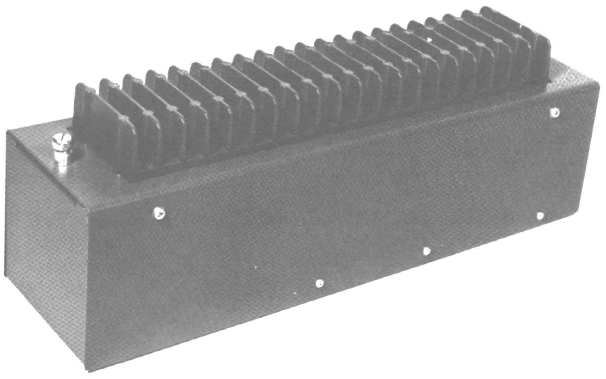
MOBILE RADIO

POWR MASTR

406-420 MHz and 450-470 MHz, 40 WATT VEHICULAR POWER AMPLIFIER TYPE KT-184-A



Maintenance Manual LBI30837C
DATAFILE FOLDER - DF3175

VEHICULAR POWER AMPLIFIER KT184A

SPECIFICATIONS *

Dimensions (H x W x D)	5.2" x 14.5" x 4" (13.2 cm x 36.8 cm x 10.1 cm)
Weight	8 pounds 3.63 Kilograms)
DC Input Voltage	13.6 VDC
RF Drive Input	1 to 5 Watts
Current Drain	
Standby	40 milliamps
Transmit	12 Amperes (rated power)
Temperature Range	-30°C to +60°C
Receiver Insertion Loss	1.0 dB
Spurious	
Radiated	-59 dB
Conducted	-59 dB

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

GENERAL ELECTRIC

TABLE OF CONTENTS

COMBINATION NOMENCLATURE

1, 2 Digits	3rd Digit	4th Digit	5th Digit	6th Digit	7th Digit
Product Code	Package	Frequency Range	RF Power	Control	Power Source
P3 P3	**A** Basic	**N** 406 - 420 MHz	**5** 21 - 40 Watts	**A** Standard	**G** 12 Volt DC Neg GRD
		R 450 - 470 MHz			

DESCRIPTION

General Electric POWR MASTR Vehicular Power Amplifier Type KT-184-A is used in conjunction with the appropriate vehicular charger to increase the transmit power of a personel radio to 40 watts in the 406 to 420 MHz and the 450 to 470 MHz frequency range.

The vehicular power amplifier consists of a control circuit and preamplifier, and an RF power amplifier (PA). The preamplifier accommodates the various input power levels (1-5 watts) and delivers a constant output power to drive the power amplifier. The control circuit senses the input drive from the mobile charger and controls the antenna relay and solid state switch in the preamplifier. Both the control circuit and the preamplifier are contained on a single printed wire interface board. The printed wire interface board is mounted inside a hinged cover to provide easy access to the board for servicing. The hinged cover also provides easy access to the power amplifier, low pass filter and centralized metering jack J5.

The Vehicular Power Amplifier requires no tuning. There are only two adjustments to be made; the input level adjustment with R2 on the interface board and the power output adjust with R213 on the final power amplifier board. The input level adjust sets the drive power level required to activate the final power amplifier. The power output adjust sets the output power level.

Since no output tuning is provided, antennas must match 50 ohms within a 1.4:1 VSWR or more than 10% power loss will result. Antenna matching is important.

The PA assembly uses four RF power transistors to provide a power output of 40 Watts. The output power is adjustable using power control R213 over a range of 10 to 40 Watts. A single transistor is used in the power control circuit.

Supply voltage for the PA is connected through capacitors C297 and C298 on the side of the PA assembly. C297, C298, and C299 prevent RF from getting on the power leads. Diode CR295 will cause the main fuse assembly to blow if the polarity of the power leads is reversed, providing reverse voltage protection for the amplifier.

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, power control voltage, driver current, and PA current.

CIRCUIT ANALYSIS

INTERFACE BOARD

The interface board consist of a voltage regulator circuit, control circuit and an RF preamplifier circuit. The 13.6 VDC vehicular battery voltage is connected to J102 of the vehicular power amplifier. This DC power input is connected to both the final RF power amplifier and across H1 and G10 on the interface board. The DC voltage on H1 is applied to the collector of NPN pass transistor Q2. Zener diode VR1 controls the base of Q2 to regulate the output on the emitter to 10.5 volts. The 10.5 regulated volts powers the control circuit and the RF preamplifier.

Control Circuit

The control circuit consist of an RF detector and switching circuit and a PIN diode RF switch. RF detector CR1 detects RF drive from the vehicular charger to operate solid state switching circuit U1 and activate the antenna relay. Level adjust R2 sets the RF level where U1 will switch (1 to 5 Watts).

PIN diode RF switch, consisting of CR3, CR4 and CR5, is turned on only in the transmit mode. When on, RF is routed through the preamplifier and power amplifier to the antenna. When in the receive mode, and the switch is off, the receiver is isolated from the preamplifier. Any received signal is routed from the antenna to the vehicular charger.

The RF output of the RF switch, when in the transmit mode, is routed through thick film attenuator AT1. AT1 is used to decrease the drive to a suitable level for the preamplifier circuit.

RF Preamplifier

The RF Preamplifier consists of RF power transistor Q1 and associated circuitry. The preamplifier amplifies the RF from attenuator AT1 to a leveled output of 250 to 450 milliwatts to drive the final power amplifier.

POWER AMPLIFIER

The preamplifier output is coupled through W102 to PA input jack J201. The 50 ohm RF input is coupled through a matching network comprised of C206, C207, C208 and W202 to the base of power amplifier Q201.

Part of the RF input is rectified by CR201 and metered at J205-4 through resistor R201.

Collector voltage for Q201 is applied direct from the DC power input through collector stabilizing network R205 and L202 and collector feed network L203 and C210.

The output of Q201 is coupled to the base of a second power amplifier Q202 through a matching network consisting of T201, C215 and C216.

Collector voltage to Q202 is controlled by power control circuit, Q215, and is applied through a collector stabilizing network L206 and R206 and collector feed network L205 and C218.

The output of Q202 is coupled to the base of driver Q203 through C219 and a matching network of T202, C222, C252, C224, C225, and L207. The collector voltage to Q203 is coupled through collector stabilizing network L209 and R214 and collector feed network L208 and C228.

Collector current for Q203 is metered across tapped manganin resistor R12. The reading is taken in position F on the 1 Volt scale with the High Sensitivity button pressed, and read as 0-15 amperes full scale.

The output of driver Q203 is coupled through an impedance matching network (C229, C230, C233 and T203) that matches the output impedance of Q203 to the input impedance of power amplifier Q204 through a 50 ohm micro strip (W204) and input impedance matching network T204, C234, C235 and C236.

Collector current for Q204 is metered across tapped manganin resistor R210. The reading taken in position G on the 1 Volt scale with the High Sensitivity button pressed and read as 0-15 amperes full scale.

Following power amplifier Q204 is a matching network C237, C238, and T205) that matches the output of Q204 to the 50 ohm input of the low pass filter, through 50 ohm micro strip W205 and a 50 ohm cable W214. C1 on the low pass filter board provides DC isolation between the transmitter and the antenna.

The PA output is coupled to the antenna through low pass filter and antenna transfer relay FL202.

Capacitors C244 through C247, C249, C255, and C256 provide ground isolation for negative ground operation.

WARNING

The RF Power Transistors used in the Vehicular Power Amplifier 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.

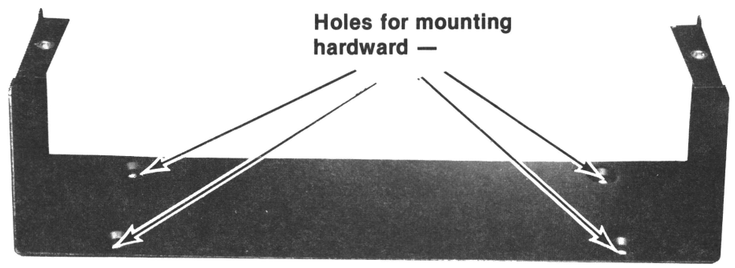
The power control circuit consists of R213 and Q215. R213 controls the base voltage, and conduction of Q215. Q215 is connected in series with the collector feed network for Q202 thereby controlling the drive to Q203 and the output power. R213 is adjusted to provide the desired output power. The control voltage on Q202 is measured on position C on 1 volt scale and read as 0-15 volts full scale.

GENERAL ELECTRIC COMPANY • MOBILE COMMUNICATIONS DIVISION
WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

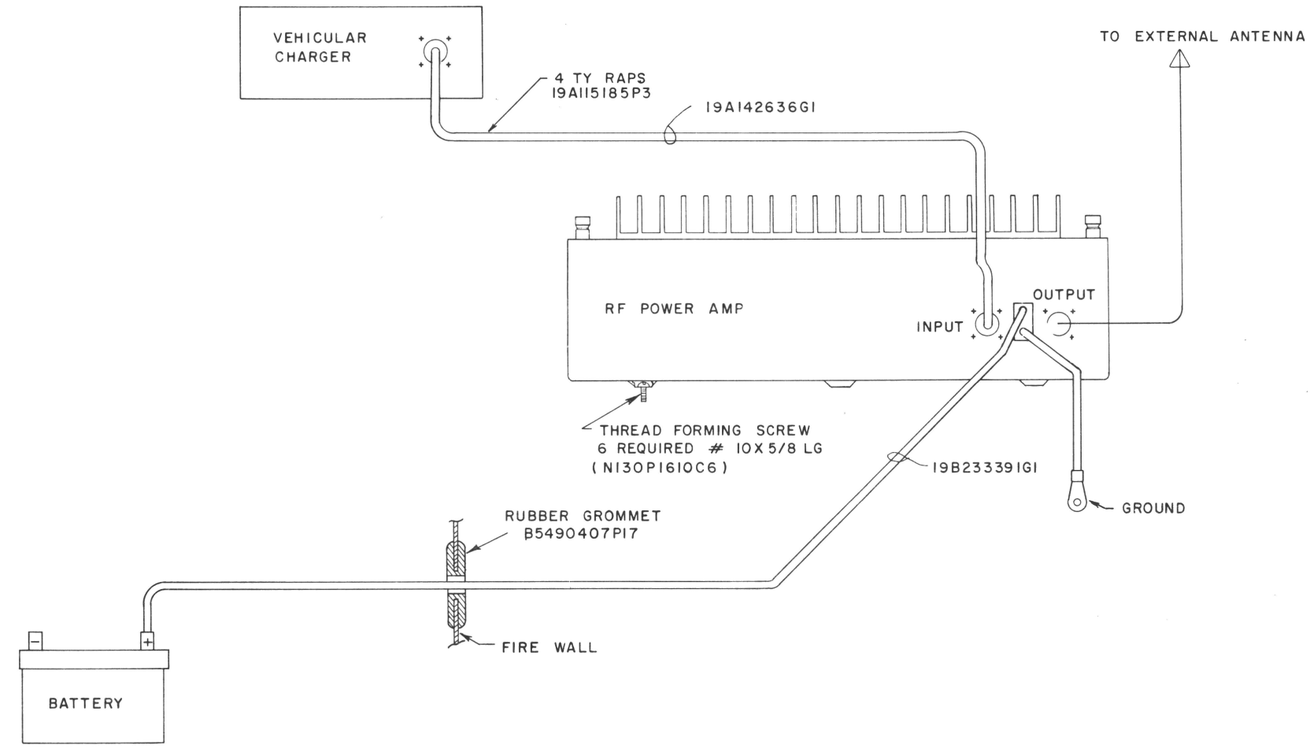
GENERAL ELECTRIC*
U.S.A.

INSTALLATION INSTRUCTIONS

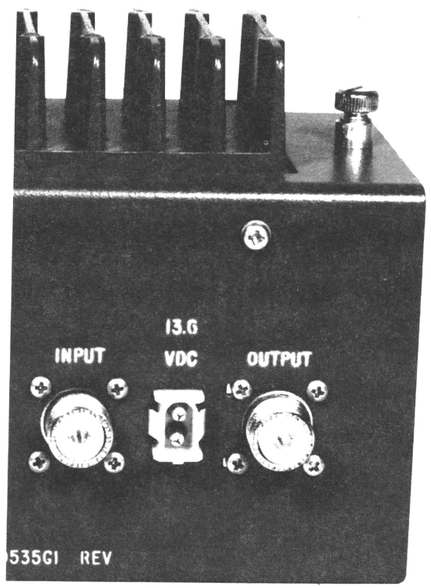
The Vehicular Power Amplifier can be mounted on any flat surface. Simply disassemble the housing as shown in the Disassembly Procedure. Use the U shaped base plate as a mounting bracket. Fasten the bracket in the desired location using the hardware shown in the installation drawing. Re-assemble the amplifier. Route and connect all cables also shown in the installation drawing.



Base Plate Mounting Bracket



(19C330416, Rev. 2)

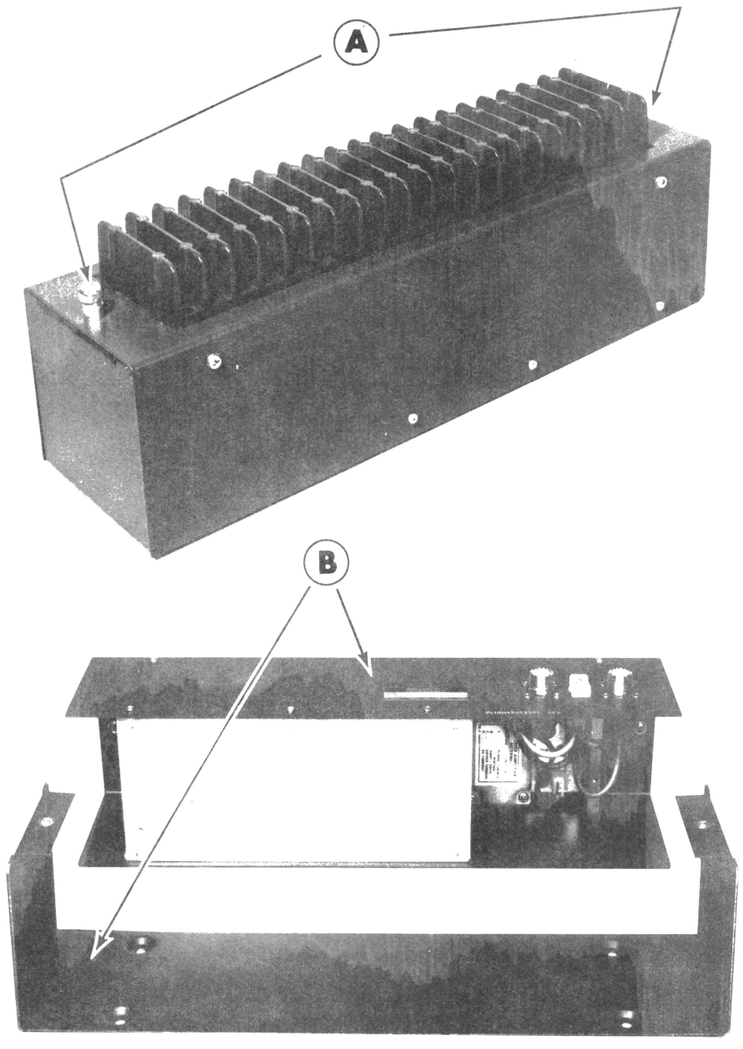


External Connections

DISASSEMBLY PROCEDURE

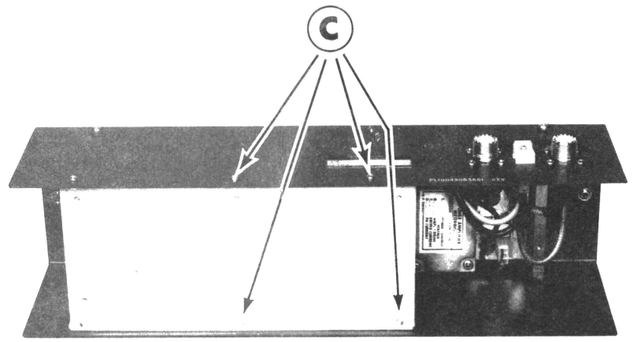
STEP 1

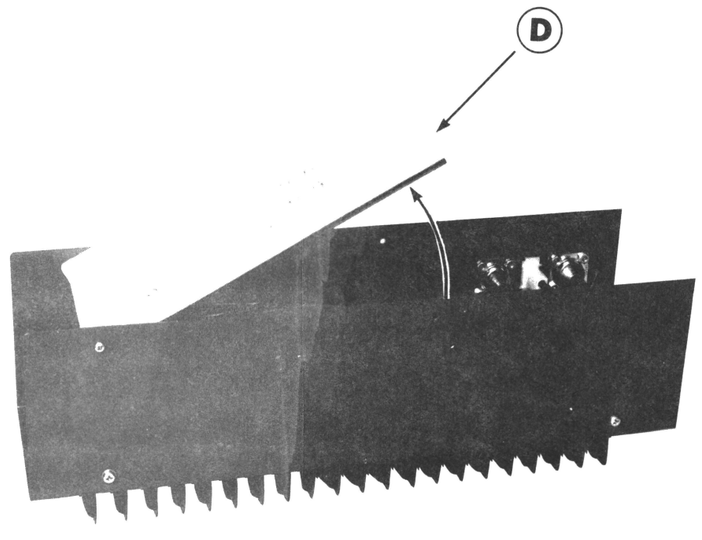
To gain access to the Vehicular Power Amplifier, loosen the captive screws at (A) and separate the housing as shown at (B).



STEP 2

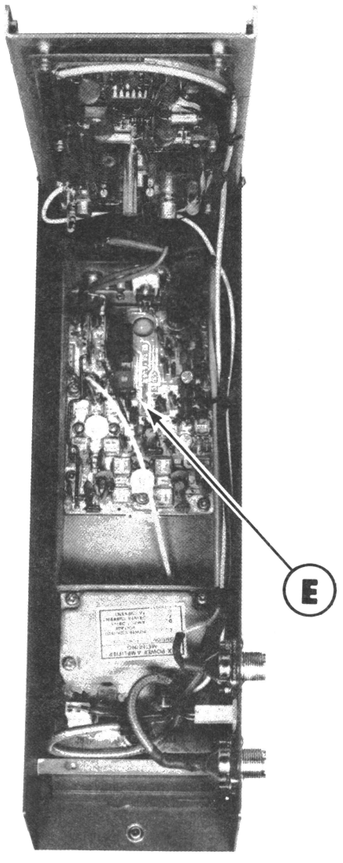
To gain access to the Interface Board or the Final Power Amplifier, remove the four Phillips-Head screws at (C) and swing open the cover plate as shown at (D).





STEP 3

To gain access to the Final Power Circuitry remove the snap on cover to expose the circuitry as shown at (E).



PA POWER INPUT

For FCC purposes, the PA power input can be determined by measuring the PA supply voltage and PA current using the following formula:

$$P_i = \text{PA voltage} \times \text{PA current}$$

where:

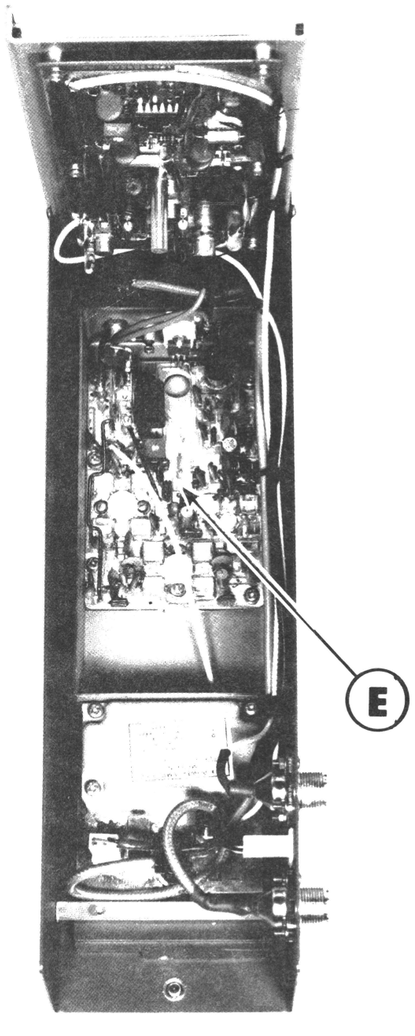
P_i is the power input in watts.

PA voltage is measured according to the Note in Step 4 of the Adjustment Procedure.

PA current is measured with the Test Set in Positions G and Test 1. Read 15 amperes full scale with the HIGH SENSITIVITY button pressed.

Example:

P_i = 12.6 Volts x 3.1 amperes = 39 Watts



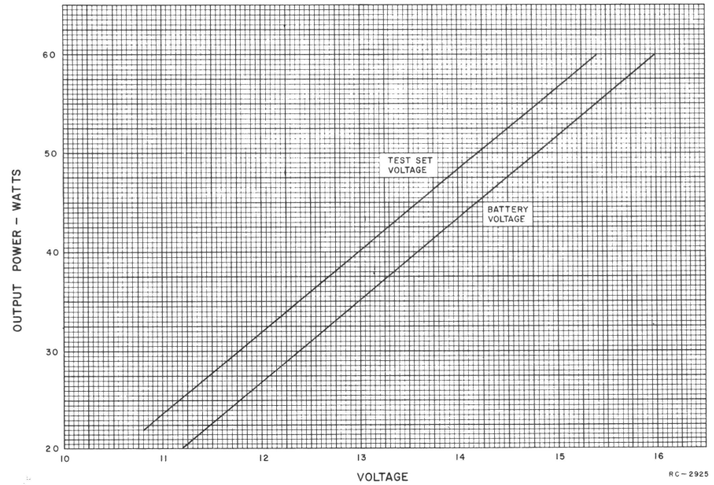
POWER AMPLIFIER ADJUSTMENT PROCEDURE (KT-184-A)

EQUIPMENT

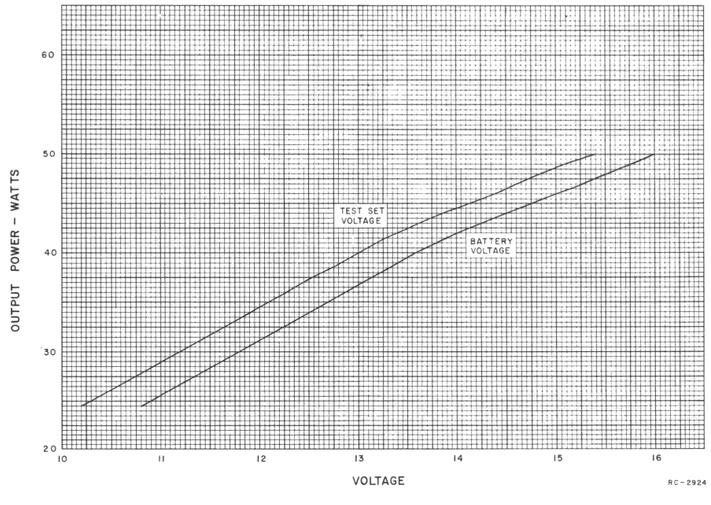
1. GE Test Set Model 4EX3A11 or Test Kit Model 4EX8K12.
2. A 50 ohm wattmeter connected to J201.
3. An RF Signal Generator (Wavetek 2001 or equivalent) connected to J101.

PROCEDURE

STEP	TUNING CONTROL	PROCEDURE
		Interface Board
1	R2	Set switch adjust control R2 fully clockwise.
2	---	With the RF signal Generator, apply 0.4 Watts at 450 MHz ±1 MHz.
3	R2	While measuring the voltage on Pin 5 of U1, adjust R2 until the voltage switches from high (≈9 VDC) to low (≈1 VDC).
		Final PA
4	R213	With the battery voltage at 13.6 Volts or the PA collector voltage at 13.0 Volts, set Power Adjust Control R213 on the PA board for desired power output. If the battery voltage is not at 13.6 Volts or the collector voltage is not at 13 volts and full rated power output is desired, set R213 for the output power according to the battery voltage or collector voltage shown in the following charts. NOTE: PA voltage is measured with Test Set 4EX3A11 in position G. Read on the 15 Volt range as 15 Volts full scale with the polarity switch in the (-) position. With Test Set 4EX8K12, use the B+ position and the 1- Volt range. Read as 15 Volts full scale with the HIGH SENSITIVITY button pressed and the polarity switch in the (-) position.



406—450 MHz Power Output Setting Chart



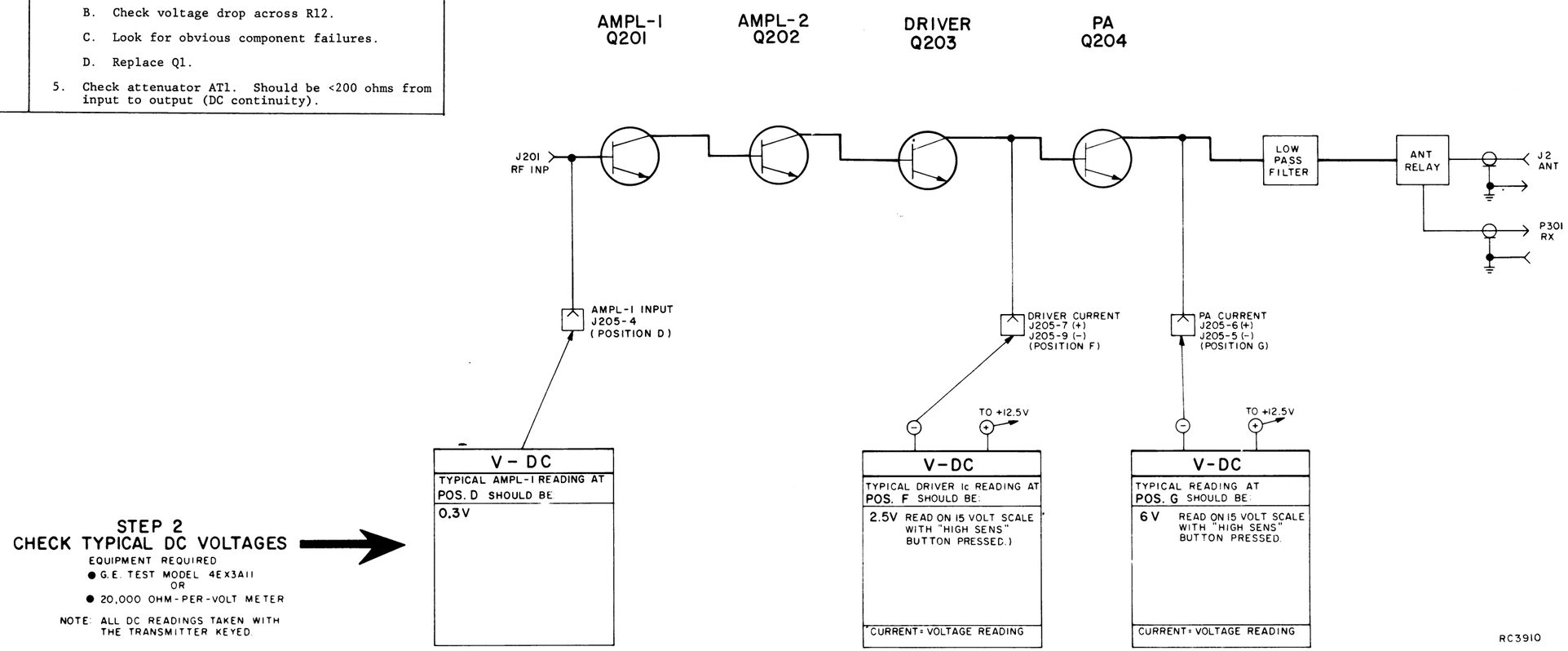
450—470 MHz Power Output Setting Chart

STEP 1 - QUICK CHECKS

SYMPTOM	PROCEDURE
Low or No Power Output	1. Using Test Set Model 4EX3A11 in position D, check for drive to the final power amplifier. If a typical reading of 0.3V is present, go to the Quick Checks for the POWER AMPLIFIER. If a typical reading is not present, continue to the next step. 2. Listen for transmit relay to close. A. Check for 10 VDC at H2. B. Check for <1 VDC at H3. C. Voltage at Pin 2 of V1 should increase with RF applied. 3. Check for 10 VDC at emitter of Q2. A. Replace Q2. B. Replace VR1. 4. Check amplifier transistor Q1 and associated components. A. Look for DC voltage at the collector of Q1. B. Check voltage drop across R12. C. Look for obvious component failures. D. Replace Q1. 5. Check attenuator AT1. Should be <200 ohms from input to output (DC continuity).

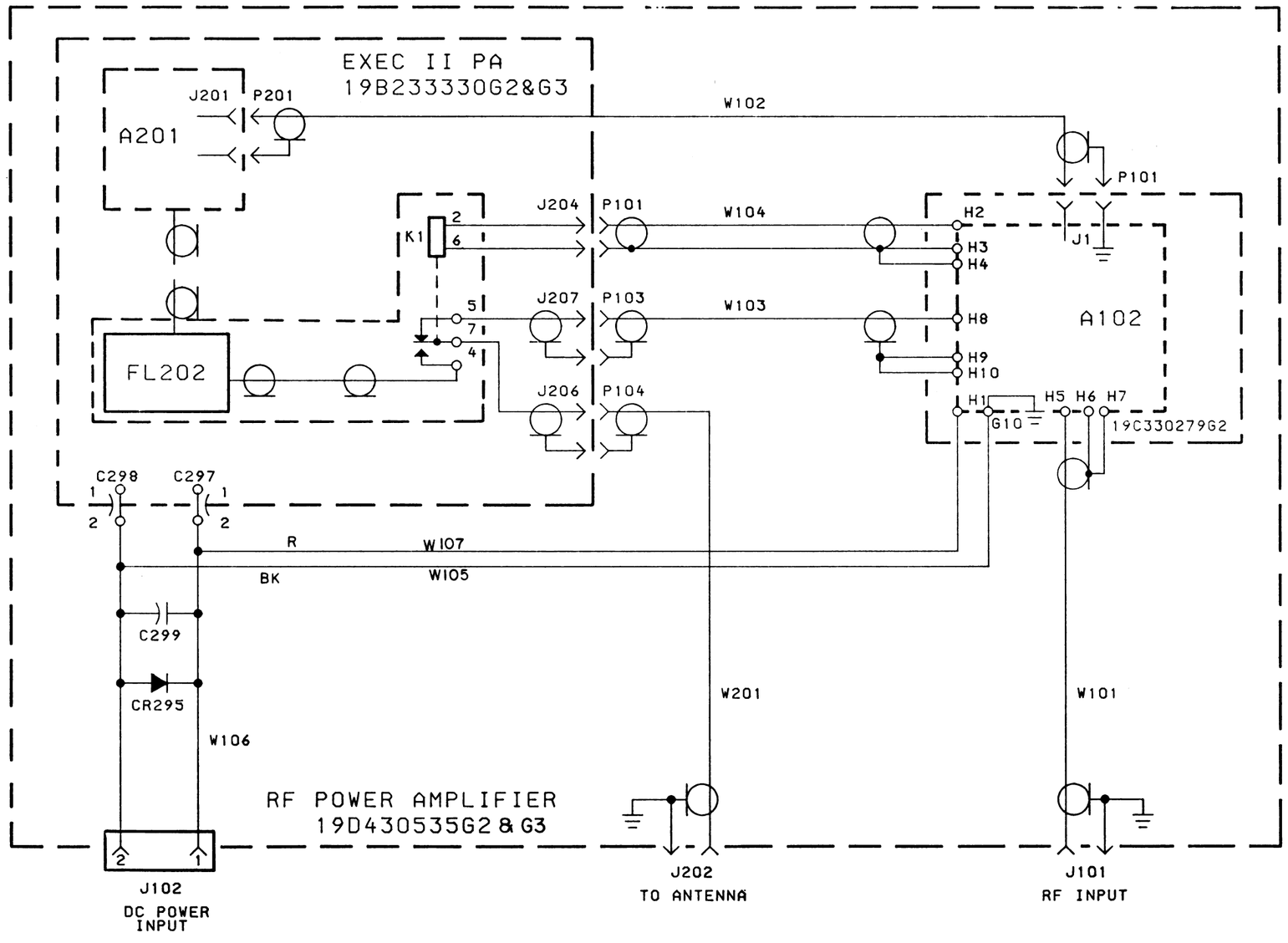
POWER AMPLIFIER
(SYMPTOMS LOW OR NO POWER OUTPUT)

METER POSITION GE TEST SET	PROBABLE DEFECTIVE STAGE		
	HIGH METER READING	LOW METER READING	ZERO METER READING
"C" (Power Control)	Q215, R213	Q215, R213	Q215, R213
"D" (AMPL-1 INPUT)		Low Output from Interface Board CR201	No output from Interface Board CR201, C205
"F" (DRIVER CURRENT)	Q203	Q203, Low Output from Q201, Q202	Q202, Q203, Q201, Check Pos. C & D
"G" (PA CURRENT)	Q204	Q201, Q202, Q204, Q203	Q204, Q203, Q202, Q201, Q215



TROUBLESHOOTING PROCEDURE

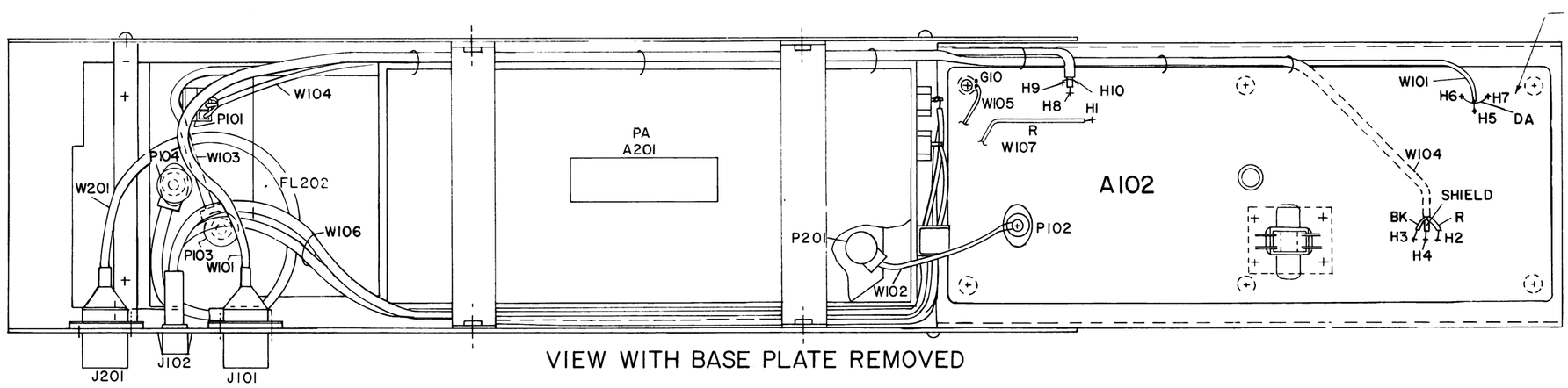
VEHICULAR POWER AMPLIFIER (TYPE KT184A)



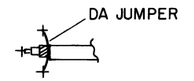
(19C330663, Rev. 2)

INTERCONNECTION DIAGRAM

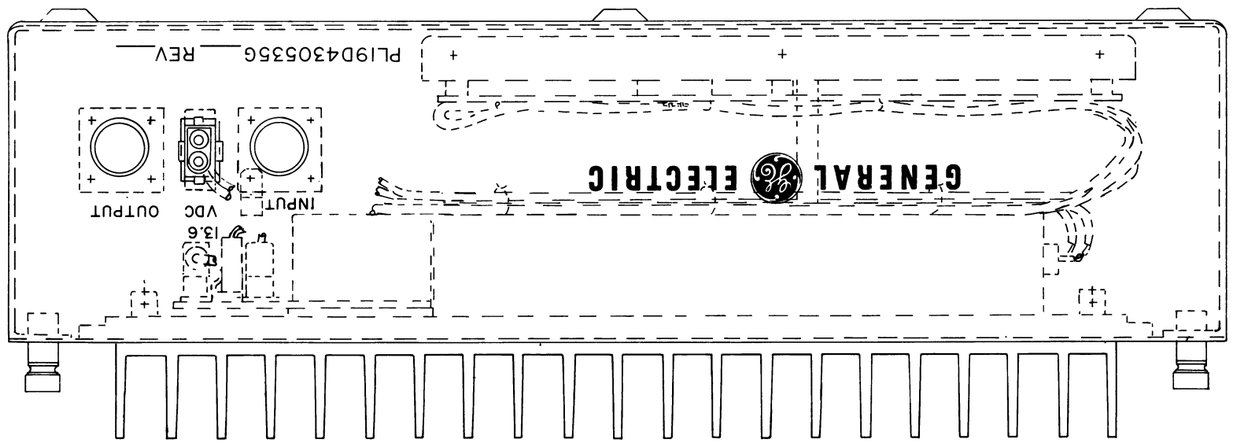
VEHICULAR POWER AMPLIFIER
(TYPE KT184A)

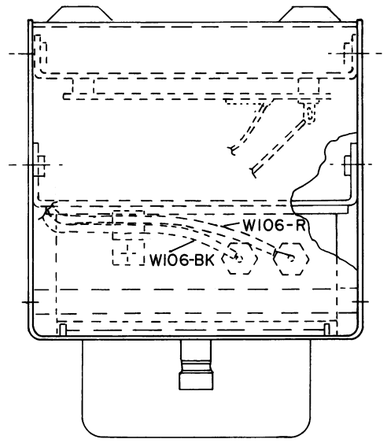


VIEW WITH BASE PLATE REMOVED



DETAIL "A"
(TYP. FOR W101 & W103)



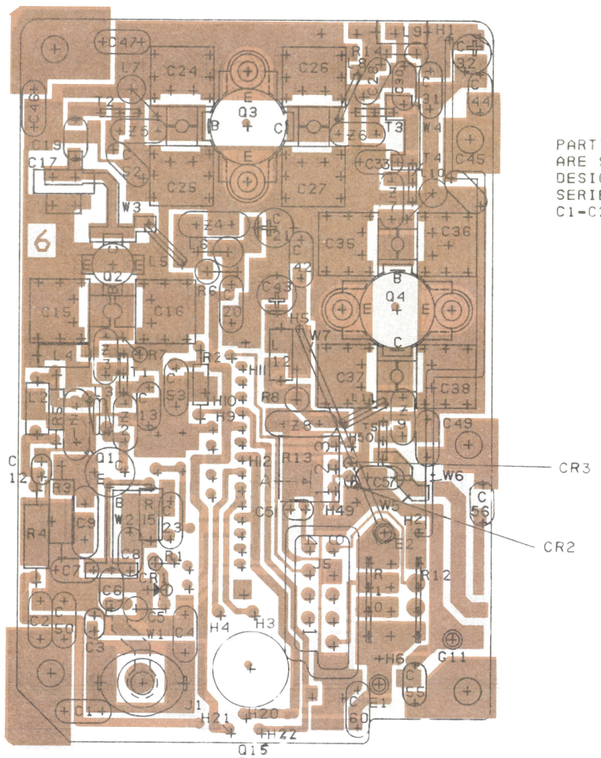


(19D430969, Rev. 2)

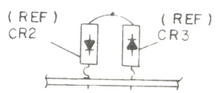
OUTLINE DIAGRAM

VEHICULAR POWER AMPLIFIER (TPYE KT184A)

PA
A201

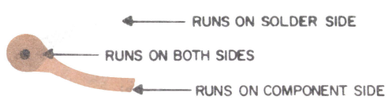


PARTIAL REFERENCE DESIGNATIONS ARE SHOWN.FOR COMPLETE DESIGNATION, PREFIX WITH 200 SERIES.EXAMPLE: C1-C201, R1-R201, ETC.

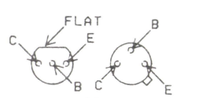


VIEW "A"
ROTATED 90° CCW

(19C327156, Rev. 5)
(19B226633, Sh. 1, Rev. 6)
(19B226633, Sh. 2, Rev. 3)



LEAD IDENTIFICATION FOR Q1 & Q2

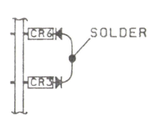


OR

IN-LINE TRIANGULAR

TOP VIEW

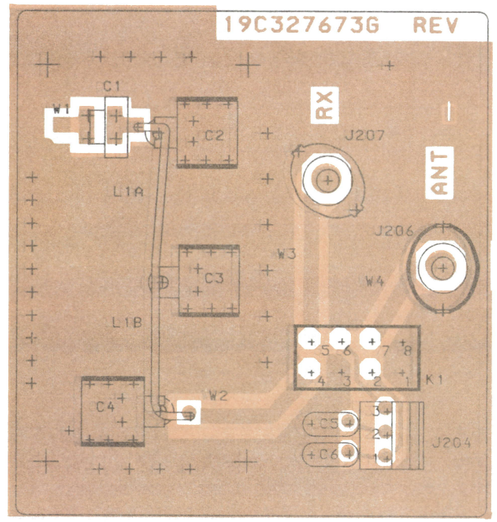
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.



VIEW IN DIRECTION OF ARROW "A"

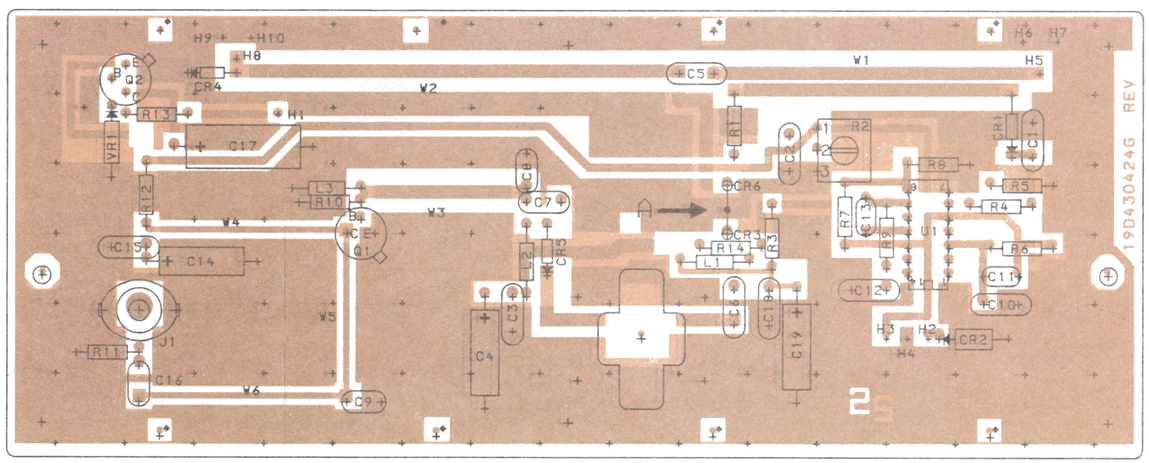
(19D430425, Rev. 3)
(19A142523, Sh. 1, Rev. 2)
(19A142523, Sh. 2, Rev. 2)

LOWPASS FILTER
FL202



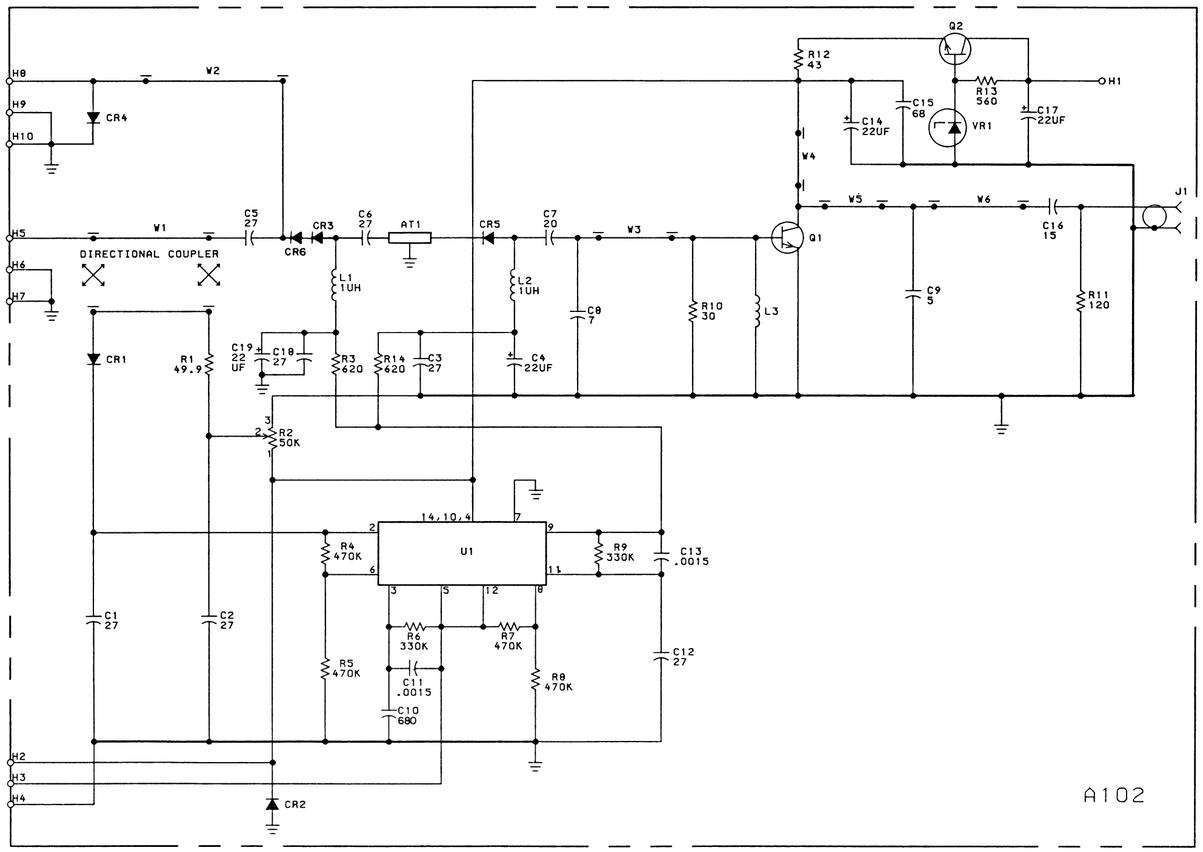
(19C327918, Rev. 1)
(19B227882, Sh. 1, Rev. 1)
(19B227882, Sh. 2, Rev. 0)

INTERFACE BOARD
A102



OUTLINE DIAGRAMS

VEHICULAR POWER AMPLIFIER
(TYPE KT184A)



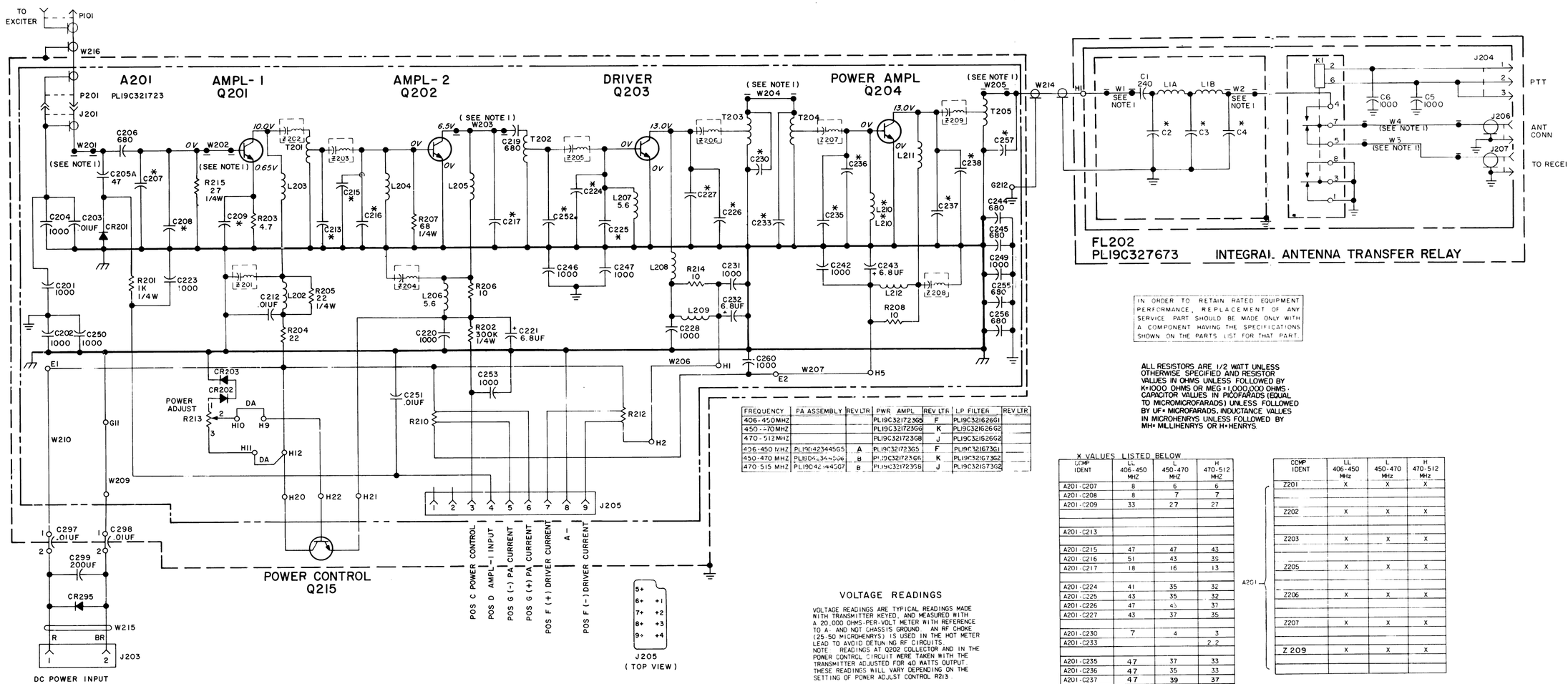
(19D430711, Rev. 5)

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PLI9D430424G1	B

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.

SCHEMATIC DIAGRAM

INTERFACE BOARD 19D430424G1



FREQUENCY	PA ASSEMBLY	REV LTR	PWR AMPL	REV LTR	LP FILTER	REV LTR
406-450 MHZ			PL19C321723G9	F	PL19C321626G1	
450--470 MHZ			PL19C321723G8	K	PL19C321626G2	
470-512 MHZ			PL19C321723G8	J	PL19C321626G2	
406-450 MHZ	PL19D423445G5	A	PL19C321723G5	F	PL19C321673G1	
450-470 MHZ	PL19D423445G6	B	PL19C321723G6	K	PL19C321673G2	
470-515 MHZ	PL19D423445G7	B	PL19C321723G8	J	PL19C321673G2	

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 1/2 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.

X VALUES LISTED BELOW

COMP IDENT	LL 406-450 MHZ	L 450-470 MHZ	H 470-512 MHZ
A201-C207	8	6	6
A201-C208	8	7	7
A201-C209	33	27	27
A201-C213			
A201-C215	47	47	43
A201-C216	51	43	35
A201-C217	18	16	13
A201-C224	41	35	32
A201-C225	43	35	32
A201-C226	47	45	37
A201-C227	43	37	35
A201-C230	7	4	3
A201-C233			2.2
A201-C235	47	37	33
A201-C236	47	35	33
A201-C237	47	39	37
A201-C238	47	43	35
A201-C252	5	4	4
A201-C257	5	2.2	4
A201-L210	15	5.6	5.6
FL201,202-C2	10	9	9
FL201,202-C3	20	18	18
FL201-C4	11	10	10
FL202-C4	13	12	12
Z210	X		

A201

COMP IDENT	LL 406-450 MHz	L 450-470 MHz	H 470-512 MHz
Z201	X	X	X
Z202	X	X	X
Z203	X	X	X
Z205	X	X	X
Z206	X	X	X
Z207	X	X	X
Z 209	X	X	X

VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MADE WITH TRANSMITTER KEYED, AND MEASURED WITH A 20,000 OHMS-PER-VOLT METER WITH REFERENCE TO A- AND NOT CHASSIS GROUND. AN RF CHOKE (25-50 MICROHENRYS) IS USED IN THE HOT METER LEAD TO AVOID DETUNING RF CIRCUITS. NOTE: READINGS AT Q202 COLLECTOR AND IN THE POWER CONTROL CIRCUIT WERE TAKEN WITH THE TRANSMITTER ADJUSTED FOR 40 WATTS OUTPUT. THESE READINGS WILL VARY DEPENDING ON THE SETTING OF POWER ADJUST CONTROL R213.

NOTE:
1. MICROSTRIP (PART OF PW BD)
2. ⏚ INDICATES A-
   ⏚ INDICATES VEHICLE GROUND

(19R622294, Rev. 16)

SCHEMATIC DIAGRAM

POWER AMPLIFIER
19B233330G2 & G3

PARTS LIST

UHF RF POWER AMPLIFIER
19D430535G2 406-420 MHz (KT-184-A)
19D430535G3 450-470 MHz (KT-184-A)
ISSUE 4

SYMBOL	GE PART NO.	DESCRIPTION
		PRINTED WIRE BOARD SUPPORT 19C330279G2
A102		INTERFACE BOARD 19D430424G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 thru C3	19A116656P27J0	Ceramic disc: 27 pF ±5%, 500 VDCW, temp coef 0 PPM.
C4	5496267P10	Tantalum: 22 uF ±20%, 15 VDCW; sim to Sprague Type 150D.
C5 and C6	19A116656P27J0	Ceramic disc: 27 pF ±5%, 500 VDCW, temp coef 0 PPM.
C7	5496218P46	Ceramic disc: 20 pF ±5%, 500 VDCW, temp coef 0 PPM.
C8	19A116656P7J0	Ceramic disc: 7 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C9	5496218P36	Ceramic disc: 5.0 pF ±0.25 pF, 500 VDCW, temp coef 0 PPM.
C10*	19A116655P18	Ceramic disc: 680 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		Earlier than REV A:
	19A116656P27J0	Ceramic disc: 27 pF ±5%, 500 VDCW, temp coef 0 PPM.
C11	19A700005P2	Polyester: 1500 pF ±10%, 50 VDCW.
C12	19A116656P27J0	Ceramic disc: 27 pF ±5%, 500 VDCW, temp coef 0 PPM.
C13	19A700005P2	Polyester: 1500 pF ±10%, 50 VDCW.
C14	5496267P10	Tantalum: 22 uF ±20%, 15 VDCW; sim to Sprague Type 150D.
C15*	19A700105P30	Mica: 68 pF ±5%, 500 VDCW.
		In REV A & earlier:
	19A116656P33J0	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef 0 PPM.
C16	19A116656P15J0	Ceramic disc: 15 pF ±5%, 500 VDCW, temp coef 0 PPM.
C17	5496267P19	Tantalum: 22 uF ±20%, 35 VDCW; sim to Sprague Type 150D.
C18	19A116656P27J0	Ceramic disc: 27 pF ±5%, 500 VDCW, temp coef 0 PPM.
C19	5496267P10	Tantalum: 22 uF ±20%, 15 VDCW; sim to Sprague Type 150D.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A116052P2	Silicon, fast recovery; sim to Hewlett Packard 5082-2811.
CR2	T324ADP1041	Silicon, 1000 mA, 400 PIV.
CR3 thru CR6	19A116925P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1	19A700049P2	Connector, receptacle; 500 VDCW maximum; sim to NTTF-1058.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1 thru L3	19A700024P13	Coil, RF: 1.0 uH ±10%.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A134237P1	Silicon, NPN.
Q2	19A115300P2	Silicon, NPN; sim to Type 2N3053.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19A701250P68	Metal film: 49.9 ohms ±1%, 1/4 w.
R2	19A116559P108	Variable cermet: 50K ohms ±20%, 1/2 w; sim to CTS Series 360.
R3	3R152P621J	Composition: 620 ohms ±5%, 1/4 w.
R4 and R5	3R152P474J	Composition: 470K ohms ±5%, 1/4 w.
R6	3R152P334J	Composition: 0.33 megohms ±5%, 1/4 w.
R7 and RR	3R152P474J	Composition: 470K ohms ±5%, 1/4 w.
R9	3R152P334J	Composition: 0.33 megohms ±5%, 1/4 w.
R10	3R152P300J	Composition: 30 ohms ±5%, 1/4 w.
R11	19A700106P41	Composition: 120 ohms ±5%, 1/4 w.
R12*	3R77P430J	Composition: 43 ohms ±5%, 1/2 w.
		In REV A & earlier:
	19A700106P32	Composition: 51 ohms ±5%, 1/4 w.
R13	19A700106P57	Composition: 560 ohms ±5%, 1/4 w.
R14	3R152P621J	Composition: 620 ohms ±5%, 1/4 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U1	19A116968P3	Linear, timer: DUAL IN-LINE 14 Pin Dip Package; sim to Signetics SA556N.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR1	4036887P8	Zener: 500 mW, 11 v. nominal.
AT1		ATTENUATOR 19B233367G2
	19B233358G2	Attenuator.
	19A142615P1	Heat sink.
W101		CABLE ASSEMBLY 19A142634G1
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J101		Connector. Includes:
	19A700067P1	Receptacle, coax; sim to Amphenol 83-798.
	4029082P2	Cover.
	19B800560P1	Cable, RF: sim to Essex 421-105.
W103	5491689P136	Cable. Includes P103.
W104		CABLE ASSEMBLY 19A142633G1
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P101		Connector. Includes:
	19A116659P14	Shell.
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108.
W201		CABLE ASSEMBLY 19A129312G8
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J201		Connector. Includes:
	19A700067P1	Receptacle, coax; sim to Amphenol 83-798.
	4029082P2	Cover.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P104	5491689P122	Plug. (Includes approx 10 inch cable).
		POWER AMPLIFIER 19B233330G2 406-450 MHz 19B233330G3 450-470 MHz (19D423445G5 406-450 MHz) (19D423445G6 450-470 MHz)
A201LL and A201L		POWER AMPLIFIER MODULE A201LL 19C321723G5 406-450 MHz A201L 19C321723G6 450-470 MHz
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C201 and C202	19A116655P20	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C203	19A116192P1	Ceramic: 0.01 uF ±20%, 50 VDCW; sim to Erie 8121 Special.
C204	19A116655P20	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C205A	19A700013P9	Phenolic: 0.47 pF ±5%, 500 VDCW.
C206	19A116655P18	Ceramic disc: 680 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C207LL	19A116656P8J0	Ceramic disc: 8 pF ±0.5 pF, 500 VDCW; temp coef 0 PPM.
C207L	19A116656P6J0	Ceramic disc: 6 pF ±0.5 pF, 500 VDCW; temp coef 0 PPM.
C208LL	19A116656P8J0	Ceramic disc: 8 pF ±0.5 pF, 500 VDCW; temp coef 0 PPM.
C208L*	19A116656P7J0	Ceramic disc: 7 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
		In REF F & earlier:
	19A116656P6J0	Ceramic disc: 6 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C209LL	19A116656P33J0	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef 0 PPM.
C209L	19A116656P27J0	Ceramic disc: 27 pF ±5%, 500 VDCW, temp coef 0 PPM.
C210LL*	19A134666P3	Silver mica: 18 pF ±5%, 500 VDCW; sim to Electro Motive Type DM154CR. Deleted by REV H.
C210LL*	19A134666P1	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef 0 PPM. Deleted by REV H.
C211LL*	19A116656P33J0	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef 0 PPM. Deleted by REV F.
C211L*	19A116656P24J0	Ceramic disc: 24 pF ±5%, 500 VDCW, temp coef 0 PPM. Deleted by REV H.
C212	19A116192P1	Ceramic: 0.01 uF ±20%, 50 VDCW; sim to Erie 8121 Special.
C213*	19A116656P4J0	Ceramic disc: 4 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM. Deleted by REV G.
C214LL*	19A116656P33J0	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef 0 PPM. Deleted by REV F.
C214L*	19A116656P24J0	Ceramic disc: 24 pF ±5%, 500 VDCW, temp coef 0 PPM. Deleted by REV H.
C215LL and C215L	19A700131P47	Metallized teflon: 47 pF ±2%, 250 VDCW.
C216LL	19A700131P51	Metallized teflon: 51 pF ±2%, 250 VDCW, temp coef -130 PPM
C216L	19A700131P43	Metallized teflon: 43 pF ±2%, 250 VDCW.
C217LL	19A116679P18D	Metallized teflon: 18 pF ±0.5 pF, 250 VDCW.
C217L	19A116679P16D	Metallized teflon: 16 pF ±0.5 pF, 250 VDCW.
C218*	19A134666P1	Silver mica: 18 pF ±5%, 500 VDCW; sim to Electro Motive Type DM154CR. Deleted in G5 by REV F. Deleted in G6 by REV H.
C219	19A116655P18	Ceramic disc: 680 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C220	19A116655P20	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C221	19A134202P15	Tantalum: 6.8 uF ±20%, 35 VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
C222LL*	19A116656P33J0	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef 0 PPM. Deleted by REV F.
C222L*	19A116656P24J0	Ceramic disc: 24 pF ±5%, 500 VDCW, temp coef 0 PPM. Deleted by REV H.
C223	19A116655P20	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C224LL	19A700131P41	Metallized teflon: 41 pF ±2%, 250 VDCW, temp coef 0 -130 PPM.
C224L	19A700131P35	Teflon/mica: 35 pF ±2%, 250 VDCW.
C225LL	19A700131P43	Metallized teflon: 43 pF ±2%, 250 VDCW.
C225L	19A700131P35	Teflon/mica: 35 pF ±2%, 250 VDCW.
C226LL	19A700131P47	Metallized teflon: 47 pF ±2%, 250 VDCW.
C226L	19A700131P43	Metallized teflon: 43 pF ±2%, 250 VDCW.
C227LL	19A700131P43	Metallized teflon: 43 pF ±2%, 250 VDCW.
C227L	19A700131P37	Metallized teflon: 37 pF ±2%, 250 VDCW.
C228	19A116655P20	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C229LL*	19A116656P33J0	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef 0 PPM. Deleted by REV F.
C229L*	19A116656P24J0	Ceramic disc: 24 pF ±5%, 500 VDCW, temp coef 0 PPM. Deleted by REV H.
C230LL*	19A116656P7J0	Ceramic disc: 7 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
		In REV F & earlier:
	19A116656P6J0	Ceramic disc: 6 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C230L	19A116656P4J0	Ceramic disc: 4 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C231	19A116655P20	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C232	19A134202P15	Tantalum: 6.8 uF ±20%, 35 VDCW.
C234LL*	19A116656P33J0	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef 0 PPM. Deleted by REV F.
C234L*	19A116656P24J0	Ceramic disc: 24 pF ±5%, 500 VDCW, temp coef 0 PPM. Deleted by REV H.
C235LL*	19A700131P47	Metallized teflon: 47 pF ±2%, 250 VDCW.
	19A116952P43	In REV F & earlier: Metallized teflon: 43 pF ±2%, 250 VDCW.
C235L	19A700131P37	Metallized teflon: 37 pF ±2%, 250 VDCW.
C236LL*	19A700131P47	Metallized teflon: 47 pF ±2%, 250 VDCW.
	19A116952P39	In REV F & earlier: Metallized teflon: 39 pF ±2%, 250 VDCW.
C236L	19A700131P35	Teflon/mica: 35 pF ±2%, 250 VDCW.
C237LL*	19A700131P47	Metallized teflon: 47 pF ±2%, 250 VDCW.
	19A116952P51	In REV F & earlier: Metallized teflon: 51 pF ±2%, 250 VDCW.
C237L*	19A700131P39	Metallized teflon: 39 pF ±2%, 250 VDCW.
		In REV H & earlier:
	19A116952P47	Metallized teflon: 47 pF ±2%, 250 VDCW.
C238LL*	19A700131P47	Metallized teflon: 47 pF ±2%, 250 VDCW.
		In REV F & earlier:
	19A116952P51	Metallized teflon: 51 pF ±2%, 250 VDCW.
C238L*	19A700131P43	Metallized teflon: 43 pF ±2%, 250 VDCW.
		In REV H & earlier:
	19A116952P47	Metallized teflon: 47 pF ±2%, 250 VDCW.
C239*	19A134666P1	Silver mica: 18 pF ±5%, 500 VDCW; sim to Electrol Motive Type DM154CR. Deleted in G5 by REV F. Deleted in G6 by REV H.
C240LL*	19A116656P33J0	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef 0 PPM. Deleted by REV F.
C240L*	19A116656P24J0	Ceramic disc: 24 pF ±5%, 500 VDCW, temp coef 0 PPM. Deleted by REV H.
C242	19A116655P20	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
C243	19A134202P15	Tantalum: 6.8 uF ±20%, 35 VDCW.
C244 and C245	19A116655P18	Ceramic disc: 680 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C246 and C247	19A116655P20	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C249 and C250	19A116655P20	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C251	19A116192P1	Ceramic: 0.01 uF ±20%, 50 VDCW; sim to Erie 8121 Special.
C252LL	19A116656P5J0	Ceramic dis: 5 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C252L	19A116656P4J0	Ceramic disc: 4 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C253	19A116655P20	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C255 and C256	19A116655P18	Ceramic disc: 680 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C257LL	19A116656P5J0	Ceramic dis: 5 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C257M*	19A134100P20	Ceramic disc: 2.2 pF ±0.1 pF, temp coef 0 ±120 PPM. Added by REV K.
C260	19A116655P20	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR201	19A116052P1	Silicon, hot carrier: Fwd drop .350 volts max.
CR202 and CR203	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1 and E2	19A134263P1	Contact, electrical: sim to Selectro 229-1082-00-0-590.
G11	19A134263P1	Contact, electrical: sim to Selectro 229-1082-00-0-590.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J201	19A700049P2	Connector, receptacle; 500 VDCW maximum; sim to NTTF-1058.
J205	19B219374G1	Connector: 9 contacts.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L202	19A701091G1	Coil.
L203	19A129774P1	Coil.
L204	19A701091G1	Coil.
L205	19B219457P6	Coil.
L206	19A700000P120	Coil, RF: 5.6 uH ±10%; sim to Jeffers 4422-1K.
L207	19A700000P20	Coil, RF: 5.6 uH ±10%; sim to Jeffers 4421-4K.
L208LL	19B219457P6	Coil.
L208L	19A130650P1	Coil.
L209	19A701091G1	Coil.
L210LL*	7488079P18	Coil, RF: 15 uH 10%, 1.2 ohms DC res. max; sim. to Jeffers 4421-9. Deleted by REV G.
L210L	19A700000P20	Coil, RF: 5.6 uH ±10%; sim to Jeffers 4421-4K.
L211	19B219457P6	Coil.
L212	19A701091G1	Coil.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q201	19A134237P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R201	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R202	3R152P304J	Composition: 300K ohms ±5%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R203	19A700113P7	Composition: 4.7 ohms ±5%, 1/2 w.
R204	19A700113P23	Composition: 22 ohms ±5%, 1/2 w.
R205	19A700106P23	Composition: 22 ohms ±5%, 1/4 w.
R206	19A700113P15	Composition: 10 ohms ±5%, 1/2 w.
R207	19A700106P35	Composition: 68 ohms ±5%, 1/4 w.
R208	19A700113P15	Composition: 10 ohms ±5%, 1/2 w.
R210	19C850605P1	Shunt resistor.
R212	19C850605P1	Shunt resistor.
R213	19A116559P102	Variable cermet: 5000 ohms ±20%, 1/2 w; sim to CTS Series 360.
R214	19A700113P15	Composition: 10 ohms ±5%, 1/2 w.
R215	19A700106P25	Composition: 27 ohms ±5%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T201 thru T205	19A130446G1	Transformer.
		- - - - - - - - - - - - CABLES - - - - - - - - - - - -
W201 thru W205		(Part of printed board 19D423005P1).
W206	19B226971G1	Jumper.
W207	19A130791G1	Jumper.
		- - - - - - - - - - - - NETWORKS - - - - - - - - - - - -
Z201LL*	19A134666P3	Frequency network: selective, 400-500 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:330J:SLAC. Added by REV F.
Z201L*	19A134666P1	Frequency network: selective, 470-630 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:240J:SLAC. Added by REV H.
Z202LL*	19A134666P3	Frequency network: selective, 400-500 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:330J:SLAC. Added by REV F.
Z202L*	19A134666P1	Frequency network: selective, 470-630 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:240J:SLAC. Added by REV H.
Z203LL*	19A134666P3	Frequency network: selective, 400-500 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:330J:SLAC. Added by REV F.
Z203L* and Z204*	19A134666P1	Frequency network: selective, 470-630 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:240J:SLAC. Added by REV H.
Z205LL*	19A134666P3	Frequency network: selective, 400-500 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:330J:SLAC. Added by REV H.
Z205L*	19A134666P1	Frequency network: selective, 470-630 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:240J:SLAC. Added by REV H.
Z206LL*	19A134666P3	Frequency network: selective, 400-500 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:330J:SLAC. Added by REV F.
Z206L*	19A134666P1	Frequency network: selective, 470-630 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:240J:SLAC. Added by REV H.
Z207LL*	19A134666P3	Frequency network: selective, 400-500 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:330J:SLAC. Added by REV F.
Z207L* and Z208*	19A134666P1	Frequency network: selective, 470-630 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:240J:SLAC. Added by REV H.
Z209LL*	19A134666P3	Frequency network: selective, 400-500 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:330J:SLAC. Added by REV F.
Z209L*	19A134666P1	Frequency network: selective, 470-630 MHz res. freq, 500 VDCW; sim to Dilectron TC501:NPO:240J:SLAC. Added by REV H.
Z210*	19A143581G1	Network assembly. Added by REV G. Includes:
L1	19A700024P1	Coil, RF: 100 nH ±10%, 0.08 ohms DC res max, 100 v.
L2	19A129773G1	Coil.
R1	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C297 and C298	19A116708P1	Ceramic: 0.01 uF -0 +100%, 500 VDCW, rated 20 amps; sim to Erie 327050X5W0103P.
C299	19A115680P10	Electrolytic: 200 uF +150-10%, 18 VDCW; sim to Mallory Type TTX.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR295	19A116783P1	Rectifier, silicon: 100 VDC blocking, 6 amp; sim to MR751.
		- - - - - - - - - - - FILTERS - - - - - - - - - - -
FL202LL and FL202H		COMPONENT BOARD FL202LL 19C327673G1 FL202H 19C327673G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1LL and C1H	19A700015P38	Teflon/Mica: 240 pF ±5%, 250 VDCW.
C2LL	19A700014P4	Metallized teflon: 10 pF ±5%, 250 VDCW.
C2H	19A700131P9	Metallized teflon: 9 pF ±0.5 pF, 250 VDCW.
C3LL	19A700131P20	Metallized teflon: 20 pF ±0.5 pF, 100 VDCW.
C3H	19A700131P18	Metallized teflon: 18 pF ±0.5 pF, 250 VDCW.
C4LL	19A700131P13	Metallized teflon: 13 pF ±0.5 pF, 250 VDCW.
C4H	19A700131P12	Teflon: 12 pF ±0.5 pF, 250 VDCW.
C5 and C6	19A116655P20	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J204	19A116659P55	Connector, printed wiring: 3 contacts rated at 5 amps; sim to Molex 09-65-1031.
J206 and J207	19A700049P2	Connector, receptacle; 500 VDCW maximum; sim to NTTF-1058.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1	19A700061P1	Hermetic sealed: 180 to 341 ohms coil res, 8-16.3 VDC; sim to GE 3SAV1760A2, CP Clare HFW-1201558, or Potter-Brumfield HCM6160.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1LL	19B227084P1	Jumper.
L1H	19B227130G1	Jumper.
		- - - - - - - - - - - - CABLES - - - - - - - - - - - -
W1 thru W4		(Part of printed board 19C327674P1).
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q202	19A134164P2	Silicon, NPN; sim to Type 2N5945.
Q203LL	19A134239P3	Silicon, NPN.
Q203L	19A134239P1	Silicon, NPN.
Q204LL and Q204L	19A134242P3	Silicon, NPN.
Q215	19A116742P1	Silicon, NPN; sim to Type 2N6103.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT201	19A129379G1	Thermistor: 40K ohms ±20%, color code white; sim to Carborundum Type M0806J-5.
		- - - - - - - - - - CABLES - - - - - - - - - -
W209	19B227025G1	Jumper.
W210	19B227024P1	Jumper.
W214	19A130831G1	Cable, RF: approx 6-1/4 inches long.

SYMBOL	GE PART NO.	DESCRIPTION
W215	19B227058G1	Cable: approx 11-1/2 inches long.
W216	19A130909G1	Coil, RF: approx 5 inches long.
W106		CABLE ASSEMBLY 19B233332G1
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J102		Connector. Includes:
	19A134281P2	Shell.
	19A134282P4	Contact, electrical: wire size No. 14-10; sim to AMP 350201-2..
	19A701658P1	Solderless terminal. (Located on opposite end of cable from connector).
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B233324G1	Base plate.
	19B233326G1	Cover.
	4029851P6	Clip, loop: 5/16 inch. (Secures W215).
	19A121759P1	Thumbscrew. (Secures Cover).
	4033714P11	Terminal, solderless: size to Zierick 349. (Located at G10).
	19B233325G2	Support. (A102).
	19A701332P4	Insulator, washer: nylon. (Used with Q1 & Q2 on A102, Q201 on A201).
	19A142616P1	Spacer. (Secures heat sink to cover).
	19C321591G3	Heat sink.
	19D416275P3	Filter casting.
	19C321441P1	Insulator. (Located under A201).
	19A129434P1	Washer. (Located on C297 & C298).
	7878455P2	Solderless terminal. (Located at G12).
	19A701863P6	Clip loop. (Secures W215).
	19A130568P1	Plate. (Mounts Q215).
	19A116023P1	Insulator, plate. (Used with Q215).
	19A700068P1	Insulator, bushing. (Used with Q215).
	N44P9006C6	Machine screw: No. 4-40 x 3/8. (Secures Q203 & Q204).
	19B201074P305	Tap screw, Phillips POZIDRIV: No. 6-32 x 5/16. (Secures A201).
	19B201074P312	Tap screw, Phillips POZIDRIV: No. 6-32 x 3/4. (Secures filter casting).
	19B226952G1	P. A. Cover.

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 - Interface Board 19D430424G1

To prevent oscillation on the interface board. Changed C10.

REV. B - Interface Board 19D430424G1

To improve output levels at high and low input levels. Changed C15 and R12.