MOBILE RADIO

DESCRIPTION AND MAINTENANCE
406—512 MHz DUAL FRONT END

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DESCRIPTION

Dual Front End

MASTR® II, 406 to 512 MHz Dual Front Ends (DFEs) are used with MASTR II Receivers to allow wide channel spaced operation, and most cross-band or cross-split combinations. A total of eight frequencies can be accommodated between the DFE and the Receiver channel.

The DFE consists of the following modules:

- RF steering Switch
- RF Assembly (standard RF assembly)
- Ultra High Sensitivity (UHS) Pre-Amplifier (standard)
- Mixer Board (standard)
- IF-Filter Board
- Oscillator/Multiplier (OSC/MULT); modified standard OSC/MULT assembly
- Mixer/IF Switch (MIF Switch); used with matching IF frequencies
- Mixer/IF Switch/2nd Converter (MIF Switch/2nd Converter); used with non-matching IF frequencies

The DFE utilizes the same Lexan® casting which is employed in a standard Receiver, and is mounted in the hinged lower assembly of "E" Series Combinations. The modules (board assemblies) utilized by the DFE occupy the same positions as those in a standard Receiver, except the MIF Switch/2nd Converter board is used in place of the standard IFAS board.

Centralized Metering Jack J2301, located on the MIF Switch or MIF Switch/2nd Converter board, is provided for use with GE Test Set 4EX3A11 or Test Kit 4EX8K12. The Test Set Meters the MULT 1, MULT 2 and MULT 3 test points of the OSC/Mult board.

An optional RF pre-amplifier stage (UHS) is available whenever an increase in sensitivity is required by the DFE.

A RF Steering Switch connects the antenna to either the Receiver or the DFE, depending upon the channel selected by the operator. The IF output of the DFE channel or the IF output of the Receiver channel is selected and applied to the Receiver IFAS board. Normally, the IF frequency of the DFE (11.2 MHz) matches that of the Receiver (11.2 MHz), therefore no IF frequency conversion is required (see Figure 1).

In certain instances of cross-band combinations, the IF frequency of the DFE (11.2 MHz) does not match that of the Receiver (9.4 MHz). Therefore, the MIF Switch/2nd Converter is required to convert the IF frequency of the DFE to the frequency required by the IFAS board (9.4 MHz) in the Receiver channel (See Figure 2).

Supply voltages, control functions and metering points are connected from the standard receiver (P903 of the System Board) to the DFE modules by cable harness 19B219980. RF signal connections to and from the RF steering Switch are made through 50-ohm RF cable assemblies equipped with phono plugs. IF signal connections are made from the MIF Switch board to the IFAS board of the Receiver channel using 72-ohm coaxial cables W2301 and W2302.

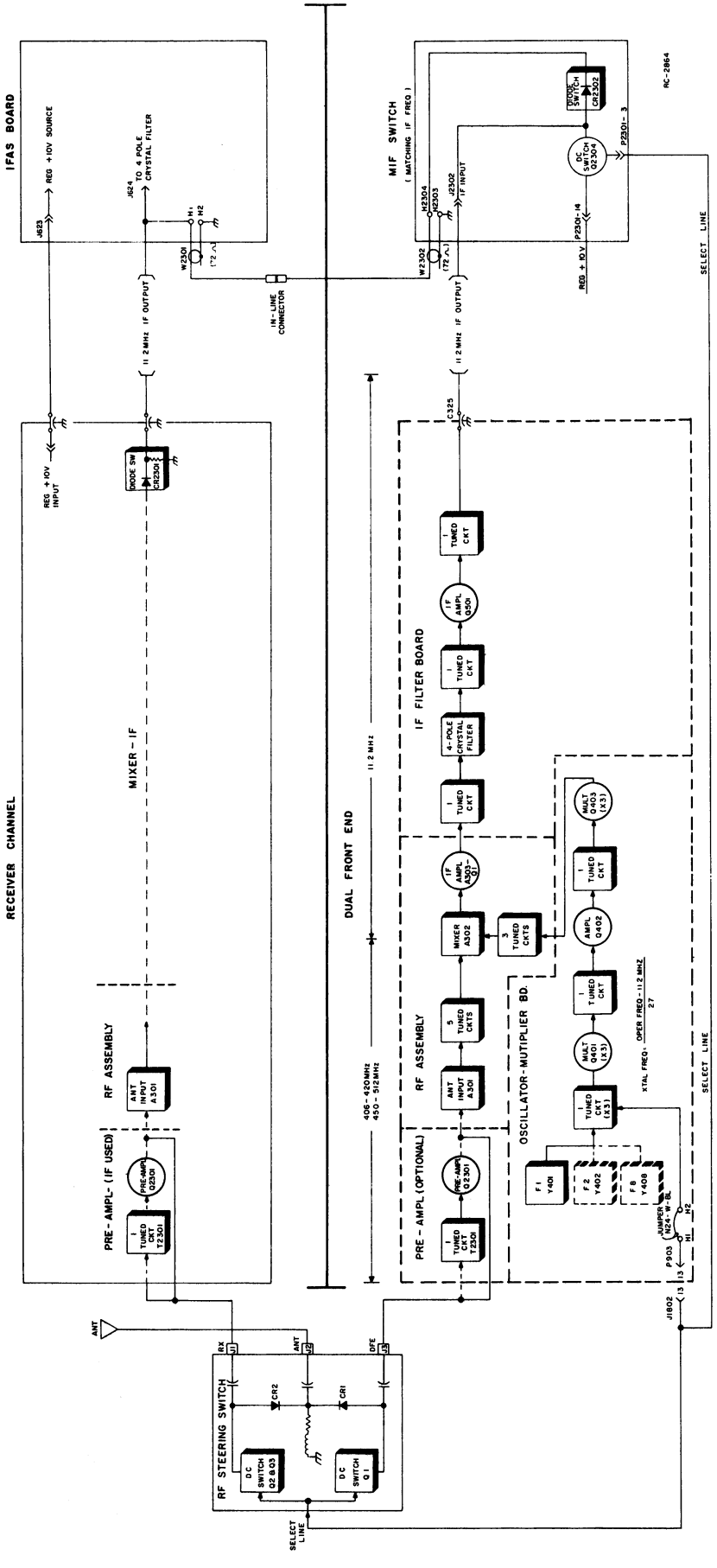


Figure 1 - DFE Block Diagram (Matching IF Frequency)

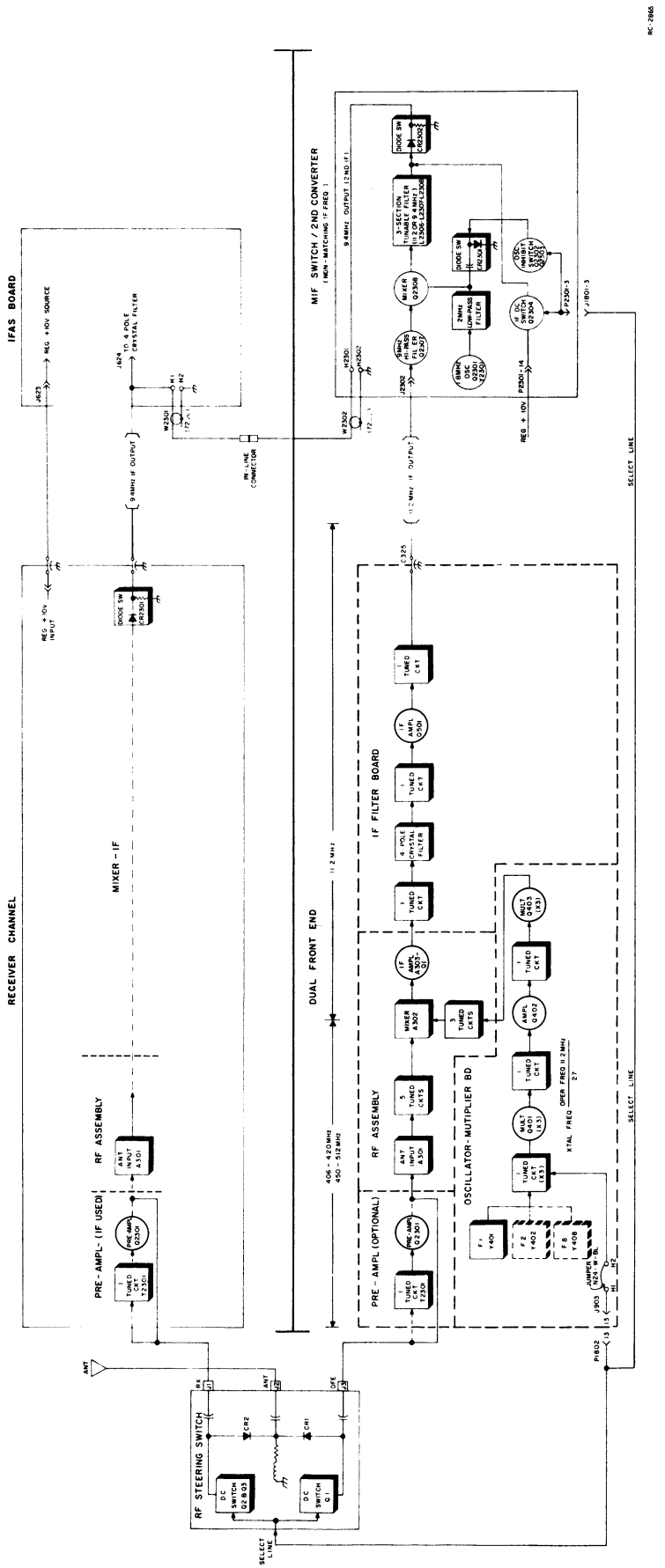


Figure 2 - DFE Block Diagram (Non-Matching IF Frequency)

RECEIVER MODIFICATIONS

The following modification is required in the MASTR® II (406 to 512 MHz) Receiver whenever the Receiver is used with a Dual Front End Option. The necessary parts required are supplied in Modification Kit 19A129750G1. Modified Units are identified by a RED dot located in the area of the unit assembly number.

MODIFICATION TO IF FILTER BOARD 19C320523G2, STANDARD RECEIVER

1. Replace R504 (47 ohm) with R2302 (680 ohm).
2. Replace C510 with CR2301 (PIN diode).
3. Add R2301 (22 K ohm) between holes H2 and H3.

MODIFICATION TO IFAS BOARD 19D417707G2, STANDARD RECEIVER

1. Connect 72 ohm coaxial cable (equipped with an in-line connector) to holes H1 (center conductor) and H2 (shield).

MODIFICATION TO OSCILLATOR-MULTIPLIER BOARD, 19D423266G1-8, DUAL FRONT END

1. Add jumper (N24-W-BL) between holes H1 and H2.

HIGH SIDE INJECTION MODIFICATION

When modification of the receiver is required for high side injection, refer to the appropriate receiver manual.

MAINTENANCE

DISASSEMBLY

To service the DFE:

1. Pull the locking handle down and pull the radio out of the mounting frame, and turn the radio over.
2. Loosen the two bottom cover retaining screws and remove the bottom cover. all major modules and tuning adjustments in the DFE are now accessible for servicing.
3. To service the bottom of the DFE, loosen the screw in the retaining latch and slide the latch open. The bottom section will now swing open.
4. Removal of modules or board assemblies from the DFE is essentially the same as for a standard Receiver. Refer to removal procedures in standard receiver Maintenance Manuals and to Figure 3, Module Location, for details.

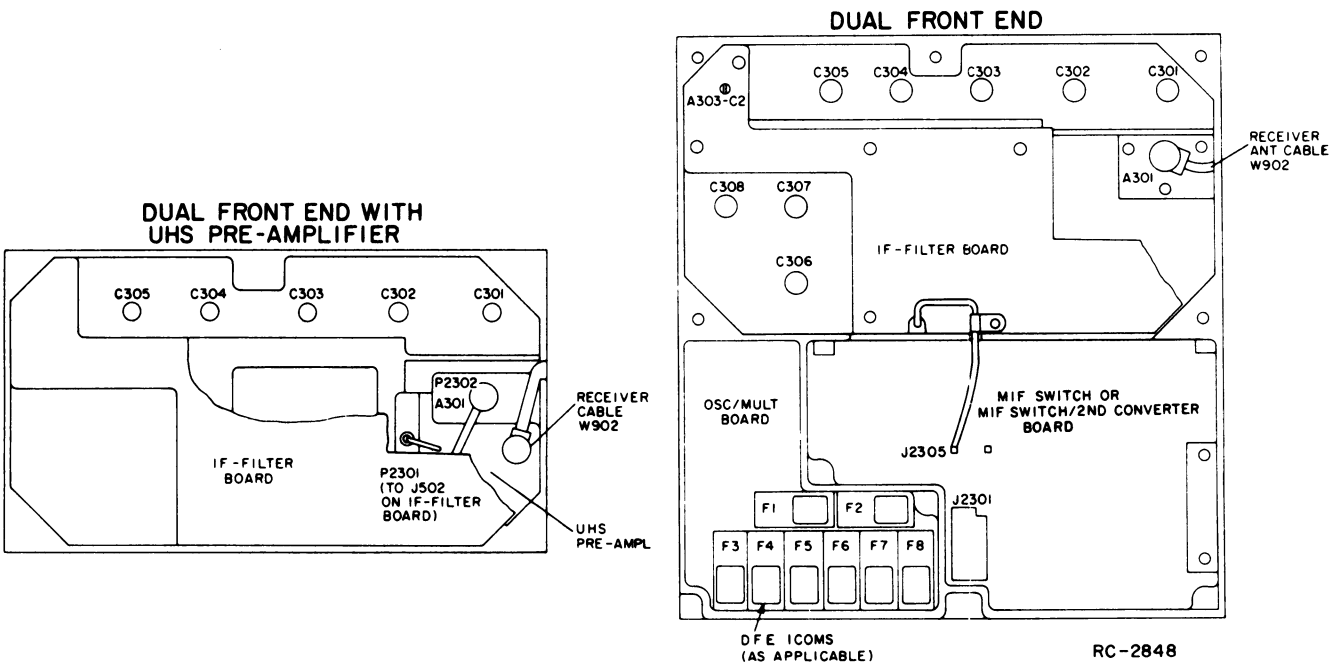


Figure 3 - Module Location

GENERAL ELECTRIC COMPANY • MOBILE COMMUNICATIONS DIVISION
WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

GENERAL ELECTRIC*
U.S.A.

FRONT END ALIGNMENT

EQUIPMENT

1. GE Test Set Models 4EX3A11, 4EX8K12, or 20,000 ohms-per Volt multimeter with a 1 Volt scale.
2. A 406-512 MHz signal source.

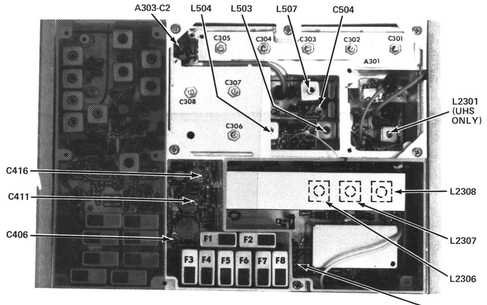
PRELIMINARY CHECKS AND ADJUSTMENTS

1. Connect black plug from Test Set to Receiver Centralized Metering Jack J601, and red plug to system board metering jack J905. Set meter sensitivity switch to the TEST 1 position (or 1 Volt position on 4EX8K12).
2. For multi-frequency receivers with a frequency spacing up to 0.800 MHz for frequency range of 406-470 MHz, 0.900 MHz for frequency range of 470-494 MHz or 0.750 MHz for frequency range of 494-512 MHz, align the receiver on the channel nearest center frequency.

   For multi-frequency receivers with a frequency spacing exceeding the above but no greater than 1.60 MHz for frequency range of 406-470 MHz, 1.80 MHz for frequency range of 470-494 MHz, or 1.50 MHz for frequency range of 494-512 MHz, align the receiver using a center frequency tune-up ICOM. These limits can be extended to 2.00 MHz, 2.30 MHz and 2.00 MHz respectively, with a 3 dB degradation in standard receiver specifications.
3. With Test Set in Position J, check for regulated +10 Volts. If using multimeter, measure between J905-3 (+) and J905-9 (-).
4. If using multimeter, connect the negative lead to J601-9 (A-).
5. Disable Channel Guard.

ALIGNMENT PROCEDURE

STEP	METERING POSITION: GE TEST SET	METERING POSITION: INTERNAL METERING	METERING POSITION: Multimeter - at J601-9	TUNING CONTROL	METER READING	PROCEDURE
			OSCILLATOR/MULTIPLIER			
1.	C (MULT-1)	3 (MULT-1)	Pin 3	C406	Maximum	Tune C406 for maximum meter reading.
2.				C411, C416, C306, C307 and C308	See Procedure	Preset C411 and C416 to a position similar to C406. Next, preset C306, C307 and C308 fully counterclockwise (minimum capacity).
3.	D (MULT-2)	4 (MULT-2)	Pin 4	C411, C416, C406	See Procedure	Tune C411 and C416 for maximum meter reading. Next, retune C406, C411 and C416 for maximum meter reading. Then carefully tune C306 for a change in meter reading (peak or dip).
4.	F (MULT-3)	5 (MULT-3)	Pin 7	C306, C307 & C308	See Procedure	Carefully tune C307 and C306 for maximum meter reading. Repeat the procedure. Next, carefully tune C308 for minimum meter reading, and retune C306 for maximum meter reading. Do NOT re-adjust C307 and C308.
			RF SELECTIVITY			
5.	B	2 (IF AMP)	Pin 1	C301 thru C305, A303-C2, (and L2301 if present)	Maximum	Apply an on-frequency signal to the antenna jack, keeping the signal below saturation. Then tune C301 through C305 and A303-C2 for maximum meter reading. In receivers with the UHS preamplifier, also tune L2301 for maximum meter reading.
6.	B	2 (IF AMP)	Pin 1	C301 thru C308, A303-C2, (L2301 if present)	Maximum	Apply an on-frequency signal to the antenna jack and slightly tune C301 through C305, A303-C2, (L2301 if present) for best quieting sensitivity. C306, C307 and C308 also may be tuned slightly (not to exceed 1/4 turn).



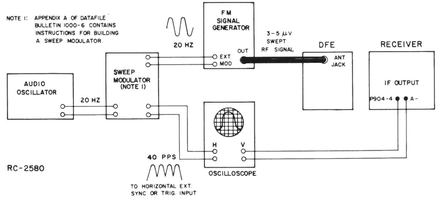


Figure 4 - Test Setup for 20-Hz Double-Trace Sweep Alignment

ICOM FREQUENCY ADJUSTMENT

First, check the frequency to determine if any adjustment is required. The frequency measurement requires equipment with an absolute accuracy which is 5 to 10 times better than the tolerance to be maintained. When performing frequency measurement, the entire radio should be as near as possible to an ambient temperature of 26.5°C (79.8°F).

MASTR II ICOMs should be reset only when the measured frequency error exceeds the following limits:

A. ±0.5 PPM, when the radio is at 26.5°C (79.8°F).

B. ±2 PPM at any other temperature within the range -5°C to +55°C (+23°F to +131°F).

C. The specification limit (±2 PPM or ±5 PPM) at any temperature within the ranges -40°C to -5°C (-40°F to +23°F) or +55°C to +70°C (+131°F to 158°F).

If frequency adjustment is required, lift up the cover on the top of the ICOM to expose the adjustment trimmer. Depending upon the type of frequency measuring equipment that is available, any of the following procedures may be used:

A. DIRECT MEASUREMENT IN THE INJECTION CHAIN

1. WITH A FREQUENCY COUNTER. "Count" the frequency at the junction of C416 and L403 on the Oscillator/Multiplier Board. The frequency measured at this point is 9 times the ICOM frequency. NOTE: The output from the ICOM itself is not sufficiently sinusoidal for reliable for reliable operation with most frequency counters.
2. WITH A COMMUNICATION MONITOR (for example: Cushman Model CE-3). "Monitor" frequency at the junction of C416 and L403 on the Oscillator/Multiplier Board. The frequency monitored at this point is 9 times the ICOM frequency. NOTE: This frequency will not always fall within an available measuring range of all monitors at all receiver operating frequencies.

B. STANDARD "ON FREQUENCY" SIGNAL AT THE RECEIVER INPUT (Generated from a COMMUNICATION MONITOR, for example: Cushman Model CE-3).

1. WITH A FREQUENCY COUNTER. "Count" the developed IF frequency at the tap of J602-X2 on the IFAS board. The deviation from the nominal IF frequency (11.2 MHz) in Hz is compared to the receiver operating frequency (also in Hz) to calculate error in PPM.
2. WITH AN 11.2 MHz IF FREQUENCY STANDARD (for example: General Electric Model 4EX8A10). Loosely couple the IF frequency standard to the IF signal path to heterodyne with the developed IF frequency. The resultant "beat frequency" can be monitored by either of the following methods:

NOTE

To Set ICOM frequency using "beat frequency" method, the temperature should be at 26.5°C (79.8°F). If the temperature is not 26.5°C, then offset the "ON FREQUENCY" signal (at the receivers input), as a function of actual temperature, by the frequency ERROR FACTOR (in PPM) shown in Figure 6.

a. Audible "beat frequency" from the receiver speaker (this requires careful frequency adjustment of the frequency standard).

b. Observe "beat frequency" at P904-4 with an Oscilloscope.

c. With GE TEST SET (Meter Position B) connected to J601 on the IFAS Board, visually observe the "beat frequency" indicated by meter movement.

The frequency of the "beat" is the frequency error, related to the IF frequency. This deviation, in Hz, is compared to the receiver operating frequency, also in Hz, to calculate the error in PPM.

NOTE

The FM Detector output (meter position A of the test set) has a DC voltage of .35 to .50 volts at the assigned frequency and is provided for routine test and measurement only. The resolution of this reading is approximately .025 V per kHz as read on a GE Test Set in meter position A, or 0.1 V per kHz as measured with a VTVM at P904-3 or J601-3 on the IFAS board is inadequate for oscillator frequency setting.

If the radio is at an ambient temperature of 26.5°C (79.8°F) set the oscillator for the correct mixer frequency (ICOM FREQ. X 9).

If the radio is not at an ambient temperature of 26.5°C, setting errors can be minimized as follows:

A. To hold setting error to ±0.6 PPM (which is considered reasonable for 5 PPM ICOMS):

1. Maintain the radio at 26.5°C (±5°C) and set the oscillator to required mixer injection frequency, or
2. Maintain the radio at 26.5°C (±10°C) and offset the oscillator, as a function of actual temperature, by the frequency error factor shown in Figure 6.

B. To hold setting error to ±0.35 PPM (which is considered reasonable for 2 PPM ICOMS): Maintain the unit at 26.5°C (±5°C) and offset the oscillator, as a function of actual temperature, by the frequency error factor shown in Figure 6.

For example: Assume the ambient temperature of the radio is 18.5°C (65.4°F). At that temperature, the curve shows a correction factor of 0.3 PPM. (At 138 MHz, 1 PPM is 138 Hz. At 174 MHz, 1 PPM is 174 Hz).

With a mixer injection frequency of 150 MHz, adjust the oscillator for a corrected mixer injection frequency 45 Hz (0.3 x 150 Hz) higher. If a negative correction factor is obtained (at temperatures above 26.5°C), set the oscillator for the indicated PPM lower than the calculated mixer injection frequency.

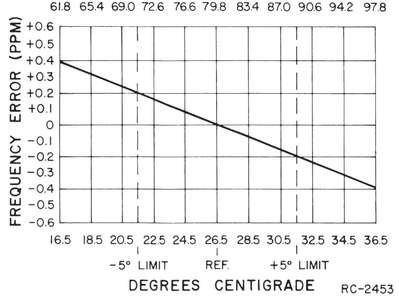


Figure 5 - Frequency Characteristics Vs. Temperature

COMPLETE DFE ALIGNMENT

EQUIPMENT REQUIRED

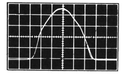
1. GE Test Models 4EX3A11, 4EX8K12 (or 20,000 ohms-per-Vol multimeter with a 1 Volt scale).
2. An 11.2 MHz signal source (GE Test Set Model 4EX9A10). Also a 406-512 MHz signal source (Measurements 803) with a one-inch piece of insulated wire no larger than .065 inch diameter connected to generator probe.
3. A VTVM.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Connect the black plug from the Test Set to receiver metering jack J601, and the red plug to system board metering jack J905. Set the meter sensitivity switch to the Test 1 (or 1 Volt position on the 4EX8K12).
2. For multi-frequency receivers with a frequency spacing up to 0.800 MHz for frequency range of 406-470 MHz, 0.900 MHz for frequency range of 470-494 MHz, or 0.750 MHz for frequency range of 494-512 MHz, align the receiver on the channel nearest center frequency.

   For multi-frequency receivers with a frequency spacing exceeding the above but no greater than 1.60 MHz for frequency range of 406-570 MHz, 1.80 MHz for frequency range of 470-494 MHz, or 1.50 MHz for frequency range of 494-512 MHz, align the receiver using a center frequency tune-up ICOM. These limits can be extended to 2.00 MHz, 2.30 MHz and 2.00 MHz respectively, with 3 dB degradation in standard receiver specifications.
3. With the Test Set in Position J, check for regulated +10 Volts. With multimeter, measure from J905-3 to J905-9.
4. If using multimeter, connect the negative lead to J601-9 (A-).
5. Disable the Channel Guard.

ALIGNMENT PROCEDURE

STEP	METERING POSITION: GE TEST SET	METERING POSITION: INTERNAL METERING	METERING POSITION: MULTIMETER - at J601-9	TUNING CONTROL	METER READING	PROCEDURE
			OSCILLATOR/MULTIPLIER			
1.	C (MULT-1)	3 (MULT-1)	Pin 3	C406	Maximum	Tune C406 for maximum meter reading.
2.				C411, C416, C306, C307 and C308	See Procedure	Preset C411 and C416 to a position similar to C406. Next, preset C306, C307 and C308 fully counterclockwise (minimum capacity).
3.	D (MULT-2)	4 (MULT-2)	Pin 4	C411, C416, C406	See Procedure	Tune C411 and C416 for maximum meter reading. Next, retune C406, C411 and C416 for maximum meter reading. Then carefully tune C306 for a change in meter reading (peak or dip).
4.	F (MULT-3)	5 (MULT-3)	Pin 1	C306, C307 & C308	See Procedure	Carefully tune C307 and C306 for maximum meter reading. Repeat the procedure. Next, carefully tune C308 for minimum meter reading, and retune C306 for maximum meter reading. Do NOT re-adjust C307 and C308.
			RF SELECTIVITY			
5.	B (IF AMP)	2 (IF AMP)	Pin 1	C305, C304 and A303-C2	Maximum	Preset A303-C2 to mid position. Apply an on-frequency signal in the hole adjacent to C304, keeping the signal below saturation. Then tune C305, C304 and then A303-C2 for maximum meter reading.
6.	B (IF AMP)	2 (IF AMP)	Pin 1	C304 and C303	Maximum	Apply an on-frequency signal in the hole adjacent to C303, keeping the signal below saturation. Then tune C304 and then C303 for maximum meter reading.
7.	B (IF AMP)	2 (IF AMP)	Pin 1	C303 and C302	Maximum	Apply an on-frequency signal in the hole adjacent to C302, keeping the signal below saturation. Then tune C303 and then C302 for maximum meter reading.
8.	B (IF AMP)	2 (IF AMP)	Pin 1	C301 thru C305 A303-C2 (and L2301 if present)	Maximum	Apply an on-frequency signal to the antenna jack, keeping the signal below saturation. Then tune C301 through C305 and A303-C2 for maximum meter reading. In receivers with the UHS preamplifier, also tune L2301 for maximum meter reading.
9.	B (IF AMP)	2 (IF AMP)	Pin 1	C301 thru C308, A303-C2 (and L2301 if present)	Maximum	Apply an on-frequency signal to the antenna jack and slightly tune C301 through C305, A303-C2 (L2301 if present) for best quieting sensitivity. C306, C307 & C308 also may be tuned slightly (not to exceed 1/4 turn.
			MIXER & IF			
	The mixer and IF circuits have been aligned at the factory and will normally require no further adjustment. If adjustment is necessary, use the procedure outlined in STEP 13. NOTE: Refer to DATAFILE BULLETIN 1000-6 (IF Alignment of Two-Way Radio FM Receivers) for helpful suggestions on how to determine when IF Alignment is required.					
10.	L507, L503, L504 and C504 					Connect scope, signal generator and probe as shown in Figure 5. Set signal generator level for 3 to 5 uV and modulate with 20 Hz and 10 kHz deviation. With probe between P904-4 (or J601-13 and A-, tune L507, L503, L504 and C504 for double trace as shown on scope pattern.
			NON-MATCHING FREQUENCY			
11.				L504, L2306, L2307 and L2308		With tuning slugs of L2306, L2307 and L2308 pre-set to bottom of coils (nearest printed wire board), tune L2306, L2307 and L2308 for maximum noise as indicated on scope. Then Tune L2306 and L2307 for maximum IF response. NEXT, Tune L504 and L2308 for optimum IF response as indicated on scope pattern (Step 10).

TEST PROCEDURES

These Test Procedures are designed to help you to service a DFE that is operating---but not properly. A typical problem encountered could be poor sensitivity. Any problems relating to audio distortion, low audio, poor limiter operation or squelch trouble should be localized using the standard receiver channel since the IFAS board is common to both the Receiver and the DFE. Refer to appropriate Receiver Maintenance Manual for servicing procedures.

By following the sequence of test steps starting with Step 1, the defect can be quickly localized. After the defective stage is pin-pointed, refer to the "Service Check" listed to correct the problem. Additional corrective measures are included in the Troubleshooting Procedure. Before starting with the Test Procedures, be sure the DFE is tuned and aligned to the proper operating frequency.

TEST EQUIPMENT REQUIRED

- Distortion Analyzer similar to:

  Heath IM-12

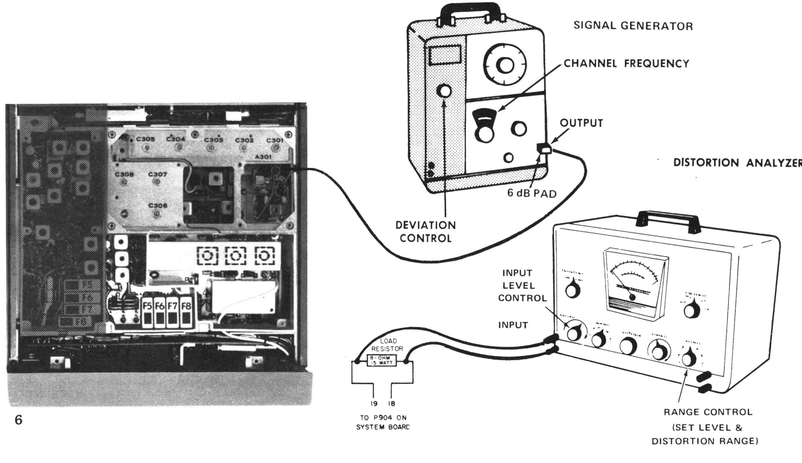
- Signal Generator similar to:

  Measurements 803

- 6-dB attenuation pad, and 8.0-ohm, 15-Watt resistor

PRELIMINARY ADJUSTMENTS

1. Connect the test equipment to the receiver and DFE as shown for all steps of the DFE Test Procedure.
2. Turn the SQUELCH control fully clockwise for all steps of the Test Procedure.
3. Turn on all of the equipment and let it warm up for 20 minutes.



STEP 1
USABLE SENSITIVITY (12-dB SINAD)

Measure DFE Sensitivity as follows:

A. Apply a 1000-microvolt, on-frequency signal modulated by 1000 Hz with 3.0-kHz deviation to A301-J1.

B. With 15-Watt Speaker (Mobile)
5-Watt (Station)

Disconnect speaker lead pin from Systems Plug P701-11 (on rear of Control Unit).

Connect an 8.0-ohm, 15-Watt load resistor from P904-19 to P904-18 or from P701-4 to P701-17 (SPEAKER Hi) on the System Plug. Connect the Distortion Analyzer input across the resistor.

OR

With Handset:

Lift the handset off of the hookswitch. Connect the Distortion Analyzer input from P904-19 to P904-18.

C. Adjust the VOLUME control for 12-Watt output 9.8 VRMS (Mobile) or 6.3 VRMS (Station) using the Distortion Analyzer as an AC Voltmeter.

D. Place the RANGE switch on the Distortion Analyzer in the 200 to 2000-Hz distortion range position (1000-Hz filter in the circuit). Tune the filter for minimum reading or null on the lowest possible scale (100%, 30%, etc.)

E. Place the RANGE switch to the SET LEVEL position (filter out of the circuit) and adjust the input LEVEL control for a +2 dB reading on a mid range (30%).

F. While reducing the signal generator output, switch the RANGE control from SET LEVEL to the distortion range until a 12-dB difference (+2 dB to -10 dB) is obtained between the SET LEVEL and distortion range positions (filter out and filter in).

G. The 12-dB difference (Signal plus noise and distortion to noise plus distortion ratio) is the "usable" sensitivity level.

The sensitivity should be less than rated 12 dB SINAD specifications with an audio output of at least 6.0 Watts (6.9 Volts RMS across the 8.0-ohm receiver load using the Distortion Analyzer as a VTVM).

H. Leave all controls as they are and all equipment connected if the Modulation Acceptance Bandwidth test is to be performed.

SERVICE CHECK

If the sensitivity level is more than rated 12 dB SINAD, check the alignment of the RF stages as directed in the Alignment Procedure, and make the gain measurements as shown on the Troubleshooting Procedure.

STEP 2
MODULATION ACCEPTANCE BANDWIDTH (IF BANDWIDTH)

If STEP 1 checks out properly, measure the IF bandwidth as follows:

A. Set the Signal Generator output for twice the microvolt reading obtained in the 12-dB SINAD measurement.

B. Set the RANGE control on the Distortion Analyzer in the SET LEVEL position (1000-Hz filter out of the circuit), and adjust the input LEVEL control for a +2 dB reading on the 30% range.

C. While increasing the deviation of the Signal Generator, switch the RANGE control from SET LEVEL to distortion range until a 12-dB difference is obtained between the SET LEVEL and distortion range readings (from +2 dB to -10 dB).

D. The deviation control reading for the 12-dB difference is the Modulation Acceptance Bandwidth of the receiver. It should be more than ±7 kHz.

SERVICE CHECK

If the Modulation Acceptance Bandwidth test does not indicate the proper width, make gain measurements as shown on the DFE Troubleshooting Procedure.

STEP 1 - QUICK CHECKS

TEST SET CHECKS

These checks are typical voltage readings measured with GE Test Set Model 4EX3A11 in the Test 1 position, or Model 4EX8K12 in the 1-Volt position.

Metering Position	Reading With No Signal In
C (Mult-1)	0.3 VDC
D (Mult-2)	0.4 VDC
F (Mult-3)	0.1 VDC
J (Reg. +10 Volts at System Metering Jack)	+10 VDC

SYMPTOM CHECKS

SYMPTOM	PROCEDURE
NO SUPPLY VOLTAGE	• Check power connections and continuity of supply leads, and check fuse. If fuse is blown, check receiver for short circuits.
NO REGULATED 10-VOLTS	• Check the 12-Volt supply. Then check 10-Volt regulator circuit. (See Troubleshooting Procedure for 10-Volt Regulator).
LOW IF READING ON IFAS BOARD WITH DFE SELECTED	• Check supply voltages and then check oscillator readings at P904-1 & -2 as shown in STEP 2. • Make SIMPLIFIED GAIN CHECKS from Mixer through Bandpass Filter stages as shown in STEP 2.
LOW OSCILLATOR/MULTIPLIER READINGS	• Check alignment of Oscillator/Multiplier chain. (Refer to Front End Alignment Procedure). • Check voltage readings of Oscillator/Multiplier chain (Q401, Q402, Q403).
LOW DFE SENSITIVITY	• Check Front End Alignment. (Refer to DFE Alignment Procedure.) • Check antenna connections, cable and antenna switch. • Check Oscillator injection voltages. • Check voltage readings of IF Amplifiers. • Make SIMPLIFIED GAIN CHECKS (STEP 2).

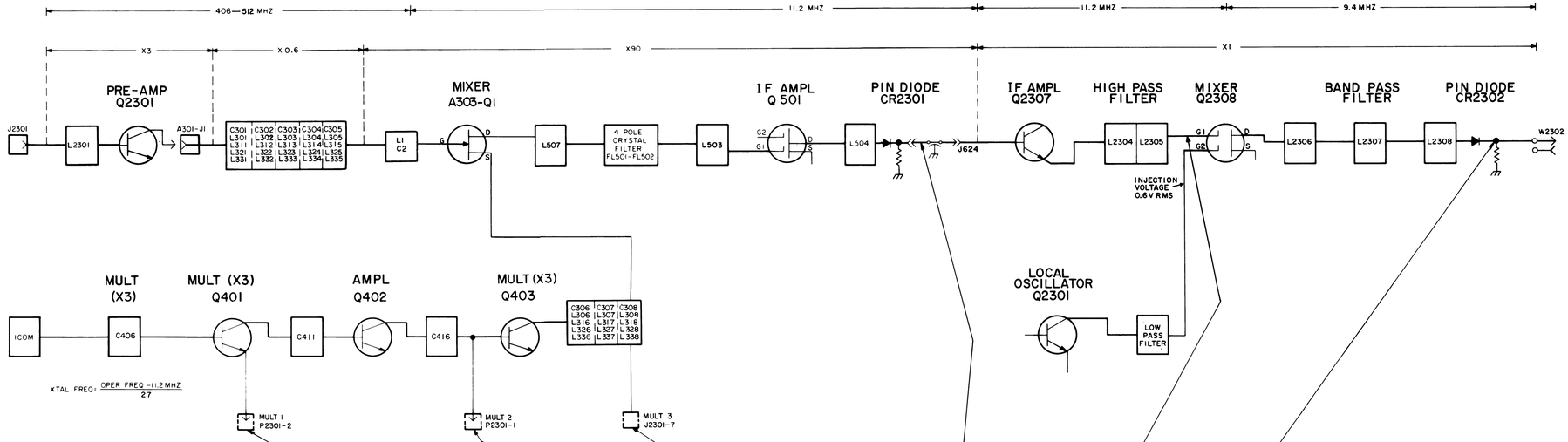
STEP 3-VOLTAGE RATIO READINGS

EQUIPMENT REQUIRED
1. RF VOLTMETER
2. SIGNAL ON RECEIVER FREQUENCY (BELOW SATURATION). USE 1000HZ SIGNAL WITH 3.0HZ DEVIATION.

PROCEDURE
1. APPLY PROBE TO INPUT OF STAGE (FOR EXAMPLE, SOURCE OF RF AMP). PEAK RESONANT CIRCUIT OF STAGE BEING MEASURED AND TAKE VOLTAGE READING (E_1).
2. MOVE PROBE TO INPUT OF FOLLOWING STAGE (MIXER). REPEAK FIRST RESONANT CIRCUIT THEN PEAK CIRCUIT BEING MEASURED AND TAKE READING (E_2).
3. CONVERT READINGS BY MEANS OF THE FOLLOWING FORMULA.

$$\text{VOLTAGE RATIO} = \frac{E_2}{E_1}$$

4. CHECK RESULTS WITH TYPICAL VOLTAGE RATIOS SHOWN ON DIAGRAM.



STEP 2-SIMPLIFIED GAIN CHECKS

EQUIPMENT REQUIRED
1. VOLTMETER AC & DC
2. SIGNAL GENERATOR
3. R F VOLTMETER

PRELIMINARY STEPS
1. SET VOLUME CONTROL FOR 9.8 VOLTS ACROSS 8.0-OHM LOAD. IF THIS CANNOT BE OBTAINED, SET TO APPROX. 70% OF MAX. ROTATION.
2. SET SQUELCH CONTROL FULLY COUNTERCLOCKWISE.
3. RECEIVER SHOULD BE PROPERLY ALIGNED.
4. CONNECT METER BETWEEN A- AND POINTS INDICATED BY ARROW.

SET SIGNAL GENERATOR TO CORRECT RF FREQUENCY AND APPLY TO A301-J1.				UNMODULATED	UNMODULATED	UNMODULATED
PROCEDURE				SET GENERATOR OUTPUT AT 1000 MICROVOLTS	SET GENERATOR OUTPUT AT 1000 MICROVOLTS	SET GENERATOR OUTPUT AT 1000 MICROVOLTS
READING	VOLTMETER READING SHOULD BE APPROX 0.4 VDC	VOLTMETER READING SHOULD BE APPROX 0.8 VDC	VOLTMETER READING SHOULD BE APPROX 0.5 V DC	R F VOLTMETER READING SHOULD BE APPROX 150 MILLIVOLTS	RF VOLTMETER READING SHOULD BE 120 MILLIVOLTS	RF VOLTMETER READING SHOULD BE 150 MILLIVOLTS

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