450-512 MHz, 100 WATT POWER AMPLIFIER 19D900439G1,2,9

450-512 MHz, 40 WATT POWER AMPLIFIER 19D900439G3,4

TABLE OF CONTENTS

DESCRIPTION

The power amplifier assembly uses five RF power transistors to provide 100 watts of output power, or 3 RF transistors to provide 40 watts of output power. The output power is adjustable over a range of 50 to 100 watts in the high power PA, and 20 to 40 watts in the medium power PA. Seven transistors are used in the power control circuit.

Supply voltage for the PA is connected from power leads on the Transmit-Receive-System (TRS) board through feedthrough capacitors A2-C1 and C2 to hole 1 (A+) and hole 2 (A-) on the PA board. Capacitor C69 provides RF decoupling for the power leads, and C41 provides low frequency decoupling. Diode D3 will cause the main fuse in the fuse assembly to blow if the polarity of the power leads is reversed.

The PA assembly is insulated from vehicle ground by C32 through C40 to permit operation in positive or negative ground vehicles.

NOTE

In positive ground vehicles, A- is "hot" with respect to vehicle ground. Shorting the transmitter PA printed wiring board ground pattern to the radio case may cause one of the in-line fuses to blow.

PA metering Jack J1 is provided for use with GE Test Set Model 4EX3A11 or Test Kit 4EX8K12 with a cable adaptor. The Test Set meters the RF drive (exciter output), control voltage, driver current, PA current and PA voltage.

CIRCUIT ANALYSIS

RF AMPLIFIERS

The exciter output is coupled through P101 on the TRS board to PA input jack J3. The RF is coupled through 50 ohm microstrip Z9, Z10 and Z11, and then to the base of 1st RF Driver Q1. Z8 is the DC return and decoupling network for Q1. C7 couples RF drive from the exciter which is rectified by D1 and applied to RF Switch A1-Q1 to activate the power control circuitry. Part of the DC voltage is applied to metering jack J1 through R7 for metering the exciter output.

The RF amplifiers consist of three Class C, common-emitter amplifiers. In 40 watt transmitters, Q3 is the PA stage. Z1, Z2 and Z3 are collector feed and decoupling networks. The output of Q3 is coupled through 50 ohm coaxial cable W2 to the low pass filter and then to the antenna relay.

Driver current is metered at J1 (Driver Current). The reading is taken on the Test 1 position with the High Sensitivity button pressed and the polarity switch in the minus (-) position. The current is read as 15 amperes full scale. Jumper W5 and W6 act as shunt resistors for the metering circuit.

In 100 watt transmitters, the 40 watt output is coupled to a Wilkinson power splitter consisting of microstrip W1.

The power amplifier stages consist of two identical paralleled Class C power amplifiers (Q5 and Q6). Z7 and Z18 are the DC return and stablilizing network in the base of Q5, while Z6 and Z21 make up

the network in the base of Q6. Supply voltage (A+) for Q5 and Q6 is coupled through collector feed networks Z4 and Z5.

Collector current for Q5 and Q6 is measured at J1 (PA Current). The reading is taken in the Test 1 position with the High Sensitivity button pressed and the polarity switch in the minus (-) position. The current is read as 30 amperes full scale. Jumper W3 acts as a shunt resistor for the metering circuit.

The output of Q5 and Q6 is applied to a Wilkinson power combiner (W2). The output of the combiner is coupled through Z24, W1 and Z26 to the low pass filter. The filter output is coupled through 50 ohm stripline Z27 to the antenna relay (K1).

WARNING

The RF Power Transistors used in the transmitter contain Beryilium 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.

POWER CONTROL CIRCUIT

The power control circuit provides power leveling as well as thermal protection for the PA.

When the transmitter is keyed, RF is rectified by D1. The resulting DC voltage turns on RF switch A1-Q1. This turns on 9 volt regulator A1-Q2. Current through R14 turns on A1-Q4 which turns on A1-Q6 and pass transistor Q4. Turning on Q4 applies collector voltage to 1st RF driver Q1.

If the power output should start to increase above the level set by R10, A1-Q3 will start conducting harder. This causes A1-Q4, and pass transistor Q4 to conduct less. This reduces the collector voltage to the 1st RF driver, reducing the transmitter power output.

Thermal protection is provided by temperature compensating resistor (thermistor) R20. As the heat sink temperature rises above 85°C, the resistance of R20 decreases, causing A1-Q5 to conduct. This causes A1-Q4 and Q4 to conduct less, reducing the power output.

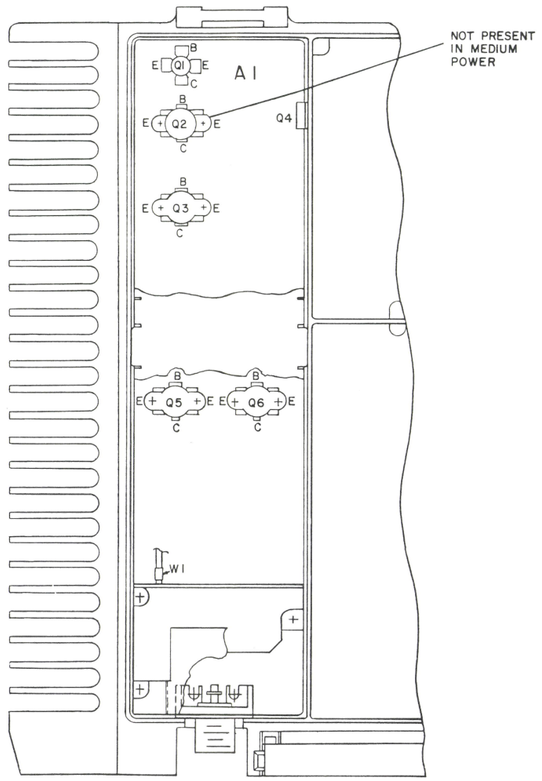
CAUTION

Do not operate the transmitter at levels higher than rated output. Operating at higher than rated output will shorten the life of the RF power transistor.

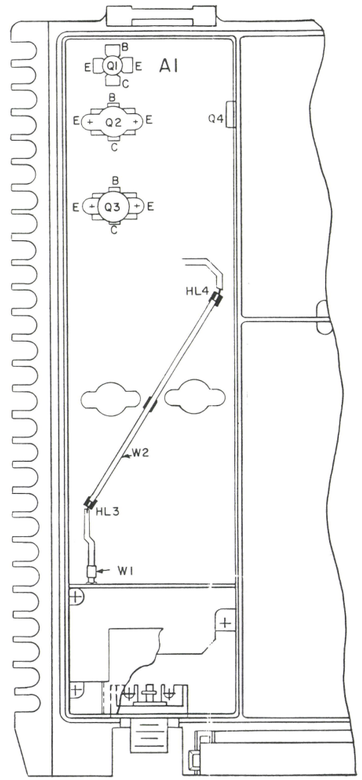
GENERAL ELECTRIC COMPANY • MOBILE COMMUNICATIONS DIVISION
WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

GENERAL ELECTRIC*
U.S.A.

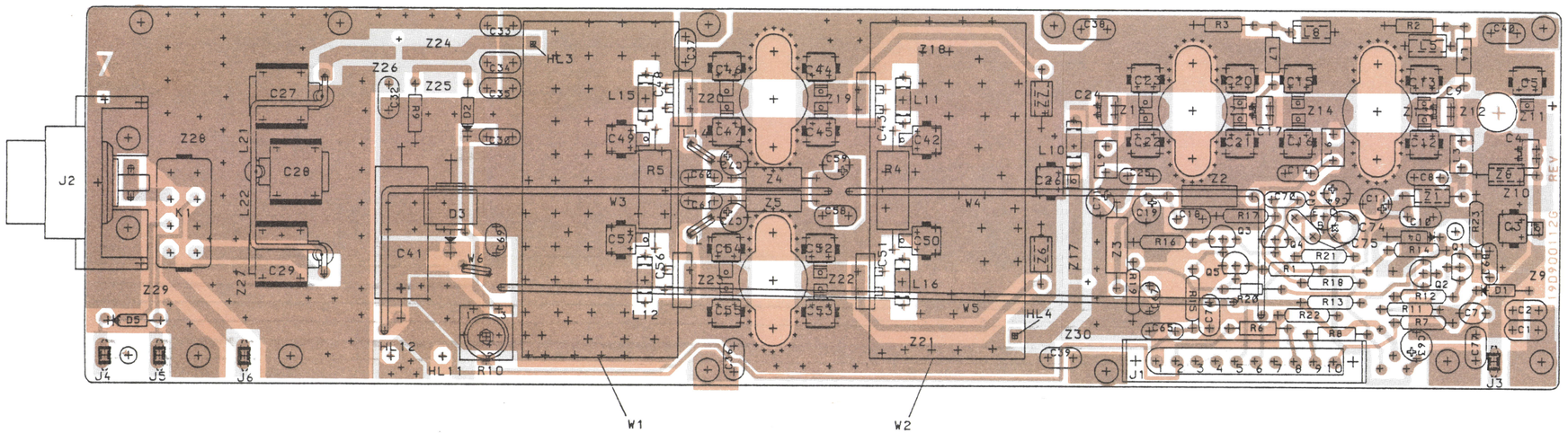
100-WATT PA



40-WATT PA



(19D900550, Rev. 1)



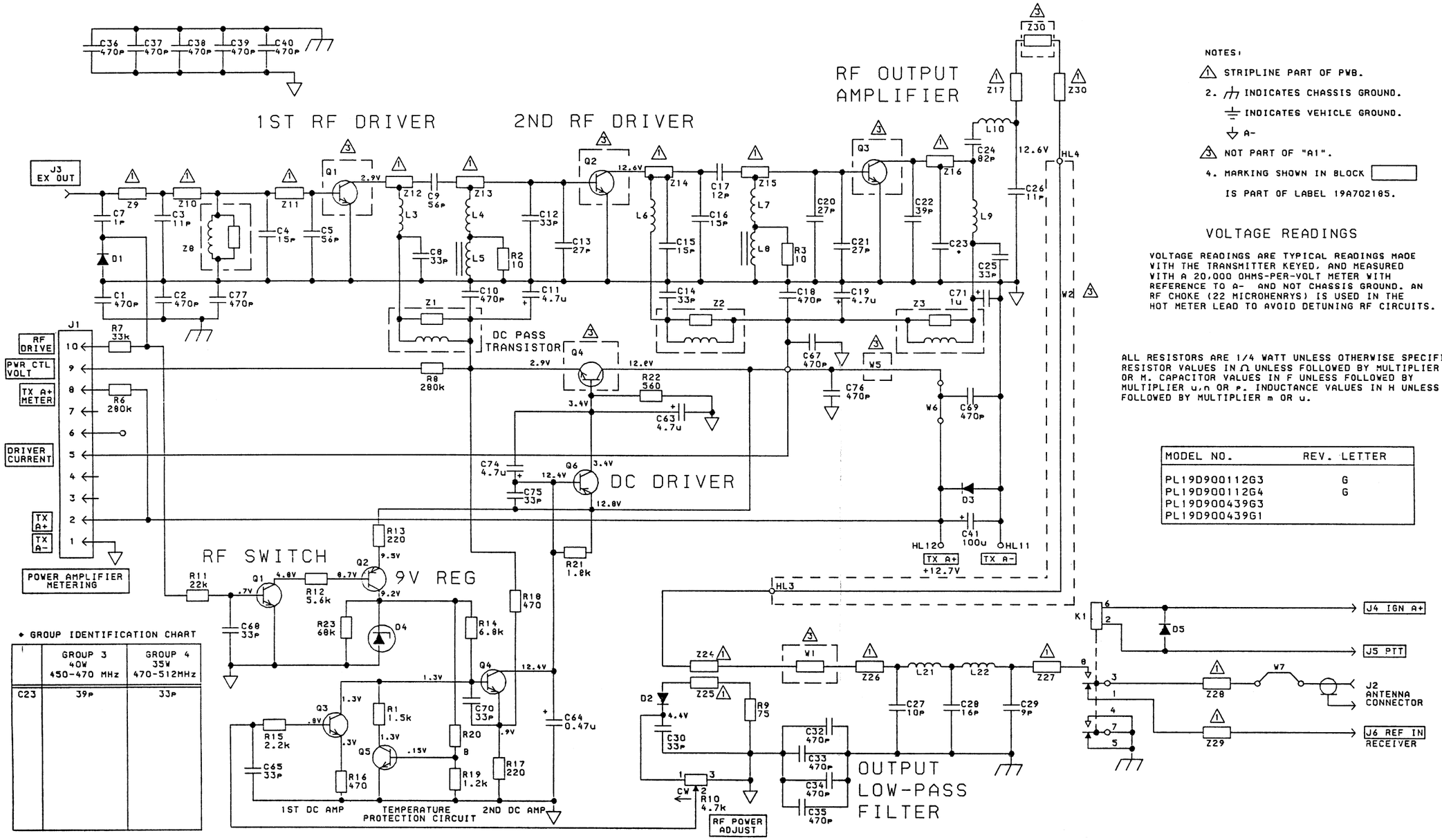
RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SID

(19D900444, Rev. 10)
(19A701296, Sh. 1, Rev. 7)
(19A701296, Sh. 2, Rev. 7)

OUTLINE DIAGRAMS

POWER AMPLIFIER ASSEMBLY

Issue 5



◆ GROUP IDENTIFICATION CHART

	GROUP 3 40W 450-470 MHz	GROUP 4 35W 470-512MHz
C23	39P	33P

NOTES:

1. STRIPLINE PART OF PWB.
2. INDICATES CHASSIS GROUND.
   INDICATES VEHICLE GROUND.
   A-
3. NOT PART OF "A1".
4. MARKING SHOWN IN BLOCK ▭ IS PART OF LABEL 19A702185.

VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MADE WITH THE TRANSMITTER KEYED, AND MEASURED WITH A 20,000 OHMS-PER-VOLT METER WITH REFERENCE TO A- AND NOT CHASSIS GROUND. AN RF CHOKE (22 MICROHENRYS) IS USED IN THE HOT METER LEAD TO AVOID DETUNING RF CIRCUITS.

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED. RESISTOR VALUES IN Ω UNLESS FOLLOWED BY MULTIPLIER k OR M. CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER u,n OR p. INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR u.

MODEL NO.	REV. LETTER
PL19D900112G3	G
PL19D900112G4	G
PL19D900439G3	
PL19D900439G1	

SCHEMATIC DIAGRAM

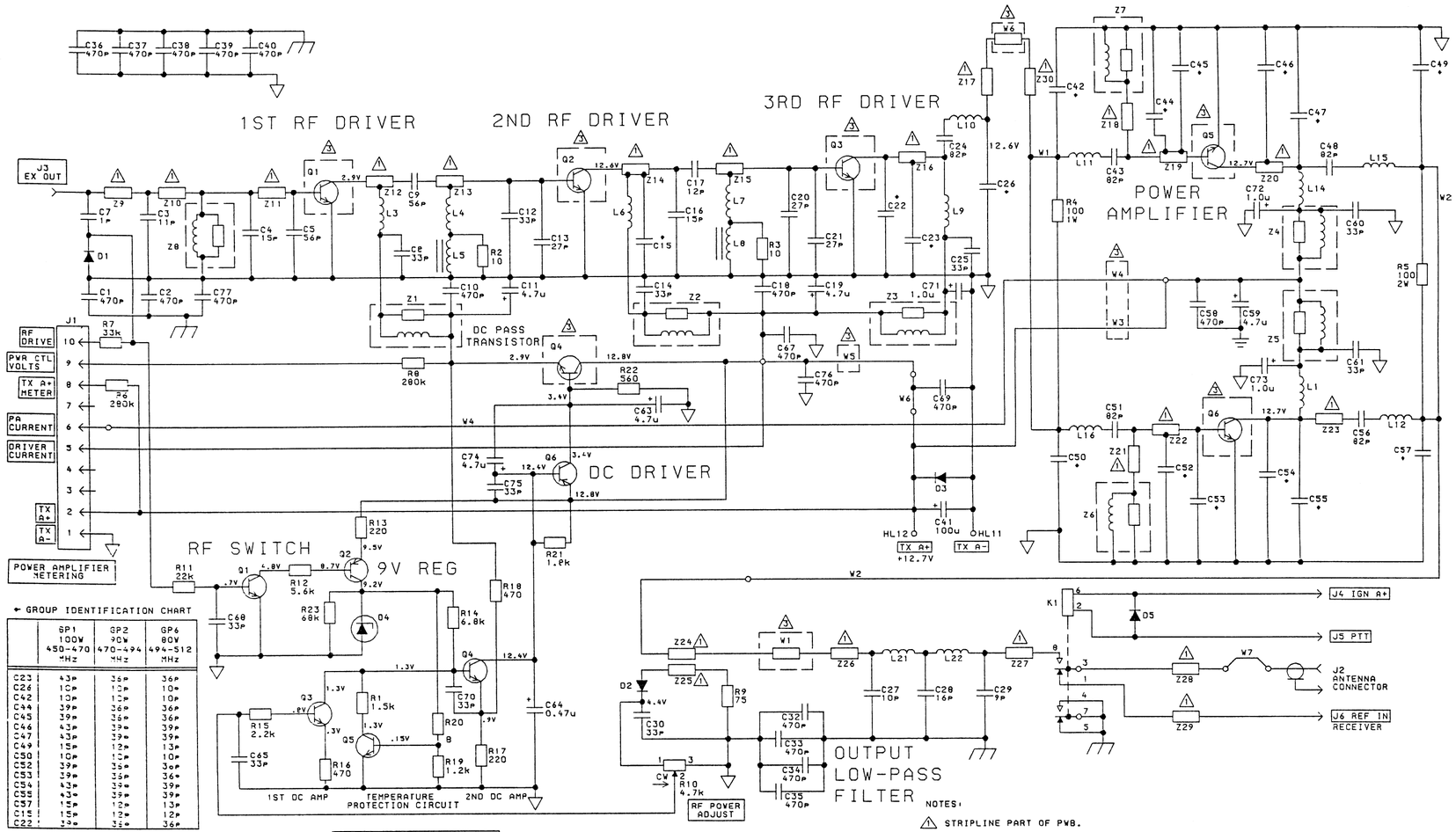
40 WATT POWER AMPLIFIER (19D900443, Rev. 9)

PARTS LIST

POWER AMPLIFIER ASSEMBLY
19D900439G1 450-470 MHz, 100 WATT - REV D
19D900439G2 470-494 MHz, 90 WATT
19D900439G3 450-470 MHz, 40 WATT - REV C
19D900439G4 470-512 MHz, 35 WATT
19D900439G9 494-512 MHz, 80 WATT
ISSUE 6

SYMBOL	GE PART NO.	DESCRIPTION
A1		POWER AMPLIFIER BOARD 19D900112G1 450-470 MHz, 100 WATT - REV G 19D900112G2 470-494 MHz, 90 WATT - REV D 19D900112G3 450-470 MHz, 40 WATT - REV E 19D900112G4 470-512 MHz, 35 WATT - REV E 19D900112G6 470-494 MHz, 80 WATT - REV D
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	19A701602P13	Ceramic: 470 pF ±20%, 1000 VDCW; sim to Type JF Discap.
C3	19A700006P7	Mica: 11 pF ±5%, 100 VDCW; sim to Underwood 3HS0020.
C4	19A701413P11	Mica: 15 pF ±5%, 100 VDCW.
C5	19A700006P28	Mica: 56 pF ±5%, 100 VDCW; sim to Underwood 3HS0020.
C7	19A700235P1	Ceramic: 1 pF ±0.25 pF, 50 VDCW, temp coef 0 PPM.
C8	19A700235P19	Ceramic: 33 pF ±5%, temp coef -150 PPM.
C9	19A701413P28	Mica: 56 pF ±5%, 100 VDCW.
C10	19A701602P13	Ceramic: 470 pF ±20%, 1000 VDCW; sim to Type JF Discap.
C11	19A701534P6	Tantalum: 4.7 uF ±20%, 35 VDCW.
C12	19A700006P21	Mica: 33 pF ±5%, 100 VDCW; sim to Underwood 3HS0020.
C13	19A700006P19	Mica: 27 pF ±5%, 100 VDCW; sim to Underwood 3HS0020.
C14	19A700235P19	Ceramic: 33 pF ±5%, temp coef -150 PPM.
C15	19A700006P11	Mica: 15 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G1, G3, & G4).
C15	19A700006P8	Mica: 12 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G2, G6).
C16	19A700006P11	Mica: 15 pF ±5%, 100 VDCW; sim to Underwood 3HS0020.
C17	19A701413P8	Mica: 12 pF ±5%, 100 VDCW; sim to Underwood 3HS0029.
C18	19A701602P13	Ceramic: 470 pF ±20%, 1000 VDCW; sim to Type JF Discap.
C19	19A703314P9	Electrolytic: 4.7 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C20 and C21	19A700006P19	Mica: 27 pF ±5%, 100 VDCW; sim to Underwood 3HS0020.
C22	19A700006P23	Mica: 39 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G1, G3 & G4).
C22	19A700006P22	Mica: 36 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G2, G6).
C23	19A700006P24	Mica: 43 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G1).
C23	19A700006P23	Mica: 39 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G3).
C23	19A700006P21	Mica: 33 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G4).
C23	19A700006P22	Mica: 36 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G2, & G6).
C24	19A701413P32	Mica: 82 pF ±%, 100 VDCW.
C25	19A700235P19	Ceramic: 33 pF ±5%, temp coef -150 PPM.
C26	19A700006P7	Mica: 11 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G3, & G4).
C26	19A700006P6	Mica: 10 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G1, G2, & G6).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



← GROUP IDENTIFICATION CHART

	GP1 100W 450-470 MHz	GP2 90W 470-494 MHz	GP6 80W 494-512 MHz
C23	43p	39p	36p
C26	10p	10p	10p
C42	12p	12p	10p
C44	39p	36p	36p
C45	39p	36p	36p
C46	43p	39p	39p
C47	43p	39p	39p
C49	15p	12p	13p
C50	10p	10p	10p
C52	39p	36p	36p
C53	39p	36p	36p
C54	43p	39p	39p
C55	43p	39p	39p
C57	15p	12p	13p
C15	15p	12p	12p
C22	39p	36p	36p

VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MADE WITH THE TRANSMITTER KEYED, AND MEASURED WITH A 20,000 OHMS-PER-VOLT METER WITH REFERENCE TO A- AND NOT CHASSIS GROUND. AN RF CHOKE (22 MICROHENRYS) IS USED IN THE HOT METER LEAD TO AVOID DETUNING RF CIRCUITS.

MODEL NO.	REV LETTER
PL19D900011261	J
PL19D900011262	F
PL19D900011266	F
PL19D900043961	
PL19D900043962	
PL19D900043969	

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED. RESISTOR VALUES IN Ω UNLESS FOLLOWED BY MULTIPLIER k OR M. CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER u,n OR p. INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR u.

NOTES:
1. ⚠1 STRIPLINE PART OF PWB.
2. ⏚ INDICATES CHASSIS GROUND.
   ⏚ INDICATES VEHICLE GROUND.
   ⏚ A-
3. ⚠3 NOT PART OF "A1".

(19D900442, Rev. 15)

SCHEMATIC DIAGRAM

100 WATT POWER AMPLIFIER

SYMBOL	GE PART NO.	DESCRIPTION
C27	19A700131P10	Teflon: 10 pF ±0.5 pF, 250 VDCW.
C28	19A700131P16	Teflon: 16 pF ±0.5 pF, 250 VDCW.
C29	19A700131P9	Teflon: 9 pF ±0.5 pF, 250 VDCW.
C30	19A700235P19	Ceramic: 33 pF ±5%, temp coef -150 PPM.
C32 thru C40	19A701602P13	Ceramic: 470 pF ±20%, 1000 VDCW; sim to Type JF Discap.
C41	19A700064P4	Electrolytic: 100 uF, -10 +150%, 25 VDCW.
C42	19A700006P6	Mica: 10 pF ±5%, 100 VDCW; sim to Underwood 3HS0020.
C43	19A700015P27	Teflon/Mica: 82 pF ±5%, 250 VDCW.
C44 and C45	19A700006P23	Mica: 39 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G1).
C44 and C45	19A700006P22	Mica: 36 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G2, & G6).
C46 and C47	19A700006P24	Mica: 43 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G1).
C46 and C47	19A700006P23	Mica: 39 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G2 & G6).
C48	19A700015P27	Teflon/Mica: 82 pF ±5%, 250 VDCW.
C49	19A700006P11	Mica: 15 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G1 & G6).
C49	19A700006P8	Mica: 12 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G2).
C50	19A700006P6	Mica: 10 pF ±5%, 100 VDCW; sim to Underwood 3HS0020.
C51	19A700015P27	Teflon/Mica: 82 pF ±5%, 250 VDCW.
C52 and C53	19A700006P23	Mica: 39 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G1).
C52 and C53	19A700006P22	Mica: 36 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G2 & G6).
C54 and C55	19A700006P24	Mica: 43 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G1).
C54 and C55	19A700006P23	Mica: 39 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G2, & G6).
C56	19A700015P27	Metallized teflon: 82 pF ±5%, 250 VDCW.
C57	19A700006P11	Mica: 15 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G1).
C57	19A700006P9	Mica: 13 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G6).
C57	19A700006P8	Mica: 12 pF ±5%, 100 VDCW; sim to Underwood 3HS0020. (Used in G2).
C58	19A701602P13	Ceramic: 470 pF ±20%, 1000 VDCW; sim to Type JF Discap.
C59	19A703314P9	Electrolytic: 4.7 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C60 and C61	19A700235P19	Ceramic: 33 pF ±5%, temp coef -150 PPM.
C63	19A701534P6	Tantalum: 4.7 uF ±20%, 35 VDCW.
C64	19A701534P3	Tantalum: 4.7 uF +20%, 35 VDCW.
C65	19A700235P19	Ceramic: 33 pF ±5%, temp coef -150 PPM.
C67	19A700233P5	Ceramic: 470 pF ±20%, 50 VDCW.
C68	19A700235P19	Ceramic: 33 pF ±5%, temp coef -150 PPM.
C69	19A700233P5	Ceramic: 470 pF ±20%, 50 VDCW.
C70	19A700235P19	Ceramic: 33 pF ±5%, temp coef -150 PPM.
C71 thru C73	19A703314P6	Electrolytic: 1 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C74	19A701534P6	Tantalum: 4.7 uF ±20%, 35 VDCW.
C75	19A700235P19	Ceramic: 33 pF ±5%, temp coef -150 PPM.
C76 and C77	19A701602P13	Ceramic: 470 pF ±20%, 1000 VDCW; sim to Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
D1	19A115250P2	Silicon, fast recovery; sim to 1N4148.
D2	19A700047P3	Silicon: 100 mW; sim to 1N6263.
D3	19A700082P1	Rectifier, silicon; sim to MR751.
D4	19A700025P16	Silicon, zener: 400 mA max; sim to BZX55-C9V1.
D5	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1	19B800555G3	Connector: metering, block. Includes: (10) 19A700237P1 contacts.
J2	19A701854G1	Coax; sim to Amphenol 83-87601002.
J3 thru J6	19A701883P4	Contact, electrical; sim to AMP 86444-1.
		- - - - - - - - - - - RELAYS - - - - - - - - - -
K1	19A700061P1	Hermetic sealed: 180 to 341 ohms coil res, 8-16.3 VDC; sim to GE 3SAV1760A2, CPClare HFW-1201558, or Potter-Brumfield HCW6160.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19A701237P1	Coil.
L3	19B800891P2	Coil, RF Choke: sim to Paul Smith SK-890-1.
L4	19A700024P1	Coil, RF: 100 nH ±10%, 0.08 ohms DC res max, 100 v.
L5	19A701091G1	Coil.
L6	19B800891P2	Coil, RF Choke: sim to Paul Smith SK-890-1.
L7	19A700024P1	Coil, RF: 100 nH ±10%, 0.08 ohms DC res max, 100 v.
L8	19A701091G1	Coil.
L9	19B800891P2	Coil, RF Choke: sim to Paul Smith SK-890-1.
L10	19A701006P4	Strap.
L11	19A701006P5	Strap. (Used in G1).
L11	19A701006P4	Strap. (Used in G2, & G6).
L12	19A701006P4	Strap.
L14	19A701237P1	Coil.
L15	19A701006P4	Strap.
L16	19A701006P5	Strap. (Used in G1).
L16	19A701006P4	Strap. (Used in G2, & G6).
L21 and L22	19B800554P1	Coil.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A700023P2	Silicon, NPN; sim to Type 2N3904.
Q2	19A700022P1	Silicon, PNP; sim to Type 2N3906.
Q3 thru Q5	19A700023P2	Silicon, NPN; sim to Type 2N3904.
Q6	19A700020P1	Silicon: PNP, 500 mW; sim to BC558A.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	H212CRP215C	Deposited carbon: 1.5K ohms ±5%, 1/4 w.
R2 and R3	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R4	19A700112P39	Composition: 100 ohms ±5%, 1 w.
R5	19A700111P39	Composition: 100 ohms ±5%, 2 w.
R6	19A701250P444	Metal film: 280K ohms ±1%, 1/4 w.
R7	H212CRP333C	Deposited carbon: 33K ohms ±5%, 1/4 w.
R8	19A701250P444	Metal film: 280K ohms ±1%, 1/4 w.
R9	19A700106P36	Composition: 75 ohms ±5%, 1/4 w.
R10	19B800784P106	Variable: 5K ohms ±20%, 1/2 w.
R11	H212CRP322C	Deposited carbon: 22K ohms ±5%, 1/4 w.
R12	H212CRP256C	Deposited carbon: 5.6K ohms ±5%, 1/4 w.
R13	H212CRP122C	Deposited carbon: 220 ohms ±5%, 1/4 w.
R14	H212CRP268C	Deposited carbon: 6.8K ohms ±5%, 1/4 w.
R15	H212CRP222C	Deposited carbon: 2.2K ohms ±5%, 1/4 w.
R16	H212CRP147C	Deposited carbon: 470 ohms ±5%, 1/4 w.
R17	H212CRP122C	Deposited carbon: 220 ohms ±5%, 1/4 w.
R18	H212CRP147C	Deposited carbon: 470 ohms ±5%, 1/4 w.
R19	H212CRP212C	Deposited carbon: 1.2K ohms ±5%, 1/4 w.
R20	19A701864P3	Thermistor: 500K ohms ±10%; sim to Midwest Components 4H-504.
R21	H212CRP218C	Deposited carbon: 1.8K ohms ±5%, 1/4 w.
R22	H212CRP156C	Deposited carbon: 560 ohms ±5%, 1/4 w.
R23	H212CRP368C	Deposited carbon: 68K ohms ±5%, 1/4 w.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1 and W2	19C850510P1	Printed circuit board.
W6	19A701237P1	Coil.
W7	19A701309P1	Terminal. (Includes RF connector terminal).
		- - - - - - - - - - NETWORKS - - - - - - - - - -
Z1	19A701771G3	Filter. Includes:
L1	19A701091G1	Coil.
R1	19A700106P3	Resistor, composition: 3.3 ohms ±5%, 1/4 w.
Z2 thru Z5	19A701092G1	Filter. Includes:
L1	19A701091G1	Coil.
R1	19A700113P15	Resistor, composition: 10 ohms ±5%, 1/2 w.
Z6 and Z7	19A701771G3	Filter. Includes:
L1	19A701091G1	Coil.
R1	19A700106P3	Resistor, composition: 3.3 ohms ±5%, 1/4 w.
Z8	19A701771G2	Filter. Includes:
L1	19A701091G1	Coil.
R1	19A700106P39	Resistor, composition: 100 ohms ±5%, 1/4 w.
Z9 thru Z29		(Part of printed board 19D900113P1).
A2		CAPACITOR ASSEMBLY 19A703218G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	19A701936G1	Ceramic, feed thru: 100 pF -0+100%, 500 VDCW.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A702177P1	Silicon: NPN.
Q2	19A700081P3	Silicon, NPN: 18 watt UHF amplifier, 12.5 v.
Q3	19A700056P3	Silicon, NPN.
Q3	19A700056P5	Silicon, NPN.
Q4	19A700054P1	Silicon, NPN, 60 w; sim to BD-201.
Q5 and Q6	19A702183P1	Silicon, NPN: UHF amplifier, 62 w.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1	19A701093P3	Strap.
W2	19A702075G2	Semi rigid cable: coax.
		HANDLE LOCK ASSEMBLY 19D900349G1 LOW POWER 19D900349G2 HIGH POWER
19B800004P5		Lock.
19C850699P1		Lock support.
19C850627P1		Handle.
19A700132P818		Dowel pin. (Secures handle).
19A701347P1		Lock pin. (Locks handle).
19A700140P2		Compression spring. (Used with lock pin).
19C850941P1		Retainer ring. (Secures compression spring).
19A702362P408		Machine screw, TORX® Drive: M3.5-0.6 x 8. (Quantity 2).
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
19D900262P1		Low pass filter housing.
19C850949G1		PA cover.
19A701368P1		Gasket. (Used with J2 on A1).
19A700068P1		Insulator, bushing. (Used with Q4).
19A700115P3		Insulator, plate. (Used with Q4).
N330P905F22		Metallic eyelet. (Used with C1 & C2 on A2).
19C850825P1		Cover. (J2).
19A701400P2		Insulated spacer. (Quantity 4 - Located near A2 board).
19A702182P1		Spacer. (Used with Q1 on assembly).
5492178P2		Washer, spring tension: sim to Wallace Barnes 375-20. (Used with Q1 on assembly).
19A702782P5		Nut, hex: No. 8-32. (Secures Q1 on assembly).
19A702381P525		Screw, thd forming: No. M3.5-0.6 x 25. (Secures Low pass filter housing).
19A702381P510		Screw, thd forming, TORX® Drive: M3.5-0.6 x 10. (Secures J2).
19A702381P508		Screw, thd forming, TORX® Drive: M3.5-0.6 x 8. (Secures A2 board).
19A701935P1		Plate. (Mounts C1 & C2 on A2).
19A700114P1		Stud terminal. (Used with L21 & L22).
19A702364P208		Machine screw: TORX®Drive, M2.5 - 0.45 x 8. (Secures Q2-Q6).

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 - PA Board 19D900112G1, 3 and 4
Incorporated in initial shipment.

REV. B - To improve operation of power control circuitry. Deleted C6 & C66.
C6 was: 19A700235P19 - Ceramic, disc: 33 pF ±5%, 50 VDCW.
C66 was: 19A700235P19 - Ceramic, disc: 33 pF ±5%, 50 VDCW.

REV. A - PA Board 19D900112G5
REV. B - PA Board 19D900112G2, G6
REV. C - PA Board 19D900112G3,
REV. D - PA Board 19D900112G1
To improve operation of power control circuitry when PA is turned down with excessive exciter input. Changed C64.
C64 was: 19A701602P13 - Ceramic, disc: 470 pF ±20%, 1000 VDCW.

REV. A - PA Board 19D900112G2, G6
REV. C - PA Board 19D900112G1
To improve operation. Added C76.

REV. E - 450-470 MHz 100-Watt Power Amplifier Board 19D900112G1
REV. C - 470-494 MHz 90-Watt Power Amplifier Board 19D900112G2
REV. D - 450-470 MHz 40-Watt Power Amplifier Board 19D900112G3
REV. D - 470-512 MHz 35-Watt Power Amplifier Board 19D900112G4
REV. C - 470-494 MHz 80-Watt Power Amplifier Board 19D900112G6
To improve output power. Deleted C62 and changed C76. Also added C77 in parallel with C2. Old part numbers were:
C62 was: 19A701602P13 - Ceramic: 470 pF ±20%, 1000 VDCW; sim to Type JF Discap.
C76 was: 19A700235P19 - Ceramic: 33 pF ±5%, temp coef -150 PPM.

REV. F - 450-470 MHz 100-Watt Power Amplifier Board 19D900112G1
REV. D - 470-494 MHz 90-Watt Power Amplifier Board 19D900112G2
REV. E - 450-470 MHz 40-Watt Power Amplifier Board 19D900112G3
REV. E - 470-512 MHz 35-Watt Power Amplifier Board 19D900112G4
REV. D - 470-494 MHz 80-Watt Power Amplifier Board 19D900112G6
To improve operation by changing to a more reliable capacitor. Changed C19, C59, and C71-73. New Part numbers are:
C19,C59 - 19A701534P6 - Tantalum: 4.7 uF ±20%, 35 VDCW.
C71-C73 - 19A701352P5 - Aluminum: 0.47 uF ±20%, 25 VDCW.

REV. G - 450-470 MHz, 100 W POWER AMPLIFIER 19D900112G1

To increase power output at 470 MHz. Changed C49 and C57. C49 and C57 were: 19A700006P9 mica, 13 pF, 5%, 100 VDCW.

REV. H - 450-470 MHz 100-WATT POWER AMPLIFIER BOARD 19D900112G1
REV. E - 470-494 MHz 90-WATT POWER AMPLIFIER BOARD 19D900112G1
REV. F - 450-470 MHz 40-WATT POWER AMPLIFIER BOARD 19D900112G3
REV. F - 470-512 MHz 35-WATT POWER AMPLIFIER BOARD 19D900112G4
REV. E - 470-494 MHz 80-WATT POWER AMPLIFIER BOARD 19D900112G6

To improve stability in power control circuit, and improve differential for wideband operation.

Added R23 and C78.

R23 is: 19A700019P59; Deposited carbon, 68K ohms ±5%, 1/4 w.
C78 is: 19A701534P6; Tantalum, 4.7 uF ±20%, 35 VDCW.

REV. J - 450-470 MHz 100-WATT POWER AMPLIFIER BOARD 19D900112G1
REV. F - 470-494 MHz 90-WATT POWER AMPLIFIER BOARD 19D900112G2
REV. G - 450-470 MHz 40-WATT POWER AMPLIFIER BOARD 19D900112G3
REV. G - 470-512 MHz 35-WATT POWER AMPLIFIER BOARD 19D900112G4
REV. F - 470-494 MHz 80-WATT POWER AMPLIFIER BOARD 19D900112G6

To improve alternator whine performance over all settings of power control and improve power control stability. Deleted C78. Changed C74.

C74 is: 315A6047P475U tantalum, 4.7 uF, 10%