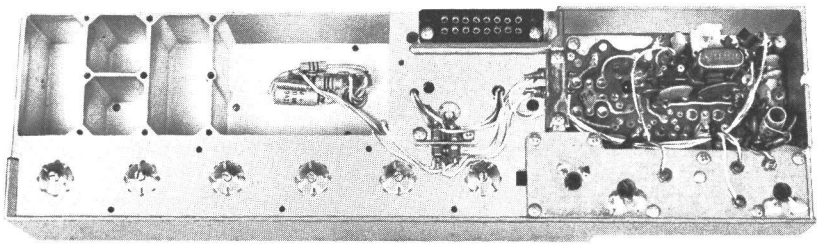
MOBILE RADIO

MASTR Progress Line

132—174 MHZ DUAL FRONT END MODELS 19D413151-G1—G4

Maintenance Manual LBI-3890A

DF-8401



SPECIFICATIONS *

DUAL FRONT END 19D413151-G1 thru -G4

FREQUENCY RANGE	132-174 MHz	
SENSITIVITY		
	With One Antenna	With Two Antennas
12-dB SINAD	0.50 microvolt	0.45 microvolt
20-dB quieting	0.65 microvolt	0.60 microvolt
INTERMODULATION (EIA)	-80 dB	
INPUT POWER	.010 Amps at 10 volts	
FREQUENCY STABILITY	.0005% (-30°C to +60°C)	
TRANSISTORS	5	
DIMENSIONS (HxWxD)	2-1/4" x 11-3/4" x 4-3/8"	

DUAL FRONT END 132-174 MHZ

*These specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specification Sheet for the complete specifications.

GENERAL ELECTRIC

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ILLUSTRATIONS

DESCRIPTION

DUAL FRONT END (DFE)

General Electric Dual Front End Model 19D413151-G1 through -G4 was designed for operation in the 132-174 megahertz band. The Dual Front End (DFE) is used with MASTR Progress Line Receivers to monitor two frequencies when the channel spacing is greater than 0.4% (±.2%).

The DFE is of single-unit construction, completely housed in an aluminum casting for maximum shielding and rigidity. The unit consists of five helical resonators, 1st mixer, oscillator and two multiplier stages, and a high IF amplifier. The output feeds directly into the receiver crystal filter as shown in Figure 1. The chassis is mounted in a housing on the rear of the mobile frame, adding approximately three inches to the overall length of the mobile unit.

ANTENNA SYSTEMS

The Dual Front End and the receiver may use a common antenna or separate antennas. If the two frequencies are in the 132-174 megahertz range, one antenna will work satisfactorily. For crossband applications, where the receiver frequency is in the 25-50 megahertz range and the DFE in the 132-174 megahertz range, two antennas must be used to obtain maximum receiver sensitivity. The frequency range and antenna system used with each model DFE is shown in the following chart.

DUAL FRONT END	FREQUENCY RANGE	ANTENNA SYSTEM
19D413151-G1	132-150.8 MHz	One Antenna
19D413151-G2	150.8-174 MHz	One Antenna
19D413151-G3	132-150.8 MHz	Two Antennas
19D413151-G4	150.8-174 MHz	Two Antennas

Single Antenna System (Figure 2)

In the single antenna system, the antenna connects to jack J901 on the front of the mobile unit. From J901, the antenna connects to the common terminal of antenna relay K901. The transmitter connects to the normally open contact terminal of the antenna relay. The normally closed contact terminal of K901 is connected to the common terminal of the antenna "T" connector. One cable from the "T" connector goes to J1 on the Dual Front End and the other cable goes to J441 on the receiver.

Dual Antenna System (Figure 3)

When two antennas are used, one antenna is connected through antenna jack J902 on the front of the mobile unit to jack J1 on the DFE. The second antenna is connected through J901 to the common terminal of antenna relay K901. The normally closed relay contact is connected to receiver antenna jack J441, and the normally open contact is connected to the transmitter.

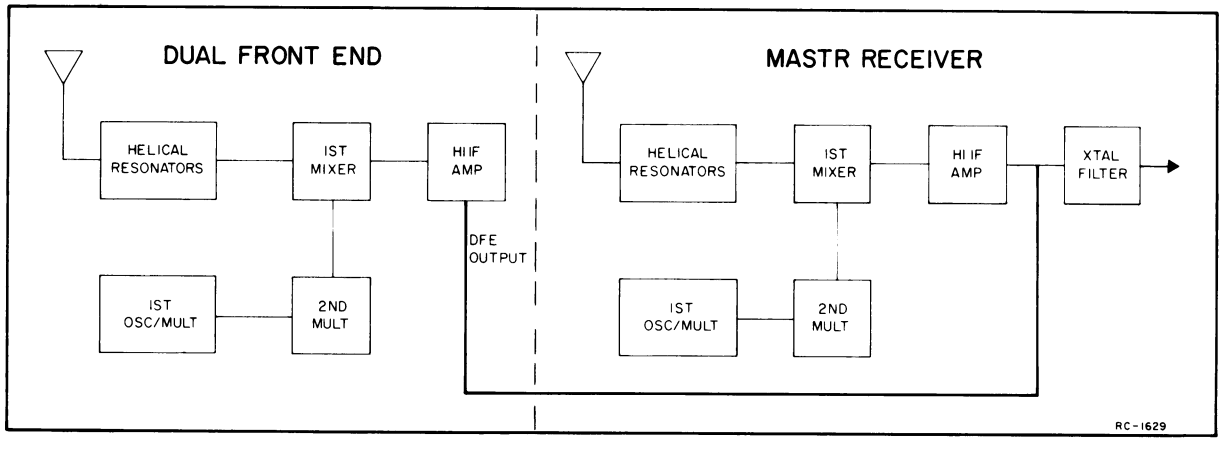


Figure 1 - Dual Front End Block Diagram

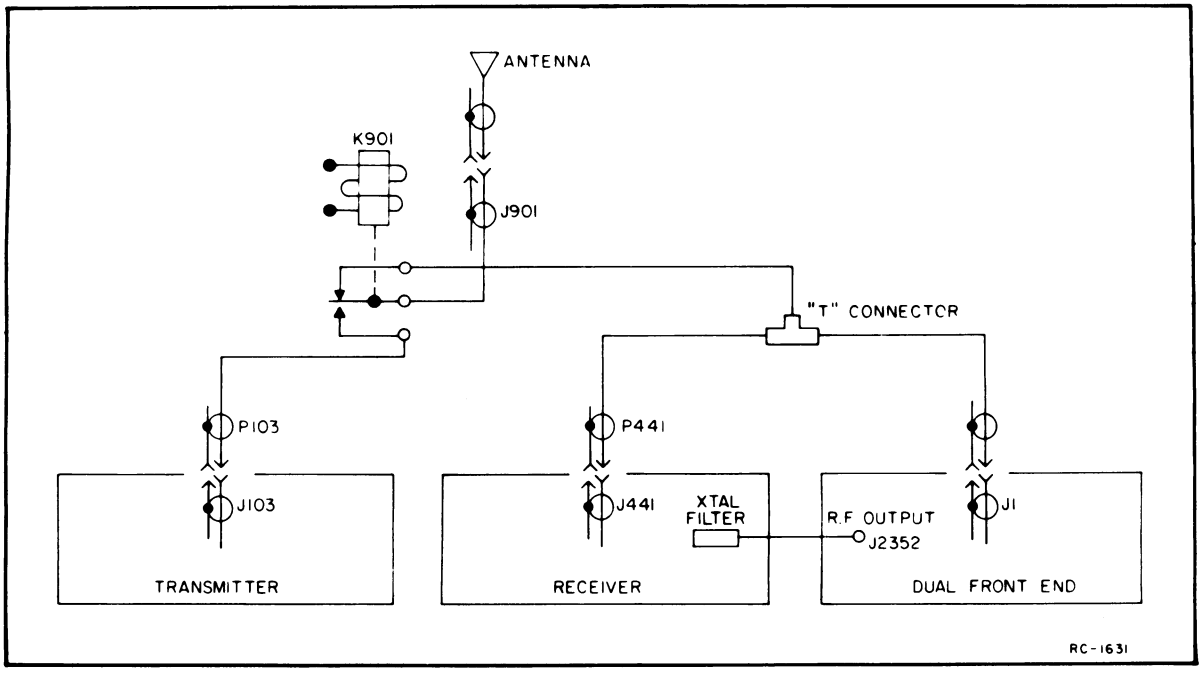


Figure 2 - Single Antenna Block Diagram

CIRCUIT ANALYSIS

DUAL FRONT END

The MASTR Progress Line Dual Front End is completely transistorized, using five silicon transistors. A regulated 10 volts is used for all stages of the Dual Front End.

Centralized metering jack J2351 is provided for use with GE Test Set Models 4EX3A10 and 4EX8K10, 11 for ease of alignment and servicing. The Test Set meters the oscillator, multipliers, and the regulated 10 volts.

Helical Resonators

Five tuned helical resonators (L2351/L2352 through L2359/L2360) provide the RF

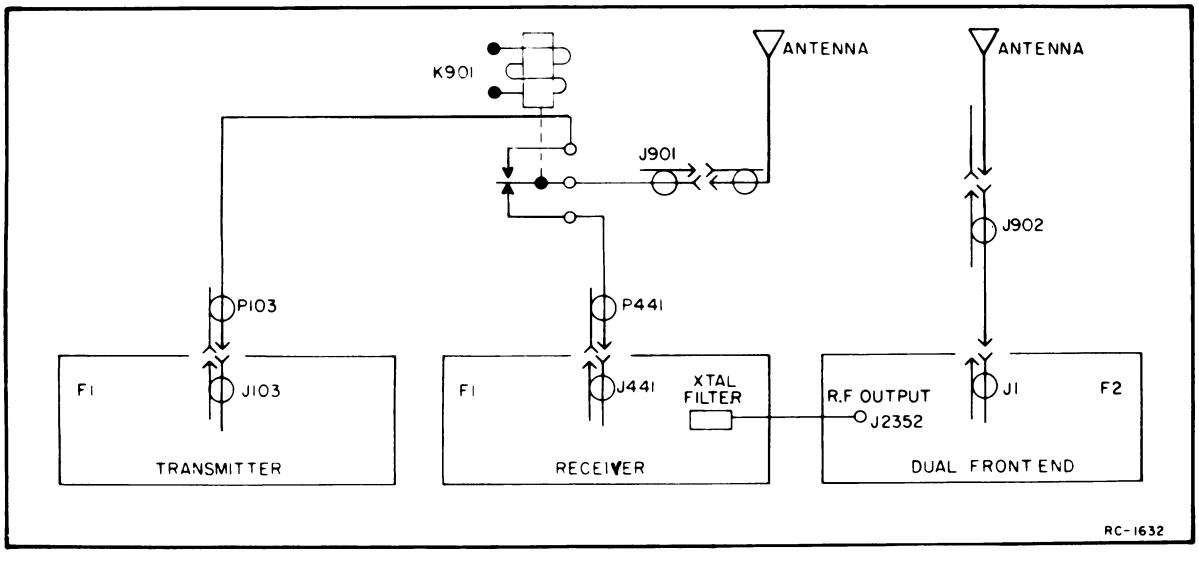


Figure 3 - Dual Antenna Block Diagram

selectivity in the dual front end. An RF cable connects the RF signal from the antenna to a tap on L2351/L2352. The tap is positioned to provide the proper impedance match to the antenna. The output of L2359/L2360 is coupled through C3 to the 1st mixer assembly.

1st Oscillator and Multiplier (A2355-A2358)

The receiver 1st oscillator operates in a transistorized Colpitts oscillator circuit. The oscillator crystal operates in a fundamental mode at a frequency of approximately 13 to 18 megahertz. The crystal is cut to provide temperature compensation at the high end of the temperature range and is thermistor compensated at low temperatures. This provides ±.0005% frequency stability as soon as the receiver is energized -- without having to wait for crystal ovens to warm up.

Regulated 10 volts is supplied to the crystal circuit to forward bias diode CR1. Forward biasing the diode reduces its impedance, so that the crystal frequency is applied to the base of oscillator transistor Q1. Feedback for the oscillator is developed across C21. The oscillator output is coupled through C24 to the base of 1st multiplier Q2.

The output of the 1st multiplier (tripler Q2) is transformer-coupled (T1/T2) to the 2nd multiplier assembly. The 1st multiplier centralized metering jack J2351-4 through metering network CR5, R5, R16 and C32.

2nd Multiplier (A2353/A2354)

The 1st multiplier output is transformer coupled through T1/T2 to the base of 2nd multiplier A2353. Following the 2nd multiplier are three resonant L-C circuits tuned to nine times the crystal frequency. The output is taken from a tap on L311/L312 and applied to the 1st mixer.

1st Mixer (A2351/A2352)

The 1st mixer uses a Field-Effect Transistor (FET) as the active device. The FET may be considered a semiconductor current path (or channel) whose resistance is varied by a voltage applied to the control element (gate). Lead identification for the FET is shown in Figure 4.

The FET has several advantages over a conventional transistor, including a high input impedance, high power gain, and an output that is relatively free of harmonics (low in intermodulation products). The FET also has voltage-controlled characteristics, and may be compared to a vacuum tube in operation (see Figure 4).

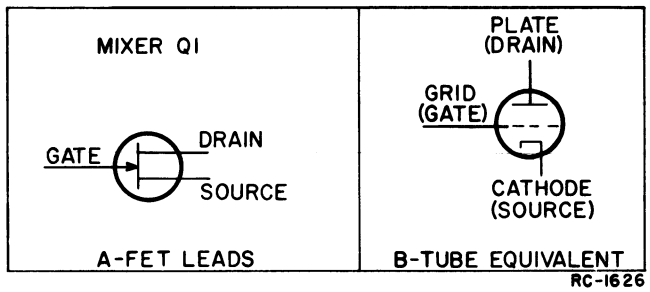


Figure 4 - FET Nomenclature

In the 1st mixer, RF from the helical resonators is applied to the gate of Q1, and injection voltage from and 2nd multiplier is applied to the source. The mixer output is taken from the drain and applied to the output transformer. The transformer is tuned to the 5.3 MHz high IF frequency.

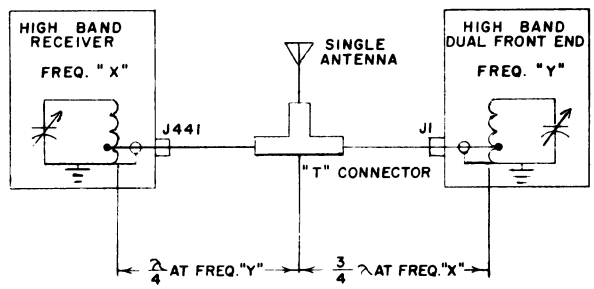
HI IF Amplifier (A2365)

A series-resonant circuit (L3 and C1) couples the mixer output to the emitter of high IF amplifier Q1. The transistor operates as a grounded-base amplifier which provides a low impedance for the mixer input. The amplifier output is coupled through transformer T1 to the crystal filter on the receiver.

Centralized metering jack J2351 is provided for maintenance and alignment of the 1st multiplier. The four leads from receiver plug P443 supplies the regulated 10 volts for the Dual Front End circuit, crystal switching, system negative, and ground connections.

RF CABLE LENGTHS

When changing frequencies or units in single antenna systems, the RF cables from the "T" connector to the receiver and DFE must be cut to the lengths calculated from the "Cable Length Chart" (Figure 5). This is particularly important when F1 and F2 are only a few channels apart.



(19A121702, Sh. 3, Rev. 2)
Figure 5 - Cable Lengths for Single Antenna Systems

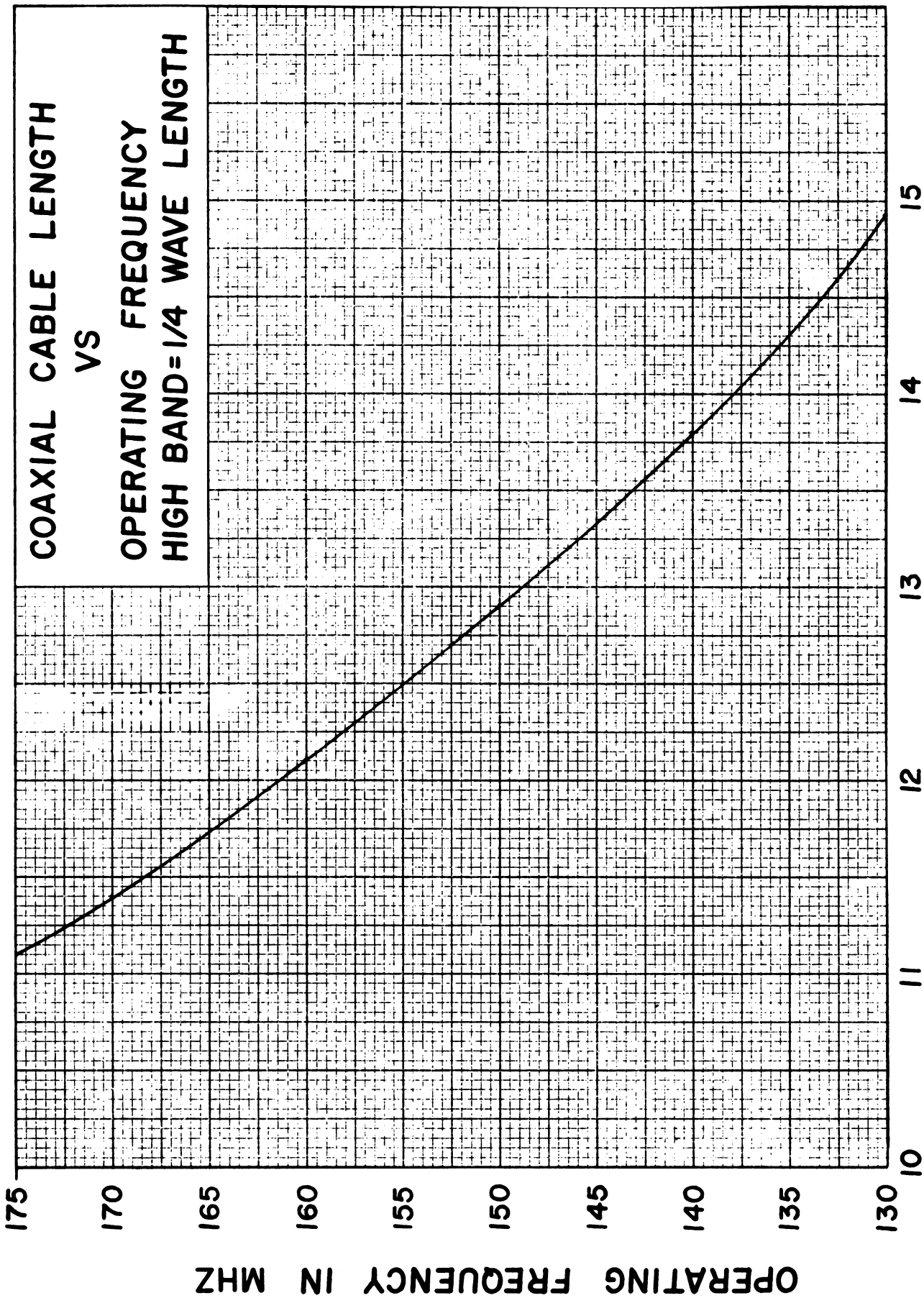


Figure 6 - Cable Length Chart (19A121702, Sh. 4, Rev. 2)

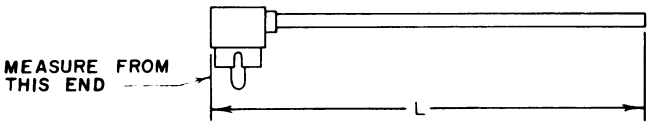
Procedure

Prepare the one-quarter wavelength coaxial cable to connect the receiver to the "T" connector as follows:

1. From Figure 6, determine the proper length for the receiver cable by using the Dual Front End frequency.

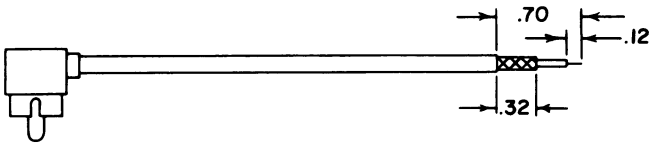
2. Subtract four inches from the length found in Step 1 (for the length of cable inside the receiver). This gives you the cutting length for the cable.

3. Measure the cable as shown in Figure 7 and cut the cable to length.

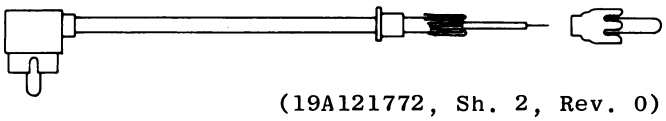


(19A121772, Sh. 1, Rev. 1)
Figure 7 - Receiver Cable Length (1/4-Wavelength at DFE Freq.)

4. Strip the cable as shown in Figure 8 and solder the phono-type connector onto the cable as shown in Figure 9. Be sure that the center conductor is even with the tip of the phono connector.



(19A121772, Sh. 2, Rev. 0)
Figure 8 - Stripping Lengths for Receiver Cable



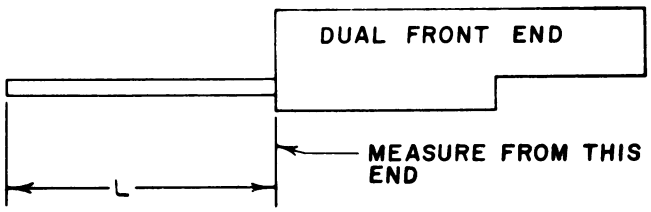
(19A121772, Sh. 2, Rev. 0)
Figure 9 - Assembling Phono Connector on Receiver Cable

5. Plug the cable from J441 on the receiver to the "T" connector. Replace the cable beneath the cable clamp.

Prepare the three-quarter wavelength coaxial cable to connect the Dual Front End to the "T" connector as follows:

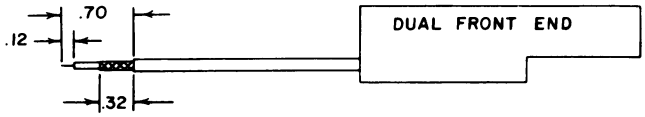
1. From Figure 6, determine the value of one-quarter wavelength at the receiver frequency. Multiply this by three to find three-quarter wavelength. This gives you the cutting length for the Dual Front End cable.

2. Measure the cable as shown in Figure 10 and cut the cable to length.

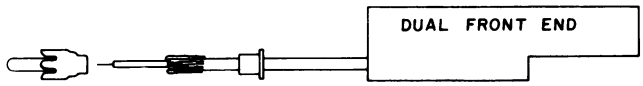


(19A121772, Sh. 1, Rev. 1)
Figure 10 - DFE Cable Length (3/4-Wavelength at Rcvr Freq.)

3. Strip the cable as shown in Figure 11 and solder the phono connector onto the cable as shown in Figure 12. Be sure that the center conductor is even with the tip of the phono conductor.



(19A121772, Sh. 2, Rev. 0)
Figure 11 - Stripping Lengths for DFE Cable



(19A121772, Sh. 2, Rev. 0)
Figure 12 - Assembling Phono Connector on DFE Cable

MAINTENANCE

DISASSEMBLY

Removing Dual Front End and/or Search-Lock Monitor:

Dual Front End

1. Pull locking handle down and pull radio out of mounting frame.

2. Remove the four screws holding back cover to system frame. Slide cover back and lift off (see Figure 13).

3. Remove four screws from angle brackets holding Dual Front End to the system frame.

4. Carefully swing Dual Front End chassis out for servicing.

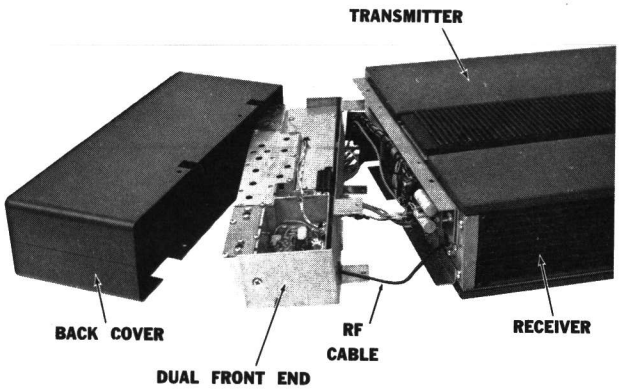


Figure 13 - Dual Front End Disassembly

TEST PROCEDURES

Dual Front End

SYMPTOM	CHECK
No Output	1. Connections to P443. 2. Cable from J2352 to receiver mixer board. 3. Antenna terminal connections. 4. Check 10-volt supply with GE test meter at pin 13 on DFE centralized metering jack J2351.
Low Sensitivity	1. DFE alignment. 2. Cable and relay connections. 3. 1st Mixer Q1 voltages. 4. 1st Oscillator Q1 voltages. 5. HI IF Amplifier Q1 voltages.
Low Oscillator Reading	1. Oscillator alignment. 2. Voltage readings at 1st Oscillator Q1. 3. Crystal Y1.

DUAL FRONT END ALIGNMENT

Refer to Receiver MAINTENANCE MANUAL for Receiver IF Alignment Procedure.

EQUIPMENT REQUIRED

1. GE Test Set Models 4EX3A10 or 4EX8K10,11 (or a 20,000 ohm-per-volt multi meter).

2. Signal Generator (132-174 MHz range). Connect a one-inch piece of insulated wire no larger than .065-inch diameter to generator output probe.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Plug Test Set cable into metering jack J2351. With Test Set in position J, check for regulated +10 volts. If using multimeter, measure at metering jack J2351-13 and -16.

2. If using Multimeter for alignment, connect positive lead to J2351-16 (ground).

3. Set frequency selector switch on control unit to F2 position.

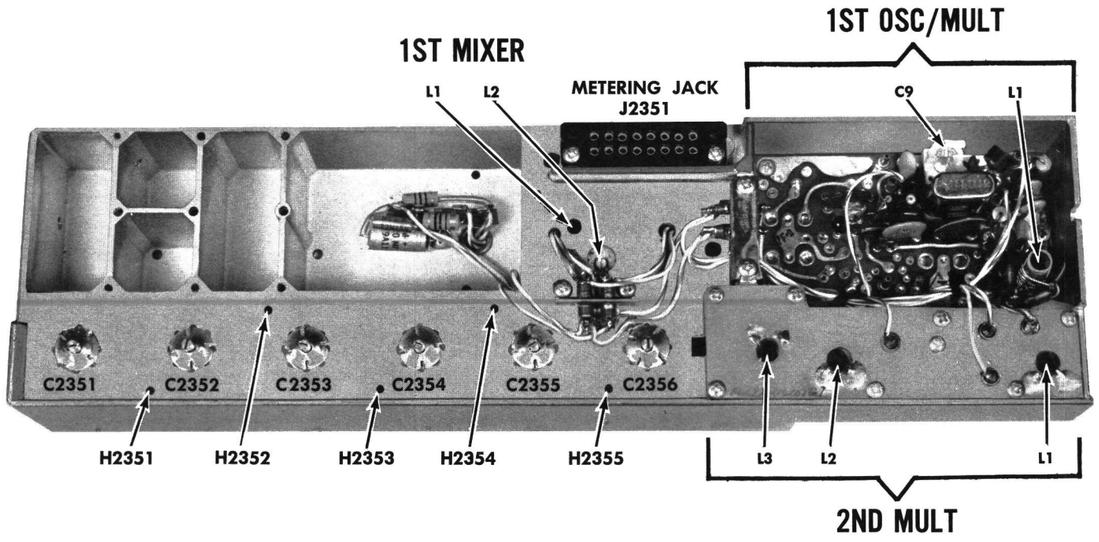
4. Set crystal trimmer C9 (on 1st Osc/Mult) to mid-capacity.

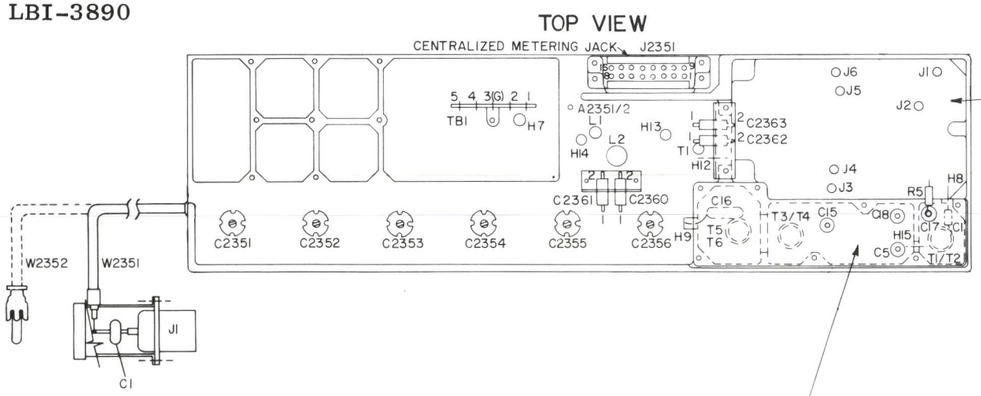
NOTE

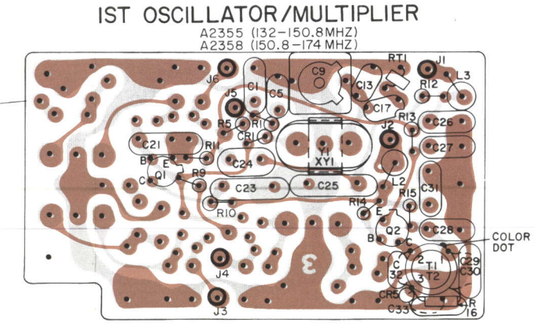
If Receiver and Dual Front End operating frequencies are less than 1 MHz apart, connect the signal generator directly into the the Dual Front End antenna connector J1, not into the "T" connector.

ALIGNMENT PROCEDURE

STEP	METERING POSITION: GE Test Set	METERING POSITION: Multimeter - at J2351	TUNING CONTROL	METER READING	PROCEDURE
			OSCILLATOR, MULTIPLIERS & 1ST MIXER		
1.	D (Mult 1 on DFE)	Pin 4	L1 (on 1st OSC/MULT), and L1 (on 2nd MULT)	See Procedure	Switch Test Set to Test 1 or 1-volt position. Tune L1 on 1st OSC/MULT for maximum meter reading. Then tune L1 on 2nd Mult for minimum meter reading.
2.	E (Mult 2 on DFE)	Pin 5	L1 (on 1st OSC/MULT), and L1, L2 and L3 (on 2nd MULT)	See Procedure	Tune L1 on 1st OSC/MULT and L1 and L2 on 2nd MULT for maximum meter reading. Then tune L3 for minimum meter reading.
3.	A (Disc on Receiver)	Pin 10		Zero	Connect Test Set plug to receiver metering jack J442. Insert signal generator probe into H2355 and adjust signal generator for discriminator zero.
4.	B (2nd IF Amp on Receiver)	Pin 2	L1 and L2 (on 1st Mixer)	Maximum	Apply an on-frequency signal as above. Tune L1 and L2 for maximum meter reading, keeping signal below saturation.
			RF CIRCUITS		
5.	B (2nd IF Amp on Receiver)	Pin 2	C2356, C2355, C2354, C2353 and C2352	Maximum	Apply an on-frequency signal onto the holes as shown below. Insert probe into hole only deep enough to obtain a reading. Insert Prove Into: / Tune: 1. H2355 / C2356 2. H2354 / C2355 3. H2353 / C2354 4. H2352 / C2353 5. H2351 / C2352
6.	B (2nd IF Amp on Receiver)	Pin 2	C2351 thru C2356	See Procedure	Apply an on-frequency signal to antenna jack J1. Tune C2351 thru C2356 for maximum meter reading, keeping signal below saturation. Then retune C2351 thru C2356 slightly for maximum quieting.
			FREQUENCY ADJUSTMENT		
7.	A (Disc on Receiver)	Pin 10	C9 (on 1st OSC/MULT)	Zero	Apply an on-frequency signal to antenna jack J1, and adjust C9 for zero discriminator reading.







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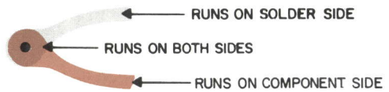
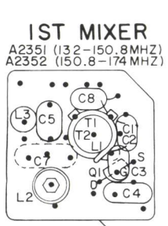
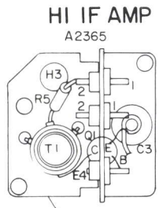
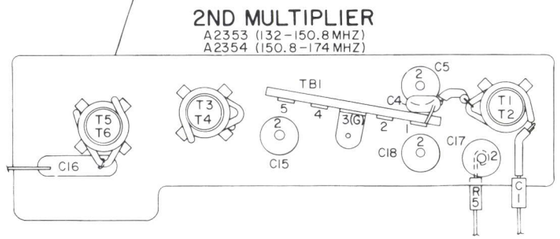
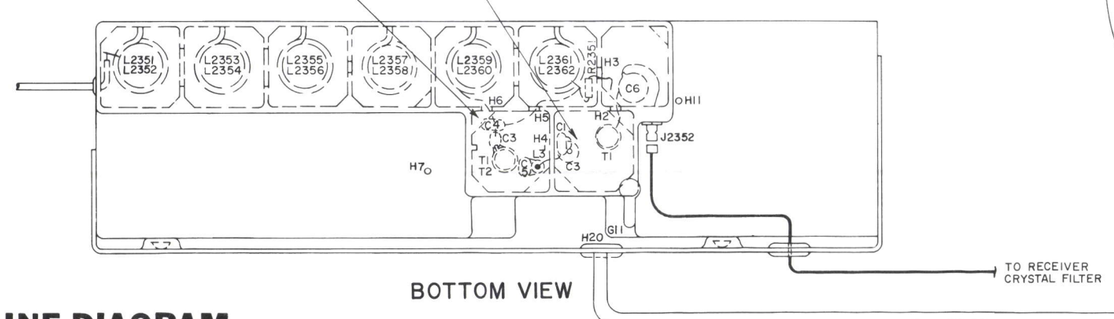
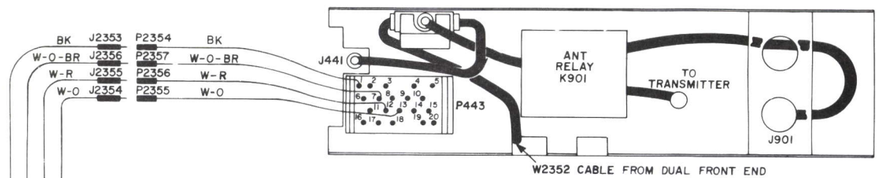


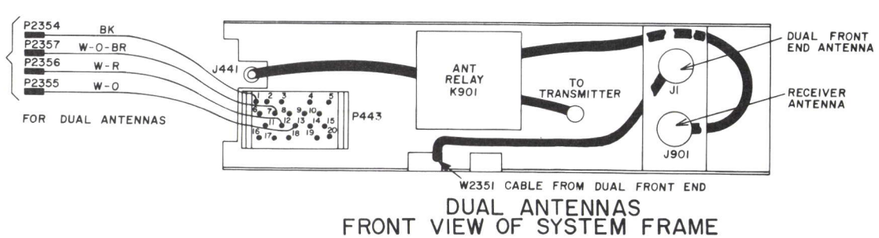












OUTLINE DIAGRAM

132—174 MHz, DUAL FRONT END
19D413151-G1 thru G4

(19R621241, Rev. 1)

PARTS LIST

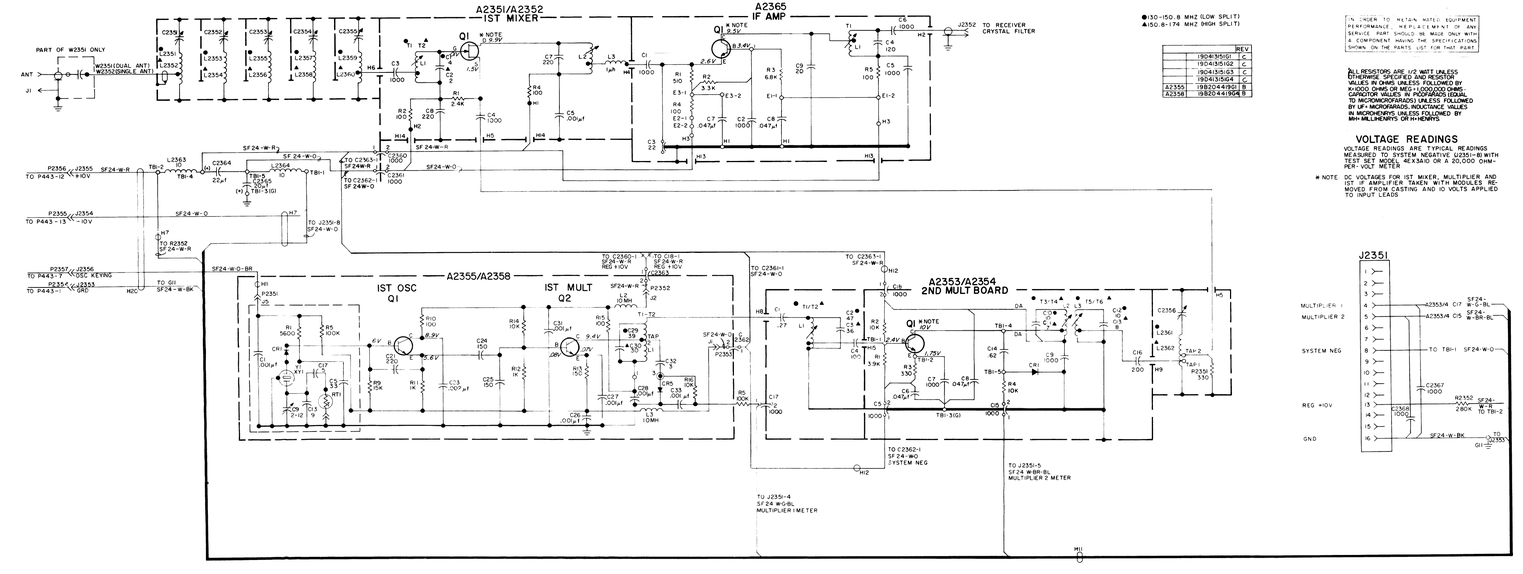
LBI-3889A

132-174 MHz DUAL FRONT END
19D413151-G1-4

SYMBOL	G-E PART NO.	DESCRIPTION
A2351 and A2352		FIRST MIXER A2351 19B216077-G1 A2352 19B216077-G2
		---------- CAPACITORS ----------
C1		(Part of T1).
C2		(Part of T2).
C3		(Part of T1 and T2).
C4	5494481-P11	Ceramic disc: .001 µf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C5*	5494481-P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. Earlier than REV L: Polyester: .01 µf ±20%, 50 VDCW.
C6*	5490446-P2	Variable, ceramic; approx 5 to 25 pf, 350 VDCW, temp coef 0 PPM; sim to Erie Style 557-36. Deleted by REV C:
C7*	7488162-P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. Earlier than REV C:
	5496218-P254	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM.
C8 and C9	5491601-P130	Phenolic: 3.3 pf ±5%, 500 VDCW.
		---------- INDUCTORS ----------
L1		(Part of T1 and T2).
L2*	19B216576-G1	Coil. Earlier than REV C:
	19A127115-G1	Coil.
L3	7488079-P6	Choke, RF; 1 µh ±10%, 0.3 ohm DC res max; sim to Jeffers 4411-8.
		---------- TRANSISTORS ----------
Q1	19A115953-P1	N Channel, field effect.
		---------- RESISTORS ----------
R1	3R152-P242J	Composition: 2400 ohms ±5%, 1/4 w.
R2	3R152-P101K	Composition: 100 ohms ±10%, 1/4 w.
R3*	3R152-P103K	Composition: 10,000 ohms ±10%, 1/4 w. Deleted by REV C:
R4	3R152-P101K	Composition: 100 ohms ±10%, 1/4 w.
		---------- TRANSFORMERS ----------
T1 and T2		COIL ASSEMBLY T1 19B216100-G1 T2 19B216100-G2
		---------- CAPACITORS ----------
C1	5496218-P235	Ceramic disc: 4.0 pf ±5%, 500 VDCW, temp coef -80 PPM.
C2	5491238-P12	Ceramic disc: 2 pf ±0.25 pf, 500 VDCW, temp coef -80 1120 PPM.
C3	5494481-P11	Ceramic disc: .001 µf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		---------- INDUCTORS ----------
L1	19B216100-P6	Coil. Includes tuning slug 5493185-P5.
A2353 and A2354		SECOND MULTIPLIER A2353 19B216107-G1 A2354 19B216107-G2

(Cont'd on page 10)

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



●(130-150.8 MHZ (LOW SPLIT)
▲(150.8-174 MHZ (HIGH SPLIT)

REV
19D413151G1 C
19D413151G2 C
19D413151G3 C
19D413151G4 C
A2355 19B204419G1 B
A2356 19B204419G2 B

IN ORDER TO MAINTAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=KILOHMS. ALL CAPACITORS ARE MFD. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS, UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MEASURED TO SYSTEM NEGATIVE (J235I-8) WITH TEST SET MODEL 4EX34-0 OR A 20,000 OHM-PER-VOLT METER.

* NOTE DC VOLTAGES FOR IST MIXER, MULTIPLIER AND IST IF AMPLIFIER TAKEN WITH MODULES REMOVED FROM CASTING AND IO VOLTS APPLIED TO INPUT LEADS

(19B621237, Rev. 5)

SCHEMATIC DIAGRAM

132—174 MHz, DUAL FRONT END
19D413151-G1 thru G4

(Cont'd from page 9) (LBI-3889)

SYMBOL	G-E PART NO	DESCRIPTION
		---------- CAPACITORS ----------
C1		(Part of T1 and T2).
C2		(Part of T1).
C3		(Part of T2).
C4		(Part of T1 and T2).
C5	5493392-97	Ceramic, feed-thru: .001 µf ±100% -0%, 500 VDCW; sim to Allen Bradley Type FASC.
C6	19B209243-P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C7	5494481-P11	Ceramic disc: .001 µf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C8	19B209243-P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C9		(Part of T3 and T4).
C10		(Part of T3).
C11		(Part of T4).
C12		(Part of T5).
C13		(Part of T6).
C14	5491601-P16	Phenolic: 0.62 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
C15	5493392-97	Ceramic, feed-thru: .001 µf ±100% -0%, 500 VDCW; sim to Allen Bradley Type FASC.
C16		(Part of T5 and T6).
C17 and C18	5493392-97	Ceramic, feed-thru: .001 µf ±100%-0%, 500 VDCW; sim to Allen Bradley Type FASC.
		---------- INDUCTOR ----------
L1		(Part of T1 and T2).
L2		(Part of T3 and T4).
L3		(Part of T5 and T6).
		---------- TRANSISTORS ----------
Q1	19A115330-P1	Silicon, NPN.
		---------- RESISTORS ----------
R1	3B153-P392E	Composition: 3900 ohms ±10%, 1/4 w.
R2	3B153-P103E	Composition: 10,000 ohms ±10%, 1/4 w.
R3	3B153-P331E	Composition: 330 ohms ±10%, 1/4 w.
R4	3B153-P103E	Composition: 10,000 ohms ±10%, 1/4 w.
R5	3B153-P104E	Composition: 0.1 megohm ±10%, 1/4 w.
		---------- TRANSFORMERS ----------
T1 and T2		COIL ASSEMBLY T1 19B216097-G1 T2 19B216097-G2
		---------- CAPACITORS ----------
C1	5491601-P107	Phenolic: 0.27 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C2	5496218-P255	Ceramic disc: 47 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5496218-P252	Ceramic disc: 36 pf ±5%, 500 VDCW, temp coef -80 PPM.
C4	5496303-P134	Ceramic disc: 100 pf ±5%, 500 VDCW, temp coef -3300 PPM.
	5491798-P5	Tuning slug.
T3 and T4		COIL ASSEMBLY T3 19B216106-G1 T4 19B216106-G2
		---------- CAPACITORS ----------
C9	5494481-P11	Ceramic disc: .001 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C10	5496218-P241	Ceramic disc: 10 pf ±5%, 500 VDCW, temp coef -80 PPM.
C11	5496218-P238	Ceramic disc: 7.0 pf ±5%, 500 VDCW, temp coef -80 PPM.

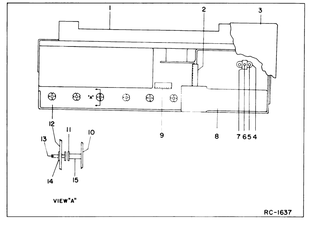
SYMBOL	G-E PART NO	DESCRIPTION
		-------- DIODES AND RECTIFIERS --------
CR1	19A115250-P1	Silicon.
	5491798-P5	Tuning slug.
T5 and T6		COIL ASSEMBLY T5 19B216103-G1 T6 19B216103-G2
		---------- CAPACITORS ----------
C12	5496218-P241	Ceramic disc: 10 pf ±5%, 500 VDCW, temp coef -80 PPM.
C13	5496218-P239	Ceramic disc: 8.0 pf ±5%, 500 VDCW, temp coef -80 PPM.
C16	5496218-P770	Ceramic disc: 200 pf ±5%, 500 VDCW, temp coef -750 PPM.
	5491798-P5	Tuning slug.
		---------- TERMINAL BOARDS ----------
TB1	7487424-P7	Miniature, phen: 4 terminals.
A2355 and A2358		FIRST OSCILLATOR A2355 19B204419-G1 Rev B A2358 19B204419-G4 Rev B
		---------- CAPACITORS ----------
C1	5494481-P112	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C5	5496219-P751	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -750 PPM.
C9	5491271-P106	Variable, subminiature: approx 2.1-12.7 pf 750 v peak; sim to EF Johnson 189-8-5.
C13	5496219-P40	Ceramic disc: 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C17	19C300685-P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C21	5496219-P771	Ceramic disc: 220 pf ±5%, 500 VDCW, temp coef -750 PPM.
C23	5494481-P114	Ceramic disc: .002 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C24	5490068-P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C25	5496219-P467	Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -220 PPM.
C26 thru C28	5494481-P112	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C29		(Part of T2).
C30		(Part of T2).
C31	5494481-P112	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C32 and C33		(Part of T1 and T2).
		-------- DIODES AND RECTIFIERS --------
CR5		(Part of T1 and T2).
		-------- JACKS AND RECEPTACLES --------
J1 thru J6	4033513-P4	Contact, electrical: sim to Bead Chain L33-3.
L1		(Part of T1 and T2).
L2 and L3	7488079-P16	Choke, RF: 10 µh ±10%, 0.6 ohm DC res; sim to Jeffers 4421-7.
		---------- TRANSISTORS ----------
Q1 and Q2	19A115330-P1	Silicon, NPN.

SYMBOL	G-E PART NO	DESCRIPTION
		---------- RESISTORS ----------
R1	3B152-P563J	Composition: 5600 ohms ±5%, 1/4 w.
R9	3B153-P153J	Composition: 15,000 ohms ±5%, 1/4 w.
R10	3B153-P101K	Composition: 100 ohms ±10%, 1/4 w.
R11 and R13	3B153-P103J	Composition: 1000 ohms ±5%, 1/4 w.
R13	3B153-P151J	Composition: 150 ohms ±5%, 1/4 w.
R14	3B153-P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R15	3B153-P101K	Composition: 100 ohms ±10%, 1/4 w.
R16		(Part of T1 and T2).
R19	3B152-P360J	Composition: 36 ohms ±5%, 1/4 w.
		---------- THERMISTORS ----------
RT1	19B209284-P5	Disc: 43 ohms nominal, color code green.
		---------- TRANSFORMERS ----------
T1 and T2		COIL ASSEMBLY T1 19B204421-G1 T2 19B204421-G2
		---------- CAPACITORS ----------
C29	5496218-P253	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -80 PPM.
C30	5496218-P250	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM.
C32	5496218-P34	Ceramic disc: 3 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C33	5494481-P12	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		-------- DIODES AND RECTIFIERS --------
CR5	19A115250-P1	Silicon.
		---------- INDUCTORS ----------
L1	19A121093-P1	Coil. Includes tuning slug 5491798-P5.
		---------- RESISTORS ----------
R16	3B153-P103E	Composition: 10,000 ohms ±10%, 1/4 w.
		---------- SOCKETS ----------
XY1		Refer to Mechanical Parts (RC-1637).
		---------- CRYSTALS ----------
		When reordering give GE Part No. and specify exact freq needed.
		Crystal freq = (CF -5.30 MHz) ÷ 9.
Y1	19B206576-P4	Quartz: freq range 14077.777 to 16166.666 KHz, temp range -30°C to +85°C. (132-150.8 MHz)
Y1	19B206576-P5	Quartz: freq range 16166.667 to 18746.444 KHz, temp range -30°C to +85°C. (150.8-174 MHz)
A2365		HIGH IF AMPLIFIER 19B216109-G1
		---------- CAPACITORS ----------
C1	5494481-P11	Ceramic disc: .001 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C2*	5493392-P107	Ceramic, feed-thru: .001 pf ±100%-0%, 500 VDCW; sim to Allen Bradley Type FASC. Earlier than REV B. Ceramic disc: .001 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C3	5493392-P108	Ceramic, stand-off: 22 pf ±10%, 500 VDCW; sim to Allen Bradley Type SSSA.
C4 thru C6		(Part of T1).

SYMBOL	G-E PART NO	DESCRIPTION
C7 and C8	19B209243-P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C9		(Part of T1).
		---------- TERMINALS ----------
E1 thru E4	4029309-P1	Feed-thru: 750 VRMS max, 5.5 amps; sim to Bealecto FT-3A-27.
		---------- INDUCTORS ----------
L1		(Part of T1).
		---------- TRANSISTORS ----------
Q1	19A115666-P1	Silicon, NPN.
		---------- RESISTORS ----------
R1	3B153-P511J	Composition: 510 ohms ±5%, 1/4 w.
R2	3B152-P332E	Composition: 3300 ohms ±10%, 1/4 w.
R3	3B152-P682E	Composition: 6800 ohms ±10%, 1/4 w.
R4	3B152-P101K	Composition: 100 ohms ±10%, 1/4 w.
R5		(Part of T1).
		---------- TRANSFORMERS ----------
T1		COIL ASSEMBLY 19B216103-G1
		---------- CAPACITORS ----------
C4	5496218-P265	Ceramic disc: 120 pf ±5%, 500 VDCW, temp coef -80 PPM.
C5	5494481-P111	Ceramic disc: .001 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C6	5494481-P51	Ceramic disc: .001 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C9	5496218-P266	Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef -80 PPM.
		---------- RESISTORS ----------
R5	3B152-P101K	Composition: 100 ohms ±10%, 1/4 w.
		CHASSIS AND RF CIRCUIT 19D413151-G1 thru G4
		---------- CAPACITORS ----------
C2351 thru C2356		(See mechanical parts, RC-1637).
C2360 thru C2363	19B209133-P1	Ceramic, feed-thru: 1000 pf +150% -0%, 500 VDCW.
C2364	5496367-P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C2365	19A115680-P3	Electrolytic: 20 µf +150% -10%, 2 VDCW; sim to Mallory Type TT.
C2367 and C2368	5494481-P12	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		---------- JACKS AND RECEPTACLES ----------
J2351	19B205689-G2	Connector: 18 contacts.
J2352	19A115465-P1	Connector, coaxial; sim to Micon Electronics Type 1104.
J2353 thru J2356	7147199-P1	Connector: male contact; sim to Winchester Electronics 21803.
		---------- INDUCTORS ----------
L2351	19B216112-G4	Coil.
L2352	19B216112-G3	Coil.
L2353	19B216110-P2	Coil.
L2354	19B216110-P1	Coil.
L2355	19B216110-P2	Coil.

SYMBOL	G-E PART NO	DESCRIPTION
L2356	19B216110-P1	Coil.
L2357	19B216110-P2	Coil.
L2358	19B216110-P1	Coil.
L2359	19B216110-P6	Coil.
L2360	19B216112-G5	Coil.
L2361	19B216112-G2	Coil.
L2362	19B216112-G1	Coil.
L2363 and L2364	7488079-P16	Choke, RF: 10 µh ±10%, 0.6 ohm DC res max; sim to Jeffers 4421-7.
		---------- PLUGS ----------
P2351 thru P2353	4029840-P2	Contact, electrical: sim to Amp 42827-2.
		---------- RESISTORS ----------
R2351	3B152-P331K	Composition: 330 ohms ±10%, 1/4 w.
R2352	5495948-P444	Deposited carbon: 280,000 ohms ±1%, 1/2 w; sim to Texas Instrument CDL-2MR.
		---------- TERMINAL BOARDS ----------
TB1	7487424-P7	Miniature, phen: 4 terminals.
		---------- CABLES ----------
W2351		CABLE ASSEMBLY 19B204930-G1
		---------- CAPACITORS ----------
C1	19B209141-P1	Ceramic disc: .001 pf ±10%, 500 VDCW.
		---------- JACKS AND RECEPTACLES ----------
J1	2N22-P3	Receptacle: coaxial, 1 contact; sim to Amphenol 83-1R.
		---------- MISCELLANEOUS ----------
	19B204398-P3	Can.
	19A121436-P1	Cap.
W2352	19B209044-P19	Cable, RF: approx 4 feet.
		DUAL FRONT END INSTALLATION KIT SINGLE ANTENNA 19A127260-G1
		---------- DIODES AND RECTIFIERS ----------
CR1	19A115348-P1	Silicon.
		---------- RESISTORS ----------
R5	3B153-P104E	Composition: 0.1 megohm ±10%, 1/4 w. (Connects between R2 and R3).
		---------- MISCELLANEOUS ----------
	7104941-P11	Plug, phono: sim to Accurate A10033-8. (Mounts on RF Cable 5491689-P56).
	5491689-P56	Cable assembly. (Connects between J443 and 19A121321-P3 support).
	19A115324-P1	Connector adaptor. (Connects to W2352 for single antenna).
	19A121321-P1	Support. (Used with 19A115324-P1 connector).
	19B204924-G1	Cable. (Connects to P443).
	19A127259-G1	Cable. (Connects to FL1).
	19A115539-P1	Tap screw. (Mounts dual front end to frame).
	4037916-P2	Channel pad.
	3B152-P123K	Resistor, Composition: 12,000 ohms ±10%, 1/4 w. (Hooks to input and ground on FL1).

SYMBOL	G-E PART NO	DESCRIPTION
		DUAL FRONT END INSTALLATION KIT DUAL ANTENNA 19A127260-G2
		-------- DIODES AND RECTIFIERS --------
CR1	19A115348-P1	Silicon. (Replaces R19 on Oscillator boards).
		To incorporate a better high-frequency capacitor. Changed C5.
REV. B -	H1 IF Amp A2365 (part of chassis and RF circuit 19B216077-G1 & -G2	
		To improve stability. Changed C2.
REV. C -	First Mixer A2351/A2352 (part of chassis and RF circuit 19B216077-G1 & -G2	
		To improve sensitivity and reduce intermodulation products. Deleted C6 and R3. Changed C7 and L2.
		---------- RESISTORS ----------
R5	3B152-P104E	Composition: 0.1 megohm ±10%, 1/4 w. (Connects between R2 and R3).
		---------- MISCELLANEOUS ----------
	19B204924-G2	Cable. (Connects to P443).
	19A127259-G1	Cable. (Connects to FL1).
	19A115539-P1	Tap screw. (Mounts dual front end to frame).
	19A115539-P1	Channel pad.
	4037916-P2	Channel pad.
	3B152-P123K	Resistor, Composition: 12,000 ohms ±10%, 1/4 w. (Hooks to input and ground on FL1).
		MECHANICAL PARTS (SEE RC-1236)
1	19C303649-P1	Support. (Mounts cover).
2	19A121222-P1	Angle support. (Used with C2362 and C2363).
3	19C303648-G1	Cover.
4	19C311172-P1	Crystal socket. (Part of XY1).
5	19A115793-P1	Electrical contact; sim to Methode 752V (PB). (Part of XY1).
6	19B200525-P9	Rivet. (Part of XY1).
7	4033089-P1	Clip. (Part of XY1).
8	19B216072-P1	Plate.
9	19A121221-P1	Angle support. (Used with C2360 and C2361).
10	19B216070-P1	RF plate. (Access to RF circuit).
11	4036765-G2	Screw; 6-32. (Part of C2351 -C2356).
12	19C311659-P1	RF Chassis.
13	4036765-G4	Screw; 6-32. (Part of C2351-C2356).
14	7117825-P1	Spring washer; 6-32, sim to Tinnerman C45788-632-24. (Part of C2351-C2356).
15	4036899-P4	Ceramic insulator; sim to Centralab 3BX545C. (Part of C2351-C2356).



PRODUCTION CHANGES

Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

ORDERING SERVICE PARTS

Each component appearing on the schematic diagram is identified by a symbol number, to simplify locating it in the parts list. Each component is listed by symbol number, followed by its description and GE Part Number.

Service parts may be obtained from Authorized GE Communication Equipment Service Stations or through any GE Radio Communication Equipment Sales Office. When ordering a part, be sure to give:

1. GE Part Number of component
2. Description of part
3. Model number of equipment
4. Revision letter stamped on unit

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired, or should particular problems arise which are not covered sufficiently for the purchaser's purposes, contact the nearest Radio Communication Equipment Sales Office of the General Electric Company.

MAINTENANCE MANUAL

LBI-3890

DF-8401

Progress Is Our Most Important Product

GENERAL ELECTRIC

MOBILE RADIO DEPARTMENT LYNCHBURG, VIRGINIA 24502

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