MOBILE RADIO

MAINTENANCE MANUAL

851-870 MHz, 90 WATT POWER AMPLIFIER ASSEMBLY 19D43230G3, G4

TABLE OF CONTENTS

DESCRIPTION

The power amplifier assembly uses four grounded base RF power transistors in Parallel to provide a minimum of 90 watts output power, R24 located on the Driver PA module, is used to adjust the output power to any level from 30 watts to rated RF power output.

SUPPLY VOLTAGE AND METERING

Supply voltage is connected through power leads from the system board to feedthrough capacitor C217. C217 prevents RF from getting on the power leads.

Centralized metering jack J213 is provided for use with GE Test Model 4EX3A11 or Test Kit 4EX8K12. The test set meters the Power In (Driver Output), the Power Output, and the PA current.

CIRCUIT ANALYSIS

PA ASSEMBLY

The 35 Watt Driver Output is coupled through a 50 ohm RF cable to the PA input connector J211. The RF input is applied to the RF power splitter board. The RF power splitter consisting of micro strip transmission line W6 thru W12, W22 thru W26, W36, R1, R2 and R3, and has a 50 ohm input and output impedance. The outputs of the power splitter are applied to the four identical Class C Power Amplifiers Q201 through Q204 via their respective identical matching networks.

Part of the RF input is rectified by CR1 and metered at J213-4 through resistor R15. The rectified RF is a relative reading of RF Power Input.

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.

Supply voltage for Q201 through Q204 is coupled through identical stabilizing networks and the collector feed networks. Supply voltage is measured in position K on the 15 volt range with the polarity switch in the (-) position (read as 15 volts full scale).

Collector current for Q201 through Q204 is metered across paralleled tapped manganin resistors R13 and R14 located on the PA module. The reading is taken in Position G in the Test 1 position on the 3 Volt scale with the "High" Sensitivity Button pressed, and read as 30 amperes full scale.

The outputs of Q201 through Q204 are coupled through identical matching networks to the RF power combiner board. The RF power combiner consists of micro strip transmission line W13 thru W19, W27 thru W32, W39 thru W42, R8 thru R10, and has a 50 ohm input and output impedance. The combiner adds the outputs of Q201 through Q204 and applies the combined RF output to the Low Pass Filter through the 50 ohm micro strip W19.

Z1 is a balance network adjusted at the factory for maximum power output. R8, R9 and R10 share equal amounts of power when Z1 is adjusted for maximum power output at a particular frequency.

Part of the RF output is rectified by CR2 and metered at J213-3 through resistor R11. The rectified RF is a relative reading of RF Power Output.

The output of the Low Pass Filter is coupled to the Antenna Switch K1 through the 50 ohm micro strip W33 or if the Antenna Switch is not used W35 couples the output to the Antenna J212.

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. Use care in replacing transistors of this type.

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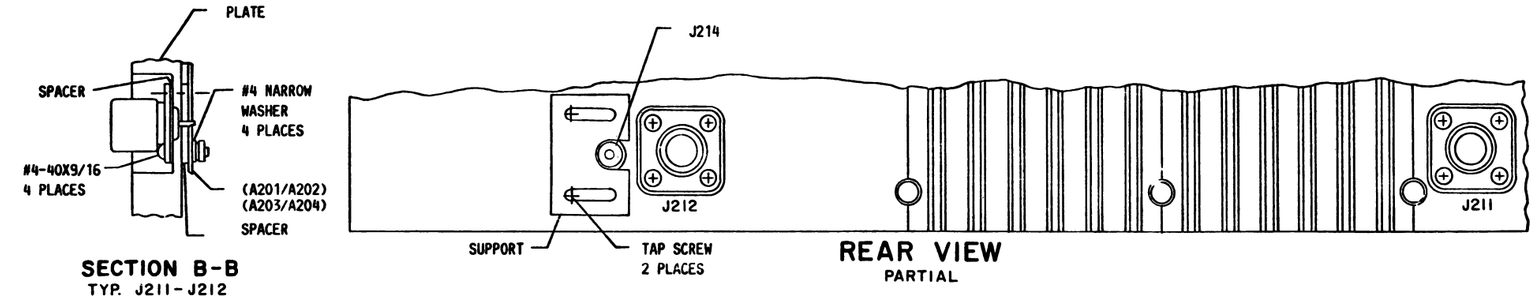
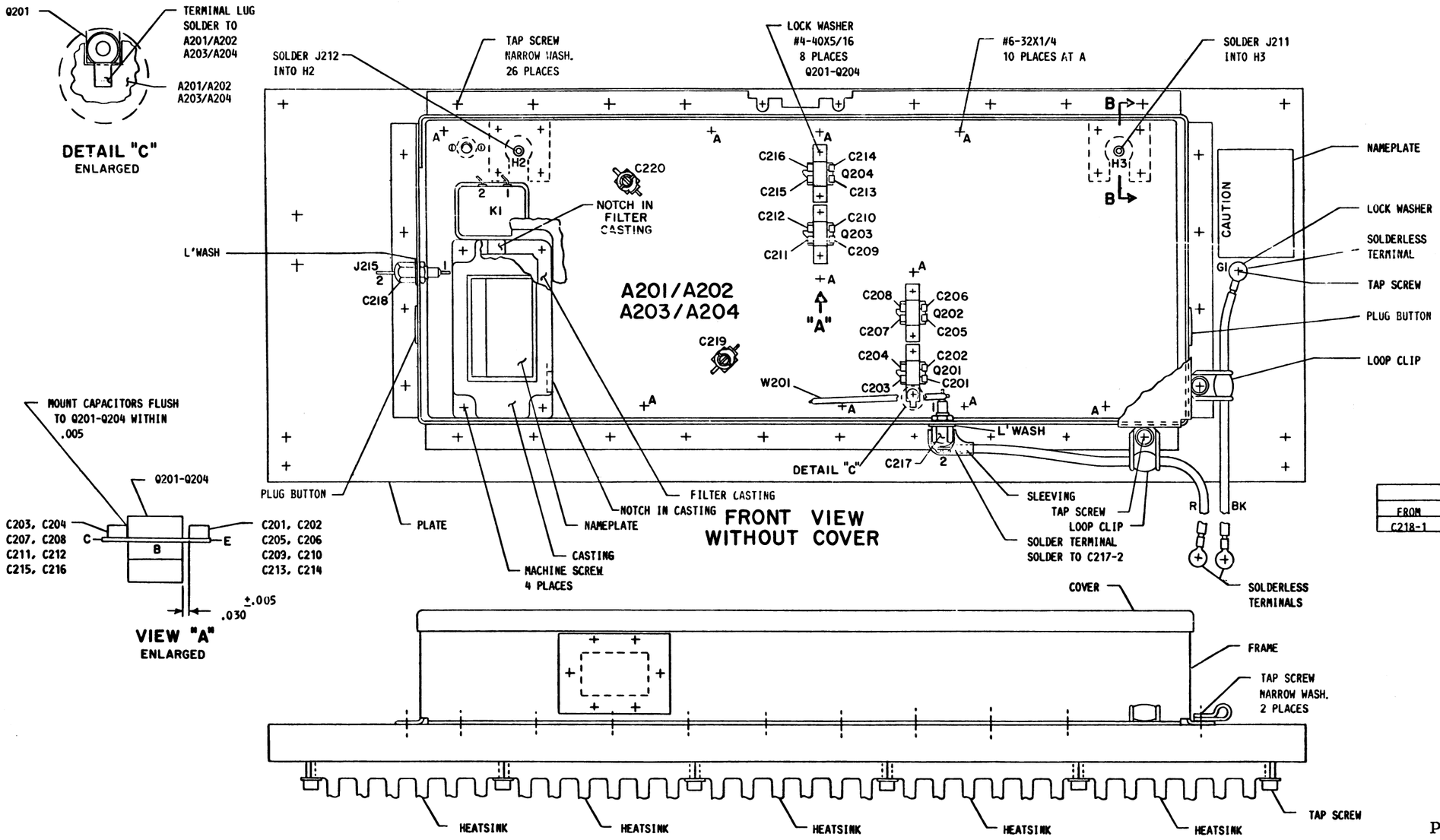




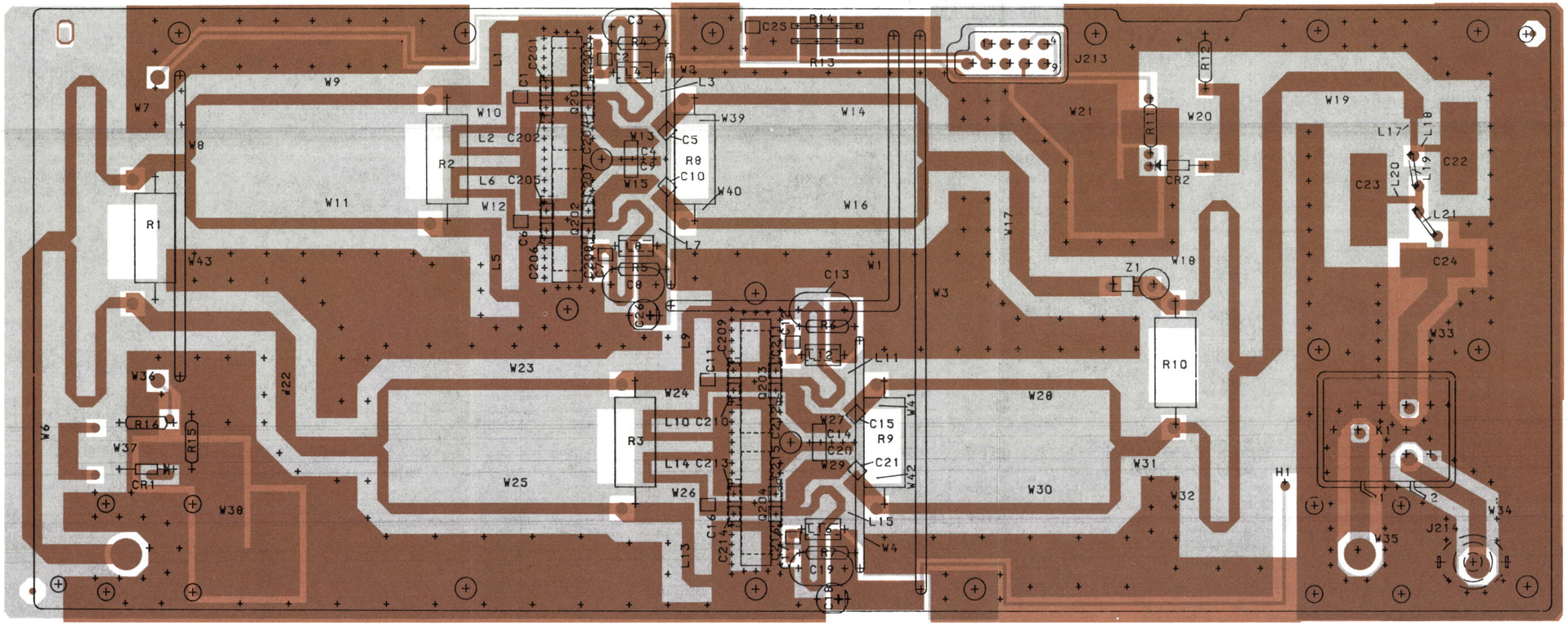
CONNECTIONS CHART GP1				
FROM	TO	WIRE	TERMINATION	REMARKS
C218-1	K1-2	SF24-WBL	USE ITEM 24	SLEEVE

(19D432772, Rev. 2)

OUTLINE DIAGRAM

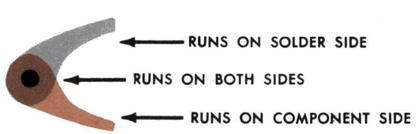
POWER AMPLIFIER 19D432307G3, G4

Issue 2



CONNECTIONS CHART GP3				
FROM	TO	WIRE	TERMINATION	REMARKS
H1	K1-1	SF24-R	USE ITEM 8	SLEEVE

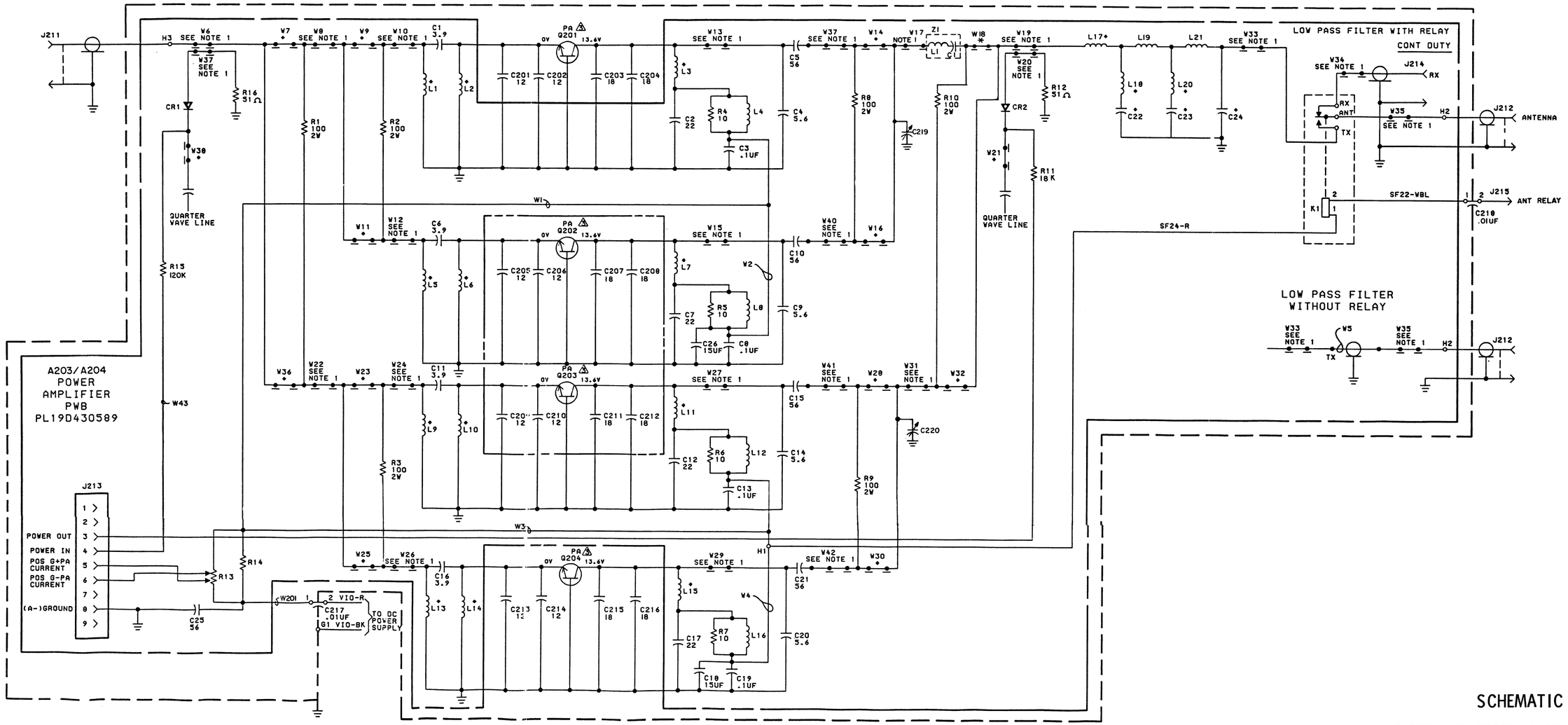
(19D433084, Rev. 1)
(19A144059, Sh. 1, Rev. 1)
(19A144059, Sh. 2, Rev. 1)



OUTLINE DIAGRAM

PA BOARD

4 Issue 3



SCHEMATIC DIAGRAM

POWER AMPLIFIER (19R622489, Rev. 3)

PARTS LIST

851 MHz, 90 WATT
POWER AMPLIFIER
19D432307G3 WITH RELAY - REV. A
19D432307G4 WITHOUT RELAY - REV. A
ISSUE 3

SYMBOL	GE PART NO.	DESCRIPTION
A203 and A204		90 WATT POWER AMPLIFIER A203 19D430589G3 WITH RELAY A204 19D430589G4 WITHOUT RELAY REV A
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A134418P3	Ceramic: 3.9 pF ±0.25 pF, 50 VDCW.
C2	19A134481P21	Ceramic: 22 pF ±5%, 50 VDCW.
C3	19A116080P107	Polyester: 0.1 uF ±10%, 50 VDCW.
C4	19A703967P1	Porcelain: 5.6 pF ±.25 pF, 500 VDCW; sim to ATC 100 85R6 CNS 500X.
C5	19A134418P31	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C6	19A134418P3	Ceramic: 3.9 pF ±0.25 pF, 50 VDCW.
C7	19A134418P21	Ceramic: 22 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C8	19A116080P107	Polyester: 0.1 uF ±10%, 50 VDCW.
C9	19A703967P1	Porcelain: 5.6 pF ±.25 pF, 500 VDCW; sim to ATC 100 85R6 CNS 500X.
C10	19A134418P31	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C11	19A134418P3	Ceramic: 3.9 pF ±0.25 pF, 50 VDCW.
C12	19A134418P21	Ceramic: 22 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C13	19A116080P107	Polyester: 0.1 uF ±10%, 50 VDCW.
C14	19A703967P1	Porcelain: 5.6 pF ±.25 pF, 500 VDCW; sim to ATC 100 85R6 CNS 500X.
C15	19A134418P31	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C16	19A134418P3	Ceramic: 3.9 pF ±0.25 pF, 50 VDCW.
C17	19A134418P21	Ceramic: 22 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C18	19A134202P8	Tantalum: 15 uF ±20%, 20 VDCW.
C19	19A116080P107	Polyester: 0.1 uF ±10%, 50 VDCW.
C20	19A703967P1	Porcelain: 5.6 pF ±.25 pF, 500 VDCW; sim to ATC 100 85R6 CNS 500X.
C21	19A134418P31	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C22 thru C24		(Part of printed board 19D433083P1).
C25	19A134418P31	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C26	19A134202P8	Tantalum: 15 uF ±20%, 20 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 and CR2	19A116052P2	Silicon, fast recovery; sim to Hewlett Packard 5082-2811.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J213	19B219374G1	Connector: 9 contacts.
J214	19A700049P2	Connector, receptacle; 500 VDCW maximum; sim to NTTF-1058.
		- - - - - - - - - - - RELAYS - - - - - - - - - -
K1	19A116722P1	Hermetic sealed: 125 ohms ±20%, 1 form C contact, 9.6 to 15.8 VDC (over the temperature range indicated).
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1 thru L3		(Part of printed board 19D433083P1).
L4	19A129773G1	Coil.
L5 thru L7		(Part of printed board 19D433083P1).
L8	19A701091G1	Coil.
L9 thru L11		(Part of printed board 19D433083P1).
L12	19A701091G1	Coil.
L13 thru L15		(Part of printed board 19D433083P1).
L16	19A701091G1	Coil.
L17 and L18		(Part of printed board 19D433083P1).
L19	19A136863P1	Coil.
L20		(Part of printed board 19D433083P1).
L21	19A136863P1	Coil.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 thru R3	19A700111P39	Composition: 100 ohms ±5%, 2 w.
R4 thru R7	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R8 thru R10	19A700111P39	Composition: 100 ohms ±5%, 2 w.
R11	19A700019P52	Deposited carbon: 18K ohms ±5%, 1/4 w.
R12	19A700106P32	Composition: 51 ohms ±5%, 1/4 w.
R13 and R14	19C850605P1	Shunt resistor.
R15	19A700019P62	Deposited carbon: 0.12M ohms ±5%, 1/4 w.
R16	19A700106P32	Composition: 51 ohms ±5%, 1/4 w.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1	19A143402P3	Jumper.
W2	19A143402P1	Jumper.
W3	19A143402P2	Jumper.
W4	19A143402P1	Jumper.
W5	19A130607G3	Cable, RF: approx .7 of an inch.
W6 thru W42		(Part of printed board 19D433083P1).
W43	19A143402P5	Jumper.
		- - - - - - - - - - NETWORKS - - - - - - - - - -
Z1	19A144057G1	Network assembly. Includes:
C1	19A134227P2	Variable, air: 2 - 7 pF, 100 VDCW, temp coef 0 ±50 PPM.
L1	19A144056P1	Coil.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C201 and C202	19A134418P15	Ceramic: 12 pF ±5%, 50 VDCW.
C203 and C204	19A134418P19	Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C205 and C206	19A134418P15	Ceramic: 12 pF ±5%, 50 VDCW.
C207 and C208	19A134418P19	Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C209 and C210	19A134418P15	Ceramic: 12 pF ±5%, 50 VDCW.
C211 and C212	19A134418P19	Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C213 and C214	19A134418P15	Ceramic: 12 pF ±5%, 50 VDCW.
C215 and C216	19A134418P19	Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C217	19A116708P1	Ceramic: 0.01 uF -0 +100%, 500 VDCW, rated 20 amps; sim to Erie 327050X5W0103P.
C218	19A116708P1	Ceramic: 0.01 uF -0 +100%, 500 VDCW, rated 20 amps; sim to Erie 327050X5W0103P. (Includes J215).
C219 and C220	19A703518P2	Variable: 1.44 to 5.20 pF, 125 VDCW; sim to EF Johnson 186-0607-175.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J211 and J212	7777145P5	Receptacle: sim to Amphenol 82-97.
J215		(Part of C218).
		- - - - - - - - - - - CABLES - - - - - - - - - - -
W201	19A143402P4	Jumper.
		TRANSISTOR KIT 19A144208G1
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q201 thru Q204	19A143471P1	Silicon, NPN.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	4029840P6	Contact, electrical: No. 22-24 AWG wire; sim to Malco 12080-0. (Located at K1-1 & K1-2).
	19C330572G1	Heat sink plate.
	19D417526G4	Frame.
	19D417513G1	PA Cover.
	19B233315G3	Filter Web.
	19B226212G1	Heat sink. (Quantity 2).
	19B226212G4	Heat sink. (Quantity 3).
	19D416275P3	Filter casting.
	N80P13016C6	Machine screw, phillips head: No. 6-32 x 1.
	19B209103P410	Tap screw, hex head: No. 8-32 x 5/8. (Secures heat sinks).
	N80P9005C6	Machine screw, phillips head: No. 4-40 x 5/16. (Secures Q201-Q204).
	N405P5C6	Lockwasher, spring type: No. 4. (Secures Q201-Q204).
	7139898P3	Nut, hex, brass: No. 1/4-28. (Secures C217 & C218).
	19B201074P304	Tap screw, Phillips POZIDRIV®: No. 6-32 x 1/4. (Secures frame to plate).
	19A701863P13	Cable clip. (Secures Red & Black power leads).
	19B201074P306	Tap screw, Phillips POZIDRIV®: No. 6-32 x 3/8. (Secures clip loops).
	19B209268P113	Terminal, solderless: sim to AMP 2-34835-4. (Located at C217).
	19B209260P11	Solderless terminal. (Located on Red & Black power leads).
	N529P18E	Button plug. (Located on ends of frame).
	19B227679P2	Spacer. (Used with J211 & J212 on J211 & J212 side of plate).
	19B227679P3	Spacer. (Used with J211 & J212 on A201 & A202 side of plate).
	19B201074P305	Tap screw, Phillips POZIDRIV®: No. 6-32 x 5/16. (Secures J214 support).
	19A143455P1	Support. (J214).
	19A142996G1	Terminal lug. (Soldered to A201 & A202 at Q201).
	N403P13C6	Lockwasher: No. 6. (Located at G1 - Black lead)
	NP280071	Nameplate, paper. (CAUTION).
	NP280901	Nameplate. (Tx Power Amplifier Metering).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

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.

REV. A - Power Amplifier 19D432307

To permit tuning and balance of the power amplifier, added C219 and C220.

REV. B - To limit board flexure during temperature cycling, added two screws to conduct heat from the board to the heat sink.

REV. A - PA Board Assembly 19D430589

Changed location and value of capacitors C4, C9, C14 and C20. These capacitors were 19A134418P7: Ceramic; 5.6 pF ±5%, 50 VDCW.