MOBILE RADIO

806–825 MHz, 10-WATT MASTR® EXECUTIVE II

POWER AMPLIFIER ASSEMBLY 19D424356G4

TABLE OF CONTENTS

DESCRIPTION

The power amplifier assembly for the MASTR® Executive II radio uses four RF power transistors to provide a maximum of 10-Watts output power.

The power adjust circuit, consisting of R16, VR1, Q1 and Q215, controls the output power. R16 is used to set the output power to 10-Watts with a battery voltage of 13.8 VDC.

SUPPLY VOLTAGE AND METERING

Supply voltage is connected through power leads from the system board to feed-through capacitor C219. C219 and C223 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 PA.

Centralized metering jack J205 is provided for use with GE Test Model 4EX3A11 or Test Kit 4EX8K12. The test set meters the AMPL-1 DRIVE (exciter output), the POWER CONTROL voltage, and the PA CURRENT.

CIRCUIT ANALYSIS

PA ASSEMBLY

The exciter output is coupled through a 50-ohm RF cable to the PA input connector J1. The RF input is coupled through a matching network composed of C2, C3, L1, L2 and L3 to the base of power amplifier Q201.

Part of the RF input is rectified by CR1 and metered at J205-4 through resistor R1 and R18.

A+ is applied to the collector of Q201 through contacts 4 and 7 of antenna relay K1, R21, R22 and through collector stabilizing network L5 and R4 and collector feed network L4 and C201.

The output of Q201 is coupled to the base of the second amplifier Q202 through coupling capacitor C5, and a matching network consisting of C6, C7, L6 and L7.

Collector voltage to Q202 is applied direct from the A+ input to the PA through collector stabilizing network L11 and R7 and collector feed network C202 and L10.

The output of Q202 is coupled to the base of amplifier Q203 through C9 and impedance matching network C203, C204, L12 and L13.

The collector voltage to Q203 is coupled directly from power control transistor Q215E through collector stabilizing network L17 and R9 and collector feed network L16 and C11.

The output of Q203 is coupled through an impedance matching network (C206, C13, C207, C208 and L18 through L21) and a 60-ohm microstrip W4 that matches the output impedance of Q203 to the input impedance of PA Q204.

The collector voltage of Q204 is applied direct from the A+ input through R20, collector stabilizing network L23 and R11, and collector feed network L22 and C15.

Collector current for Q204 is metered across tapped manganin resistor R20. The meter reading, taken in position""F" on the 10-Volt scale of the Test Set with the High Sensitivity button pressed, should be approximately 2.5 Amperes.

WARNING

The RF Power Transistors used in the transmitter contain Beryllium Oxide, a TOXIC substance. If the ceramic, or other encapsulation is opened, crushed, broken or abraded, the dust may be hazardous if inhaled. Be extremely careful to avoid transistors when working with PA assembly.

The output of Q204 is coupled through an impedance matching network (C209, C210, C16 and L24) and a 50-ohm microstrip, W5, to the low pass filter. The output of the low pass filter is coupled to antenna connector J2 through closed contact 3 and 8 of antenna transfer relay K1.

CAUTION

The placement of monolithic capacitors on the PA board is very critical; therefore, it is not recommended that the PA board be serviced in the field. When a malfunction occurs with the PA board, the entire PA assembly should be returned to the factory for service.

POWER CONTROL CIRCUIT

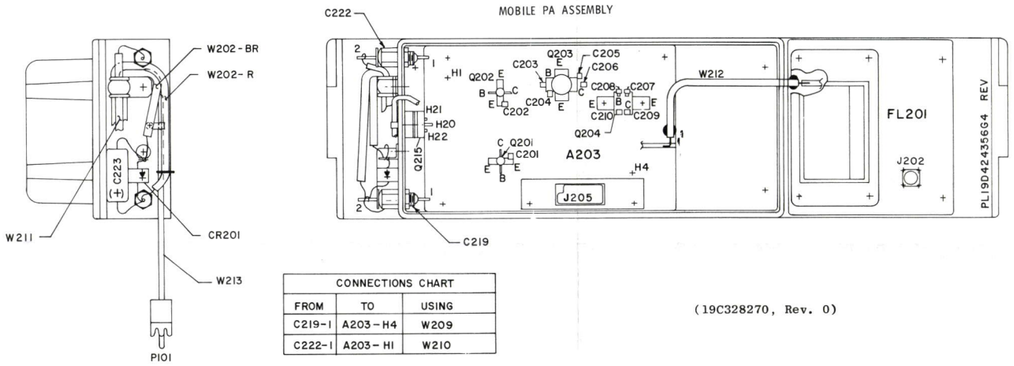
The Power Control Circuit is a regulated power supply consisting of voltage regulator VR1 and Q1 and pass transistor Q215. VR1 sets the bias for Q1 at a level of 5.4 VDC above the reference point established by R16-- nominally 10-11 VDC. Q1, functioning as a variable resistor, controls the base voltage of pass transistor Q215. When R16 is set for 10-watts output, the base voltage of Q215 should be approximately 6.4 VDC and the emitter at 7.0 VDC.

As the battery voltage increases or decreases the voltage across R16 and therefore the bias level of Q1 varies in direct proportion. With an increase in battery voltage, Q1 will conduct more, lowering the base voltage of Q215. Q215 now conducts less, lowering the output voltage to compensate for the increase in battery voltage.

The output voltage of Q215 is applied to the collector of Q203, thereby controlling the drive to power amplifier Q204 and the output power.

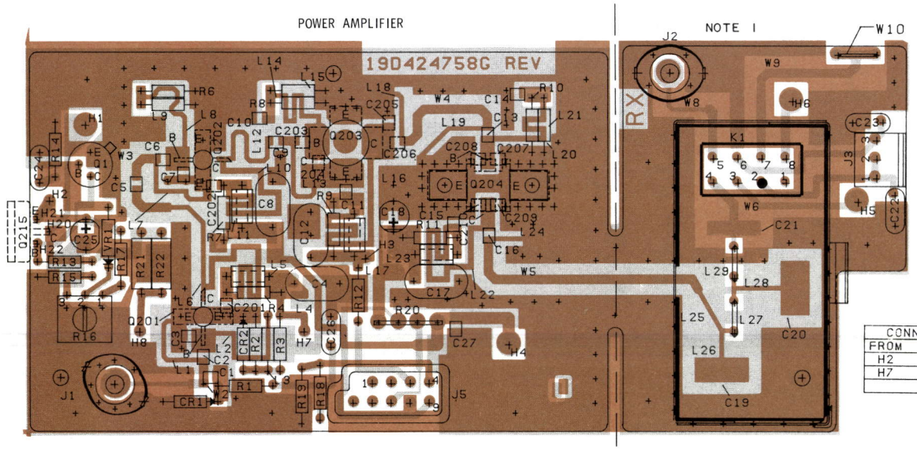
MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

GENERAL ELECTRIC



CONNECTIONS CHART		
FROM	TO	USING
C219-1	A203-H4	W209
C222-1	A203-H1	W210

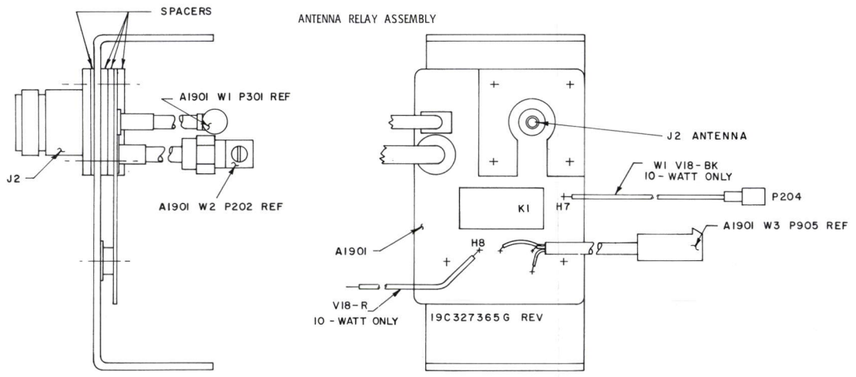
(19C328270, Rev. 0)



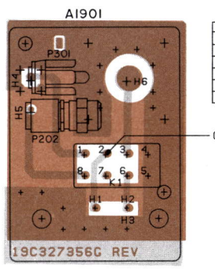
CONNECTIONS CHART		
FROM	TO	USING
H2	H3	W12
H7	H8	W11

(19D424760, Rev. 0)
(RC-3256)
(19B227954, Sh. 1, Rev. 0)
(19B227954, Sh. 2, Rev. 0)

NOTE:
1. THIS SECTION NOT PRESENT IN MASTR EXECTIVE II APPLICATIONS.



(19C327924, Rev. 1)

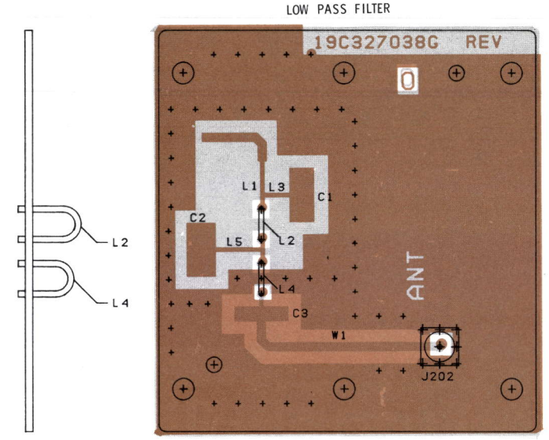


ANTENNA RELAY

CONNECTION CHART			
FROM	TO	WIRE	REMARKS
H1	LET HANG	W3-BK	
H2		W3-R	
H3		W3-SHLD	
H4		W1	
H5	LET HANG	W2	

COLORED BEAD

(19C327489, Rev. 1)
(19B227558, Sh. 1, Rev. 0)
(19B227558, Sh. 2, Rev. 0)

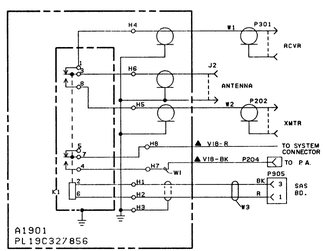


(19C327595, Rev. 0)
(19B227304, Sh. 1, Rev. 0)
(19B227304, Sh. 2, Rev. 0)

RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE

OUTLINE DIAGRAM

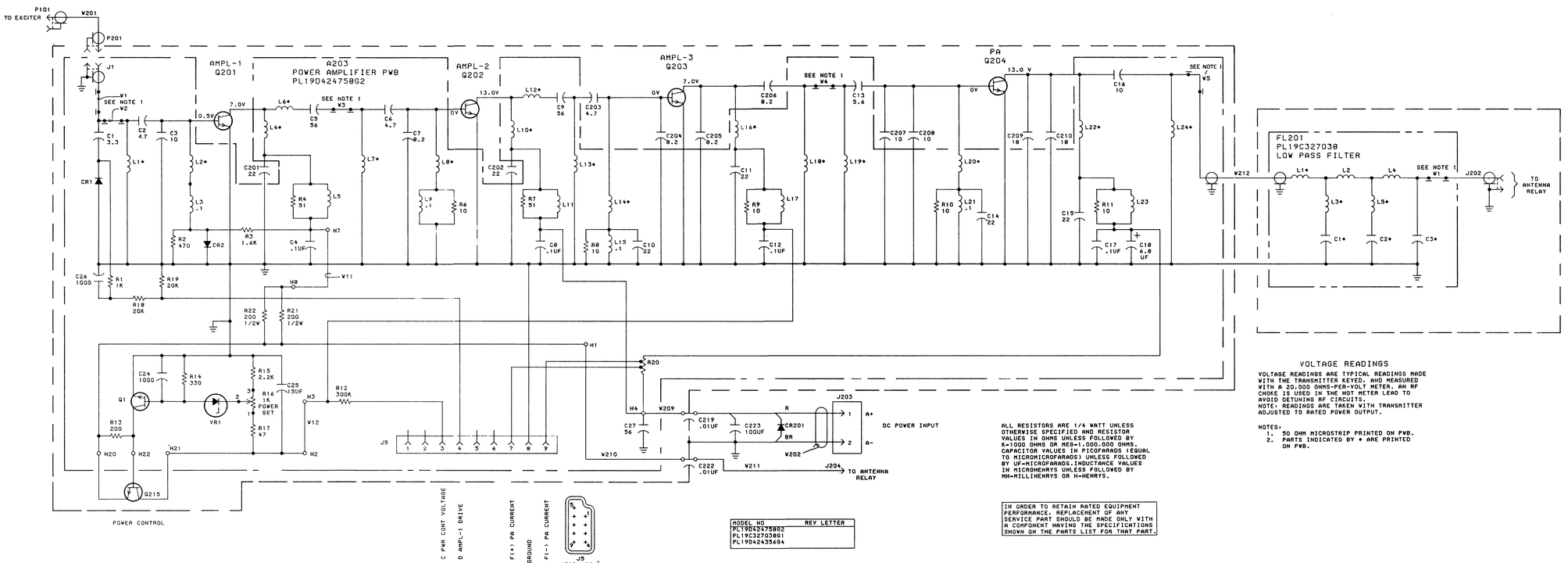
806—825 MHz, 10-WATT
MOBILE TRANSMITTER



NOTES:
1. ▲ THESE WIRES ARE PART OF 19C327245G2 ONLY.

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT. FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.	
THIS ELEW DIAG APPLIES TO	
MODEL NO	REV LETTER
PL19C327365G1 PL19C327365G2 PL19C327856G1	

(19B227557, Rev. 2)



MODEL NO	REV LETTER
PL19D424758G2 PL19C327038G1 PL19D424356G4	

(19R622312, Rev. 1)

VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MADE WITH THE TRANSMITTER KEYED, AND MEASURED WITH A 20,000 OHMS-PER-VOLT METER. AN RF CHOKE IS USED IN THE HOT METER LEAD TO AVOID DETUNING RF CIRCUITS.
NOTE: READINGS ARE TAKEN WITH TRANSMITTER ADJUSTED TO RATED POWER OUTPUT.

NOTES:
1. 50 OHM MICROSTRIP PRINTED ON PWB.
2. PARTS INDICATED BY ★ ARE PRINTED ON PWB.

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.

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.

SCHEMATIC DIAGRAM

806—825 MHz, 10-WATT
MOBILE TRANSMITTER

PARTS LIST

LBI-30643

806-825 MHz PA ASSEMBLY
19D424356G4

SYMBOL	GE PART NO.	DESCRIPTION
A203		PA BOARD 19D424758G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A134419P1	Ceramic: 3.3 pf ±.25 pf, 50 VDCW.
C2	19A134419P5	Ceramic: 4.7 pf ±.25 pf, 50 VDCW.
C3	19A134419P13	Ceramic: 10 pf ±5% pf, 50 VDCW.
C4	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C5	19A134419P31	Ceramic: 56 pf ±5% pf, 50 VDCW.
C6	19A134419P5	Ceramic: 4.7 pf ±.25 pf, 50 VDCW.
C7	19A134419P11	Ceramic: 8.2 pf ±5% pf, 50 VDCW.
C8	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C9	19A134419P31	Ceramic: 56 pf ±5% pf, 50 VDCW.
C10 and C11	19A134419P21	Ceramic: 22 pf ±5% pf, 50 VDCW.
C12	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C13	19A134419P7	Ceramic: 5.6 pf ±5% pf, 50 VDCW.
C14 and C15	19A134419P21	Ceramic: 22 pf ±5% pf, 50 VDCW.
C16	19A134418P11	Ceramic: 8.2 pf ±5% pf, 50 VDCW.
C17	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C18	19A134202P15	Tantalum: 6.8 µf ±20%, 35 VDCW.
C24	19A116655P19	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C25	19A134202P8	Tantalum: 15 µf ±20%, 20 VDCW.
C26	19A116655P19	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C27	19A134419P31	Ceramic: 56 pf ±5% pf, 50 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	19A116052P1	Silicon.
CR2	19A115775P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1	19A116832P1	Receptacle, coaxial: jack type; sim to Cinch 14B11613.
J5	19B219374G1	Connector: 9 contacts.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1 and L2		(Part of 19C327853G1 printed board).
L3	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1K.
L4		(Part of 19C327853G1 printed board).
L5	19A129773G1	Coil.
L6 thru L8		(Part of 19C327853G1 printed board).
L9	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1K.
L10		(Part of 19C327853G1 printed board).
L11	19A129773G1	Coil.
L12 thru L14		(Part of 19C327853G1 printed board).
L15	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1K.
L16		(Part of 19C327853G1 printed board).
L17	19A129773G1	Coil.
L18 thru L20		(Part of 19C327853G1 printed board).
L21	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1K.
L22		(Part of 19C327853G1 printed board).
L23	19A129773G1	Coil.
L24		(Part of 19C327853G1 printed board).
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115300P2	Silicon, NPN; sim to Type 2N3053.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R2	3R152P471J	Composition: 470 ohms ±5%, 1/4 w.
R3	3R152P162J	Composition: 1.6K ohms ±5%, 1/4 w.
R4	3R152P510J	Composition: 51 ohms ±5%, 1/4 w.
R6	3R152P100J	Composition: 10 ohms ±5%, 1/4 w.
R7	3R152P510J	Composition: 51 ohms ±5%, 1/4 w.
R8 thru R11	3R152P100J	Composition: 10 ohms ±5%, 1/4 w.
R12	3R152P304J	Composition: 300K ohms ±5%, 1/4 w.
R13	3R152P201J	Composition: 200 ohms ±5%, 1/4 w.
R14	3R152P331J	Composition: 330 ohms ±5%, 1/4 w.
R15	3R152P222J	Composition: 2.2K ohms ±5%, 1/4 w.
R16	19A116559P101	Variable, cermet: 1K ohms ±20%, .5 w; sim to CTS Series 360.
R17	3R152P470J	Composition: 47 ohms ±5%, 1/4 w.
R18 and R19	3R152P203J	Composition: 20K ohms ±5%, 1/4 w.
R20	19C320212P2	Shunt resistor.
R21	3R77P201J	Composition: 200 ohms ±5%, 1/2 w.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR1	4036887P5	Silicon, Zener.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1 thru W5		(Part of 19C327853G1 printed board).
W11	19B227659P6	Jumper.
W12	19B227659P7	Jumper.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C201 and C202	19A134419P21	Ceramic: 22 pf ±5%, 50 VDCW.
C203	19A134419P5	Ceramic: 4.7 pf ±.25 pf, 50 VDCW.
C204 thru C206	19A134419P11	Ceramic: 8.2 pf ±5%, 50 VDCW.
C207 and C208	19A134419P13	Ceramic: 10 pf ±5%, 50 VDCW.
C209 and C210	19A134418P19	Ceramic: 18 pf ±5%, 50 VDCW.
C219	19A116708P1	Ceramic, feed-thru: 0.01 µf +100% -0%, 500 VDCW; sim to Erie 327050X-5W0103P.
C222	19A116708P1	Ceramic, feed-thru: 0.01 µf +100% -0%, 500 VDCW; sim to Erie 327050X-5W0103P.
C223	19A115680P4	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR201	19A116783P1	Silicon.
		- - - - - - - - - - FILTERS - - - - - - - - -
FL201		FILTER ASSEMBLY 19C327038G1
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1 thru C3		(Part of 19C327039P1 printed board).
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J202	19A134413P5	Connector, receptacle: sim to E.F. Johnson 142-0298-006.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1		(Part of printed board 19C327039P1).
L2	19A136863P1	Coil.
L3		(Part of printed board 19C327039P1).
L4	19A136863P1	Coil.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1		(Part of printed board 19C327039P1).
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q201	19A134430P1	Silicon, NPN.
Q202		
Q203	19A134431P1	Silicon, NPN.
Q204	19A134432P1	Silicon, NPN.
Q215	19A116375P1	Silicon, PNP.
		- - - - - - - - - - CABLES - - - - - - - - - -
W202	19B227058G1	Cable: approx 1 foot long.
W209	19C327785P3	Jumper.
W210	19C327785P4	Jumper.
W211	19B232180G1	Cable. Includes:
	19B209505P201	Shell.
	19B209505P21	Contact, electrical: female, wire size No. 18-24.
W212	19B227684G2	Jumper.
W213	19A130909G2	Cable, RF: approx 7-1/2 inches long.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A134016P1	Insulator, bushing. (Used with Q215).
	19A116023P1	Insulator, plate. Dupont No. 300 Kapton H. (Used with Q215).
	5492178P2	Washer, spring tension: sim to Wallace Barnes 375-20. (Used with Q201-Q203).
	19A121006P14	Washer. (Used with Q201 and Q202).
	N207P15C6	Nut, hex: No 8-32. (Used with Q201-Q203).
	19C327746P1	Insulator. (Used with Q201-Q203).
	19D424364P2	Support. (Used with Q201-Q203).
	19B219076G2	Support. (Mounts J5 of A203).
	19B201074P912	Tap screw, Phillips POZIDRIV®: No. 6-32 x 3/4. (Secures J5 to support).
	19B227351G1	Cover, PA.
	7139898P3	Nut, hex, brass. (Used with C219, C222).
	19A129434P1	Washer, fiber. (Used with C219, C222).
	4029851P27	Clip loop. (Used with W211).
	19B226906G1	Filter Housing.
	19B201074P320	Tap screw, Phillips POZIDRIV®: No. 6-32 x 1-1/4. (Secures 19B226906G1 Filter housing).
	7878455P2	Solderless terminal. (Located between W202 and C223).
	19C321591G8	Heat sink.
	19A130568P1	Plate. (Located between 19C321591G8 heat sink and insulator plate under Q215).
	N80P9007C6	Machine screw: No. 4-40 x 7/16. (Secures W211 clip loop).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES