MAINTENANCE MANUAL

66—88 MHz, 25-WATT POWER AMPLIFIER ASSEMBLY 19D429074G1-3

LBI30637C
(DF3173)

TABLE OF CONTENTS

DESCRIPTION

The 66-88 MHz PA assembly for CUSTOM MVP radios uses two RF power transistors to provide a power output of 25 Watts. The output power is adjustable using power adjust control R3 over a range of 8 to 25 Watts. A single transistor is used in the power adjust circuit.

Supply voltage for the PA is connected through power leads from the system board to feed through capacitors C201 and C202 on the side of the PA assembly. C201 and C202 prevent RF from getting on the power leads. Diode CR201 will cause the main fuse assembly to blow if the polarity of the power leads is reversed, providing reverse voltage protection for the radio.

Centralized metering jack J205 is provided for use with GE Test Set Model 4EX3A11 or Test Kit 4EX8K12. The Test Set meters the Ampl-1 drive (exciter output), power control voltage (Ampl-1 collector voltage) and PA current.

CIRCUIT ANALYSIS

RF AMPLIFIERS

The exciter output is coupled through a 50 ohm cable to PA input jack J201. The RF is coupled through DC blocking capacitor C1 and an impedance matching network to the base of Class C amplifier Q1. The network matches the 50 ohm input of the base of Q1 and consists of C2, C3, C4, L1 and L2. L3 and R1 comprise a stabilizing network in the base circuit of Q1.

Part of the RF input is rectified by CR1 and applied to voltage divider R7 and R8. This voltage is used to meter the AMPL-1 drive at J205-4.

Collector voltage to Q1 (Ampl-1) is controlled by the power adjust circuit, Q215 and R3 and is applied through collector stabilizing network (L5 & R2 and collector feed network L4 & C7). The collector voltage of Q1 is metered through R9 at J205-3.

The output of Q1 is coupled to the base of Class C Power Amplifier, Q2 through coupling capacitor C10 & a matching network consisting of L6, C11, C12 & C13. L8 & R4 comprise a stabilizing network in the base circuit of Q2.

Collector current for Q2 is metered across tapped manganin resistor R6 at J205-5, 6 (PA Current). The reading is taken on the one-Volt scale with the High Sensitivity button pressed, & read as 10 amperes full scale.

Following Q2 is a matching network (L11, C17, C18 & L12) that matches the output of Q2 to the 50 ohm microstrip impedance (W2) to the input of low pass filter. When the transmitter is keyed, the PA output is coupled through the low-pass filter antenna transfer relay K1 to the antenna.

WARNING

The RF Power Transistor used in the transmitter contain Beryllium Ozide, a TOXIC substance. If the ceramic, or other encapsulation is opened, crushed, broken or abraded, the dust may be hazardous if inhaled. Use care in replacing transistors.

POWER ADJUST CIRCUIT

The power adjust circuit consists of R3 and Q215. R3 controls the base voltage and therefore the conduction of Q215. Q215 is connected in series with the collector feed network for Q1 thereby controlling the drive to PA transistor Q2 and the output power. R3 is adjusted to provide the desired output power over a range of 8 to 25 Watts.

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WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

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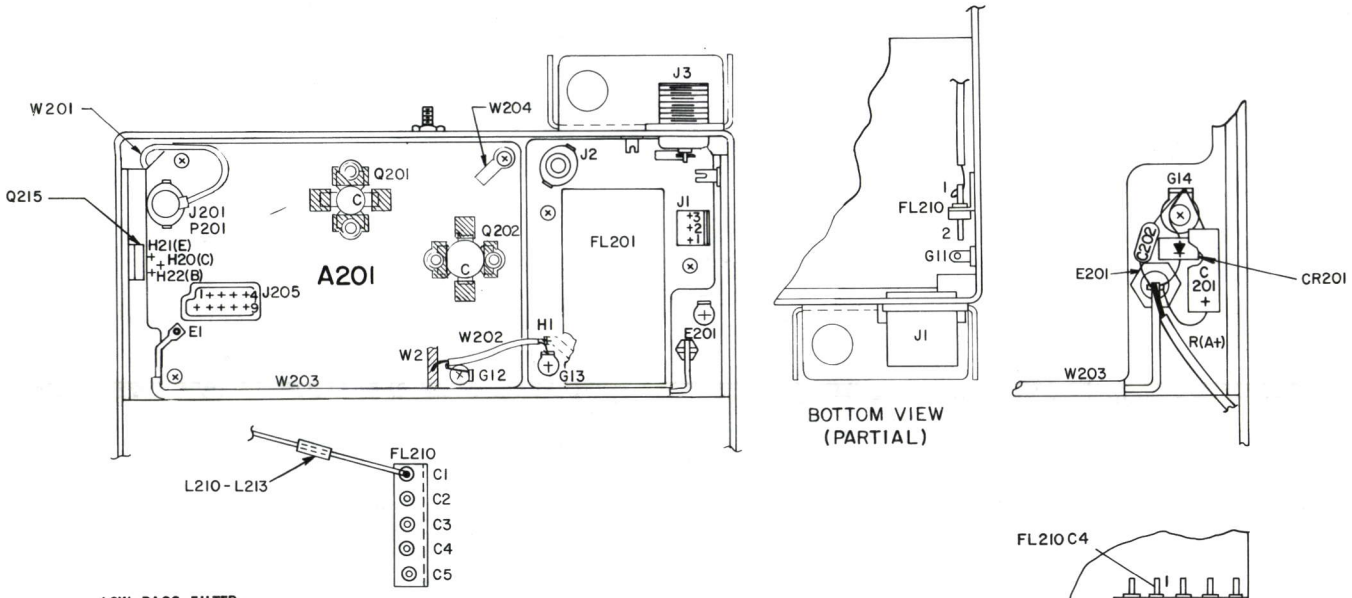
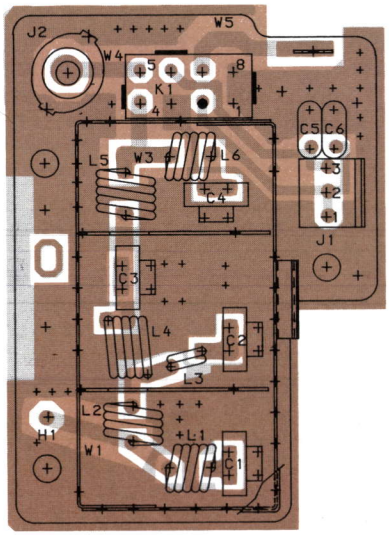
POWER AMPLIFIER ASSEMBLY



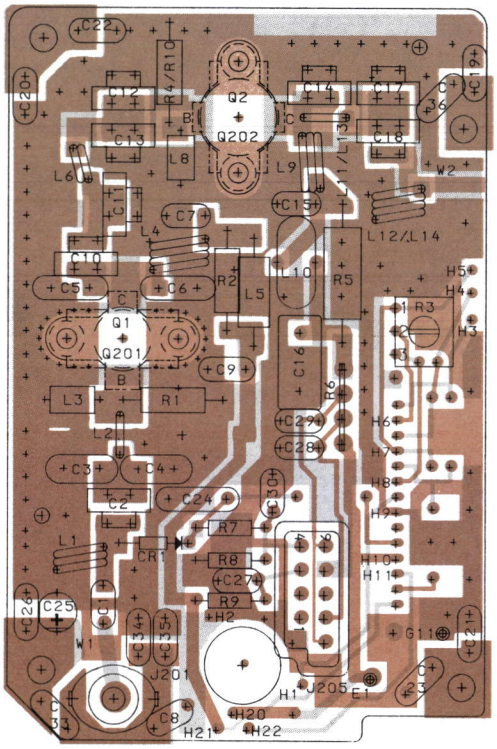
LOW PASS FILTER



(19C327954, Rev. 1)
(19B227596, Sh. 1, Rev. 0)
(19B227596, Sh. 2, Rev. 0)

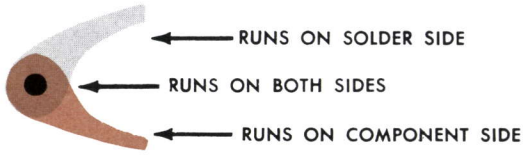
(19C328244, Rev. 1)

PA BOARD



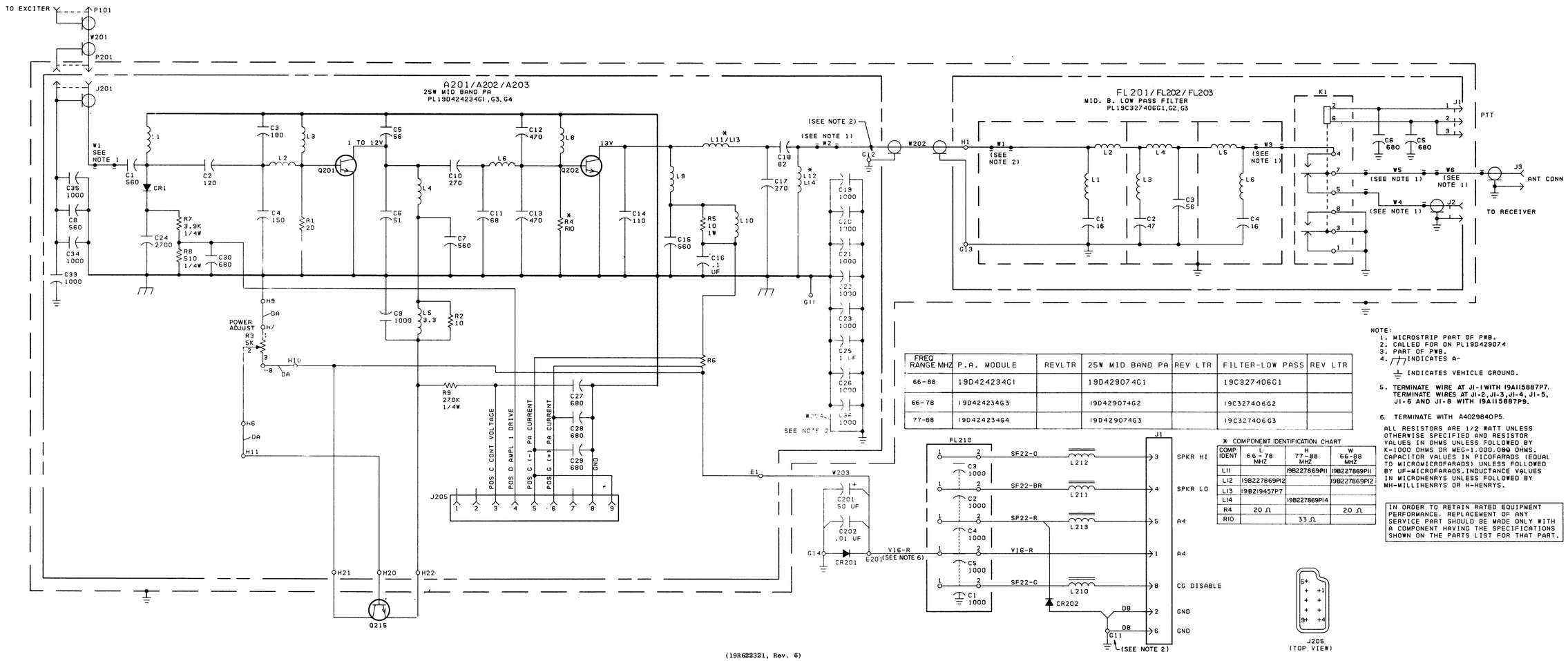
(19C327844, Rev. 2)
(19B227591, Sh. 1, Rev. 1)
(19B227591, Sh. 2, Rev. 1)

CONNECTION CHART			
FROM	TO	WIRE	REMARKS
H10	H8	DA	SLEEVE
H11	H6	DA	SLEEVE
H7	H9	DA	SLEEVE



OUTLINE DIAGRAM

66—88 MHz POWER AMPLIFIER



FREQ RANGE MHZ	P.A. MODULE	REVLTR	25W MID BAND PA	REV LTR	FILTER-LOW PASS	REV LTR
66-88	19D424234G1		19D429074G1		19C327406G1	
66-78	19D424234G3		19D429074G2		19C327406G2	
77-88	19D424234G4		19D429074G3		19C327406G3	

NOTE:
1. MICROSTRIP PART OF PWB.
2. CALLED FOR ON PL19D429074
3. PART OF PWB.
4. INDICATES A-
   INDICATES VEHICLE GROUND.
5. TERMINATE WIRE AT J1-1 WITH 19A115887P7. TERMINATE WIRES AT J1-2, J1-3, J1-4, J1-5, J1-6 AND J1-8 WITH 19A115887P9.
6. TERMINATE WITH A4029840P5.

ALL RESISTORS ARE 1/2 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.

* COMPONENT IDENTIFICATION CHART

COMP IDENT	L 66-78 MHZ	H 77-88 MHZ	W 66-88 MHZ
L11		19B227869P11	19B227869P11
L12	19B227869P12		19B227869P12
L13	19B219457P7		
L14		19B227869P14	
R4	20 Ω		20 Ω
R10		33 Ω	

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.

(19R622321, Rev. 6)

SCHEMATIC DIAGRAM

66—88 MHz POWER AMPLIFIER

PARTS LIST

LBI30638B

66-88 MHz, 25 WATT POWER AMPLIFIER
19D429074G1 66-88 MHz
19D429074G2 66-78 MHz
19D429074G3 77-88 MHz

SYMBOL	GE PART NO.	DESCRIPTION
A201 thru A203		25 WATT MODULE A201 19D424234G1 66-88 MHz A202 19D424234G3 66-78 MHz A203 19D424234G4 77-88 MHz
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116655P15	Ceramic disc: 560 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C2	19A700015P31	Teflon/mica: 120 pf ±5%, 250 VDCW.
C3	19A700105P41	Mica: 180 pf ±5%, 500 VDCW.
C4	19A700105P38	Mica: 240 pf ±5%, 500 VDCW.
C5	19A116656P56J8	Ceramic disc: 56 pf ±5%, 500 VDCW, temp coef -80 PPM.
C6	19A116656P51J8	Ceramic disc: 51 pf ±5%, 500 VDCW, temp coef -80 PPM.
C7 and C8	19A116655P15	Ceramic disc: 560 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C9	19A116655P20	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C10	19A700015P39	Teflon/mica: 270 pf ±5%, 250 VDCW.
C11	19A700015P25	Teflon/mica: 68 pf ±5%, 250 VDCW.
C12 and C13	19A700015P45	Teflon/mica: 470 pf ±5%, 250 VDCW.
C14	19A700015P30	Teflon/mica: 110 pf ±5%, 250 VDCW.
C15	19A116655P15	Ceramic disc: 560 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C16	19A116966P107	Metallized polyester: 0.1 µf ±10%, 50 VDCW.
C17	19A700015P39	Teflon/mica: 270 pf ±5%, 250 VDCW.
C18	19A700015P27	Teflon/mica: 82 pf ±5%, 250 VDCW.
C19 thru C23	19A116655P20	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C24	19A116655P21	Ceramic disc: 2700 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C25	19A134202P14	Tantalum: 1 µf ±20%, 35 VDCW.
C26	19A116655P20	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C27 thru C30	19A116655P18	Ceramic disc: 680 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C33 thru C36	19A116655P20	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - - TERMINALS - - - - - - - - -
E1	19A134263P1	Contact, electrical: sim to Selectro 22901082-00-0-590.
G11	19A134263P1	Contact, electrical: sim to Selectro 229-1082-00-0-590.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J201	19A130924G1	Receptacle, coaxial: jack type; sim to Cinch 14H11613.
J205	19B219374G1	Connector: 9 contacts.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	19B227869P6	Coil.
L2	19B227869P7	Coil.
L3	19A129773G1	Coil.
L4	19B227869P8	Coil.
L5	19A700000P17	Coil, RF: 3.3 µh ±10%, 0.14 ohms DC res max.
L6	19B227869P9	Coil.
L8	19A129773G1	Coil.
L9	19B227869P10	Coil.
L10	19A129346G1	Coil.
L11	19B227869P11	Coil.
L12	19B227869P12	Coil.
L13	19A219457P7	Coil.
L14	19B227869P14	Coil.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77P200J	Composition: 2 ohms ±5%, 1/2 w.
R2	19A700113P15	Composition: 10 ohms ±5%, 1/2 w.
R3	19A116559P102	Variable, cermet: 5K ohms ±20%, 0.5 w; sim to CTS Series 360.
R4	3R77P200J	Composition: 20 ohms ±5%, 1/2 w.
R5	19A700112P15	Composition: 10 ohms ±5%, 1 w.
R6	19C320212P2	Shunt resistor.
R7	19A700106P77	Composition: 3.9K ohms ±5%, 1/4 w.
R8	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R9	3R152P274J	Composition: 270K ohms ±5%, 1/4 w.
R10	19A700113P27	Composition: 33 ohms ±5%, 1/2 w.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1 and W2		(Part of 19D424233P1 printed board).
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C201	19A115680P4	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
C202	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR201	19A116783P1	Silicon, NPN; sim to Type 2N5210.
CR202	4037822P1	Silicon, 1000 mA, 400 PIV.
		- - - - - - - - - - TERMINALS - - - - - - - - -
E201	7143206P1	Terminal, stud.
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL201 thru FL203		COMPONENT BOARD 19C327406G1 66-88 MHz 19C327406G2 66-78 MHz 19C327406G3 77-88 MHz
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116679P16D	Metallized teflon: 17 pf ±.5 pf 250 VDCW.
C2	19A116679P47G	Metallized teflon: 47 pf ±2%, 250 VDCW.
C3	19A116679P56G	Silver mica: 56 pf ±2%, 250 VDCW.
C4	19A116679P16D	Metallized teflon: L17 pf ±.5 pf, 250 VDCW.
C5 and C6	19A116655P18	Ceramic disc: 680 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1	19A116659P55	Connector, printed wiring: 3 contacts; sim to Molex 09-65-1031.

SYMBOL	GE PART NO.	DESCRIPTION
J2	19A130924G1	Connector, receptacle: coaxial, jack type; sim to Cinch 14H11613.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1	19B209558P1	Hermetic sealed: 180 to 341 ohms coil res, 2 form C contacts, 8.0 to 16.3 VDC; sim to GE 3SAV1760A2.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L1	19B227869P1	Coil.
L2	19B227869P2	Coil.
L3	19B227869P3	Coil.
L4	19B227869P4	Coil.
L5	19B227869P5	Coil.
L6	19B227869P13	Coil.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1		(Part of printed board 19C327405P1).
W3 thru W5		(Part of printed board 19C327405P1).
W6	19A136512P1	Antenna strap.
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL210		FILTER ASSEMBLY 19A136680G1
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1 thru C5	5493392P7	Ceramic, feed-thru: 1000 pf +100% -0%, 500 VDCW; sim to Allen-Bradley Type FA5C.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
G11 thru G14	7135118P2	Terminal, solderless.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1		Connector. Includes:
	19A115884P12	Shell.
	19A115884P7	Contact, male: wire size No. 20-14 AWG; sim to AMP 60528-4.
	19A115884P9	Contact, male: wire size No. 30-22 AWG; sim to AMP 60910-4.
J3	4029493P1	Connector, receptacle: coaxial; sim to Amphenol 83-798.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L210 thru L213	19A126140P3	Core, toroidal, ferrite: sim to Stackpole 88-31959.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q201	19A134489P1	Silicon, NPN.
Q202	19A134489P2	Silicon, NPN.
Q215	19A116742P1	Silicon, NPN.
		- - - - - - - - - - CABLES - - - - - - - - - -
W201	5491689P91	Cable, RF: approx 7-1/2 inches long; 350 VRMS, 500 VDC operating voltage. Includes (P201).
W202	19A135529G2	Cable: approx 2 inches long.
W203	19B227302P1	Jumper.
W204	7878455P1	Solderless terminal.
		- - - - - - - - - MISCELLANEOUS - - - - - - - -
	19C321982P1	Insulator. (Located under A201).
	19A116023P3	Insulator, plate. (Used with Q215).
	19A134016P1	Insulator, bushing. (Used with Q215).

SYMBOL	GE PART NO.	DESCRIPTION
	4033714P11	Solderless terminal. (Located at FL210).
	4029840P5	Contact, electrical. (Located at FL210- C5-1).
	19B201074P204	Tap screw, Phillips POZIDRIV®: No. 4-40 x 1/4. (Secures J3).
	N44P9006C6	Machine, screw: No. 4-40 x 3/8. (Secures Q1, Q2).
	19A116417P4	Plastic bumper. (Quantity 4).
	7878243P11	Hex nut. (Located on cover retaining stud).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES