

MIL-R-55698A(EL)
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 Superseding
 MIL-R-55698(EL)
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MILITARY SPECIFICATION

RADIO SET GROUP OA-1387()/GRC (UNITS OF)

1. SCOPE

1.1 This specification covers the following units of radio relay equipment designated Radio Set Group OA-1387()/GRC (see 6.1 and 6.6). The group is capable of transmitting and receiving, multichannel frequency division multiplexed circuits or wide band signals in the frequency range of 50 to 600 MHz (megahertz), 790 to 915 MHz, 840 to 965 MHz, and 1350 to 1875 MHz over an unobstructed line-of-sight path. The system transmits and receives signals in the base band frequency range from 250 to 108,000 Hz (hertz):

Radio Transmitter	T-302()/TRC
Radio Receiver	R-417()/TRC
Transformer, Power, Fixed	
Autotransformer	TF-167()/TRC
Power Supply	PP-685()/TRC
Accessory Kit	MK-133()/TRC

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL

NN-P-71	Pallet, Material, Handling, Wood, Double Faced, Stringer Construction
QQ-S-781	Strapping, Flat; Steel
PPP-B-601	Boxes, Wood, Cleated-Plywood
PPP-B-621	Boxes, Wood, Nailed and Lock-Corner
PPP-B-636	Box, Fiberboard
PPP-B-640	Boxes, Fiberboard Corrugated, Triple-Wall
PPP-F-320	Fiberboard; Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes
PPP-S-760	Strapping, Nonmetallic, (And Connectors)
PPP-T-76	Tape, Pressure-Sensitive Adhesive Paper, (For Carton Sealing)
PPP-T-97	Tape, Pressure-Sensitive Adhesive, Filament Reinforced

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SPECIFICATIONS

MILITARY

MIL-P-116	Preservation, Methods of
MIL-P-11268	Parts, Materials, and Processes Used in
	Electronic Equipment
MIL-M-13231	Marking of Electronic Items
MIL-F-14072	Finishes for Ground Signal Equipment

STANDARDS

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-147	Palletized Unit Loads; 40 in x 48 in. 4-way Partial and 4-way Pallets
MIL-STD-188	Military Communication System Technical Standards
MIL-STD-252	Wired Equipment, Classification of Visual and Mechanical Defects
MIL-STD-454	Standard General Requirements for Electronic Equipment
MIL-STD-781	Reliability Tests: Exponential Distribution
MIL-STD-810	Environmental Test Methods

DRAWINGS

ELECTRONICS COMMAND

SC-A-46439	List of Accessories for Package Tester
SC-GL-57265	Radio Transmitter T-302()/GRC Gages
SC-GL-57266	Radio Receiver R-417()/GRC Gages
SC-GL-57267	Power Supply PP-685()/GRC Gages
SC-GL-57269	Case CY-1341()/TRC Gages
SC-GL-57528	Case CY-1339()/TRC Gages
SC-GL-57529	Case CY-1340()/TRC Gages
SC-GL-57532	Case CY-1342()/TRC Gages
SC-DL-64547	Radio Receiver R-417()/TRC
SC-DL-64714	Power Supply PP-685()/TRC
SC-DL-64827	Radio Transmitter T-302()/TRC
SC-DL-66197	Accessory Kit MK-133()/TRC
SC-DL-66691	Transformer, Power, Fixed Autotransformer TF-167()/TRC

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

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3. REQUIREMENTS

3.1 Construction - The units on order shall be constructed in accordance with the following Drawing and Data List:

SC-DL-64547	Radio Receiver	R-417()/TRC
SC-DL-64714	Power Supply	PP-685()/TRC
SC-DL-64827	Radio Transmitter	T-302()/TRC
SC-DL-66197	Accessory Kit	MK-133()/TRC
SC-DL-66691	Transformer, Power	TF-167()/GRC
	Fixed Autotransformer	

3.2 First Article Samples - The contractor shall furnish three first article samples of Radio Set Group OA-1387()/GRC for approval, if required by the Invitation for Bid and contract (see 4.3).

3.3 Finish, protective - Equipment shall be given protective finish in accordance with Specification MIL-F-14072. This includes finish of hardware, such as handles, hinges, screws, etc., and necessary touchup after mounting. The final paint film on the front panel surfaces of the transmitter, receiver and power supply shall be gray color, semigloss enamel. The final paint film on all other Type I surfaces shall be green color (olive drab), semigloss enamel. The finishes shall match color chips provided by the procuring agency, (see 6.3).

3.4 Marking.

3.4.1 General - Marking shall conform to Specification MIL-M-13231 (see 4.4). Front panel marking shall be group 1 as described in that specification.

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

3.4.3 Serial numbers - All units listed in 1.1 shall have serial numbers.

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

3.6 Fungus - The equipment (including accessories) shall show no evidence of viable fungus or corrosion when subjected to the test specified in 4.13. Corrosion is any visible degradation that can be attributed to flaky, pitted, blistered, or otherwise loosened finish or metal surface.

3.7 Interchangeability - Like units, assemblies, subassemblies and replaceable parts shall conform to Requirement 7 of MIL-STD-454 (see 4.14).

3.8 Service conditions - The equipment shall meet the following service conditions:

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3.8.1 Operation - Continuous use for a period of 1 year, under the environmental requirements specified in 3.8.2 through 3.8.8, with a duty cycle of 24 hours "ON" per day with no more than normal maintenance and replacement of parts. Where the contractor is required to make a selection of parts, materials, processes, construction methods, etc., he shall be guided by this requirement. Approval of the first article (see 3.2) shall be considered as compliance with this requirement.

3.8.2 Temperature.

3.8.2.1 Low - During testing as specified in 4.12.1.1, the equipment shall meet the following requirements:

<u>Measurements</u>	<u>Req Para</u>	<u>Insp Para</u>
<u>Transmitter T-302()/TRC</u>		
Power Output	3.12.2	4.8.1
Metering	3.12.9(d)	4.8.8
Alarm	3.12.6	4.8.5
Frequency Stability	3.12.3	4.8.2
AFC	3.12.4	4.8.3
<u>Receiver R-417()/TRC</u>		
AFC	3.13.3	4.9.2
Metering	3.13.2	4.9.1
Squelch and Alarm	3.13.7	4.9.6
Crystal Cal Check	3.13.4	4.9.3
<u>Power Supply PP-685()/TRC</u>		
AC - Microphone	3.15.1	4.11.1
+150v output	3.15.2	4.11.2
750v output	3.15.3	4.11.3
<u>Autotransformer TF-167()/TRC</u>		
Output Voltage	3.14.1	4.10.1

After testing, the equipment shall meet full specification performance for these measurements.

3.8.2.2 High - During testing as specified in 4.12.1.2, the equipment shall meet the requirements listed in 3.8.2.1. After testing, the equipment shall meet full specification performance for these measurements.

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3.8.3 Humidity (Moisture-resistance) - During testing as specified in 4.12.2, the equipment shall meet the requirement listed in 3.8.2.1. After testing, the equipment shall meet full specification performance for these measurements.

3.8.4 Altitude (elevation) - The equipment shall meet full specification performance for the requirements listed in 3.8.2.1 both during and after testing as specified in 4.12.3.

3.8.5 Immersion - Cases CY-1339()/TRC, CY-1340()/TRC, CY-1341()/TRC, and CY-1342()/TRC, without contents, and Transformer, Power, Fixed Auto Transformer TF-167()/TRC shall show no evidence of leakage after they are tested as specified in 4.12.4.

3.8.6 Orientation - When tested as specified in 4.12.5, the equipment shall meet full specification performance for the requirements listed in 3.8.2.1.

3.8.7 Vibration - With the equipment shock-mounts, where used, blocked, the amplitude of vibration of the equipment shall not exceed twice the amplitude of the vibration applied to the equipment at any frequency between 10 and 55 Hz (see 4.12.6).

3.8.8 Bounce and Shock - The equipment shall be capable of meeting the requirements of Table 1.

Table 1 - Bounce and Shock

Paragraph heading	Test Para	Performance after test
Bounce	4.12.7	Specified performance. (Notes A and B) - No physical damage except minor surface abrasion.
Shock; bench-handling	4.12.8	Specified performance (Note B) No physical damage.
Shock; drop	4.12.9	Operable. (Note B). Any physical damage shall be minor only.
NOTE A: With the equipment shock-mounts (if any) blocked, the amplitude of vibration of any part, subassembly, or structural member of the equipment shall not exceed twice the amplitude of the vibration applied to the equipment at any frequency between 10 and 55 hertz.		
NOTE B: The equipment shall meet specified performance for the requirements listed in 3.8.2.1.		

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3.9 Power source - Electrical units of Radio Set Group OA-1387()/GRC shall meet the requirements of this specification when included as part of a system supplied with 115 or 230 volts a.c. ± 10 per cent, single phase, 47.5 to 63.5 Hz power source.

3.10 Radio Frequency range - The radio frequency range of the transmitter and receiver covered by this specification is determined by the tuners being used. References in this specification to "tuner(s)" shall be understood to mean the plug-in units listed in 3.12 or 3.13 as applicable. The equipment will be tested in only the 100-225 MHz frequency range ("B band") to determine compliance with this specification. (see 4.8.10 and 4.9.1)

3.11 Preconditioning - All equipments on order shall be capable of meeting the requirements herein without subsequent processing, after subjection to the preconditioning of 4.7.

3.12 Radio Transmitter T-302()/TRC - Radio Transmitter T-302()/TRC shall provide coverage in the frequency range of 100 MHz to 225 MHz, when operated with Amplifier, Radio Frequency AM-912()/TRC (see 4.8.10).

3.12.1 Plug-in subassemblies - Each Radio Transmitter T-302()/TRC shall meet full specification requirements with random selection of the following subassemblies:

- a. Pulsed Oscillator and Mixer
- b. Crystal Oscillator and Pulse Generator
- c. Alarm
- d. Automatic Frequency Control (AFC)
- e. Exciter
- f. Baseband Amplifier and Metering
- g. IF Amplifier and Discriminator

3.12.2 Power output.

3.12.2.1 Amplifier, Radio Frequency AM-912()/TRC ("B" Band tuner) - The r.f. power delivered by the transmitter, shall be 70 watts minimum when operated into a 52 ohm resistive load at any frequency in the 100 to 225 MHz range (see 4.8.1.1).

3.12.2.2 Exciter - When the transmitter is operated without any of its respective tuners, the r.f. power delivered to a 52 ohm resistive load shall be a minimum of 13 watts at any frequency in the range of 50 MHz to 112.5 MHz (driver fundamental), and 4 watts minimum at any frequency in the range of 100 MHz to 225 MHz (driver second harmonic) (see 4.8.1.2).

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3.12.2.3 Low line voltage - With power supply input voltage reduced to 90 per cent of the nominal rated voltage, and with no other readjustment, transmitter r.f. power output shall be not less than 60 per cent of the level obtained with nominal line voltage (see 4.8.1.3).

3.12.3 Frequency stability - Under the test conditions specified in paragraph 4.8.2, the operating frequency shall not vary more than plus or minus 25 kHz or plus or minus 0.02 per cent, whichever is greater.

3.12.4 Automatic frequency control.

3.12.4.1 Frequency settability - The basic oscillator r.f. settability shall be within 0.005 per cent ± 4 kHz of the desired frequency with the AFC circuit operating normally (see 4.8.3.1).

3.12.4.2 AFC control - The knob shall return to its original setting within 0.005 per cent to ± 4 kHz of the desired frequency (see 4.8.3.2).

3.12.4.3 AFC capacitor range - The range of the AFC capacitor, at room ambient temperature, shall be not less than 140 kHz total or greater than 600 kHz total at any frequency in the 50 to 112.5 MHz basic oscillator range (see 4.8.3.3).

3.12.5 Pulsed Oscillator Dial - The calibration accuracy of the dial of the pulsed oscillator shall be within ± 4 channels when the transmitter has been optimum tuned at any channel within its range (see 4.8.4).

3.12.6 Alarm (see 4.8.5) - An audible and visible alarm, capable of being adjusted in sensitivity, shall be provided to indicate a reduction of 3 dB in normal power output. A three position toggle switch labeled "NOR", "REV", and "OFF" shall function as follows:

a. Place "ALARM" switch in "NOR" position. For r.f. output power levels ranging from normal to approximately 50% of normal, the alarm shall remain silent. For r.f. output power less than 50% of normal, the indicator lamp will glow and the buzzer will sound.

b. Place "ALARM" switch in "REV" position. For r.f. output power levels ranging from normal to approximately 50% of normal, the indicator lamp will be extinguished and the buzzer will sound. For r.f. output power less than 50% of normal, the indicator lamp will glow and the buzzer will be silent.

c. Place "ALARM" switch in "OFF" position. Buzzer will be silenced for all conditions. Lamp will glow under conditions of low power.

3.12.6.1 Failure of the transmitter cooling air supply shall cause the alarm to operate and shall remove the 750 volt supply from the power tubes.

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3.12.7 Orderwire noise level - The signal to noise ratio as measured at the receiver 600 ohm terminal with F1A (see MIL-STD-188) weighting shall be at least 45 dB (see 4.8.6).

3.12.8 Transmitter interchannel crosstalk - The ratio of the average power measured at the "RECEIVER" cable connection 135 ohm terminals in the 60-64 kHz band to the average power measured in the 12-16 kHz band shall be a minimum of 43 dB. The ratio of the average power measured in the "RECEIVER" cable connection 135 ohm terminals in the 60-64 kHz band to the average power measured in the 104-108 kHz band shall be a minimum of 43 dB (see 4.8.7).

3.12.9 Metering circuits - The 0 dB level point of the system is defined as the transmitter cable connection terminals. In the transmitter, the "MEASURE" metering circuit shall meet the following requirements: (see 4.8.8)

- a. "1 KC IN" position of the "MEASURE" switch

<u>"MEASURE" Meter Reading</u>	<u>Input Level at Zero Level Point</u>	
0	+10 dBm	±2.0 dB
+1	+11 dBm	±2.0 dB
+2	+12 dBm	±2.0 dB
-1	+ 9 dBm	±2.0 dB
-2	+ 8 dBm	±2.0 dB
-3	+ 7 dBm	±2.0 dB

- b. "68 KC IN" position on the "MEASURE" switch

<u>"MEASURE" Meter Reading</u>	<u>Input Level at Zero Level Point</u>	
0	0 dBm	±2.0 dB
+1	+1 dBm	±2.0 dB
+2	+2 dBm	±2.0 dB
-1	-1 dBm	±2.0 dB
-2	-2 dBm	±2.0 dB
-3	-3 dBm	±2.0 dB

- c. The ratios of the 1 kHz and the 68 kHz line power to the "MOD 1 KC IN" and "MOD 68 KC IN" respectively shall not exceed ± 1.5 dB.

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3.12.9 Metering circuits (Contd)

d. The following meter readings shall be obtained when the transmitter is tuned to optimum output at any r.f. frequency:

Transmitter'MEASURE' Switch Position

'RF CHAN TUNE"
'1 KC ADJ "
'MTR CAL"
'DISCR RF DRIVE"
'1 KC IN"
'68 KC IN"
'MOD 68 KC IN"
'MOD ADJ"

'MEASURE' Meter Reading

10-45 Microamperes (ua)
0 dB (adjust)
0 dB (adjust)
0 dB (adjust)
0-3 ua
0-3 ua
0-3 ua
0 dB (adjust)

'XTAL SEL' Switch Position

'DECADE CHANS"
'UNIT CHANS"
'DISCR CENTER"

'FREQ DRIFT' Meter Reading

0 ua
0 ua
0 ua (adjust)

'TEST' Switch Position

'OSC MOD PLATE"
'DRIVER GRID"
'DRIVER CATH"
'MULT GRID"
'MULT CATH"
'PWR AMPL GRID"
'PWR AMPL CATH"

'TEST' Meter Reading

8 - 18 ua
4 - 45 ua
25 ua maximum
30 ua (adjust)
18 ua maximum (adjust)
15 - 30 ua
25 ua maximum

Power Supply

Plate Volts
Screen Volts

Meter Reading

850 \pm 50 VDC
180-275 VDC

3.12.10 Dial Accuracy - The 'DRIVER TUNE' dial calibration shall be accurate within ± 15 channels of the r.f. channel being tuned (see 4.8.9).

3.12.11 Modulation Alignment - The level of 24 kHz input signal which obtains the first carrier null (carrier deviation of 2.4 radians) at any carrier frequency in the 100 to 225 MHz band shall be 11.9 dBm \pm 1 dB (see 4.8.11).

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3.12.12 Modulation Response - The modulation response at any audio frequency from 1 kHz to 108 kHz shall be within $\pm .5$ dB of the desired response when referenced to the response at 1 kHz. The response from 250 Hz to 1000 Hz shall be within -0.9 to +0.4 dB of the response at 1 kHz (see 4.8.12).

3.12.12.1 Pre-emphasis network - The audio output at any frequency to the audio output at 1 kHz expressed in dB shall meet the following requirements:

<u>Modulating Frequency (kHz)</u>	<u>Desired Response (dB)</u>	<u>Tolerance (dB)</u>
0.25	0	-0.9 to +0.4
0.50	0	-0.9 to +0.4
1.0	0 (reference)	-----
4	0.10	± 0.5
8	0.30	± 0.5
12	0.55	± 0.5
16	0.82	± 0.5
20	1.10	± 0.5
24	1.45	± 0.5
28	1.85	± 0.5
32	2.25	± 0.5
36	2.70	± 0.5
40	3.10	± 0.5
44	3.55	± 0.5
48	3.95	± 0.5
52	4.30	± 0.5
56	4.65	± 0.5
60	4.95	± 0.5
64	5.30	± 0.5
68	5.60	± 0.5
78	6.3	+0.5 to -0.9
88	6.8	+0.5 to -0.9
98	7.4	+0.5 to -0.9
108	7.8	+0.5 to -0.9

3.12.13 1000 Hz tone generator - The 1000 Hz ± 25 Hz tone voltage appearing at connector J101, when measured in accordance with 4.8.13, shall be 10 dBm ± 0.5 dB.

3.12.14 Controls (see 4.8.15) =

a. The discriminator meter shall read clockwise for increasing frequency changes and counter-clockwise for decreasing frequency changes of the basic oscillator.

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3.12.14 Controls (see 4.8.15) - (Contd)

b. The main oscillator tuning control shall turn clockwise for increasing frequency settings.

c. Clockwise rotation of the "AFC" control condenser shall increase frequency and counter-clockwise rotation shall decrease frequency.

d. All r.f. coupling controls shall be calibrated to allow resetting of the coupling to a previously set value.

e. The plate of the driver stage shall tune the range 50 to 225 MHz and shall have the letters A, B, C, and D in the appropriate places on the dial to indicate band being tuned.

f. The movable index associated with the "RF CHANNEL TUNE" dial shall comply with the following:

(1) When the transmitter is aligned with the "XTAL SEL" switch set to the "DECADE CHANS" position, the "AFC" knob at zero and the "FREQ. DRIFT" meter at zero, the dial index shall be capable of being set to the decade channel being tuned for any decade channel setting in the entire range of the "RF CHANNEL TUNE" dial.

(2) The amount of travel of the dial index shall be less than the spacing between any two adjacent decade channel markings on the "RF CHANNEL TUNE" dial.

g. Adjust of "MOD TRIM" control shall provide a condition of maximum modulation sensitivity. Maximum sensitivity shall occur within ± 70 degrees of the midposition of the control.

h. With the AFC disabled and the "RF CHANNEL TUNE" dial locked, rotation of the "INDEX" control shall not change the oscillator frequency by more than a 5 microampere indication on the "FREQ DRIFT" meter.

3.12.15 Order wire control channel - When tested in accordance with 4.18.14, the 1000 Hz signal appearing at connector J101 shall be 0.36 to 0.43 volts.

3.12.16 Blower motor, rotation - The blower motors shall rotate in the direction that will force air out of the front grill.

3.13 Radio Receiver R-417()/TRC - The receiver shall provide coverage in the frequency range of 100 to 225 MHz when operated with the radio frequency amplifier-converter, AM-913()/TRC (see 4.9.1).

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3.13.1 Plug-in subassemblies - Each Radio Receiver R-417()/TRC shall include the following subassemblies, and shall be capable of meeting full specification requirements with random selection of these plug-in subassemblies:

- a. IF Amplifier and Discriminator
- b. Base Band Amplifier and Order Wire
- c. Limiter Discriminator and AFC
- d. Power
- e. Calibrator

3.13.2 Metering -

a. When tested as outlined in 4.9.1, the following limits shall be met with the 'MEASURE' switch as indicated:

<u>'MEASURE' SWITCH POSITION</u>	<u>'MEASURE' METER REQUIREMENTS</u>
'OSC'	ON SCALE
'MIX'	ON SCALE
'SIG LEV'	30 ± 7 ua
'1ST LIM'	3 to 20 ua
'2ND LIM'	20 to 50 ua

b. With a 1 kHz signal fed into the receiver, the following limits shall be met when the input is varied in amplitude:

<u>'MEASURE' METER READING (DB)</u>	<u>AUDIO POWER METER OUTPUT REQUIREMENTS</u>
-3	7 ± 1.5 dBm
-2	8 ± 1.5 dBm
-1	9 ± 1.5 dBm
0	10 ± 1.5 dBm
+1	11 ± 1.5 dBm
+2	12 ± 1.5 dBm

c. With a 68 kHz signal fed into the receiver, the following limits shall be met when the input is varied in amplitude:

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3.13.2 Metering

c. (Contd) -

"MEASURE" METER
READING (dB)AUDIO POWER METER OUTPUT
REQUIREMENTS

-3	-3 \pm 1.5 dBm
-2	-2 \pm 1.5 dBm
-1	-1 \pm 1.5 dBm
0	0 \pm 1.5 dBm
+1	+1 \pm 1.5 dBm
+2	+2 \pm 1.5 dBm

3.13.3 AFC Range - The AFC Range, when tested as specified in paragraph 4.9.2, shall meet the requirements specified below:

3.13.3.1 Pull-in Range (see 4.9.2.1) - When tested in accordance with 4.9.2, the AFC motor shall re-tune the receiver to the incoming signal (back to zero on the "FREQ DRIFT" meter), with the "AFC" knob coming to rest between 0 and +5 when the incoming signal goes above the tuned receiver frequency, and between 0 and -5 when the incoming signal goes below the tuned receiver frequency.

3.13.3.2 Throw-out Range (see 4.9.2.2) -

a. When the "AFC" knob is rotated counter-clockwise from 0 to +5, the local oscillator frequency shall be increased. The increase in local oscillator frequency shall be not less than 600 kHz and not more than 2.0 MHz.

b. When the "AFC" knob is rotated counter-clockwise from 0 to -5, the local oscillator frequency shall be decreased. The decrease in the local oscillator frequency shall be not less than 600 kHz and not more than 2.0 MHz.

3.13.4 Calibrator Tests - There shall be a harmonic output of 25 micro-volts minimum at each red calibration mark on each tuner dial. There shall be no spurious output that causes a total deflection on the "FREQ DRIFT" meter in excess of 20 Microamperes (see 4.9.3).

3.13.5 Overall selectivity - Overall selectivity of the receiver to signals removed 1.0 MHz, as measured in 4.9.4, shall be at least 25 dB.

3.13.6 Receiver Output -

a. When tested in accordance with 4.9.5, and the receiver output adjusted for +16 dBm \pm 0.5 dB, the "OUTPUT ADJ." knob setting shall be between 8 and 28.

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3.13.6 Receiver Output - (Contd)

b. Within a 20 kHz modulating frequency, the change in receiver output in going from the 135 OHM to the 600 OHM position and taking into account the repeat coil loss shall be 10 ± 0.5 dB.

3.13.7 Squelch and Alarm (see 4.9.6) -

a. With a 250 uv input, there shall be a point in the squelch knob rotation where the receiver shall be squelched as indicated by a marked drop in the receiver output as measured on the power meter, lighting of the 'ALARM' lamp, and sounding of the buzzer, with the 'ALARM' switch in the 'NOR' position. The buzzer shall be quieted when the 'ALARM' switch is thrown to the 'REV' position.

b. With a 6 uv input and the 'ALARM' switch in the 'REV' position, there shall be a setting, less than maximum clockwise, where the receiver squelch relay disengages as indicated by the marked increase in the audio output. At the same moment, the 'ALARM' lamp shall be extinguished and buzzer shall sound.

3.13.8 Receiver quieting -

a. The filter output shall meet the following requirements:

Filter Output Requirement

Unmod. RF Sig. Gen. Input uv.	Filter used	"B" Band Output
10,000	4 kHz - 100 kHz	Less than minus (-) 53 dBm
7	4 kHz - 100 kHz	Less than -16 dBm
70	4 kHz - 100 kHz	Less than -36 dBm
70	12 kHz - 16 kHz	Less than -54 dBm
70	60 kHz - 64 kHz	Less than -47 dBm
70	104 kHz - 108 kHz	Less than -40 dBm
70	Noise measuring set	Less than -35 dBm

b. With 70 uv input to the receiver 'ANTENNA' jack, at the same channels used for filter measurements, the signal to noise ratio with FIA weighting shall be at least 38 dB (see 4.9.7).

3.13.9 Base-band frequency response (de-emphasis) - With a constant input to the transmitter, the receiver output shall be constant within the following limits (see 4.9.8):

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3.13.9 Base-band frequency response (de-emphasis) - (Contd)

<u>FREQ</u> <u>(kHz)</u>	<u>TOLERANCE FROM</u> <u>1 kHz REF - (dB)</u>
0.250	+0.4 to -0.9
1.0	0
4.0	±0.5
8.0	±0.5
16.0	±0.5
32.0	±0.5
48.0	±0.5
68.0	±0.5
88.0	±0.5
108.0	-0.5 to +0.9

3.13.10 Interchannel modulation distortion - The "in band" noise through the 60 to 64 kHz filter to the distortion products in the 12 to 16 kHz and 104 to 108 kHz filters shall be at least 43 dB for each test frequency (see 4.9.9).

3.13.11 Order-wire characteristics -3.13.11.1 Phone output (see 4.9.10.1) -

- a. The phone output corrected for filter loss shall be -15 dBm ± 4 dB.
- b. The phone fidelity, corrected for filter loss, shall meet the following requirements:

<u>FREQ</u> <u>(Hz)</u>	<u>OUTPUT</u> <u>(dB)</u>	<u>TOLERANCE</u> <u>(dB)</u>
1000	REFERENCE	0
250	+2 dB	±2 dB
2000	-5 dB	±2 dB
4000	AT LEAST -30 dB	

3.13.11.2 Microphone connection -

- a. When tested in accordance with 4.9.10.2, the reading on the power meter shall be 0 dBm ± 2 dB. With the VTVM connected across terminals B and D of J135, the reading of the VTVM shall be 0.62 to 0.98 volts.
- b. With the above reading as a reference, the microphone fidelity shall be as follows:

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3.13.11.2 Microphone connection -

b. (Contd) -

<u>FREQ</u> <u>(Hz)</u>	<u>OUTPUT</u> <u>(dB)</u>	<u>TOLERANCE</u> <u>(dB)</u>
250	-5	±2
1000	REFERENCE	0
2000	-2.5	±2
4000	AT LEAST -30	

c. The microphone limiters shall function as follows:

<u>INPUT</u> <u>(VOLTS)</u>	<u>OUTPUT</u> <u>(dB)</u>	<u>TOLERANCE</u> <u>(dB)</u>
.22	REFERENCE	0
.22 +20 dB	+9.4	±2

d. The phone output shall be -25 dBm ±7 dB.

3.13.12 Crosstalk - When tested in accordance with 4.9.11, the following requirements shall be met:

<u>FREQ</u> <u>(kHz)</u>	<u>OUTPUT</u> <u>(VOLTS)</u>
1.0	Less than .078
4.0	Less than .078
10.0	Less than .025
30.0	Less than .025
68.0	Less than .025
108.0	Less than .025

3.13.13 Ringer sensitivity - The input as measured with a VTVM across terminals C and D shall be less than .123 volts, when tested in accordance with 4.9.12.3.13.14 1600 Hz Oscillator -

a. With the "TALK-RING" switch depressed to "RING", the voltage across terminals B and D shall be 1.55 to 3.88 volts. The "RING" lamp shall light and the buzzer shall sound (see 4.9.13).

b. With the "TALK-RING" switch released, the "RING" lamp shall be extinguished and the buzzer silenced within 1 second after the "TALK-RING" switch is released.

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3.14 Fixed power Autotransformer TF-167()/TRC -3.14.1 Output Voltage (see 4.10.1) -

- a. With 115 v applied to x-y of J1, the voltage at J2 shall be:

<u>SWITCH POSITION</u>	<u>OUTPUT VOLTAGE (VOLTS)</u>
1	102.0 \pm 5
2	107.5 \pm 5
4	121.0 \pm 5
5	130.0 \pm 5
6	140.5 \pm 5

- b. With 115 v applied to z-x of J1, the voltage of J2 shall be 1/2 line voltage \pm 5 v.

3.15 Power Supply PP-685()/TRC -3.15.1 AC and Microphone supplies (see 4.11.1) -

- a. Resistance loads at the terminals of J3 shall provide approximately the load currents tabulated below:

<u>TERMINALS</u>	<u>LOAD CURRENT</u>
L to W	2.0 AMPS A. C.
A to K	6.25 AMPS A.C.
B to C	6.0 AMPS A. C.
E to F	6.0 AMPS A. C.
V to N	75 ma D. C.

- b. Meter "AC VOLTS" M1 shall indicate within ± 4 volts of exact line voltage.

- c. Indicator lamp "FIL" shall indicate on.

- d. The output voltages, measured across the terminals of jack "TRANSMITTER" shall be within the limits tabulated below:

<u>TERMINALS</u>	<u>VOLTAGE</u>
L to W	115 \pm 2% AC
A to K	2.85 \pm 0.1 AC
B to C	6.7 \pm 0.25 AC
E to F	6.7 \pm 0.25 AC
V to N	-12 \pm 1.5 DC

- e. The ripple on the -12 volt supply shall be less than 500 millivolts rms (75 ma load).

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3.15.2 +150 Volt rectifier output (see 4.11.2) -

a. With the "150V DC" switch turned on, indicator lamp "150V DC" shall indicate on.

b. Adjust the load to 290 ma with the control "150V ADJ" set to deliver 150 volts. Control "150V ADJ" shall provide adjustment over the range 140 to 160 volts. The line regulation shall be less than ± 2.0 volts for any setting in line voltage from 104.5 to 126.5 volts. The ripple voltage under these conditions shall be less than 6 millivolts.

c. At 150 volts, test meter "DC Volts" shall be accurate within ± 7.5 volts.

d. With line voltage adjusted to 115 ± 2 volts and the output at terminals M to S set for 150 volts with 290 ma of load, the output across terminals T and S shall be within the limits 240 ± 20 volts DC. The ripple voltage shall be less than 70 millivolts rms.

3.15.3 750 Volt rectifier output -

a. For the conditions outlined in 4.11.3, the non-regulated supply shall meet the following requirements:

<u>750V ADJ SWITCH POSITION</u>	<u>OUTPUT ACROSS TERMINALS A TO C</u>	
	<u>VOLTS</u>	<u>MAX RIPPLE</u>
1	310 ± 20	5 volts RMS
2	670 ± 25	10 volts RMS
3	730 ± 30	10 volts RMS
4	780 ± 30	15 volts RMS
5	830 ± 35	15 volts RMS
6	875 ± 35	15 volts RMS

b. With switch "750V ADJ" set at any position and the load adjusted to obtain 750 volts across terminals H to N, check the accuracy of meter "DC VOLTS" in the 750V position. Meter shall indicate 750 ± 20 volts. With the line voltage reduced to 103.5 volts, there shall be no interruption in the 750 volt supply. Under the above conditions, check that removal of the chassis from the integral case, a distance of between 3 and 5 inches, results in interruption of the high voltage supply and returning chassis to normal operating position restores supply.

c. Operate switches "150V DC" and "750V DC" to "ON". Operate switch "115V AC" to "OFF". After a 5 minute standby, operate switch "115V AC" to "ON", and observe the time interval before the 750 volt supply is energized. (Line voltage during this interval must be maintained at 115 ± 2 volts). The interval required shall be not less than 35 seconds and not more than 80 seconds from the time the switch "115V AC" is operated "ON".

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3.15.3 750 Volt rectifier output - (Contd)

d. For momentary interruptions of line voltage obtained by switching the main AC power switch off and on, there shall be no time delay between the restoration of the line voltage and restoration of the 750 volt supply.

e. With line voltage adjusted to 115 ± 2 volts, the high voltage supply to 750 ± 20 volts and with the load current between V and N set for 35 ma at 275 volts, the external potentiometer shall permit variation of voltage across terminals V and N over the range 200 to 350 volts. The ripple on this supply shall not exceed 2 volts rms.

f. With the line voltage adjusted to 115 ± 2 volts, and the high voltage supply to 750 ± 20 volts, the current in the load across U and N adjusted to 35 ma with the regulated voltage across U and N set to 200 volts and again to 350 volts by means of the external potentiometer. The regulated voltage shall not increase by more than 21 volts when the load is removed.

g. With switch "DC TEST" set at position "275 LOWER SCALE", meter "DC VOLTS" shall indicate the voltage developed across terminals U and N. The meter indication shall be accurate within $\pm 18V$.

h. The over-current trip adjustment, potentiometer R1, shall interrupt the high voltage supply at low load currents for counter-clockwise rotation of the potentiometer. After interruption, the high voltage supply shall remain off until the primary line circuit breaker is turned OFF and then ON. Normal setting of the potentiometer shall be such as to interrupt the circuit for load currents in excess of 0.5 amperes.

i. When actuated, thermostat S1 shall energize the blower motor.

3.16 Technical literature, tools, and running spare parts - Technical literature, tools, and running spare parts shall be furnished if specified in the contract. Running spare parts shall be identical to corresponding parts in the equipment furnished on the order (see 6.2).

3.17 Workmanship - The equipment shall be manufactured and assembled in accordance with requirement 9 of MIL-STD-454 and the applicable portions of the following paragraphs:

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3.17 Workmanship = (Contd)

a. In MIL-P-11268: General requirements for plastic material and parts.

Wiring and cabling, including:

- Slack
- Protection
- Clearance
- Splicing
- Connections, general
- Grounding, general
- Shielding on wire and cable

- Soldering and brazing
- Cleaning of units
- General requirements for securing of parts
- Cleaning prior to welding
- Process for welding
- Cleaning after welding
- Controls
- Self-tapping screws

b. In this specification:

- 3.1 Construction
- 3.3 Finish, protective
- 3.4 Marking

4. QUALITY ASSURANCE PROVISIONS

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

4.2 Classification of inspection - Inspection shall be classified as follows:

- a. First article inspection (does not include preparation for delivery).
- b. Inspection covered by subsidiary documents (see 4.4).
- c. Quality conformance inspection.

(1) Quality conformance inspection of equipment before preparation for delivery (see 4.5).

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4.2 Classification of inspection - (Contd)

c. Quality conformance inspection - (Contd)

(2) Quality conformance inspection of preparation for delivery (see 4.17).

4.3 First article inspection - This inspection shall consist of the inspection specified in the subsidiary documents covering the items listed in 4.4, and the inspection specified for group A, group B, and group C (see tables III, IV and V respectively). The first article inspection shall be performed in the order shown in table II according to the number of samples specified in the contract or order.

Table II - Order of first article inspection

Inspection (see Note 1)	Three Samples		
	Unit 1	Unit 2	Unit 3
<u>Non-damaging (see Note 2)</u>			
Temperature			
Low - - - - -	1		
High - - - - -	2		
Altitude (elevation) - - - - -		1	
Leakage (immersion) - - - - -			5
Vibration - - - - -			1
<u>Potentially damaging</u>			
Humidity (moisture-resistance) -	3		
Fungus (SEE NOTE 3) - - - - -		2	
Bounce - - - - -			2
Shock, bench-handling - - - - -			3
Shock, drop - - - - -			4

Note 1: Other first article inspection may precede, follow, or be interspersed between the non-damaging tests.

Note 2: The order on non-damaging tests and the choice of which units are subjected to the non-damaging tests may be varied if convenient, except that the vibration test should be performed on the same unit used for the bounce and shock tests.

Note 3: The equipment shall be thoroughly washed, cleaned, dried and refurbished, if necessary, before proceeding with subsequent tests.

4.4 Inspection covered by subsidiary documents - The following shall be inspected under the applicable subsidiary documents as part of the inspection before preparation for delivery:

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4.4 Inspection covered by subsidiary documents - (Contd)

<u>Item</u>	<u>Where required</u>
Finish	3.3
Marking	3.4

4.5 Quality conformance inspection of equipment before preparation for delivery - Each unit of each lot of equipment shall be subjected to pre-conditioning (see 3.11) prior to inspection. The contractor shall perform the inspection specified in 4.4 and 4.5.1 through 4.5.4. This does not relieve the contractor of his responsibility for performing any additional inspection which is necessary to control the quality of the product and to assure compliance with all specification requirements. Failure to meet any requirement as a result of preconditioning shall be classified as a defect and recorded as such. The Government will review and evaluate the contractor's inspection procedures and examine the contractor's inspection records. In addition, the Government -- at its discretion -- may perform all or any part of the specified inspection, to verify the contractor's compliance with specified requirements (see 6.7). Test equipment for Government verification inspection shall be made available by the contractor.

4.5.1 Group A inspection - Each unit of each lot of equipment shall be inspected for conformance to all the inspection and test requirements of table III. Each lot will be subject to verification, utilizing the procedures of MIL-STD-105 using the general inspection levels and the AQL's indicated in table III. Group A inspection shall be performed in any order which is satisfactory to the Government, except that the operational inspection (4.15) shall be last (see 6.5).

Table III - Group A Inspection

Inspection	Req Para	Insp Para	AQL	
			Major	Minor
<u>Visual-Mechanical</u>				
<u>Transmitter T-302()/TRC</u>				
Upper Chassis	3.17	4.16	1%	4%
Base Band	3.17	4.16	1%	4%
Xtal osc	3.17	4.16	1%	4%
Pulse osc	3.17	4.16	1%	4%
AFC	3.17	4.16	1%	4%
Lower chassis	3.17	4.16	1%	4%
Exciter	3.17	4.16	1%	4%
Alarm	3.17	4.16	1%	4%
Blower motor, rotation	3.17	4.16	1%	4%
Complete Trans T-302()/TRC	3.17	4.16	1%	4%

(Contd)

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Table III - Group A Inspection - (Contd)

Inspection	Req Para	Insp Para	AQL	
			Major	Minor
<u>Receiver R-417()/TRC</u>				
Chassis	3.17	4.16	1%	4%
Power Supply	3.17	4.16	1%	4%
Calibration	3.17	4.16	1%	4%
Base Band	3.17	4.16	1%	4%
Limiter-Disc-AFC	3.17	4.16	1%	4%
IF	3.17	4.16	1%	4%
Complete Rcvr R-417()/TRC	3.17	4.16	1%	4%
<u>Autotransformer TF-167()/TRC</u>	3.17	4.16	1%	4%
<u>Power Supply PP-685()/TRC</u>	3.17	4.16	1%	4%
<u>Case CY-1339()/TRC</u>	3.17	4.16	1%	4%
<u>Case CY-1340()/TRC</u>	3.17	4.16	1%	4%
<u>Case CY-1341()/TRC</u>	3.17	4.16	1%	4%
<u>Case CY-1342()/TRC</u>	3.17	4.16	1%	4%
<u>Electrical</u>				
<u>Transmitter T-302()/TRC</u>				
Freq range	3.10	4.8.10)		
	5			
	3.12			
Power output	3.12.2	4.8.1)		
AFC	3.12.4	4.8.3)		
Pulsed oscillator dial	3.12.5	4.8.4)		
Alarm	3.12.6	4.8.5)		
Order wire noise level	3.12.7	4.8.6)		
Interchannel crosstalk	3.12.8	4.8.7)	1%	*
Metering circuits	3.12.9	4.8.8)	for the group	
Dial accuracy	3.12.10	4.8.9)		
Modulation alignment	3.12.11	4.8.11)		
Modulation response	3.12.12	4.8.12)		
1000 Hz tone generator	3.12.13	4.8.13)		
Controls	3.12.14	4.8.15)		
Order wire control channel	3.12.15	4.8.14)		

(Contd)

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Table III - Group A Inspection - (Contd)

Inspection	Req Para	Insp Para	AQL	
			Major	Minor
<u>Receiver R-417()/TRC</u>				
Freq range	3.10 & 3.13	4.9.1)	1% for the group	*
Metering	3.13.2	4.9.1)		
AFC	3.13.3	4.9.2)		
Calibrator	3.13.4	4.9.3)		
Rcvr output	3.13.6	4.9.5)		
Squelch and Alarm	3.13.7	4.9.6)		
Interchannel modulation distortion	3.13.10	4.9.9)		
Ringer sensitivity	3.13.13	4.9.12)		
1600 Hz oscillator	3.13.14	4.9.13)		
<u>Auto Transformer TF-167()/TRC</u>				
Output voltage	3.14.1	4.10.1	1%	*
<u>Power Supply PP-685()/TRC</u>				
AC-Microphone	3.15.1	4.11.1)	1% for the group	*
+150v output	3.15.2	4.11.2)		
750v output	3.15.3	4.11.3)		
<u>Operational</u>				
<u>Transmitter</u>				
Power output	3.12.2	4.8.1)	1% for the group	*
Metering	3.12.9(d)	4.8.8)		
Alarm	3.12.6	4.8.5)		
AFC	3.12.4	4.8.3)		
<u>Receiver</u>				
AFC	3.13.3	4.9.2)	1% for the group	*
Metering	3.13.2	4.9.1)		
Squelch and Alarm	3.13.7	4.9.6)		
Crystal Cal check	3.13.4	4.9.3)		

* All electrical defects are considered major.

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4.5.2 Group B inspection - This inspection, including sampling, shall conform to Table IV and to the special procedures for small-sample inspection of Standard MIL-STD-105. Group B inspection shall normally be performed on inspection lots that have passed group A inspection and on samples selected from units that have been subjected to and met the group A inspection.

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

<u>AQL</u>	<u>inspection level</u>
6.5%	S=4
10.0%	S=3
15.0 dphu	S=3

4.5.2.2 Order of inspection within group B - Group B inspection shall be performed in any order which is satisfactory to the Government.

Table IV - Group B inspection

Inspection	Req Para	Insp Para	AQL (See 4.5.2.1)
<u>Receiver R-417()/TRC</u>			
Selectivity	3.13.5	4.9.4)	6.5% for the group 10%
Quieting	3.13.8	4.9.7)	
Base-Band Freq Response	3.13.9	4.9.8)	
Order-Wire Characteristics	3.13.11	4.9.10)	
Crosstalk	3.13.12	4.9.11)	
Immersion	3.8.5	4.12.4	
Interchangeability			
Rcvr R-417()/TRC	3.7	4.14)	15.0 dphu for the group
Xmitter T-302()/TRC	3.7	4.14)	
Pwr Supply PP-685()/TRC	3.7	4.14)	
Case CY-1339()/TRC	3.7	4.14)	
Case CY-1340()/TRC	3.7	4.14)	
Case CY-1341()/TRC	3.7	4.14)	
Case CY-1342()/TRC	3.7	4.14)	

4.5.3 Group C inspection - This inspection shall be as listed in Table V and shall be performed on sample units that have been subjected to and met group A and group B inspection.

4.5.3.1 Sampling for inspection - Units selected for each Group C inspection shall be selected at random without regard to their quality in accordance with the following:

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4.5.3.1 Sampling for inspection - (Contd)Table V - Group C Inspection

Inspection	Req Para	Insp Para
<u>Transmitter T-302()/TRC</u>		
<u>Sub-Group I</u>		
Frequency Stability	3.12.3	4.8.2
Temperature	3.8.2	4.12.1
Bounce	3.8.8	4.12.7
Vibration	3.8.7	4.12.6
<u>Sub-Group ii</u>		
Humidity	3.8.3	4.12.2
Shock, drop	3.8.8	4.12.9
<u>Sub-Group III</u>		
Shock, bench-handling	3.8.8	4.12.8
Elevation	3.8.4	4.12.3
Orientation	3.8.6	4.12.5
Fungus	3.6	4.13
<u>Receiver R-417()/TRC</u>		
<u>Sub-Group I</u>		
Temperature	3.8.2	4.12.1
Bounce	3.8.8	4.12.7
Vibration	3.8.7	4.12.6
<u>Sub-Group II</u>		
Humidity	3.8.3	4.12.2
Shock, drop	3.8.8	4.12.9
<u>Sub-Group III</u>		
Shock, bench-handling	3.8.8	4.12.8
Elevation	3.8.4	4.12.3
Orientation	3.8.6	4.12.5
Fungus	3.6	4.13
<u>Auto Transformer TF-167()/TRC</u>		
<u>Sub-Group I</u>		
Temperature	3.8.2	4.12.1
Bounce	3.8.8	4.12.7
Vibration	3.8.7	4.12.6
<u>Sub-Group II</u>		
Humidity	3.8.3	4.12.2
Shock drop	3.8.8	4.12.9

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Table V - Group C Inspection - (Contd)

Inspection	Req Para	Insp Para
<u>Auto Transformer TF-167()/TRC-(Contd)</u>		
<u>Sub-Group III</u>		
Shock, bench-handling	3.8.8	4.12.8
Elevation	3.8.4	4.12.3
Orientation	3.8.6	4.12.5
Fungus	3.6	4.13
<u>Power Supply PP-685()/TRC</u>		
<u>Sub-Group I</u>		
Temperature	3.8.2	4.12.1
Bounce	3.8.8	4.12.7
Vibration	3.8.7	4.12.6
<u>Sub-Group II</u>		
Humidity	3.8.3	4.12.2
Shock, drop	3.8.8	4.12.9
<u>Sub-Group III</u>		
Shock, bench-handling	3.8.8	4.12.8
Elevation	3.8.4	4.12.3
Orientation	3.8.6	4.12.5
Fungus	3.6	4.13

4.5.3.1.1 Sub-Group I - For this subgroup, two (2) units per month shall be selected for group C inspection.

4.5.3.1.2 Sub-Group II - For this subgroup, two (2) units from the first fifty (50) production units shall be selected for the first group C inspection. For subsequent group C inspections, two (2) units every four (4) months shall be selected.

4.5.3.1.3 Sub-Group III - For this subgroup, two (2) units from the first fifty (50) production units only shall be selected for the first group C inspection.

4.5.3.2 Noncompliance - The contractor shall immediately report in writing each Group C failure occurrence, including details of the failure and characteristics affected. The contractor shall immediately investigate the cause of failure and further report the results of investigation and details of the proposed corrective action on (i) the process and materials, as applicable, and (ii) all units of product which were manufactured under the same conditions and which the Government considers subject to

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4.5.3.2 Noncompliance - (Contd)

the same failure. Reports shall be forwarded to the responsible technical activity designated in the contract through the Quality Assurance Representative. After corrective action has been taken, additional sample units shall be subjected to Group C Inspection (all inspections, or the inspections which the sample failed, at the option of the Government) and Groups A and B Inspection may be re-instituted; however, final acceptance and shipment will be withheld until the Group C reinspection results have shown that the corrective action was effective.

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

4.6 Standard test conditions - Unless otherwise specified, the following test conditions shall apply:

4.6.1 Standard ambient conditions - The standard ambient conditions shall be as follows:

Temperature	-	$23^{\circ} \pm 10^{\circ}\text{C}$ ($73^{\circ} \pm 18^{\circ}\text{F}$)
Relative Humidity	-	50 percent \pm 30 percent
Atmospheric pressure	-	$725 + 50, -115$ mm Hg ($28.5 + 2.0, -4.5$ in Hg)

4.6.2 Line voltage and frequency - All tests shall be conducted with the line voltage at $103.5 \pm 2\text{V}$, $115 \pm 2\text{V}$, and $126.5 \pm 2\text{V}$, 60 Hz \pm 1 per cent.

4.6.3 Test methods - The performance tests for the receiver and transmitter covered by this specification also pertains to their respective "Tuners". All associated units used in the performance tests of a specific unit shall be standards. For purposes of this specification, a standard unit is one which is known to meet all the applicable requirements and tests of this specification.

4.7 Preconditioning - Each unit of each lot of equipment shall be subjected to the preconditioning operation as specified **herein prior** to first article and quality conformance testing, (see 3.11).

4.7.1 Conditions -

4.7.1.1 Preconditioning cycle time period - The preconditioning cycle time period shall be 48 hours (nominal).

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4.7.1.2 Environmental and Stress Conditions - The conditions shall be in accordance with Test Level C of MIL-STD-781, except as modified herein:

Input voltage cycling - None.

4.7.1.3 Duty cycle - The duty cycle (or performance profile) is the time phase apportionment of modes of operation and functions to be performed by the equipment during the ON-time portion of the environmental pre-conditional cycle. The equipment shall be operated in both the transmit and receive modes for 100% of the entire ON-time portion of the preconditioning period.

4.7.1.4 Preventive maintenance and repairs - No preventive maintenance or repairs shall be performed during preconditioning period.

4.7.2 Inspection prior to preconditioning - The supplier may conduct any inspection prior to testing that he deems necessary.

4.7.2.1 Monitoring - Continuous monitoring during preconditioning is not mandatory. However, it may be implemented to optimize cost against continuation of preconditioning on failed equipments. After completion of the preconditioning period of 4.7.1.3, each item shall be tested for conformance to the applicable performance requirements listed below:

4.7.3 Performance requirements -

<u>Inspection</u>	<u>Rgt Para</u>	<u>Insp Para</u>
<u>Transformer, Power, Fixed</u>		
<u>Auto Transformer TF-167()/TRC</u>		
Output Voltage	3.14.1	4.10.1
<u>Power Supply PP-685()/TRC</u>		
AC and Microphone Supplies	3.15.1	4.11.1
+150 Volt Rectifier Output	3.15.2	4.11.2
750 Volt Rectifier Output	3.15.3	4.11.3
<u>Radio Transmitter T-302()/TRC</u>		
Power Output	3.12.2	4.8.1
Metering	3.12.9(d)	4.8.8
Alarm Test	3.12.6	4.8.5
AFC	3.12.4	4.8.3
<u>Radio Receiver R-417()/TRC</u>		
AFC	3.13.3	4.9.2
Metering	3.13.2	4.9.1
Squelch and Alarm	3.13.7	4.9.6
Crystal Cal Check	3.13.4	4.9.3

4.7.4 Failures - A failure is defined as any deviation from the performance requirements of paragraph 4.7.3.

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4.7.5 Failed Units - All equipment that exhibit one or more failures during the monitoring of paragraph 4.7.3 shall be resubmitted after corrective action has been completed to an additional 24 nominal hours of preconditioning. (NOTE: The recycling of equipment, as described here, may have to be repeated one or more times and therefore the availability of equipment for delivery could be affected). When replacement of a defective part (s) is determined necessary, the replacement of that part (s) shall be with an identical one.

4.7.6 Failure Analysis - A failure analysis shall be performed on all failed units. Depth of analysis shall be to the extent necessary to determine the cause of failure and the need for preventive and corrective measures. In the event that the contractor determines through the failure analysis that a component substitution or design change would increase the reliability of the equipment, he shall notify the procuring activity of the recommended change.

4.7.7 Failure Reports - All failures shall be recorded, as a minimum, records shall include the number of production units debugged, individual identification of failed units, ITEM ON-time prior to failure, the number of each component that failed, analysis of the failures and failed components (if any), analysis method used (if any), corrective action taken, and recommended design changes (if any). These Failure Records shall be made available to the Government. A reliability prediction is not required.

4.7.8 Preconditioning Facilities - Facilities shall be capable of maintaining the environmental stress conditions specified. Preconditioning equipment shall be capable of assuring, by automatic or other means, that the environmental stresses have been applied for the required time. The facilities shall be subject to Government approval.

4.8 Transmitter tests -

4.8.1 Power output -

4.8.1.1 Tuner - Attach a coaxial cable between Wattmeter ME-82/U, or Bird Model 611, or equal, and the Antenna Jack. Adjust the tuner for maximum output to the highest and lowest frequency in the band. The tuner shall meet the requirements of 3.12.2.1.

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4.8.1.2 Exciter - By-pass the tuner r.f. connections with a coaxial cable between J112 and J114, restrict the air supply opening to 1/4 inch diameter, and connect pin 6 and pin 7 of J113 together to complete the interlock circuit. Terminate the antenna output connector with a r.f. wattmeter having a characteristic impedance of 52 ohms, (essentially resistive). The transmitter shall be tuned for optimum output with a plate supply voltage not greater than 850 volts. The requirements of 3.12.2.2 shall be met.

4.8.1.3 Low line voltage - The tests of 4.8.1.1 and 4.8.1.2 shall be repeated with the power supply input voltage reduced to 90 per cent of the normal rated voltage. The requirements of 3.12.2.3 shall be met.

4.8.2 Frequency stability - The transmitter shall be tuned to any channel and the operating frequency measured with a Gertsch frequency meter, or equal. The unit shall meet the requirements of 3.12.3.

4.8.3 AFC -

4.8.3.1 Frequency Settability - With the AFC on and the transmitter alternately tuned to channels A-1 and A-200, the oscillator frequency shall meet the requirements of 3.12.4.1, when measured with a Gertsch frequency meter or equal.

4.8.3.2 AFC Control - On channels 1 and 250, rotate the AFC control knob to +5 and -5. The knob shall return to its original setting within the requirements of 3.12.4.2.

4.8.3.3 AFC Capacitor Range - Set the AFC capacitor to its extreme position for channels 1 and 250. Measure the frequency of the base R.F. oscillator, (at J-107). The requirements of 3.12.4.3 shall be met.

4.8.4 Pulsed Oscillator Dial - Note the setting of the pulsed oscillator dial after the unit has been tuned. The requirements of 3.12.5 shall be met. This test is normally performed at the low, middle, and high channel of the band.

4.8.5 Alarm - With a tuner installed, the transmitter shall be tuned for maximum power output at any frequency and the "ALARM" switch set to "NOR", then to "REV", and then to "OFF". The power output shall be reduced to less than 50% of maximum by reducing the output coupling. Turn the "ALARM" switch alternately to "NOR", "REV", and "OFF". The requirements of 3.12.6 shall be met. A blower failure check shall be made to determine compliance with 3.12.6.1.

4.8.6 Order wire noise level - With the transmitter tuned for normal operation, the "MEASURE" switch at the "MOD ADJ" position to activate the internal 1 kHz modulating signal, the transmitter output fed to a standard receiver at a level of 5000 microvolts and the receiver "OUTPUT ADJ" control set at 19 for the B Band, the signal to noise ratio with FIA weighting shall meet the requirements of 3.12.7.

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4.8.7 Transmitter Interchannel crosstalk - The transmitter and standard test receiver shall be aligned and tuned. The transmitter r.f. power output shall be coupled to the standard test receiver through sufficient attenuation to obtain a receiver input power of -37 dBm (equivalent to 3000 uv across 52 ohms). The system gain shall be adjusted for 0 dB \pm .5 dB net loss. The transmitter shall be operated with normal r.f. power output with the following input signals:

- a. 68 kHz tone at 0 dBm.
- b. A uniform random noise spectrum from 16 to 100 kHz of mean power +3 dBm.

The output of the radio receiver shall be connected to a 104 to 108 kHz, 12 to 16 kHz, or 60 to 64 kHz filter as required. The ratio of the average power at the "RECEIVER" Cable Connection 135 ohm terminals in the 60 to 64 kHz band to the average power measured in the 12 to 16 kHz band and the ratio of the average power in the 60 to 64 kHz band to the average power measured in the 104 to 108 kHz band shall meet the requirements of 3.12.8. This test should be performed at the low and high channel of the band (s) under test.

4.8.8 Metering Circuits - Feed an audio oscillator into the 135 or 600 ohms input cable connection terminals with the transmitter modulation control set at 15 dB attenuation. With the "MEASURE" switch in the "1 KC IN" position, adjust the audio voltage for 0 dB reading on the "MEASURE" meter. Record the oscillator voltage. Repeat the above for a +1, +2, -2, and -3 reading on the "MEASURE" meter. Repeat above tests with "MEASURE" switch set to the "68 KC IN" position. Measure the 1 kHz and 68 kHz power required at the 0 dB level point to obtain a reading of 0 on the "MEASURE" meter when the "MEASURE" switch is in the "MOD 1KC IN" and "MOD 68KC IN" positions respectively. The requirements of 3.12.9 shall be met. This test is normally performed at the low, middle and high channel of the band.

4.8.9 Dial Accuracy - With the transmitter tuned to any frequency, the deviation of the "DRIVER TUNE" dial shall be noted. The requirements of 3.12.10 shall be met. This test should be performed at low, middle and high channel of the band.

4.8.10 Frequency Range - With a tuner installed in the transmitter, the frequency of the transmitter shall be measured at each end of the tuning range. The requirements of 3.10 and 3.12 shall be met.

4.8.11 Modulation alignment - With the transmitter tuned at any frequency from 100 - 225 MHz and the modulation circuits properly aligned, the transmitter "INPUT ADJ" control shall be set at 15. The transmitter shall be modulated by an external audio oscillator at 24 kHz and its amplitude adjusted for a first null as detected by a spectrum analyzer. The audio level shall meet the requirements of 3.12.11.

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4.8.12 Modulation response - The transmitter, tuned to any r.f. channel, shall be modulated by an external audio oscillator initially adjusted to 1 kHz whose output level shall be held constant at +10 dBm. The transmitter output shall be attenuated to a level of 5000 microvolts and applied to a standard receiver whose frequency response has been accurately calibrated. The receiver output shall be initially adjusted to approximately 0 dBm. The ratio of the receiver output level after correction for the calibrated receiver response at the modulating frequencies listed in paragraph 3.12.12.1, to the receiver output level at a modulating frequency of 1 kHz shall meet the requirements of 3.12.12.

4.8.13 1000 Hz Tone generator - Terminate pins A and D of J101 with a 100,000 ohm ± 1 per cent resistor, set the 'MOD ADJ' control to +2 dB, the 'I KC ADJ' control to 0 dB, and operate the transmitter at any frequency. The 1000 Hz voltage level across the 100,000 ohm load resistor shall conform to 3.12.13.

4.8.14 Order wire control channel - Operate the transmitter at any r.f. frequency and apply a 1000 Hz ± 1 per cent sine wave of +10 dBm (from an audio generator having an output impedance of 135 ohms balanced to ground) to the 135 ohm terminals (H- and J) of J101. Connect a 100,000 ohm ± 1 per cent load resistor across terminals C and D of J101. With the 'INPUT ADJ' control set on step 15, the voltage across the load resistor shall be in accordance with the requirements of 3.12.15.

4.8.15 Controls - The transmitter controls shall meet the requirements of 3.12.14.

4.9 Receiver tests -

4.9.1 Frequency range and metering -

a. The receiver with tuner shall be tuned to the lowest and highest frequency in the tuner range, with a 100 uv signal applied to the 'ANTENNA' jack from a signal generator. At each frequency, the 'MEASURE' meter shall meet the requirements of 3.13.2(a) and the tuning range shall meet the applicable requirements of 3.10 and 3.13.

b. With the 'MEASURE' meter properly calibrated, apply a 1 kHz signal through a 600 to 135 ohm repeat coil to the 135 ohm termination. Connect this output to P110 of the receiver. Connect a power meter across the 'REC CABLE CONNECTIONS' and set the '135 OHM: 600 OHM' switch in the '135 OHM' position. Place the 'OUTPUT ADJ' knob on 15 and the 'MEASURE' meter switch to 'I KC OUT'. Adjust the 1 kHz input for 'MEASURE' meter readings of -3 to +2 dB in steps of 1 dB. The power output shall meet the requirements of 3.13.2(b).

c. Repeat the above with a 68 kHz input signal. The requirements of 3.13.2(c) shall be met.

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4.9.2 AFC range -

4.9.2.1 AFC Pull-in-range - With the Amplifier-Converter AM-913()/TRC, ('B' Band tuner), installed in Receiver R-417()/TRC, the receiver shall be tuned to all frequencies within the 100 to 225 MHz range, with the 'AFC' knob set to zero. Set the incoming signal 400 kHz above and then 400 kHz below the receiver frequency with the 'AFC-OFF-CAL' switch set to AFC. The requirements of 3.13.3.1 shall be met. (Data shall be furnished at 100, 167, and 225 MHz).

4.9.2.2 AFC throw-out range - The receiver shall be tuned to all frequencies within the 100 to 225 MHz range, with the 'AFC' knob set at zero and the 'AFC-OFF-CAL' switch set at 'OFF', the following tests shall be performed:

a. The 'AFC' knob shall be rotated to +5. The incoming frequency shall be retuned so that the 'FREQ-DRIFT' meter again reads zero. The requirements of paragraph 3.13.3.2(a) shall be met. (Data shall be furnished at 100, 167 and 225 MHz).

b. The 'AFC' knob shall be rotated to -5. The incoming frequency shall be retuned so that the 'FREQ-DRIFT' meter again reads zero. The requirements of paragraph 3.13.3.2(b) shall be met. (Data shall be furnished at 100, 167 and 225 MHz).

4.9.3 Calibrator tests - The tuner shall be installed in the receiver. Connect the 'CAL OUT' jack to the 'ANTENNA' jack. With the 'AFC-OFF-CAL' switch held in the 'CAL' position, slowly turn the 'RF AMP' dial over its entire frequency range. The requirements of 3.13.4 shall be met.

4.9.4 Overall Selectivity - Set the transmitter to the lowest megahertz channel in the tuner band. Connect the r.f. output to the receiver 'ANTENNA' jack, and tune the receiver with tuner to the transmitted frequency. Connect a signal generator to the receiver 'ANTENNA' jack and calibrate the 'MEASURE' Meter ('MEASURE' switch in 'SIG LEV' position) for 5 uv. Reconnect the transmitter output to the receiver 'ANTENNA' jack and attenuate the receiver input to within ± 1 dB of 5 uv. Note the amount of required attenuation. Tune the transmitter to the next megahertz channel above, and remove attenuation until the reading of the receiver 'MEASURE' meter is within ± 1 dB of 5 uv. Tune the transmitter to the next megahertz channel below and remove attenuation until the reading of the receiver measure meter is within ± 1 dB of 5 uv. The difference in the attenuation settings is the 1.0 MHz selectivity of the receiver on the low frequency side. Repeat the above test for every alternate megahertz channel. The requirements of 3.13.5 shall be met.

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4.9.5 Receiver Output -

a. The Amplifier Converter AM-913()/TRC, ("B" Band tuner), shall be installed in the receiver and preset to any channel. Connect the "REC CABLE CONNECTIONS" to an audio power meter. Connect a signal generator to the "ANTENNA" jack and tune the signal generator to the receiver frequency. Adjust the r.f. output of the signal generator to 1000 uv and turn the "SQUELCH" knob counter-clockwise for a reading of 20 ua on the "MEASURE" meter with the "MEASURE" switch in the "SIG LEV" position. Connect the transmitter to the receiver "ANTENNA" jack. Tune the transmitter to the receiver frequency and retune the receiver. Adjust the transmitter attenuation until the receiver "MEASURE" meter again reads approximately 20 ua. After adjusting level, turn "SQUELCH" knob completely clockwise. Set the "INPUT ADJ" control of the transmitter to 15. Modulate the transmitter with a 24 kHz tone by heterodyning the transmitter output with the signal generator to obtain a spectrum on the analyzer screen. Introduce a 24 kHz signal from an audio oscillator into the transmitter through a 1 dB pad. Increase the level of the 24 kHz signal until a second null is reached. Remove the 1 dB pad and adjust the receiver "OUTPUT ADJ" control for a receiver output of +16 dBm \pm 0.5 dB as measured on the power meter. The "OUTPUT ADJ" knob setting shall meet the requirements of 3.13.6(a).

b. Change the transmitter modulation frequency to 20 kHz and note the reading on the power level meter. Throw the "135 OHM - 600 OHM" switch to the "600 OHM" position. Reconnect the "REC CABLE CONNECTIONS" to the power meter through a 600:135 ohm repeat coil, the loss of which has been measured at 20 kHz. The requirements of 3.13.6(b) shall be met.

4.9.6 Squelch and Alarm - With 250 uv of r.f. input signal at any channel frequency fed into the antenna jack, and the receiver with applicable tuner tuned to this frequency, the "SQUELCH" knob shall be turned slowly counter-clockwise until the receiver is squelched. Reduce the r.f. input level to 6 uv and turn the "SQUELCH" knob clockwise until the receiver squelch relay disengages. The requirements of 3.13.7 shall be met.

4.9.7 Receiver Quieting -

a. With the receiver tuned to any r.f. frequency, connect a signal generator to the "ANTENNA" jack. With the "OUTPUT ADJ" control at the setting established in 4.9.5, measure the output level with a Ballantine Number 310.VTVM, or equal, through the various filters and at an unmodulated r.f. input levels listed in 3.13.8(a). The filter output requirements of 3.13.8(a) shall be met.

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4.9.7 Receiver Quieting - (Contd)

b. Connect the "REC CABLE CONNECTIONS" 135 ohm output to an audio power meter. Connect the phone output terminals through a 250:600 ohm repeat coil to a noise measuring set with F1A weighting. Connect the test transmitter to the "ANTENNA" jack of the receiver and adjust the receiver input to $70 \text{ ua} \pm 1 \text{ dB}$. Modulate the test transmitter with 1000 Hz and adjust the modulation level to +10 dBm receiver output on the power meter. Read the noise measuring set. Remove the transmitter modulation and again read the noise measuring set. The requirements of 3.13.8(b) shall be met.

4.9.8 Base Band Frequency Response (De-emphasis) - The transmitter used for measuring base band fidelity shall be checked for pre-emphasis and any variance from nominal pre-emphasis shall be applied on a correction factor to the overall characteristic. Tune the transmitter to any channel and connect the r.f. output to the "ANTENNA" jack of the receiver through attenuators. Tune the receiver with tuner to the transmitter frequency. Using a signal generator, calibrate the receiver at 1000 uv and then adjust the transmitter output to approximately this same level. Turn the receiver "SQUELCH" knob completely clockwise and throw the "AFC-OFF-CAL" switch to the "AFC" position. Place the receiver "OUTPUT ADJ" control on the setting established for the receiver output test (4.9.5) and connect the "REC CABLE CONNECTIONS" terminals directly to the audio power meter, modulate the transmitter with 1000 Hz and adjust the transmitter input until the receiver output is +10 dBm as read on the power meter. Maintaining a constant input to the transmitter, measure the receiver output at frequencies from 250 Hz to 108 kHz. The requirements of 3.13.9 shall be met.

4.9.9 Interchannel Modulation Distortion - Tune the transmitter to any channel and the receiver to the transmitter. Using a signal generator as a standard, adjust the receiver r.f. input level from the test transmitter to 3000 uv. Adjust the test transmitter for normal modulation sensitivity and apply 0 dBm of 68 kHz pilot tone combined with +3 dBm of random noise through the 16 to 100 kHz filters to the 135 ohm input terminals of the transmitter. With the receiver "OUTPUT ADJ" control properly set and the 135 OHM - 600 OHM switch in the 135 OHM position, measure the relative output from the "REC CABLE CONNECTIONS" through the 104 to 108 kHz, 12 to 16 kHz and 60 to 64 kHz filters. The requirements of 3.13.10 shall be met.

4.9.10 Order-Wire Characteristics -4.9.10.1 Phone output -

a. Connect an audio oscillator to the 600 ohm termination and to P110 of the base band amplifier panel. With the 135 OHM - 600 OHM switch in the 135 OHM position, connect the "REC CABLE CONNECTIONS" to the audio

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4.9.10.1 Phone output - (Contd)

power meter. Set the audio oscillator to 1000 Hz and adjust the input level for a reading of +10 dbm on the power meter. Connect terminals A and B of J136 through the 250 to 600 ohm repeat coil and the 250 Hz high pass filter to a VTVM. Terminate the voltmeter in 600 ohms. The phone output shall be measured. Reconnect the audio oscillator between terminals C and D of J135. Adjust the audio oscillator output for .39 volts across the 600 ohm load. Turn squelch potentiometer fully counter-clockwise. The requirements of 3.13.11.1(a) shall be met.

b. Maintaining the .39 volt input level from the audio oscillator, vary the input frequency from 250 Hz to 400 Hz and measure the output. The requirements of 3.13.11.1(b) shall be met.

4.9.10.2 Microphone Connection -

a. A simulated microphone is used consisting of a repeat coil connected for an impedance stepdown of 600 to 10 ohms with a 56 ohm resistor in series with the 10 ohm winding. The microphone input voltage is measured across the 10 ohm winding. Connect an audio oscillator to the 600 ohm input of the dummy microphone and adjust the frequency to 1000 Hz. Connect a VTVM across the 10 ohm winding of the transformer. Connect the dummy microphone output to C and E of J136. Adjust the audio oscillator output for a reading of 0.22 volts on the VTVM. With the 135 OHM-600 OHM switch in the 135 OHM position and the 'REC CABLE CONNECTIONS' connected to an audio power meter, the reading on the power meter shall be recorded. With the VTVM connected across terminals B and D of J135, the reading of the VTVM shall be recorded. Both readings shall meet the requirements of 3.13.11.2(a).

b. Vary the input frequency from 250 Hz to 4000 Hz keeping the input constant. Measure the output. The requirements of 3.13.11.2(b) shall be met.

c. With 1000 Hz input adjusted for .22 volts, the output shall be measured. The input is increased by 20 dB and the output shall again be measured. The requirements of 3.13.11.2(c) shall be met.

d. With .22 volts of 1000 Hz from the audio oscillator and the VTVM connected across the PHONE output, the output shall meet the requirements of 3.13.11.2(d).

4.9.11 Order-Wire Crosstalk - Connect an audio oscillator to the 600 ohm termination end to P110 of the base-band amplifier panel. With the 135 OHM - 600 OHM switch in the 135 OHM position, connect the 'REC CABLE CONNECTIONS' to an audio power meter. Set the audio oscillator to 1000 Hz and adjust the input level for a reading of +10 dBm on the power meter. Connect a VTVM through a 250 Hz high pass filter to Terminals B and D of J135.

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4.9.11 Order-Wire Crosstalk - (Contd)

Terminate the voltmeter with 10,000 ohms. Record the crosstalk output on the VTVM. Disconnect the audio oscillator from P110 and connect its terminated output between terminals C and D of J135. Adjust the audio oscillator output for .39 volts across the 600 ohm load. Turn squelch potentiometer fully counter-clockwise. Connect the VTVM through a 135:600 OHM repeat coil and a 250 Hz high pass filter. Terminate the voltmeter with 600 ohms. Record the crosstalk output on the VTVM. Repeat this test for other specified frequencies. The requirements of 3.13.12 shall be met.

4.9.12 Ringer Sensitivity - Tune the transmitter and receiver to any channel. Turn the 'SQUELCH' knob fully counter-clockwise and set the 'ALARM' switch to 'REV.' Set the audio oscillator to 1600 Hz and connect its output to terminals C and D of J135. Slowly raise the audio oscillator output from zero to the point where the 'RING' lamp lights and the buzzer sounds. The input shall be measured and shall meet the requirements of 3.13.13.

4.9.13 1600 HZ Oscillator - Depress the 'TALK-RING' switch to RING. With a VTVM, measure the voltage across terminals B and D of J136. Release the 'TALK-RING' switch. The requirements of 3.13.14 shall be met.

4.10 Fixed Power Autotransformer Tests -4.10.1 Output Voltage -

a. A line voltage of $115 \pm 5V$ A.C. at 60 Hz is applied to input terminals X-Y of J1 and adjusted to give 115V A.C. at J2 and terminals X-Y of J3 and J4 with switch S1 in position 3. The voltage of J2 or terminals X-Y of J3 or J4 shall be measured.

b. A line voltage of $115 \pm 1V$ AC at 60 Hz is applied to input terminals Z-X of J1. The voltage at J2 shall be measured with switch S1 set on position 3. The requirements of 3.14.1 shall be measured with switch S1 set on position 3. The requirements of 3.14.1 shall be met.

4.11 Power Supply Tests -

4.11.1 AC and Microphone Supplies - The power supply shall be turned on and checked for resistance load current, metering, output voltage and ripple. The requirements of 3.15.1 shall be met.

4.11.2 +150 Volt Rectifier Output - With switch "150V DC" operated to the "ON" position, resistance loads at the terminals of J3 shall be adjusted for the following load currents:

4.11.2 +150 Volt Rectifier Output - (Contd)

<u>TERMINALS</u>	<u>LOAD CURRENT</u>
T to S	10 ma (DC)
M to S	Variable over the range 200 to 300 ma (DC)

The requirements of 3.15.2 shall be met.

4.11.3 750 VOLT Rectifier Output - The over current trip potentiometer is adjusted to its extreme clockwise position. Terminals V and P of J3 are strapped together and terminal N of J3 is connected to ground. For the regulated supply, the load is connected and measurements made across terminal U to N. An adjustment circuit consisting of 16,000 ohms plus a 25,000 ohm potentiometer plus another 16,000 resistor is connected across terminal U and N. The arm of the potentiometer is connected to terminal R and should be left in approximately mid-position. For the nonregulated supply, the load is connected and measurements are made across terminals H to N of J3. Switch "750V ADJ" is positioned at tap 4 to establish a reference load of 360 ma and then switched to the positions indicated in the requirements. With switch "115V AC" and "150V DC" operated to their "ON" positions and the line voltage adjusted to 115 volts, the requirements of 3.15.3 shall be met.

4.12 Service Conditions Tests - The units covered by this specification shall meet the following service conditions:

4.12.1 Temperature test -

4.12.1.1 Low temperature - The equipment shall be tested in accordance with Method 502, Procedure I, of MIL-STD-810. The storage temperature shall be -80°F, and the operating temperature shall be -40°F. Prior to testing, the equipment shall meet full specification performance for the measurements specified in 3.8.2.1.

4.12.1.2 High temperature - The equipment shall be tested in accordance with Method 501, Procedure II, of MIL-STD-810. The operating temperature shall be 132°F. Prior to testing, the equipment shall meet full specification performance for the measurements specified in 3.8.2.2.

4.12.2 Humidity (moisture-resistance) test - The equipment shall be tested in accordance with Method 507, Procedure II, of MIL-STD-810. Prior to testing, the equipment shall meet full specification performance for the measurements specified in 3.8.2.1. Measurements shall be made during the periods shown on the figure for the cycle. However, in Step 6, measurements shall be taken during the last 5 hours of each test cycle. (NOTE: Operate the equipment for five (5) minutes on filaments only, before applying high voltages). Do not move equipment from the humidity chamber

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4.12.2 Humidity (moisture-resistance) test - (Contd)

for measurements, and do not leave power on after measurements have been completed. If any equipment fails to meet the specified performance during cycling, it shall be realigned or readjusted once and the test continued. No repair or replacement of part shall be permitted. If the equipment still fails to meet the specified performance during cycling, or fails subsequently, it does not pass the test. In addition, if the equipment fails to meet specified requirements after final conditioning and adjustment, it does not pass the test.

4.12.3 Altitude (elevation) test - The equipment shall be subjected to the test of Method 500, Procedure 1, of MIL-STD-810.

4.12.4 Leakage (immersion) test - Cases CY-1339()/TRC, CY-1340()/TRC, CY-1314()/TRC and CY-1342()/TRC, without contents, and Transformer, Power, Fixed Autotransformer TF-167()/TRC, shall be tested in accordance with Method 512, Procedure 1, of MIL-STD-810. (See 3.8.5)

4.12.5 Orientation test - The equipment shall be inclined for a minimum of 5 minutes in each plane (forward, backward, left, and right) to an angle of 20 ± 3 degrees. Measurements shall be made during inclination in

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each plane. (See 3.8.6)

4.12.6 Vibration test - The equipment shall be tested in accordance with Method 514, Procedure IX, Part 1, of MIL-STD-810. Prior to testing, the equipment shall meet full specification performance for the measurement specified in 3.8.2.1.

4.12.7 Bounce test - The equipment shall be tested in accordance with Method 514, Procedure XI, Part 2, of MIL-STD-810. Prior to testing, the equipment shall meet full specification performance for the measurements specified in table 1. Package tester accessories shall be selected from those listed on Drawing SC-A-46439. (See 3.8.8)

4.12.8 Shock test; bench-handling - The equipment shall be tested in accordance with Method 516, Procedure V, of MIL-STD-810. Prior to testing, the equipment shall meet full specification performance for the measurements specified in table 1. (See 3.8.8)

4.12.9 Shock test; drop - The equipment shall be tested in accordance with Method 516, Procedure II, of MIL-STD-810. Prior to testing, the equipment shall meet full specification performance for the measurements specified in table 1. (See 3.8.8)

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4.13 Fungus test - The equipment (including accessories) shall be tested in accordance with Method 508, Procedure 1, of MIL-STD-810. Spraying shall include parts and materials on and under the chassis, and the interior of the equipment case. The equipment shall remain in an open condition during the test. Operation is not required. (See 3.6)

4.14 Inspection for interchangeability - The dimensions as listed on the gage lists, for the applicable units shown below, shall be gaged or measured to determine conformance to the physical interchangeability requirements of 3.7. When a listed dimension is not within specified or design limits, it shall be considered a major defect.

Radio Receiver	R-417()/TRC	-	SC-GL-57266
Power Supply	PP-685()/TRC	-	SC-GL-57267
Radio Transmitter	T-302()/TRC	-	SC-GL-57265
Auto Transformer	TF-167()/TRC	-	SC-DL-66691
Case	CY-1339()/TRC	-	SC-GL-57528
Case	CY-1340()/TRC	-	SC-GL-57529
Case	CY-1341()/TRC	-	SC-GL-57269
Case	CY-1342()/TRC	-	SC-GL-57532

4.15 Operational inspection - This inspection shall be performed after completing other acceptance inspection prior to packaging to determine that specified requirements are still met (as Table III).

4.16 Visual and mechanical inspection - The units shall be examined for the defects listed in Standard MIL-STD-252. (See 3.17)

4.17 Quality conformance inspection of preparation for delivery - Preparation for delivery shall be inspected in accordance with Specification MIL-P-116 to determine conformance to the requirements of Section 5.

4.18 Rough handling test (preparation for delivery) - When rough handling test in accordance with Specification MIL-P-116 is required by the contract, the tests of 4.15 shall be conducted to determine freedom from operational malfunction caused by the rough handling.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging - Preservation and packaging shall be level A or C, as specified (See 6.2c).

5.1.1 Level A.

5.1.1.1 Cleaning - Radio Set Group OA-1387()/GRC, and units of, shall be cleaned in accordance with process C-1 of MIL-P-116.

5.1.1.2 Drying - Radio Set Group OA-1387()/GRC, and units of, shall be dried in accordance with the applicable procedure of MIL-P-116.

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5.1.1.3 Preservation application - None required.

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

5.1.1.4.1 Technical literature - Each technical literature shall be packaged method 1C-1.

5.1.1.4.2 Radio Transmitter, T-302()/TRC; Radio Receiver R-417()/TRC; Transformer, Power, Fixed Auto Transformer TF-167()/TRC; Power Supply PP-685()/TRC and Accessories Kit MK-133()/TRC. - Each unit shall be individually packaged Method III as follows: Stow the accessories and running spares within the designated compartments of the accessories kit chest. Place the technical literature, packaged as specified in 5.1.1.4.1, on top of the contents, directly below the lid of the container. Close the covers on the unit chests and secure with fasteners provided. Place each secured unit with a close-fitting fiberboard box conforming to PPP-B-636, VI1c, VI3c or VI5c. Closure shall be in accordance with the appendix of the box specification.

5.1.2 Level C - Radio Set Group OA-1387()/GRC, and units of, shall be preserved and packaged in a manner that will afford adequate protection against physical and environmental damage during shipment, handling and limited intransit storage.

5.2 Packing - Packing shall be Level A, B or C as specified. Shipping containers for all levels shall be capable of supporting superimposed loads during shipment and storage without damaging the container or its contents.

5.2.1 Level A.

5.2.1.1 Radio Transmitter T-302()/TRC; Radio Receiver R-417()/TRC; Transformer, Power, Fixed Auto Transformer TF-167()/TRC; Power Supply PP-685()/TRC and Accessories Kit MK-133()/TRC.

5.2.1.1.1 Palletized load - A quantity of individual units of Radio Set Group OA-1387()/GRC, packaged as specified in 5.1 and bearing the same stock number, shall be placed on a Pallet, Load Type I, conforming to MIL-STD-147 except that the pallet shall be softwood conforming to NN-P-71, Type IV, Size 2. A fiberboard cap shall be employed over the load having two sides extending down the stacked load at least 12 inches to accommodate marking requirements. The cap shall be fabricated of fiberboard conforming to PPP-F-320, class weather-resistant, W5s or V3c. The load shall be "Bonded" to the pallet by strapping.

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5.2.1.1.2 Less than palletized load - When quantities per destination are less than a pallet load, the individual units of Radio Set Group OA-1387()/GRC, packaged as specified in 5.1, shall be waterproofed, with tape conforming to PPP-T-76, in accordance with the taping requirements of the appendix of the box specification. A quantity of the waterproofed containers, bearing the same stock number, shall be packed within a close-fitting box conforming to PPP-B-601, overseas type or PPP-B-621, Style 4, Class 2. When the gross weight exceeds 200 pounds, or the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, 3 x 4 inch skids, laid flat, shall be applied in accordance with the requirements of the container specification, or if not specified in the specification, in a manner which will adequately support the item and facilitate the use of material handling equipment. Closure and strapping shall be in accordance with the applicable container specification or appendix thereto except that metal strapping shall conform to QQ-S-781, Type I, Class B.

5.2.1.2 Radio Set Group OA-1387()/GRC - Each Radio Set Group, packaged as specified in 5.1, shall be individually packed within a close-fitting box conforming to PPP-B-601, overseas type or PPP-B-621, Style 2, Class 2. Fiberboard boxes being placed directly in the shipping container shall be waterproofed with tape conforming to PPP-T-76 in accordance with the taping requirements of the box specification. Skids, 3 x 4 inches, laid flat, shall be applied in accordance with the requirements of the container specification. Closure and strapping shall be in accordance with the applicable container specification or appendix thereto except that metal strapping shall conform to QQ-S-781, Type I, Class B.

5.2.2 Level B.

5.2.2.1 Radio Transmitter T-302()/TRC; Radio Receiver R-417()/TRC; Transformer, Power, Fixed Auto Transformer TF-167()/TRC; Power Supply PP-685()/TRC and Accessories Kit MK-133()/TRC.

5.2.2.1.1 Palletized load - A quantity of individual units of Radio Set Group OA-1387()/GRC, packaged as specified in 5.1 and bearing the same stock number, shall be palletized as specified in 5.2.1.1.1.

5.2.2.1.2 Less than palletized load - When quantities per destination are less than a pallet load, the individual units of Radio Set Group OA-1387()/GRC, packaged as specified in 5.1 and bearing the same stock number, shall be packed within a close-fitting fiberboard box conforming to PPP-B-640, Class 2, Style E, or PPP-B-636, Type CF, Class weather-resistant, variety DW. The gross weight of boxes conforming to PPP-B-640 shall not exceed 250 pounds. When the gross weight exceeds 200 pounds,

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5.2.2.1.2 Less than palletized load (Contd) -

or the container length and width is 48 x 24 inches or more, and the weight exceeds 100 pounds, containers will be pallet-mounted on pallets conforming to NN-P-71, Type IV. Closure shall be in accordance with the appendix of the applicable box specification. Reinforcing shall be by pressure-sensitive filament tape banding or nonmetallic strapping conforming to PPP-T-97, Type IV and PPP-S-760, Type II, respectively; selection of the material and application shall be in accordance with the appendix of the applicable box specification.

5.2.2.2. Radio Set Group OA-1387()/GRC - Each Radio Set Group, packaged as specified in 5.1, shall be individually packed within a close-fitting box conforming to PPP-B-601, Domestic Type or PPP-B-621, Style 2, Class I. Skids, 3 x 4 inches, laid flat, shall be applied in accordance with the requirements of the container specification. Closure and strapping shall be in accordance with the applicable container specification or appendix thereto.

5.2.3 Level C.

5.2.3.1 Radio Transmitter T-302()/TRC; Radio Receiver R-417()/TRC; Transformer, Power, Fixed Auto Transformer TF-167()/TRC; Power Supply PP-685()/TRC and Accessories Kit MK-133()/TRC.

5.2.3.1.1 Palletized load - A quantity of individual units of Radio Set Group OA-1387()/GRC, packaged as specified in 5.1 and bearing the same stock number, shall be palletized as specified in 5.2.1.1.1 except that the fiberboard caps shall be class domestic.

5.2.3.1.2 Less than palletized load - When quantities per destination are less than a pallet load, the individual units of Radio Set Group OA-1387()/GRC, packaged as specified in 5.1 and bearing the same stock number, shall be packed as specified in 5.2.2.1.2 except that the fiberboard boxes shall conform to PPP-B-640 and PPP-B-636, Class I and Class Domestic, respectively, and reinforcing shall not be required for boxes conforming to PPP-B-636.

5.2.3.2 Radio Set Group OA-1387()/GRC - Each Radio Set Group, packaged as specified in 5.1, shall be individually packed as specified in 5.2.2.2.

5.3 Marking - In addition to any special marking required by the contract or order, interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129.

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6. NOTES

6.1 Intended use - Radio Set Group OA-1387()/GRC is the basic unit of Radio Sets AN/TRC-24(), AN/GRC-75(), AN/GRC-78(), AN/GRC-81(); Terminal Sets AN/TRC-35(), AN/GRC-76(), AN/GRC-79(), AN/GRC-82(); Relay Sets AN/TRC-36(), AN/GRC-77(), AN/GRC-80() and AN/GRC-83(). These sets are used as radio connecting links in parts of multichannel telephone circuits where the laying of telephone cable is not practicable.

6.2 Ordering data - Procurement documents should specify the following:

- a. Title, number, and date of this specification and any amendment thereto.
- b. Type required.
- c. Levels of preservation and packaging and packing (See Section 5).
- d. When rough handling and functional tests are required.
- e. Marking and shipping of samples.
- f. Place of final inspection.
- g. Technical literature required (see 3.16).
- h. Quantity of tools and running spare parts required (see 3.16).

6.3 Color - The color chips furnished by the procuring agency (3.3) will be color chips No. 26152 and No. X24087, and may be obtained upon request to Commander, US Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

6.4 Group C Inspection - Approval to ship may be withheld, at the discretion of the Government, pending the decision from the contracting officer on the adequacy of corrective action (see 4.5.3.2).

6.5 Location of operational inspection - It is desirable that the operational inspection (4.15) be performed at a location that will minimize handling (which might cause damage to the equipment) after this inspection is completed. It is recommended that the entire lot (including all previously inspected sample units) be sampled and inspected immediately prior to packaging.

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6.6 Nomenclature - The parentheses in the nomenclature will be deleted or replaced by a letter identifying the particular design; for example: T-302W/TRC. The contractor should apply for nomenclature in accordance with the applicable clause in the contract (see 1.1).

6.7 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 inspection by the Government will be adjusted to make maximum utilization of the contractor's quality control system and the quality history of the product.

6.8 Supersession - This specification supersedes that part of MIL-R-10616 that covers the units of Radio Set Group OA-1387()/GRC, the basic unit of the intermediate Area Radio Relay Systems. This partial supersedure has been made since the units of radio relay equipment are presently procured as OA- groups and not as complete systems.

Custodian:
ARMY-EL

Preparing Activity
ARMY-EL
Project Number 5820-A-540

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SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 22-R255
INSTRUCTIONS: This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.		
SPECIFICATION <u>MIL-R-55698A(EL) RADIO SET GROUP OS-1387()/GRC (UNITS OF)</u>		
ORGANIZATION _____		
CITY AND STATE _____	CONTRACT NUMBER _____	
MATERIAL PROCURED UNDER A <input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO (If "yes", in what way?)		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED BY (Printed or typed name and activity - Optional)		DATE

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