MOBILE RADIO

MAINTENANCE MANUAL

IF GENERATOR MODEL 4EX9A10

OPTION 4381/ COMBINATION TE 46

SPECIFICATIONS *

Output Voltage	0 to 50 millivolts into 50 ohm load	
Input Power	2.5 milliamperes at 7 Volts (one 7-Volt mercury battery)	
Output Frequencies	Option 4381	Combination TE46
F1:	20 MHz	9.4 MHz
F2:	19 MHz	11.2 MHz
F3:	12.4 MHz	5 to 20 MHz (Opt.)
F4:	5 to 20 MHz (Optional)	5 to 20 MHz (Opt.)
Temperature Range	0°C to 45°C (+32°F to 113°F)	

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

EX-9-A

GENERAL ELECTRIC

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DESCRIPTION

General Electric IF Generator Model 4EX9A10 is a transistorized, battery-operated IF Generator for aligning and troubleshooting the IF stages in two-way FM receivers.

The generator is equipped with four internally-mounted crystal sockets for ease of crystal installation. As Option 4381, three crystals are normally shipped for Personal Radio IF frequencies of 20 MHz, 19 MHz and 12.4 MHz. The fourth crystal can be ordered for any frequency in the 5-MHz to 20-MHz range.

As combination TE46, two crystals are normally shipped for MASTR II IF frequencies of 9.4 MHz and 11.2 MHz. The third and fourth crystals can be ordered for any frequency in the 5-MHz to 20-MHz range. The TE46 also includes test cable 19B205457G2.

OPERATION

All operating controls and the output jack are conveniently located on the front of the generator. Output frequencies are selected by a five-position rotary switch. The rotary switch also turns the generator on. The LEVEL control adjusts the output from zero to 50 millivolts. The output is taken from the BNC output jack.

To use the generator for alignment and servicing, refer to the Maintenance Manual for the radio.

CIRCUIT ANALYSIS

Output frequencies are generated by a battery-operated, crystal controlled Colpitts oscillator (Q1). The desired frequency is obtained by switching the crystals in the oscillator control circuit.

Selecting a frequency with FREQ-MHz switch S1001 applies positive battery voltage to Q1 and Q2, causing them to conduct. Feedback for the oscillator is developed across C1. The output of Q1 is applied to the base of buffer amplifier Q2 through C8. The output of Q2 is coupled through LEVEL control R1001 to OUTPUT jack J1001.

MAINTENANCE

BATTERY REPLACEMENT

To replace battery, take out the two screws holding the front plate and carefully remove the housing. Then remove the old battery and insert the new battery (Eveready No. E165 or equivalent) being certain to maintain the same polarity.

WARNING

Do not dispose of mercury batteries by burning them, as they may explode.

FREQUENCY ADJUSTMENT

To adjust the output frequencies:

1. Connect a frequency counter to OUTPUT jack J1001.
2. Place frequency selector switch S1001 in the proper position.
3. Tune C3, C6, C9 and C12 for proper output frequency.

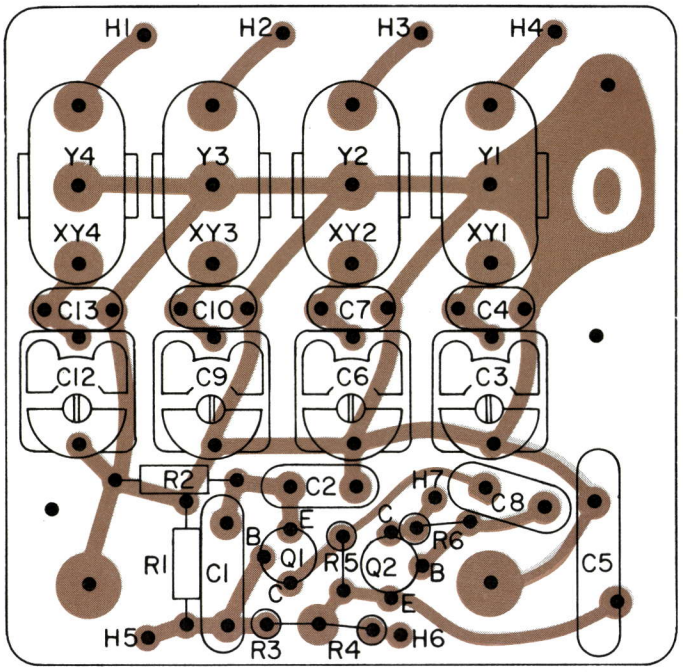
TROUBLESHOOTING PROCEDURE

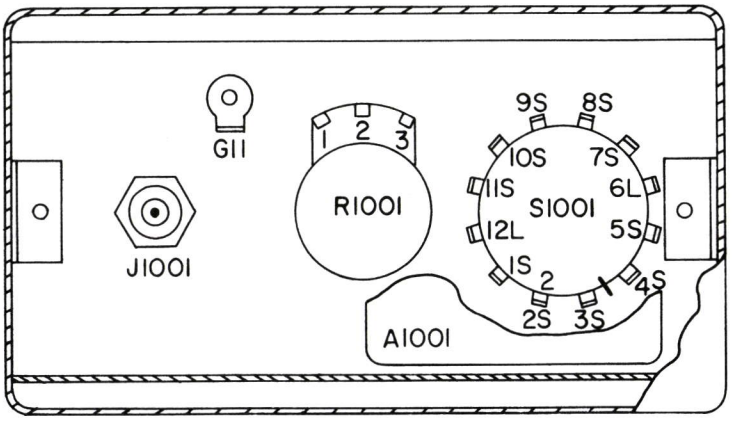
Troubleshooting procedures are outlined in the following chart. Also refer to voltage readings on the Schematic Diagrams.

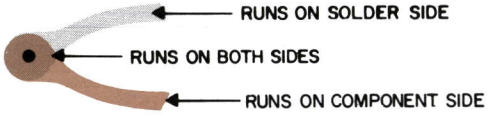
TROUBLESHOOTING PROCEDURE

SYMPTON	CHECK FOR:
No Output	1. Defective Battery. 2. Defective S1001. 3. Defective Q1 or Q2.
Excessive Current Drain on Battery	Shorted Q1 and Q2.
Cannot Adjust Output	Defective R1001.
Will not Operate on One Frequency, but Other Frequencies OK.	1. Defective crystal and crystal socket. 2. Defective S1001.

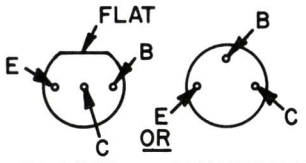
A1001







LEAD IDENTIFICATION FOR



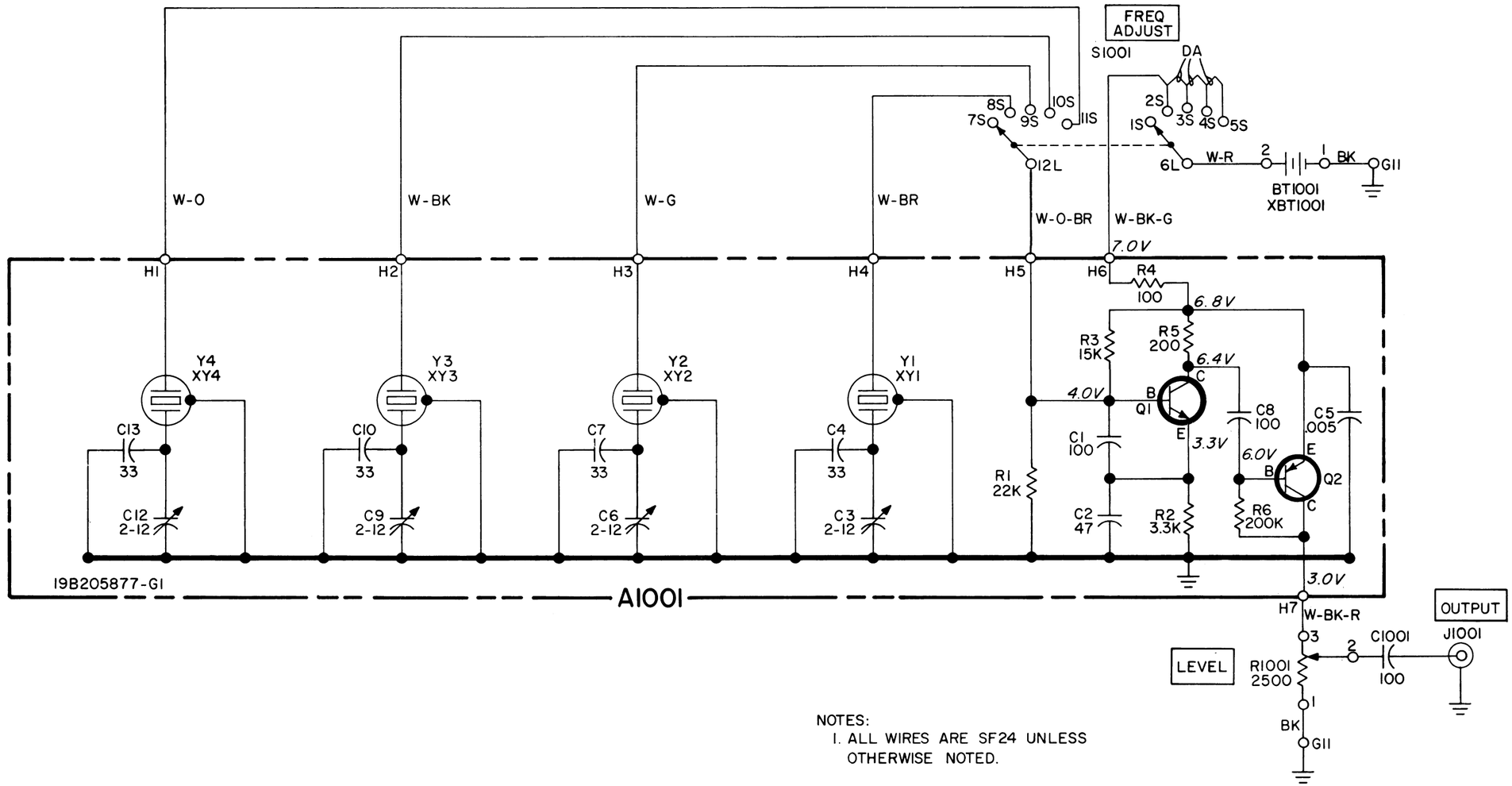
VIEW FROM LEAD END

NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

(19B219058, Rev. 0)
(19B205876, Sh. 1, Rev. 0)
(19B205876, Sh. 2, Rev. 0)

OUTLINE DIAGRAM

IF GENERATOR MODEL 4EX9A10



NOTES:
1. ALL WIRES ARE SF24 UNLESS OTHERWISE NOTED.

VOLTAGE READINGS

ALL READINGS ARE TYPICAL DC VOLTAGES MEASURED WITH A VTVM FROM TRANSISTOR PIN TO GROUND, AND WITH THE CRYSTAL REMOVED.

IN ORDER TO RETAIN 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 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

(19C317241, Rev. 3)

SCHEMATIC DIAGRAM

IF GENERATOR MODEL 4EX9A10

PARTS LIST

LBI-4096B

IF GENERATOR TEST SET
MODEL 4EX9A10 19C317243G1

SYMBOL	GE PART NO.	DESCRIPTION
A1001		COMPONENT BOARD 19B205877G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116656P100J2	Ceramic disc: 100 pf ±10%, 500 VDCW, temp coef -220 PPM.
C2	19A116656P47J8	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -80 PPM.
C3	5491271P106	Variable, sub-miniature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189.
C4	19A116656P33J4	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -470 PPM.
C5	19A116655P26	Ceramic disc: 5000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C6	5491271P106	Variable, sub-miniature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189.
C7	19A116656P33J4	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -470 PPM.
C8	5490008P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C9	5491271P106	Variable, sub-miniature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189.
C10	19A116656P33J4	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -470 PPM.
C12	5491271P106	Variable, sub-miniature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189.
C13	19A116656P33J4	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -470 PPM.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115330P1	Silicon, NPN.
Q2	19A115768P1	Silicon, PNP; sim to Type 2N3702.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P223K	Composition: 22,000 ohms ±10%, 1/4 w.
R2	3R152P332J	Composition: 3300 ohms ±5%, 1/4 w.
R3	3R152P153K	Composition: 15,000 ohms ±10%, 1/4 w.
R4	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R5	3R152P201K	Composition: 200 ohms ±10%, 1/4 w.
R6	3R152P204J	Composition: 0.20 megohm ±5%, 1/4 w.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY1 thru XY4		(See Miscellaneous).
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y1 thru Y4	19B206802P2	Crystal: freq range 1800 to 20,000 KHz.
		- - - - - - - - - - BATTERIES - - - - - - - - - -
BT1001	5492174P1	Mercury: 7 v; sim to Mallory Type TR-165.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1001	7489162P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1001	7776570P17	Receptacle, bulkhead: coaxial, 500 v peak. Military Type UG-1094/U.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1001	5496870P25	Resistor/Switch: variable, carbon film: 2000 ohms ±20%; sim to Mallory LC(2K).
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1001	5495227P16	Rotary: 2 section, 2 pole, 2 to 5 position, non-shorting contacts, 2 amp at 28 VDC or 1 amp at 110 VDC; sim to Oak Mfg Co Type F.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XBT1001	19B200019P4	Battery holder; sim to Keystone Electronics 110.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - -
	19B205453G1	Housing.
	7142162P81	Spacer: (Located between A1001 and housing).
	19A116170P1	Knob. (Used with R1001 and S1001).
	19C311172P2	Socket. (Part of XY1 thru XY4).
	4033089P1	Clip. (Part of XY1 thru XY4).
	19A115793P1	Contact, electrical: sim to Malco 2700. (Part of XY1 thru XY4).
	19B200525P9	Rivet. (Part of XY1 thru XY4).
	NP257957	Nameplate.
	19B205457G2	Test Cable (RG-58A/U): approx 4 feet. Includes:
	7776570P1	Connector, BNC: Plug; sim to Military UG-88C/U or UG-88D/U.
	4033711P1	Clip, alligator. (Used with center lead and shield).
	19A115821P1	Sleeving, insulated: Red; sim to Mueller Electric 32B. (Used with center lead).
	19A115821P2	Sleeving, insulated: Black; sim to Mueller Electric 32B. (Used with shield).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

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 for 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-4129

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MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

GENERAL ELECTRIC

PRINTED IN U.S.A.