000 MHz, the carrier frequency shall be measured during the applicable test periods of the temperature, humidity and input voltage tests (see 4.6.1 through 4.6.4 and 4.5.26). The requirement of 3.5.24.2 shall be met. The long term stability requirement shall be considered met if the sum of the service test condition error and the long term stability error does not exceed ± 1.3 ppm.

4.5.24.4 Warm-up. With the transmitter in the AM mode with no modulation at 35.055 MHz, the carrier frequency shall be measured 5 seconds after the radio set has been turned on during the applicable test periods of the low temperature and temperature creep tests. The requirement of 3.5.24.3 shall be met.

4.5.25 Phase and frequency jitter tests.

4.5.25.1 Frequency jitter. With the radio in the SSB mode at 2.0000 MHz, apply a 5.0 microvolt signal which produces a 1 KHz audio output. Measure the signal-plus-noise-plus-distortion to noise-plus-distortion ratio. Repeat the test for the following RF frequencies: 23.3333, 47.7777 and 75.9999 MHz. The above test shall be performed during the applicable test periods of the vehicular bounce test (see 4.6.5). The requirements of 3.5.25 shall be met.

4.5.25.2 Phase jitter. Connect the test equipment as shown ib fig. 6, make the following internal modification to the PRC-70 unit under test. Connect P4 of the reference A module (4.5 MHz) to J2 of the upconverter module (antenna input) through a 100 pf capacitor. Tune the unit to 4.4990 MHz and measure the phase difference. Repeat for frequency of 44.9990. The requirement of 3.5.25 shall also be met.

4.5.26 Input power test. The input current required to operate the radio set from a 24 volts DC source shall be measured for the modes of 3.5.26. In the transmit modes, use a 2.8 KHz tone modulation for FM and AM and two equal 1 millivolt audio tones at 1.5 KHz and 2.8 KHz for SSB operation. The requirements of 3.5.26 shall be met.

4.5.27 Input voltage test. The measurements specified below shall be made for input voltages of 20.5, 24, and 31 volts DC. The equipment shall meet the performance specified in 3.5.27.

4.5.28 Retransmission operation. Set up three radio sets as shown in fig. 7. Operate the units as follows:

UUT "A"	UUT "B"	UUT "C"
Set freq. dials to 35.055 MHz Mode SW to FM Squelch function to RXTMT Turn volume control full CCW With 50 ohm load connected to a connector (BNC), turn unit on and perform a coupler tune Set power SW to LOW POWER	Set freq. dials to 45.055 MHz Set mode SW to FM Squelch function RXTMT Turn volume control full CCW With 50 ohm load connected to a connector (BNC), turn unit on and perform a coupler tune Set RF power SW to LOW POWER	Set freq. dials to 45.055 MHz Set mode SW to FM Squelch function to "OFF' connect 50 ohm power load to BNC connector and perform a coupler tune. Reconnect pad and set the signal generator to 35.055 MHz, 10 MV output, FM mode at 8 KHz deviation on the internal mode freq. Set the modulation freq. to approximately 2200 Hz (±50 Hz).

Measure distortion of the received audio UUT "C" at level of 2.2 to 2.4V audio output.

Turn power switches OFF, interchange units "A" and "B" and repeat the above test.

Repeat this test for the following modes:

FM to SSB
SSB to FM
SSB to SSB

The requirements of 3.5.28 shall be met.

4.5.29 Antenna matching test. Connect a dummy load to the RF output and adjust to the appropriate value specified below. Set the mode switch to CW and actuate the "tune" command for each frequency listed below. Measure the time required to tune by monitoring the "tune tone" at the transmit sidetone output. Key the transmitter and wait until the coupler has tuned. Adjust the radio set's frequency selector until a "no tune tone" is heard in the transmit* sidetone output. Repeat for the frequencies listed below. The VSWR shall be measured for the "no tune" conditions at the asterisked frequencies as part of Group B testing only.

Freq. (MHz)	Dummy load setting
2.0*	doublet
4.0*	6 ft whip, 9 ft whip
6.000	6 ft whip, 9 ft whip, doublet
8.000	6 ft. whip, 9 ft whip, doublet
13.000	6 ft whip, 9 ft whip, doublet
20.000	9 ft whip, doublet
30.000*	6 ft whip, 9ft whip, doublet
35.000	6 ft whip, 9 ft whip
50,000	6 ft whip, 9 ft whip
75.999	6 ft whip, 9 ft whip

The requirement of 3.5.29 shall be met.

4.5.30 Operational test. The following modified bench handling test shall be performed. Prior to turning on the receiver/transmitter, lift the receiver/transmitter four (4) inches above the bench by the left corner and drop two (2) times. Repeat the foregoing for the right corner. Turn the receiver/transmitter and repeat the above procedure on both bottom corners. Note that when the radio is lifted by a corner, the receiver/transmitter pivots on the opposite corner and all sides are above the bench. After connection to power source, turn the receiver/transmitter on and perform the following test: The receiver-transmitter to be operationally tested shall be talk-tested with a standard RT-1133/PRC-70 on frequencies of 2.05, 3.05, 4.05, 6.05, 10.05, 14.05 and 20.05 MHz in the SSB mode, at frequencies 20.05 and 30.05 MHz in the AM mode, and on frequencies of 40.05 and 60.05 MHz in the FM mode. The radios shall transmit in the low power mode and will be interconnected by a 120 dB insertion loss (attenuation) path. Leakage around the attenuators shall be controlled to insure specified path loss. In both the receiver and transmit modes, the RT unit under inspection shall be monitored for proper operation of squelch, as well as normal signal strength, excessive noise and hum, and proper sidetone level. Dial light operation shall also be checked.

4.5.31 Interchangeability test.

4.5.31.1 Mechanical. Units which have been subjected to the passed all Group A and Group B inspections shall have the dimensions listed below gauged or measured to determine conformance with 3.5.31. When a listed dimension is not within specified or design limits, it shall be considered a major defect.

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.

4.5.31.2 Electrical. Units which have been subjected to and passed all Group A and Group B electrical inspections shall be tested as stated for conformance with 3.5.31. The specified number of sample RT-1133( )/PRC-70 units shall be selected from the lot and the modules listed below shall be identified with the serial number of the radio set from which they are removed. From the time of selection through the test period and replacement of the modules in the radio sets the modules shall not be retuned, realigned, modified or otherwise altered. The modules shall be tested to determine compliance with the performance requirements specified in the applicable test procedure drawing referenced in drawings covering interchangeability of the modules. Modules failing to meet the test requirements shall be considered to have failed the interchangeability requirement.

(1A1A1) FREQUENCY SELECTOR
(1A1A2) PWR & TR RELAY ASSY.
(1A1A3) 455 KHz IF GAIN ASSY.
(1A1A3) P.S 10V REGULATOR
(1A1A5) P.S., 5 V REGULATOR
(1A1A6) TRANSLATOR
(1A1A7) UPPER LOOP DIVIDER
(1A1A8) UPPER LOOP PHASE DETECTOR
(1A1A9) LOWER LOOP ASSY.
(1A1A10) OSCILLATOR DISTRIBUTOR
(1A1A11) OSCILLATOR DIGITAL DIVIDER
(1A1A12) TRANSMIT BROADBAND ASSY.
(1A1A13) UP CONVERTER
(1A1A14) FIRST IF SELECTIVITY ASSY.
(1A1A15) FIRST IF AGC AND GAIN ASSY.
(1A1A16) SECOND MIXER
(1A1A17) SECOND IF ASSY.
(1A1A18) PUMP VFO ASSY.
(1A1A20) DC CONTROL ASSY.
(1A1A21) MODULATOR SQUELCH ASSY.
(1A1A22) 455 KHz IF DETECTOR
(1A1A23) AUDIO MODULE ASSY.
(1A1A24) COUPLER ASSY.
(1A1A25) ALC ASSY.
(1A1A26) BANDSWITCH ASSY.
(1A1A27) DETECTOR ASSY.
(1A1A28) HARMONIC FILTER ASSY.
(1A1A29) DRIVER AND POWER AMPLIFIER ASSY.

NOTE: For the following modules, alignment within the limits of the production test procedure is allowed:

(1A1A22) 455 KHz IF DETECTOR 1A1A22
(1A1A24) COUPLER ASSY.
(1A1A25) ALC ASSY.

4.5.32 Electromagnetic interference test. The equipment shall be tested for compliance to the requirements of Appendix A to this specification.

4.5.33 Visual and Mechanical inspection. An inspection shall be performed to verify compliance with those portions of 3.7 which can be determined visually.

4.5.34 Reliability testing.

4.5.34.1 First article Group D. The first article Group D inspection shall be in accordance with the contractor-prepared, Government-approved, Reliability Test Plan. The sample size shall be in accordance with ANSI/ASQC Z 1.4.

4.5.34.2 Conformance Group D inspection. The quality conformance Group D inspection shall be in accordance with the contractor-prepared, Government approved, test plan.

4.5.34.3 Test requirements. Testing will continue until the total unit hours together with the total count of relevant equipment failures (see 6.4) permit either an accept or reject decision. Only equipment “on” time may be used in MTBF determinations. No single equipment “on” time shall be less than one half the average operating time of all radio sets on test. The units shall operate 24 hours a day and the operating modes shall be representative of the operations expected in the field. Occurrence of pattern failures (see 6.4.8) shall be cause for lot rejection.

4.5.34.4 Reliability test conditions. The detailed test conditions, procedures and methods for the tests described in 4.5.34.1 and 4.5.34.2, above, shall be in accordance with the contractor developed, Government approved, reliability test procedure for the AN/PRC-70.

4.5.34.5 Reliability test procedure.

4.5.34.5.1 Performance measurements. Proper instrumentation shall be provided to insure recognition of failure. At least once daily, the performance parameters of Table VI, as a minimum, shall be measured with the equipment stabilized at the high temperature. The frequency shall be in accordance with Table VII. If the value of any parameter is not within tolerance, a failure shall be recorded and the required action shall be taken. The failure shall be presumed to have occurred immediately after the last successful measurement of the same parameter.

TABLE VI. Performance measurements.

Measurement	Requirement paragraph	Test paragraph	Test frequency
Overall frequency tolerance	3.5.23	4.5.23	Per Table VII
Audio distortion	3.5.6	4.5.6	Per Table VII
Sensitivity	3.5.1	4.5.1	Per Table VII
Transmitter power output	3.5.13	4.5.13	Per Table VII
Intermodulation distortion (Transmitter)	3.5.16	4.5.16	Per Table VII

The frequencies and sequence which shall be utilized are tabulated in Table VII.

TABLE VII. Daily test frequency schedule.

Day-of-the-month	AM SSB Frequency (MHz)	FM Frequency (MHz)
1	2.5700	50.2000
2	3.9000	35.1000
3	5.1000	50.2000
4	8.4000	60.1000
5	12.5500	35.1000
6	17.3000	50.2000
7	25.1000	60.1000
8	35.1000	35.1000
9	50.2000	50.2000
10	60.1000	60.1000
11	2.5700	35.1000
12	3.9000	35.1000
13	5.1000	50.2000
14	8.4000	60.1000
15	12.5500	35.1000
16	17.3000	50.2000
17	25.1000	60.1000
18	35.1000	35.1000
19	50.2000	50.2000
20	60.1000	60.1000
21 etc. - repeat sequence starting with day 1.		

4.5.35 Air seal test. The equipment shall be opened and closed again in such manner as to break and remake the seal. Immediately thereafter, the equipment as field transported configuration 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 enclosure when no transit case is provided. The vacuum shall then be valved-off and the interior pressure measured during the ensuing period of

five minutes. During this five minute period, the decrease in vacuum shall not exceed 0.01 pound. The gage used shall have an accuracy such that 0.01 pound can be determined readily. The requirements of 3.4.2 shall be met.

Note to 4.5.35: At the option of the contractor, this test may be done out of sequence with the other Group A tests on each Radio Set just prior to shipment.

4.5.36 Control stop test. A torque of 10 inch-pounds shall be applied 500 times against each of the rotating switch control end stops. A torque of 3 inch-pounds shall be applied 50 times against each of the volume control end stops. The requirement of 3.4.3.1 shall be met.

4.5.37 Weight. The Radio Set shall be weighed with a scale with not more than one percent deviation from standard. The requirement of 3.3.1 shall be met.

4.6 Environmental tests. Environmental testing may be performed in accordance with the recommended procedures and methods identified in 6.3. The contractor may develop and use an alternate test plan specifying equivalent alternative methods and procedures following approval of that test plan by the Government. When the contractor's test plan deviates from the test procedures prescribed, the contractor shall be required to show where his own tests test methods for verifying the specified performance are equivalent. Also, measurements taken by the contractor during verification testing apparatus, e.g. environmental test chamber, vibration test table, pendulum shock device, or similar test equipment for which the technical capabilities to properly simulate extreme climatic or transportation conditions are scientifically documented.

4.6.1 Low temperature. The radio set shall be tested for compliance with 3.6.1. The recommended procedures of 6.3 may be used to determine compliance with 3.6.1. The storage temperature shall be -70°F and the operating temperature shall be -50°F. Prior to testing, the set shall meet full specification performance for the measurements specified in 3.6.1.

4.6.2 Temperature shock. The radio set shall be stabilized at a temperature of -50°F and then operated with a duty cycle of 1 to 9 (transmit to receive). The requirements of 3.6.2 shall be verified. The temperature shall then be increased in 10°F steps, remaining at each step for ten minutes at which time the measurements of 3.5.2 shall be made. When the temperature chamber reaches 160°F, continue taking the measurements specified in 3.5.2 until temperature stabilization is reached. Temperature stabilization will have been attained when the temperature of the part of the test item considered to have the longest thermal lag does not change more than 3.6°F per hour. Prior to testing, the equipment shall meet full specification performance for the requirements specified in 3.6.2.

4.6.3 High temperature. The radio set shall be tested for compliance with 3.6.3. The recommended procedures of 6.3 may be used to determine compliance with 3.6.3. After completion of the measurements specified in 3.6.3, the radio set shall be placed in the SSB, XMIT mode at 24.0000 MHz. Once set, apply two equal (1mv) audio tones to the radio set's audio input and key the radio for two hours. Record the power output at the start, at the three minute point, at ten minute point and at the end of the two hour period. Turn the radio set off

for two hours, then repeat the two hour key down test at 48 MHz. The operating and storage temperatures shall be 160° F. Prior to testing, the equipment shall meet full specification performance for the measurements specified in 3.6.3.

NOTE: While exposed to service conditions and on a 50 ohm resistive load, power output tests may be performed with the radio tuned to the closest adjacent in-band frequencies at which the radio will tune. This method may be used instead of the specified test frequencies, where the radio will not tune into a 50-ohm load at those specified frequencies.

4.6.4 Humidity. The radio set shall be tested for compliance with 3.6.4. The recommended procedures of 6.3 may be used to determine compliance with 3.6.4. Inability of the equipment to meet the requirements of 3.6.4 shall constitute failure of this test.

4.6.5 Bounce, vehicular. The radio set, on its vehicular mounting base, shall be tested for compliance with 3.6.5. The recommended procedures of 6.3 may be used to determine compliance with 3.6.5.

4.6.6 Bounce (vehicular shock). The radio set shall be tested for compliance with 3.6.6. The recommended procedures of 6.3 may be used to determine compliance with 3.6.6. Prior to testing, the equipment shall meet full specification performance for the measurements specified in 3.6.6.

4.6.7 Bench-handling shock. The radio set shall be tested for compliance with 3.6.7. The recommended procedures of 6.3 may be used to determine compliance with 3.6.7. Prior to testing, the equipment shall meet full specification performance for the measurements specified in 3.6.7. Reinsertion of loosened modules shall be permitted to obtain equipment performance.

4.6.8 Altitude. The radio set shall be tested for compliance with 3.6.8. The recommended procedures of 6.3 may be used to determine compliance with 3.6.8. Prior to and following testing, the equipment shall meet full specification performance for the measurements specified in 3.6.8.

4.6.9 Dust. The radio set shall be tested for dust contamination. The recommended procedures of 6.3 may be used to determine compliance with 3.6.9. Prior to and following the test, the equipment shall meet performance characteristics specified in section 3.

4.6.10 Leakage (immersion). The radio set shall be immersed in fresh water at a depth of 3 feet for a period of 30 minutes. Following this test, the set shall be examined for the presence of moisture or any intrusion of water inside the casing. The intrusion of moisture shall be cause for failure of this test and rejection of the sample.

4.6.11 Salt fog. The radio set shall be tested for compliance with 3.6.11. The recommended procedures of 6.3 may be used to determine compliance with 3.6.11. Following such testing, the set shall meet all the performance characteristics of 3.6.11. Failure of this requirement shall result in rejection of this sample.

4.6.12 Fungus. The radio set shall be tested for compliance with 3.6.12. The recommended procedures of 6.3 may be used to determine compliance with 3.6.12. Following such testing, the set shall meet all the performance characteristics of 3.6.12. Failure of this requirement shall result in rejection of the sample.

5. PACKAGING

5.1 Packaging requirements. For acquisition purposes, the packaging requirements shall be as specified in the contract or purchase order (see 6.2). When actual packaging of material is to be performed by DoD personnel, these personnel need to contract the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department of Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Radio Set AN/PRC-70( ) will be used by selected forces to establish and maintain communication with their headquarters, adjacent units or conventional forces having tactical FM, AM or SSB radio sets.

6.2 Acquisition requirements. Acquisition documents must specify the following:

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

b. Type required.

c. Number of samples required for first article inspection.

d. Marking and shipping of samples.

e. Place of final inspection.

f. Technical literature required.

g. Issue of DoDISS to be cited in the solicitation, and if required, the specified issue of individual documents referenced (see 2.2 and 2.3).

6.3 Environmental inspection procedures. The test methods and procedures of MIL-STD-810 listed below are recommended, but not mandatory for determining compliance with the environmental requirements of this specification. The contractor may use any test method that he can verify as providing comparable stress levels on the materiel to be tested.

TABLE VIII. Environmental inspection procedures.

Inspection	Spec. Paragraph	MIL-STD-810 Method	MIL-STD-810 Procedure	Remarks
Low Temperature	3.6.1	502.1	I	See remarks in 4.6.1.
Temperature creep	3.6.2	503.1	I	Use 4.6.2 procedure.
High temperature	3.6.3	501.1	II	See remarks in 4.6.3.
Humidity	3.6.4	507.1	II	See remarks in 4.6.4.
Bounce (Vehicular) shock	3.6.6	516.2	II	See 4.6.6.
Bench-handling shock	3.6.7	516	V	See 4.6.7.
Altitude	3.6.8	500	I	Operate altitude chamber @ 10,000 feet above sea level for 3 hours.
Dust	3.6.9	510.1	I	See 4.6.9.
Immersion	3.6.10	512	I	Immerse for 30 minutes.
Salt Fog	3.6.11	509.1	I	Duration is 3 hours.
Fungus	3.6.12	508.1	I	See 4.6.12.

6.4 Definitions.

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

6.4.2 Growth colonization. Growth colonization is a mass of individual plants, generally of one species, living together; or a group of hyphae, 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, single celled, 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 boundaries of the metal resulting in the pulling or separating, or both, of successive layers of the metal. The appearance resembles loose book pages or onion skin peeling.

6.4.7 Equipment failure. The inability to commence operation, the cessation of operation or degradation of performance below specified levels identified in Table VI or the approved reliability test plan.

6.4.8 Pattern failure. The occurrence of two (2) or more failures of the same part in identical or equivalent application whose combined failure rate exceeds that predicted. When two (2) or more dependent failures of the same part occur whose combined failure rate exceed predictions and which are due to more than one independent failure, are relevant pattern failures.

6.5 Color. The color chip furnished by the procuring agency will match color chip No. X-24087, FED-STD-595. Colors Use in Government Procurement is cited for guidance and may be obtained upon request to Commanding Officer, U.S. Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

6.6 Color of textiles. Standard samples of Olive Drab No. 7 may be obtained from the Sample Loan Unit, Military Clothing and Textile Supply Agency, Philadelphia, Pennsylvania. When requesting samples, indication should be given as to type of material concerned.

6.7 Location of operational inspection and air seal test. It is desirable that the operational inspection (4.5.30) and the air seal test (4.5.35) 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 previous inspected sample units) be sampled and inspected immediately prior to packaging.

6.8 Nomenclature. The parenthesis in the nomenclature will be deleted or replaced by a letter identifying the particular design; for example: AN/PIQ-1W. The contractor should apply for nomenclature in accordance with the applicable clause in the contract (see 1.1).

6.9 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 provisions established in this specification and the contract. The amount of verification inspections by the Government will be adjusted to make maximum use of the contractor’s quality control system and the quality history of the product.

6.10 Subject term (key word) listing.

RT-1133/PRC-70	Receiver-Traansmitter
AS-2974	Aantenna
H-250A/U	Handset
AS-2975	Antenna
H-251/U	Haandset

6.11 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

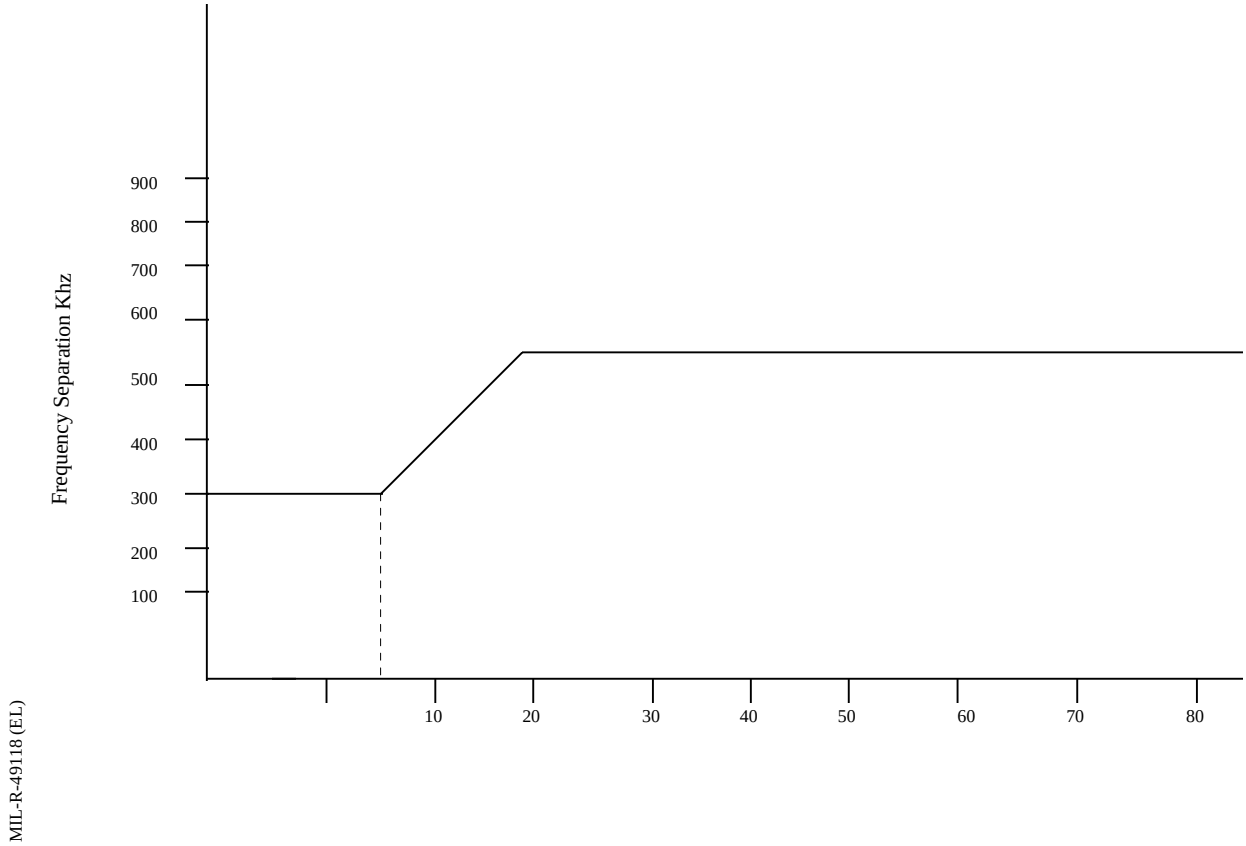


FIGURE 1 CROSS MODULATION

CUSTODIAN:
Army-CR

PREPARING ACTIVITY:
Army-CR

APPENDIX A

ELECTROMAGNETIC INTERFERENCE (EMI) VERIFICATION PROGRAM FOR RADIO SET, AN/PRC-70( ) and (UNITS OF)

A.1. SCOPE

A.1.1 Scope. This appendix outlines and specifies the requirements for the electromagnetic interference (EMI) verification program applicable to the Radio Set, AN/PRC-70 and Units of the Set. It is a mandatory part of the specification. The information contained herein is intended for compliance.

A.1.2 The EMI verification program for the Radio Set, AN/PRC-70 and Units of the Set shall be completed as per the following test plans:

a. EMI Qualification Test Plan, to be performed on first article equipment as specified in the contract or order.

b. EMI Production Verification Test Plan, to be performed on samples of production equipment as specified in the contract or order.

A.2. APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

A.3. TEST CONDITIONS

A.3.1 The equipment shall be set up in a shielded enclosure with the test equipment, its related antennas and sensing equipment.

A.3.2 The test shall be conducted at normal ambient temperature of 20° C to 30°C (68°F to 86°F).

A.3.3 The equipment under test shall be accessible to the operator for switching and retuning as required.

A.4. VERIFICATION PROCEDURE

A.4.1 Conducted emissions, power leads, 10 KHz to 10 MHz. The equipment is to be tested for conducted emissions on the power leads over the frequency range of 10 KHz to 10 MHz using the measurement setup of Figure A-1. Tests shall be performed at three frequencies each in the AM mode, 5.7 MHz, 39 MHz and 72.3 MHz. Equipment is to be tested in the transmit mode only. The emissions shall not exceed the levels shown in Figure A-2.

A.4.2 Conducted emissions, antenna terminal. The equipment is to be tested for conducted emissions on the antenna terminal over the frequency range hereby defined using the measurement setup of Figure A-3. The start frequency shall be as follows:

Operating frequency range	Start frequency of test
10 KHz to 3 MHz	10 KHz
3 MHz to 300 MHz	100 Khz

The end frequency shall be 1.52 GHz. Tests shall be performed at three frequencies each in the AM mode, 5.7 MHz, 39 MHz and 72.3 MHz. The requirement for the second harmonic of 5.7 MHz is reduced by 15dB. A maximum of eight emissions per test frequency may exceed the specification limit by 20 dB, except 38.8 MHz which shall be 25 dB. Also, during narrowband emission testing, the limit shall be relaxed 18dB at frequencies above 100 MHz. The Broadband emissions of the 50 KHz oscillator (below 150 KHz) may exceed the specification limits by a maximum of 20 dB. The conducted emissions at the antenna terminal of the equipment under test shall not exceed the values below.

a. Receivers: 34 dBµV

b. Transmitters (standby mode): 34 dBµV

c. Transmitters (transmit mode): Harmonics, except the second and third, and all other spurious emissions shall be at least 80 dB down from the level at the fundamental. The second and third harmonics shall be suppressed 50 +10 log p (where p = peak power input in watts at the fundamental) or 80 dB, whichever requires least suppression.

A.4.3 Conducted susceptibility, antenna port, intermodulation, 15 KHz to 10 Ghz. The equipment is to be tested for conducted susceptibility to intermodulation on the antenna port over the frequency range of 15 KHz to 10 GHz using the measurement setup of Figure A-4. Tests shall be performed at the same three frequencies in both the FM and SSB mode. The equipment shall not exhibit any malfunction, degradation of performance, or deviation from specified indications, beyond the tolerances indicated in 3.5.10 of this specification, when subjected to the test signals specified in the equipment specification.

A.4.4 Conducted susceptibility, antenna port, rejection of undesired signals, 30 Hz to 20 GHz. The equipment is to be tested for conducted susceptibility to undesired signals on the antenna port over the frequency range of 30 Hz to 20 GHz using the measurement setup of Figure A-4. Tests shall be performed at the above listed frequencies in the receive, SSB mode of operation. The equipment shall not exhibit any malfunction, degradation of performance, or deviation from specified indications, beyond the tolerances indicated in 3.5.9 and 3.5.11 of this specification when subjected to the test signals specified in the equipment specification.

A.4.5 Radiated emissions, electric field, 2 MHz to 18 GHz. The equipment is to be tested for radiated emissions of the electric field over the frequency range of 2 MHz to 18 GHz using

the measurement setup of Figure A-5. Tests shall be performed at three frequencies each in the AM mode, 5.7 MHz, 39 MHz and 72.3 MHz. Tests are to be performed in the transmit mode only. Narrowband emission limits shall be tested. However, the transmit fundamental frequency is exempt from this requirement. Additionally, a maximum of ten emissions, harmonically related to the transmit fundamental, and the 11.0 MHz oscillator may exceed the Table A1 limit by 20 dB per test frequency and one other emission may exceed the prescribed limit by no more than 33 dB. The Broadband limit below 150 Khz is relaxed 10 dB due to the 50 Khz oscillator. The emissions shall not exceed the levels shown in Figure A-6. Above 30 MHz, the limits shall be met for both horizontally and vertically polarized fields.

A.4.6 Radiated susceptibility, electric field, 10 KHz to 40 GHz. The equipment is to be tested for radiated susceptibility to the electric field over the frequency range of 10 KHz to 40 GHz using the measurement setup of Figure A-7. Tests shall be performed at the above listed frequencies in the receive, SSB mode of operation. The IF (111.455 MHz) response and the responses due to the PUMP VFO harmonics may exceed the specification limit by 35 dB. The limit shall be relaxed 15 dB for the first 100 Khz spurious responses on both sides of the tuned frequency. The equipment shall not exhibit any malfunction, degradation of performance, or deviation from specified indications beyond the tolerances indicated in this specification when subjected to the electric fields shown below in Table A-I. Up to 30 MHz, the limits shall be met for vertically polarized fields. Above 30 MHz, the limits shall be met for both horizontally and vertically polarized fields. Circular polarized fields are not acceptable.

Table A-I. Radiated susceptibility limits - electric field.

Frequency range	Limit level (volts/meter)
10 Khz - 2 MHz	20
2 MHz - 30 MHz	50
30 MHz - 1 GHz	50
1 GHz - 18 GHz	50
18 GHz - 40 GHz	50

APPENDIX A

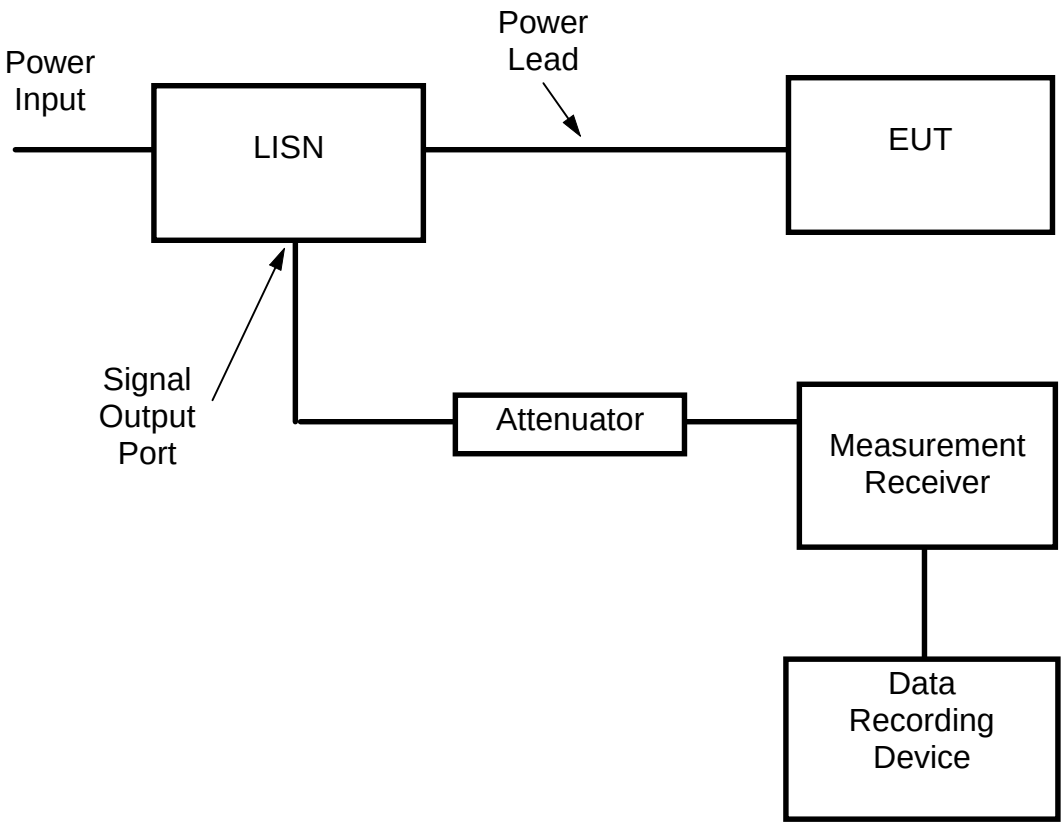
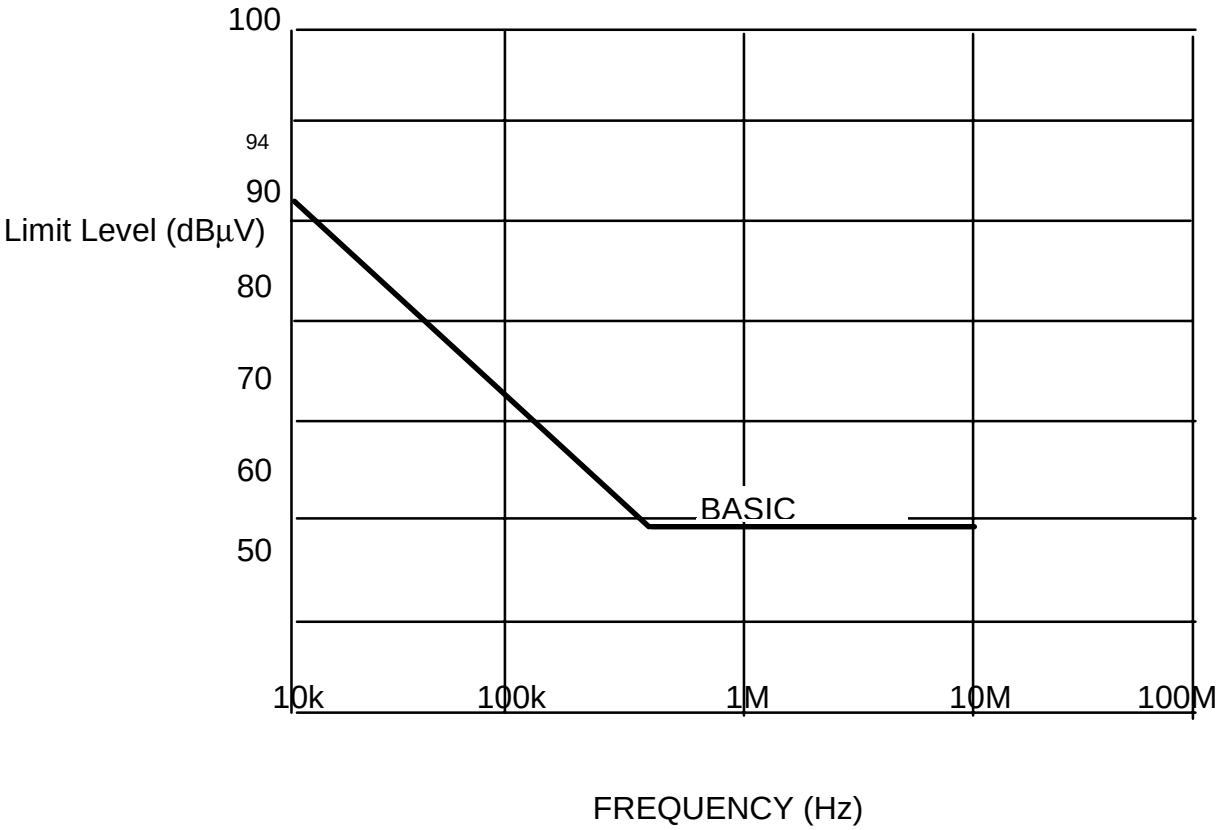


FIGURE A-1. Measurement Setup, Conducted Emissions, Power Leads.

APPENDIX A



NOMINAL EUT SOURCE VOLTAGE (AC&DC)	LIMIT RELAXATION
28 V 115V 220V 270V 440V	BASIC CURVE 6dB 9dB 10dB 12dB

Figure A-2. Conducted Emissions Limit, Power Leads.

APPENDIX A

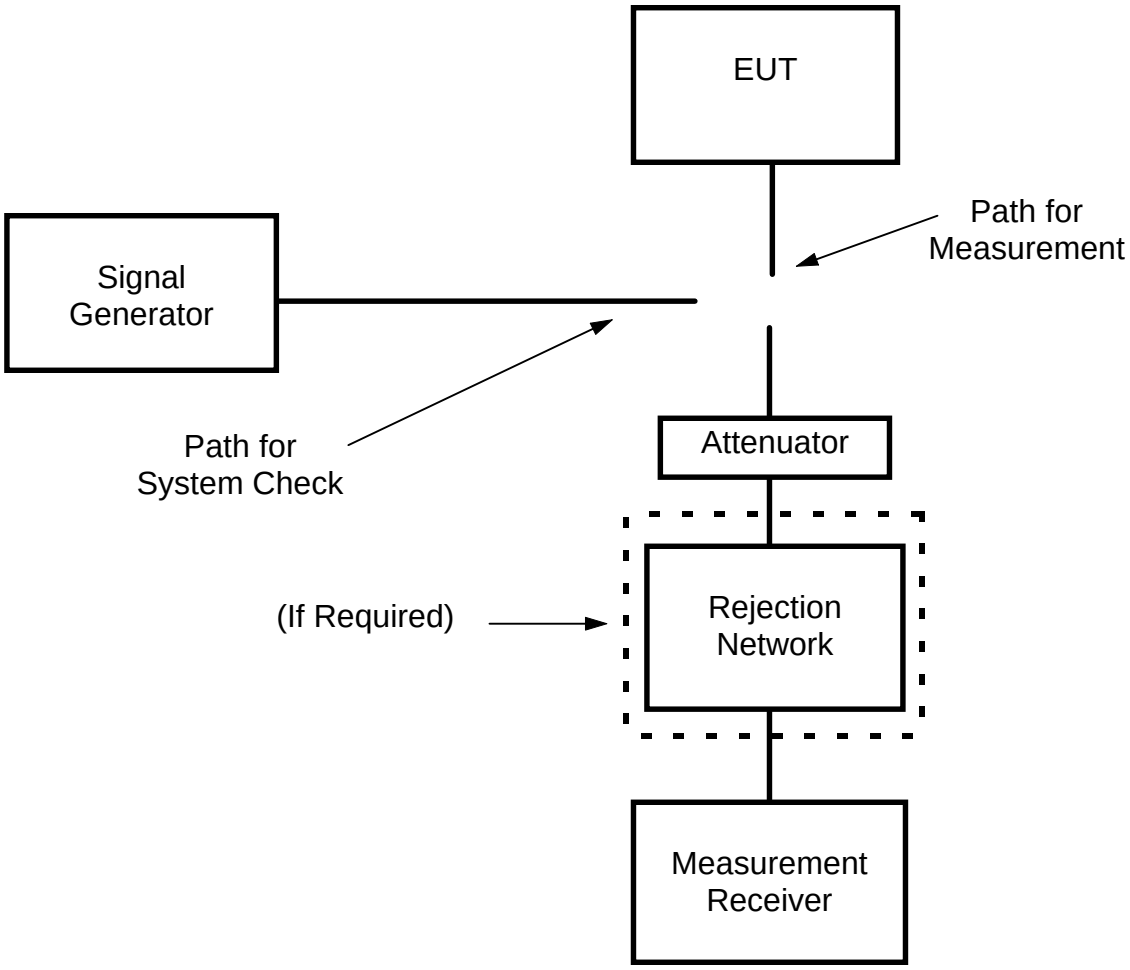


FIGURE A-3. Measurement Setup, Conducted Emissions, Antenna Terminals.

APPENDIX A

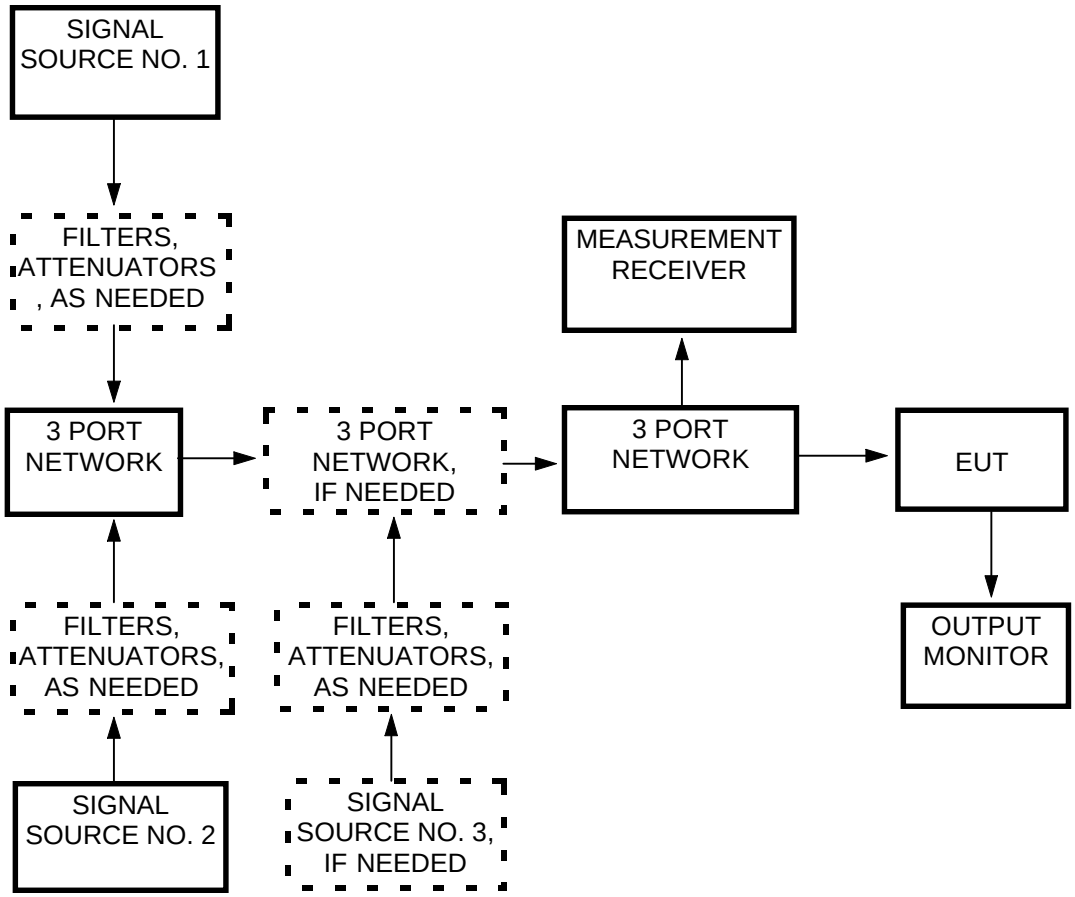


FIGURE A-4. Test Setup, Conducted Susceptibility, Antenna Port.

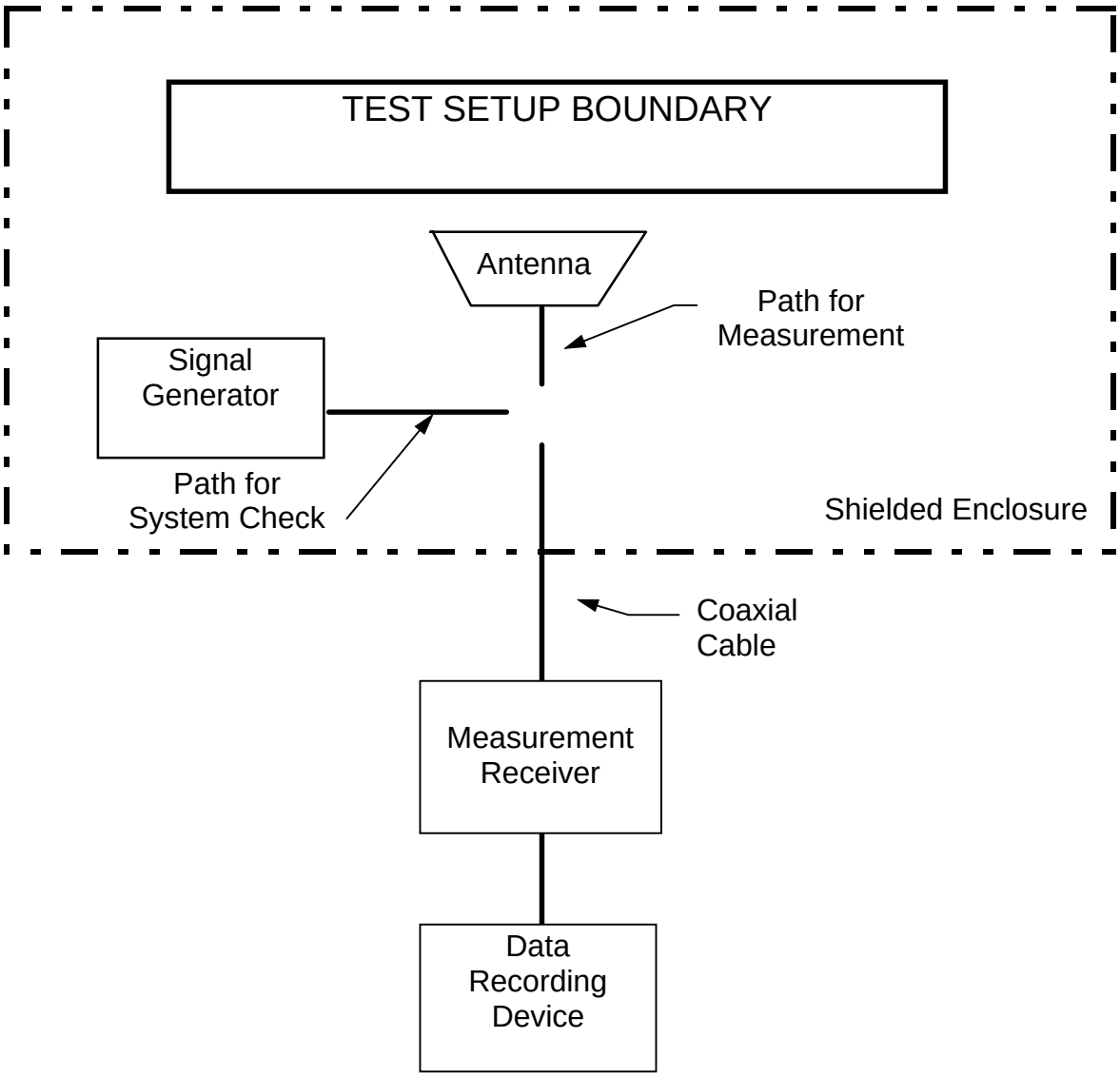


FIGURE A-5. Test Setup, Radiated Emissions, Electric Field, 2 MHz to 18 GHz.

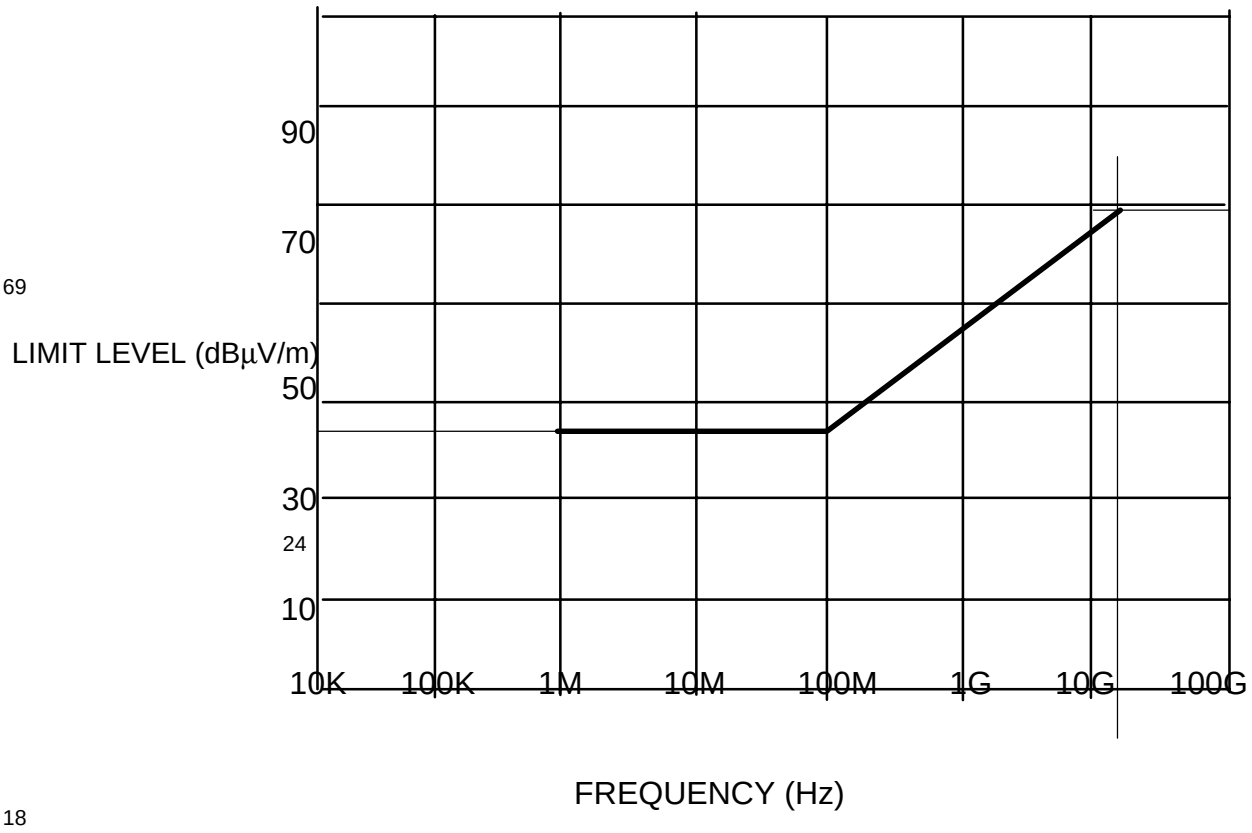


Figure A-6. Radiated Emission Limit, Electric Field.

APPENDIX A

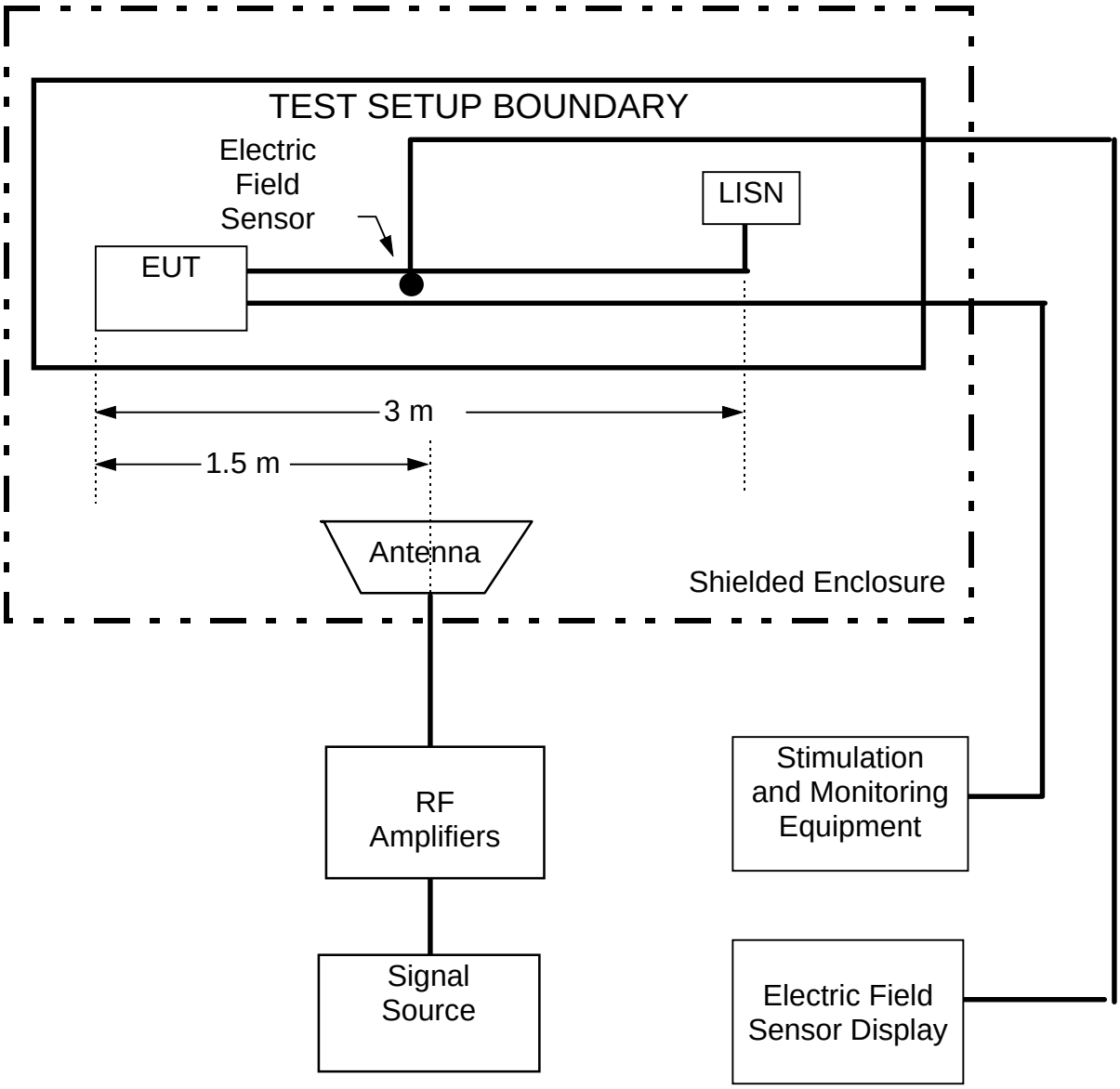


FIGURE A-7. Test Setup, Radiated Susceptibility, Electric Field, 10 KHz to 40 GHz.

APPENDIX A

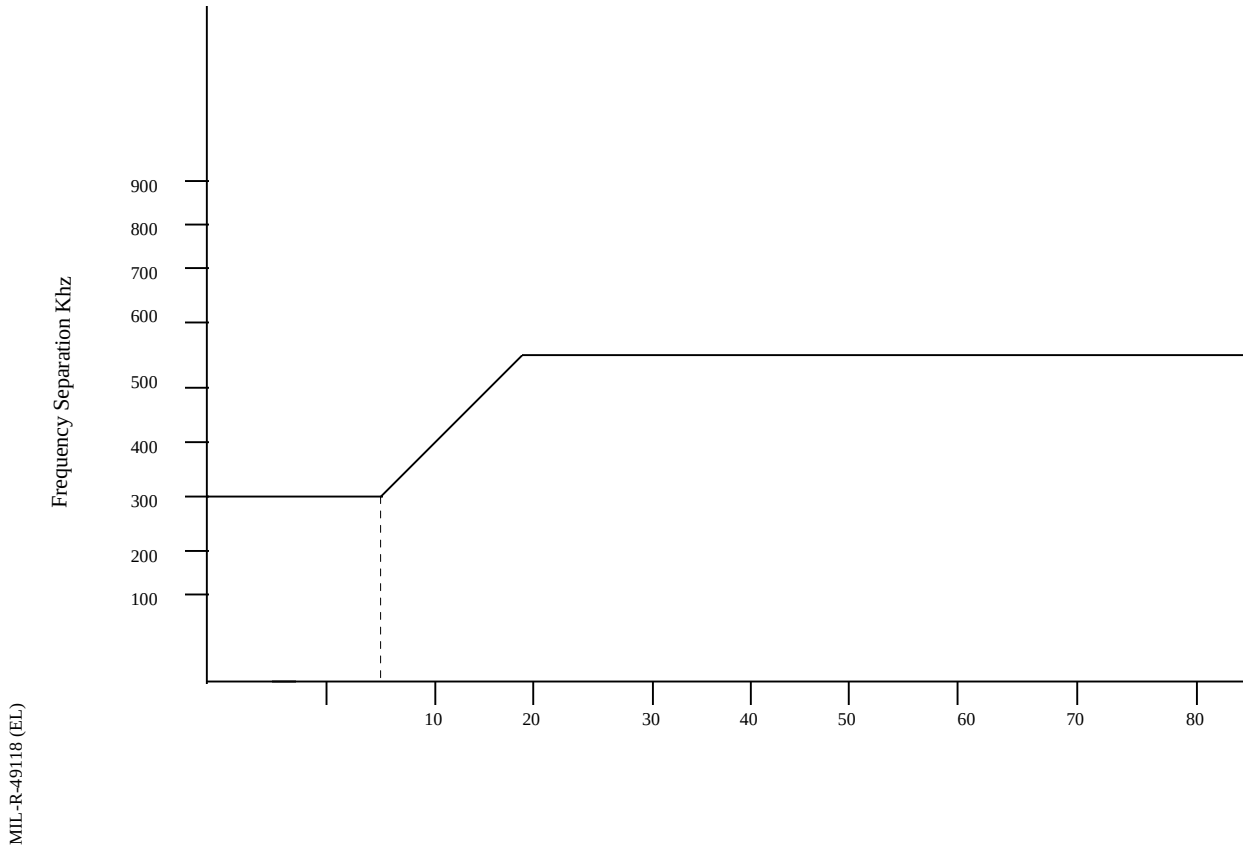
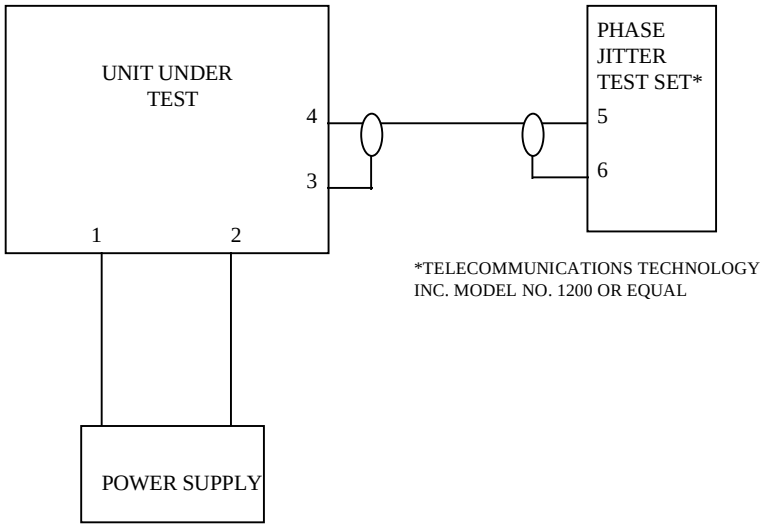


FIGURE 1 CROSS MODULATION

APPENDIX A



*TELECOMMUNICATIONS TECHNOLOGY INC. MODEL NO. 1200 OR EQUAL

MIL-R-49118 (EL)

1 BATTERY CONNECTOR PIN 1

2 BATTERY CONNECTOR PIN 5

3 AUDIO CONNECTOR PIN A

4 AUDIO CONNECTOR PIN B

5 INPUT CONNECTIONS ON REAR

6 TEST SET GROUND

FIGURE 6 PHASE JITTER

APPENDIX A

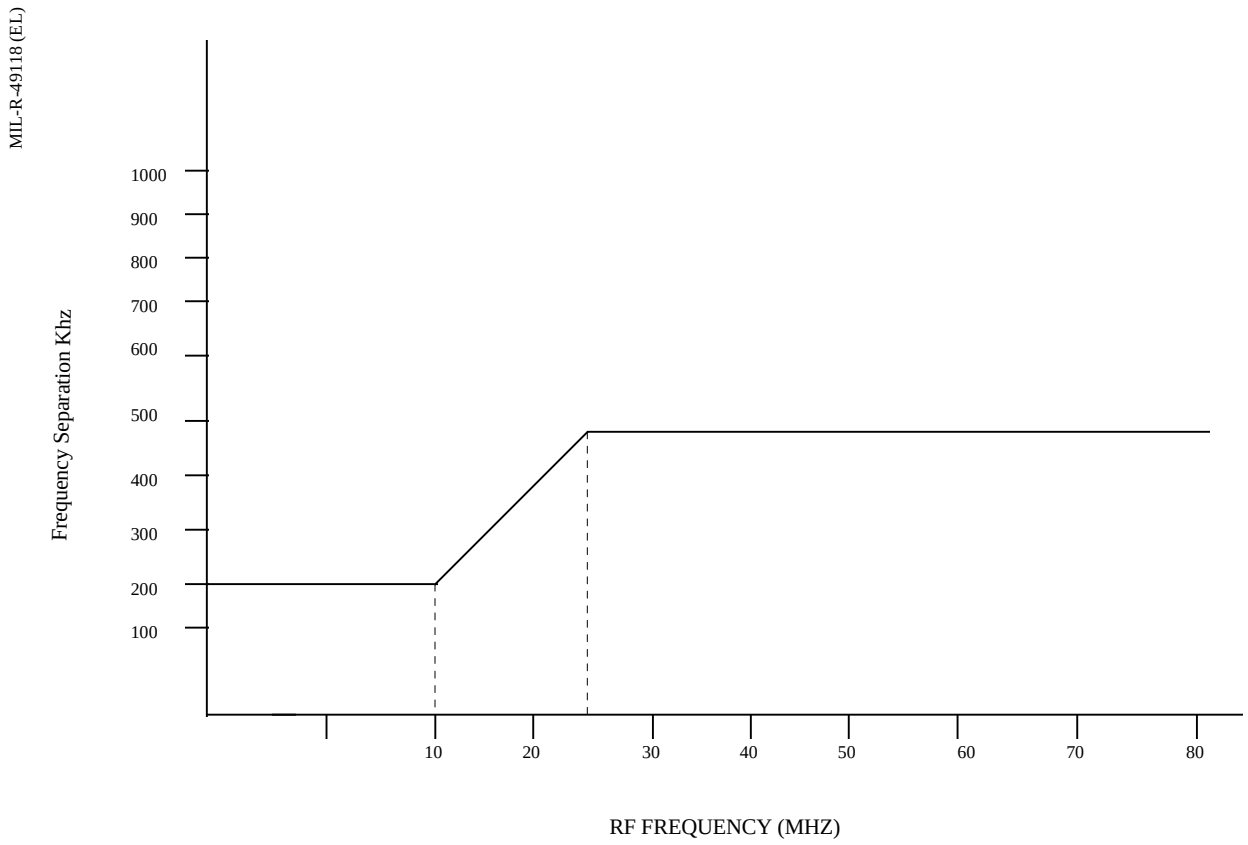


FIGURE 2 DESENSITIZATION

APPENDIX A

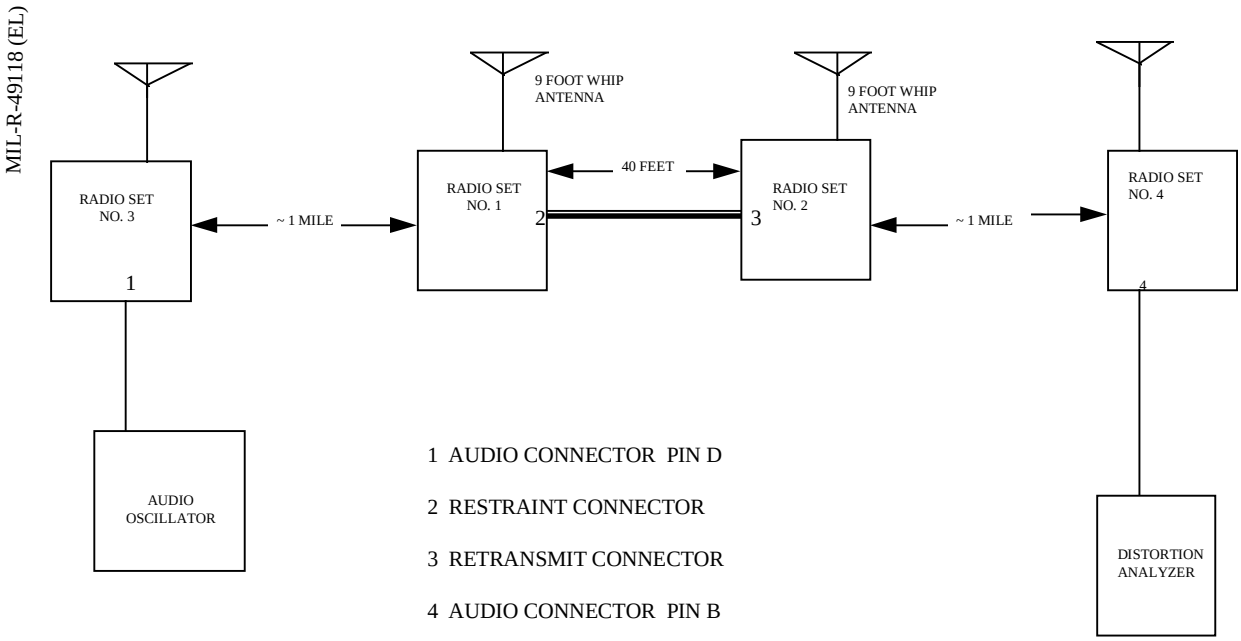


FIGURE 7 RETRANSMISSION

APPENDIX A

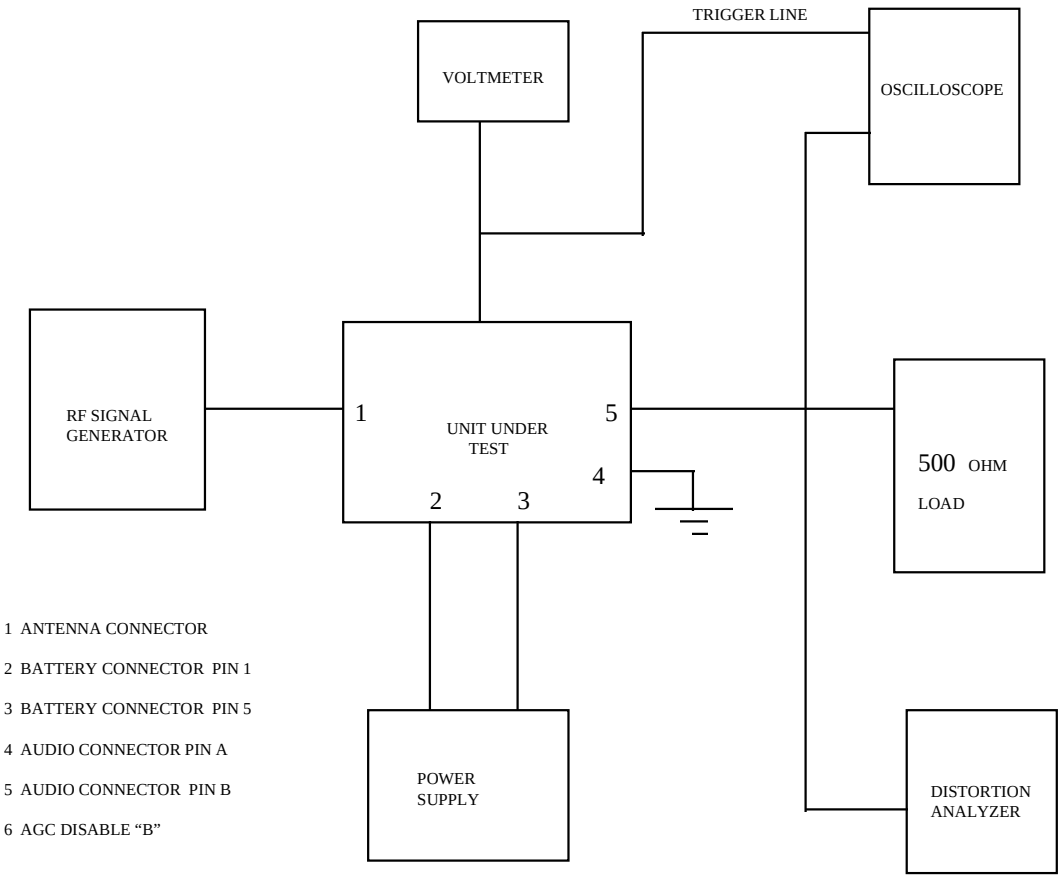
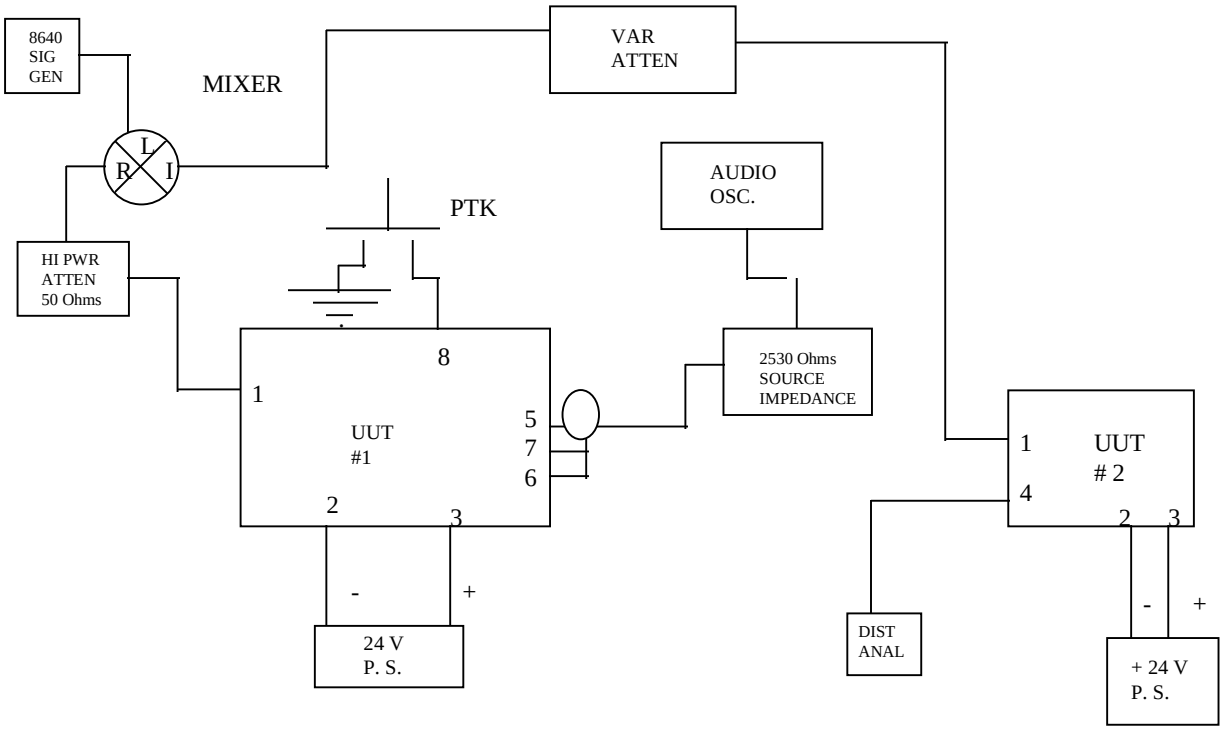


FIGURE 4 RECEIVER SQUELCH

APPENDIX A

OVERALL WIDEBAND PERFORMANCE - CALIBRATION



TEST SET UP

1. Antenna 50 ohms conn. (BNC)
2. Battery Conn. Pin 1
3. Battery Conn. Pin 5
4. Audio Conn. Pin B
5. Security Conn. Pin R
6. Security Conn. Pin L
7. Security Conn. Pin A
8. Audio Conn. Pin C

(1) Remove jumper from security conn. Pin L and R on UUT #1

FIGURE 8

APPENDIX A

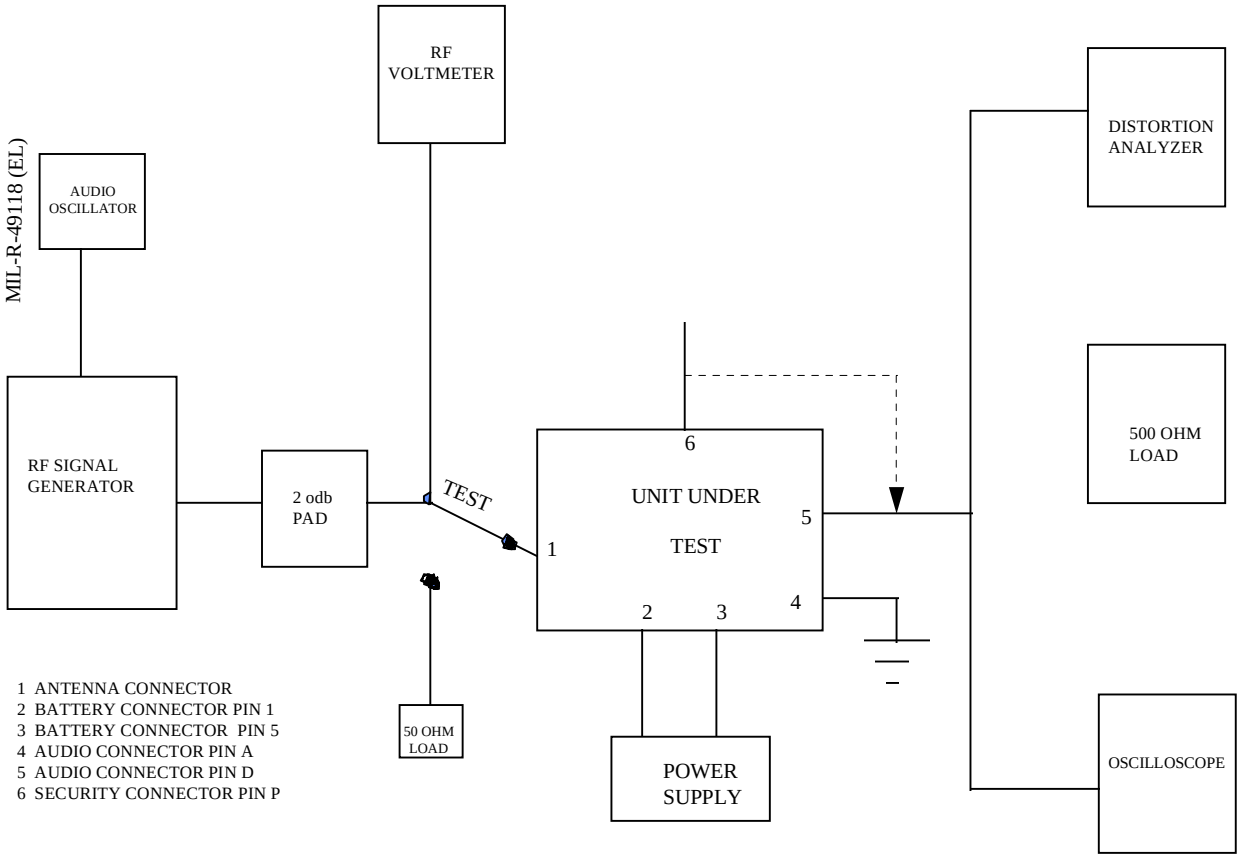


FIGURE 3 SENSITIVITY, AUDIO POWER OUTPUT, AUDIO DISTORTION,
AUDIO FREQUENCY RESPONSE AND WIDEBAND AUDIOFREQUENCY RESPONSE

APPENDIX A

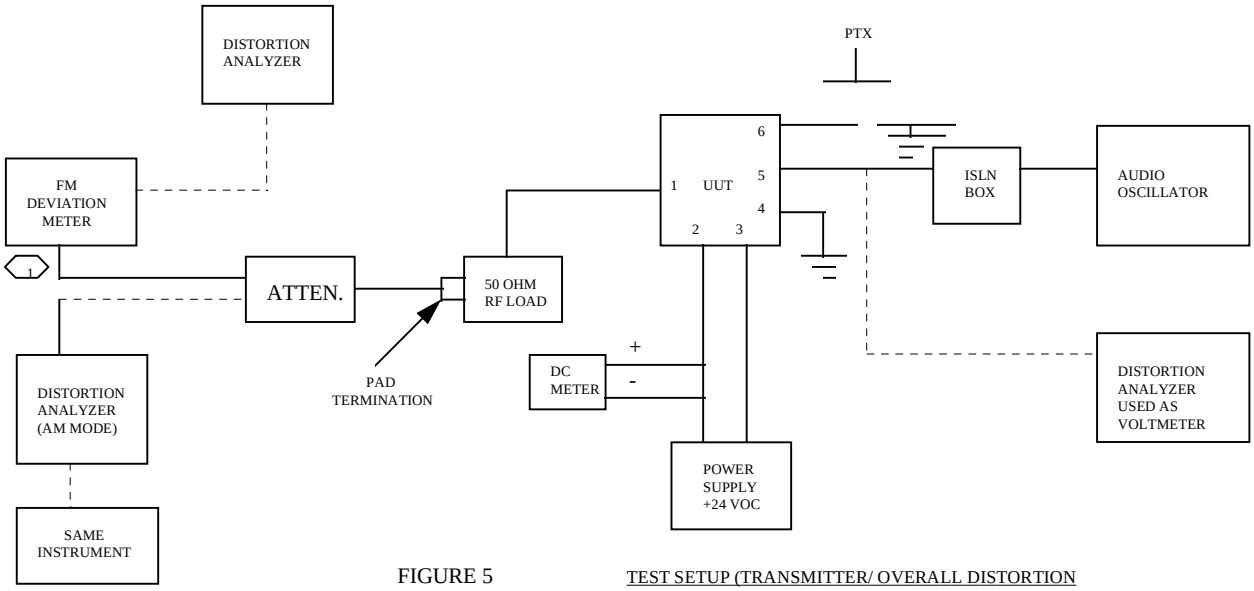


FIGURE 5 TEST SETUP (TRANSMITTER/ OVERALL DISTORTION

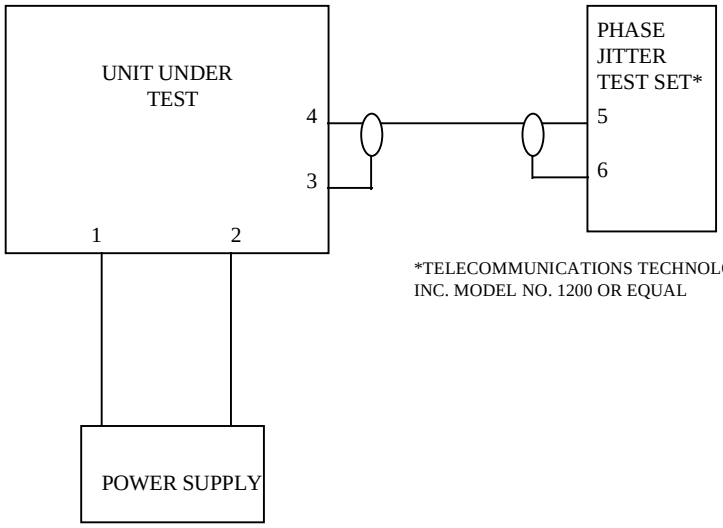
UUT Connections

1. Antenna 50 ohm Connector (BNC)
2. Battery Connector Pin (-)
3. Battery Connector Pin 5 (+)
4. Audio Connector Pin A (CND)
5. Audio Connector Pin D
6. Audio Connector Pin C

Notes

1 O dBen maximum input level

APPENDIX A



*TELECOMMUNICATIONS TECHNOLOGY INC. MODEL NO. 1200 OR EQUAL

MIL-R-49118 (EL)

1 BATTERY CONNECTOR PIN 1

2 BATTERY CONNECTOR PIN 5

3 AUDIO CONNECTOR PIN A

4 AUDIO CONNECTOR PIN B

5 INPUT CONNECTIONS ON REAR

6 TEST SET GROUND

FIGURE 6 PHASE JITTER

APPENDIX A

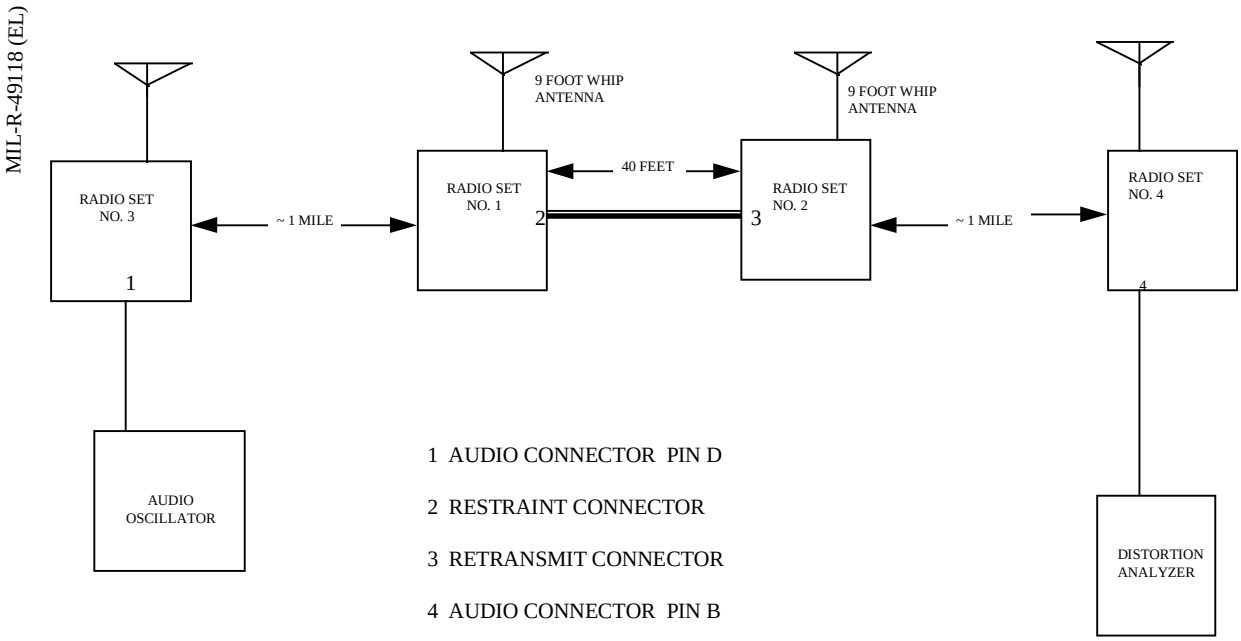


FIGURE 7 RETRANSMISSION

APPENDIX A

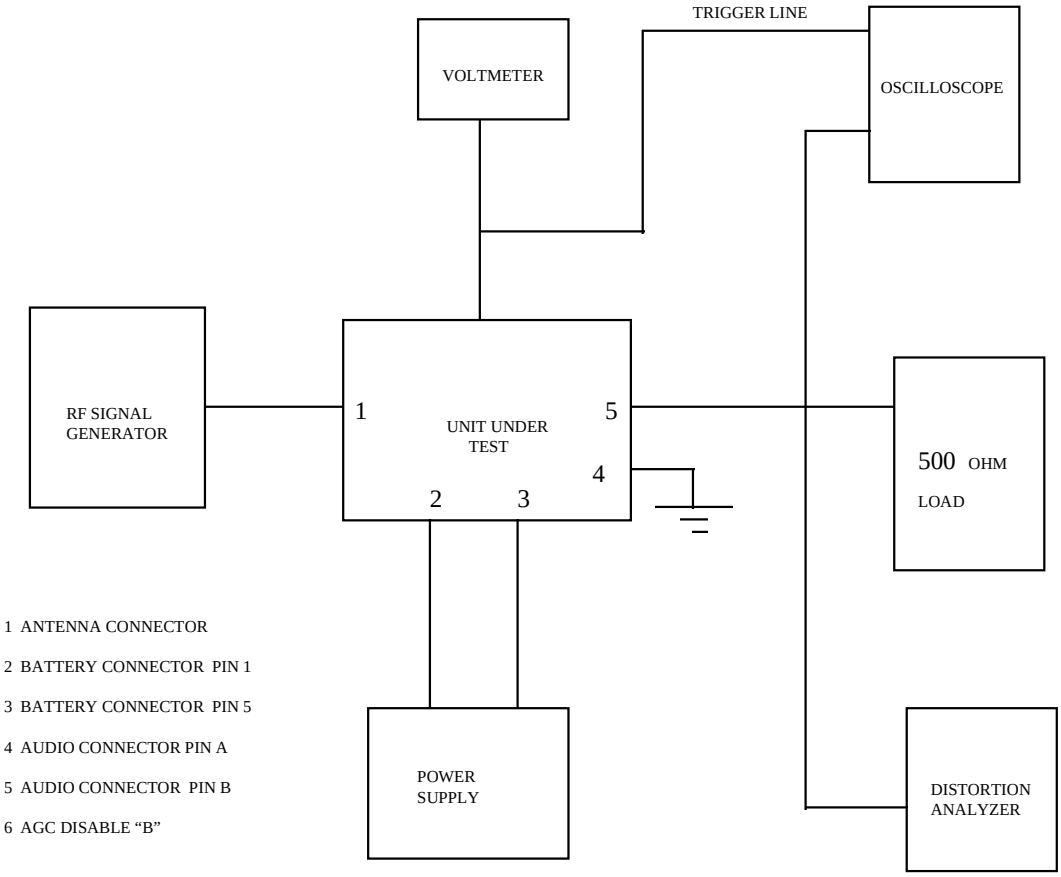
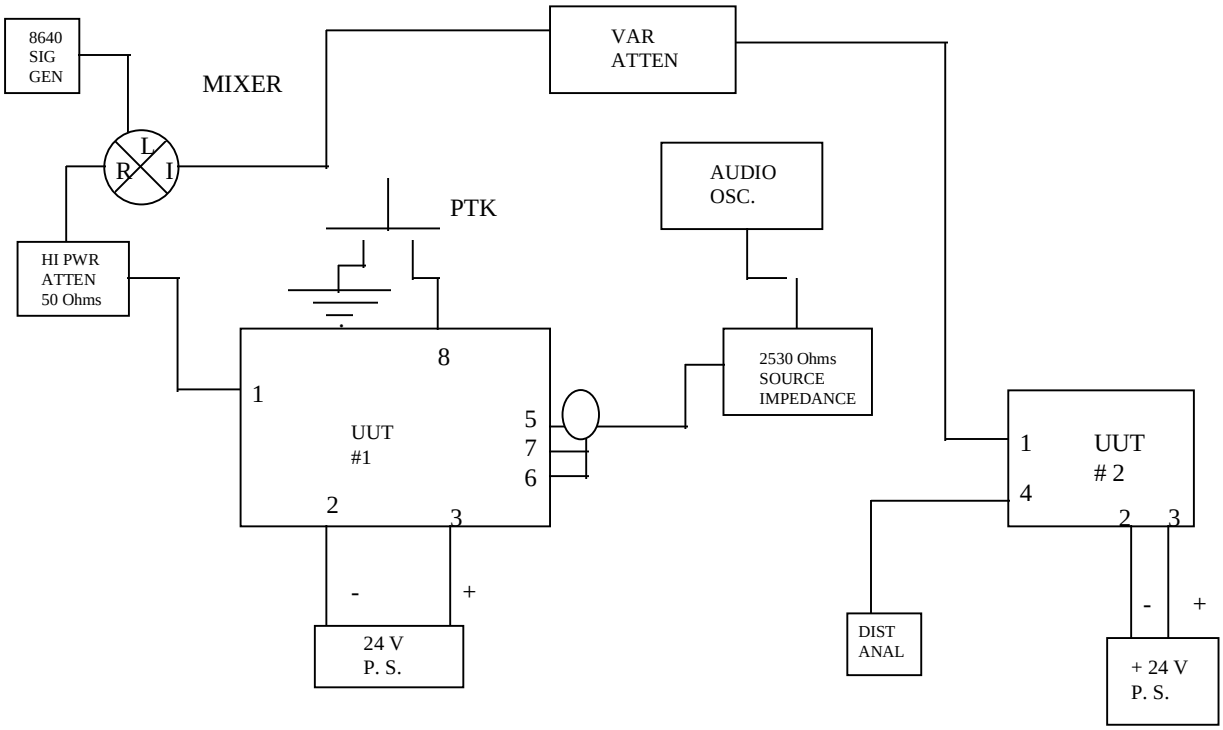


FIGURE 4 RECEIVER SQUELCH

APPENDIX A

OVERALL WIDEBAND PERFORMANCE - CALIBRATION



TEST SET UP

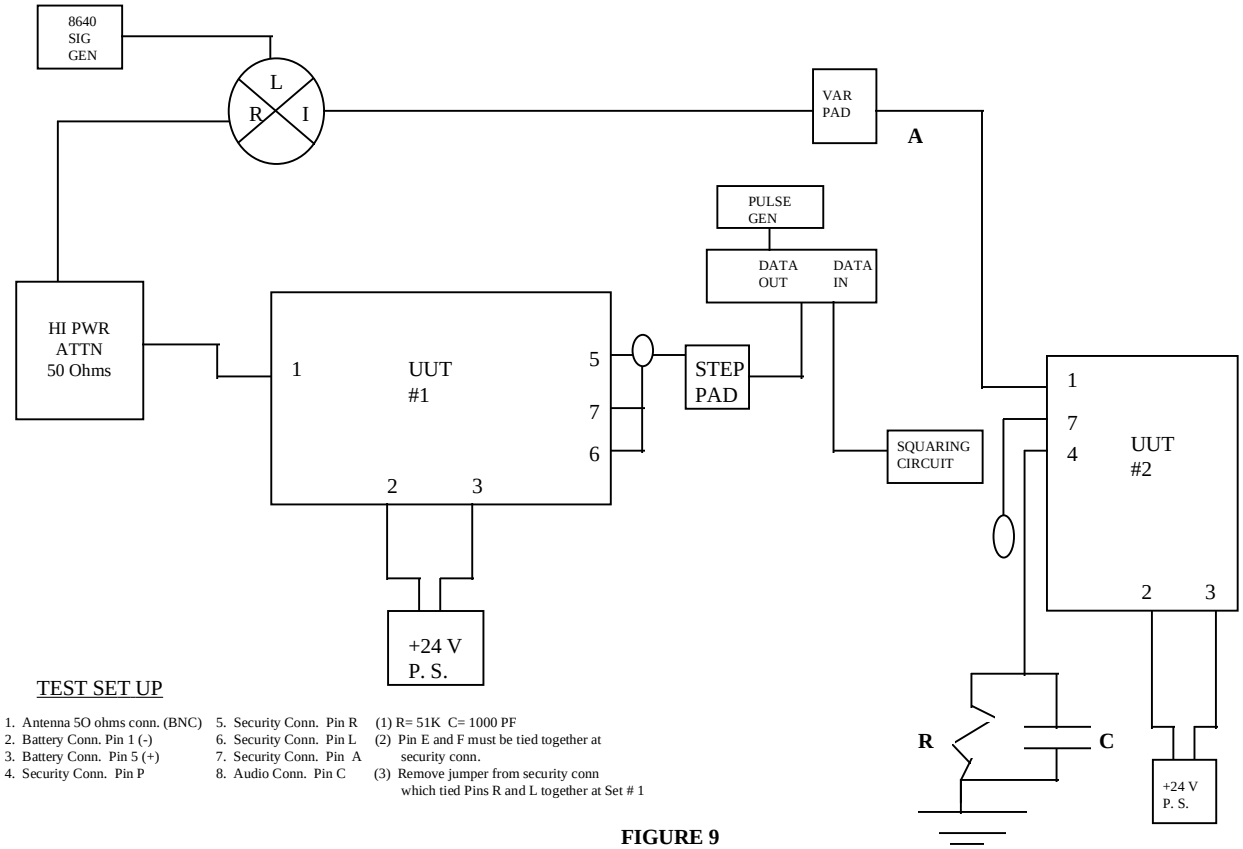
1. Antenna 50 ohms conn. (BNC)
2. Battery Conn. Pin 1
3. Battery Conn. Pin 5
4. Audio Conn. Pin B
5. Security Conn. Pin R
6. Security Conn. Pin L
7. Security Conn. Pin A
8. Audio Conn. Pin C

(1) Remove jumper from security conn. Pin L and R on UUT #1

FIGURE 8

APPENDIX A

OVERALL WIDEBAND PERFORMANCE - TEST SET UP



TEST SET UP

1. Antenna 5O ohms conn. (BNC)
2. Battery Conn. Pin 1 (-)
3. Battery Conn. Pin 5 (+)
4. Security Conn. Pin P
5. Security Conn. Pin R
6. Security Conn. Pin L
7. Security Conn. Pin A
8. Audio Conn. Pin C

(1) R= 51K C= 1000 PF
(2) Pin E and F must be tied together at security conn.
(3) Remove jumper from security conn which tied Pins R and L together at Set # 1

FIGURE 9

APPENDIX A

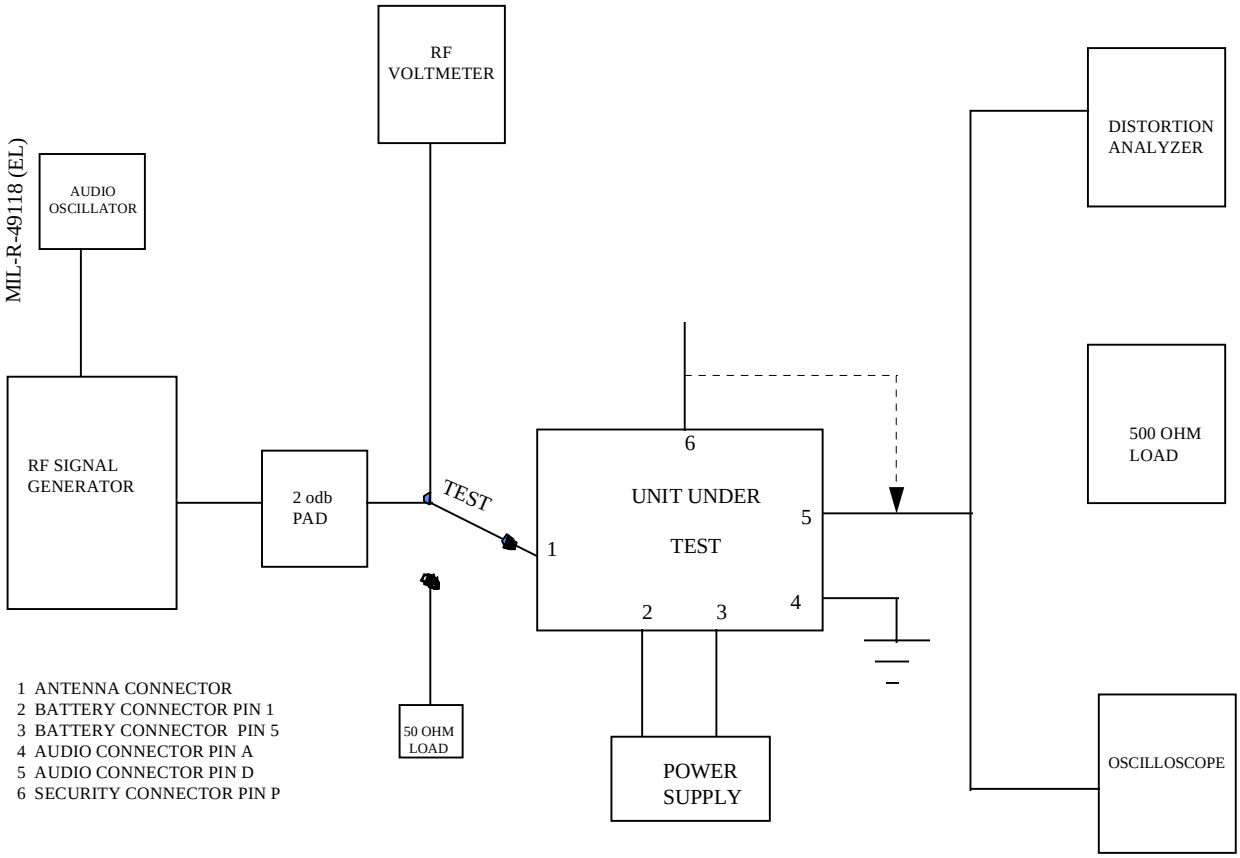


FIGURE 3 SENSITIVITY, AUDIO POWER OUTPUT, AUDIO DISTORTION,
AUDIO FREQUENCY RESPONSE AND WIDEBAND AUDIOFREQUENCY RESPONSE

APPENDIX A

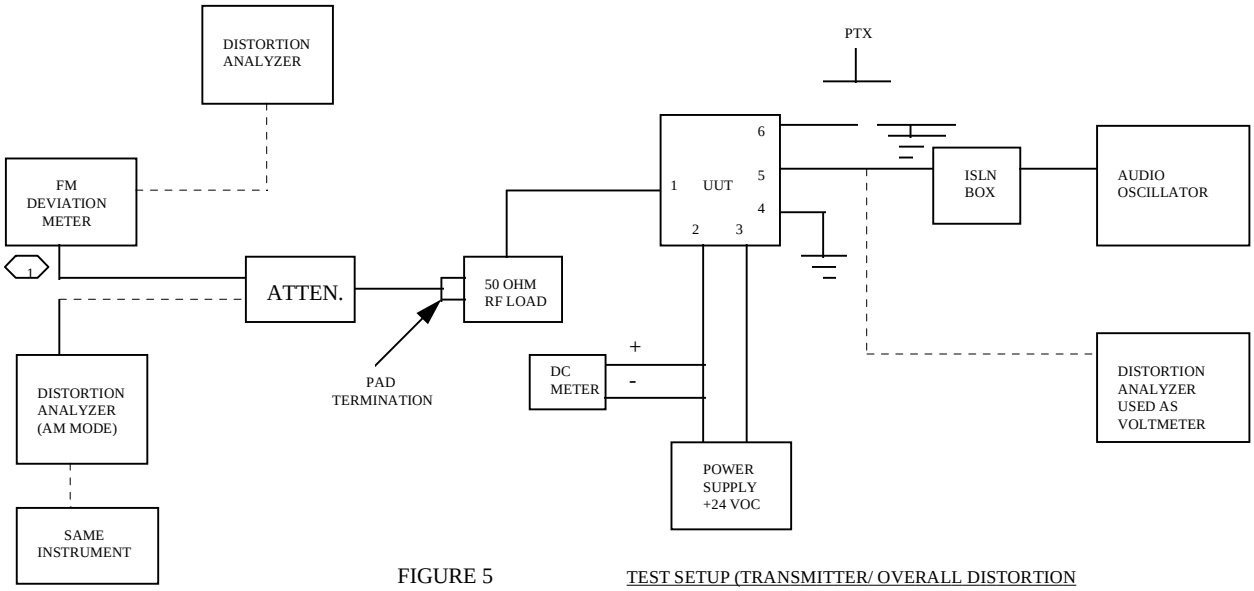


FIGURE 5 TEST SETUP (TRANSMITTER/ OVERALL DISTORTION

UUT Connections

1. Antenna 50 ohm Connector (BNC)
2. Battery Connector Pin (-)
3. Battery Connector Pin 5 (+)
4. Audio Connector Pin A (CND)
5. Audio Connector Pin D
6. Audio Connector Pin C

Notes

1 O dBen maximum input level

APPENDIX A

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3. DOCUMENT TITLE RADIO SET, AN/PRC-70() AND (UNITS OF)

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

5. REASON FOR RECOMMENDATION

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