# MAINTENANCE MANUAL FOR 450-470 MHz, 110 WATT POWER AMPLIFIER 19D902797G3 425-450 MHz, 90 WATT POWER AMPLIFIER 19D902797G7 403-425 MHz, 90 WATT POWER AMPLIFIER 19D902797G6 380-400 MHz, 75 WATT POWER AMPLIFIER 19D902797G8 470-494 MHz, 90 WATT POWER AMPLIFIER 19D902797G9 492-512 MHz, 90 WATT POWER AMPLIFIER 19D902797G10 410-430 MHz, 90 WATT POWER AMPLIFIER 19D902797G10

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Table 1 - General Specifications						
ITEM	SPECIFICATION					
FREQUENCY	450 MHz - 470 MHz (G3) 403 MHz - 425 MHz (G6) 425 MHz - 450 MHz (G7) 380 MHz - 400 MHz (G8) 470 MHz - 494 MHz (G9) 492 MHz - 512 MHz (G10) 410 MHz - 430 MHz (G11)					
OUTPUT POWER (RF)	65 watts - 130 watts (G3) 55 watts - 110 watts (G6, G7, G9, G10 & G11) 45 watts - 90 watts (G8)					
INPUT POWER (RF)	$10 \text{ mW} \text{ min. into} \le 2:1 \text{ VSWR.}$					
TEMPERATURE RANGE	-30°C TO +60°C (Ambient air)					
SUPPLY VOLTAGE	13.4 Vdc					
CURRENT	29 Amps max. (26 A typical @ rated power, 13.4V) (G3) 29 Amps max. (21 A typical @rated power, 13.4V)(G6, G7, G9, G10 & G11) 29 Amps max. (20 A typical @ rated power, 13.4V) (G8)					
DUTY CYCLE Continuous						
STABILITY	Stable into 3:1 VSWR; all temp., voltage, freq. 55 watts - 110 watts (G3) or 45 watts - 90 watts (G6, G7, G9, G10 & G11) or 45 watts - 90 watts (G8)					
RUGGEDNESS AT HIGH VSWR	No damage into open or shorted load.					



The UHF Power Amplifier Assembly is a wide band RF power amplifier operating over the 380-400, 410-430, 403-425, 425-450, 450-470, 470-494, and 492-512 MHz range without tuning. Its main function is to amplify the 10 mW FM signal from the Transmitter Synthesizer to the rated RF output at the antenna port. The output of the Power Amplifier Assembly is adjustable from rated power to 3dB lower at the PA output J104.

The assembly consists of a printed wiring board (A1) and associated components, including a power module and three RF power transistors, mounted to the heat sink assembly. The printed wiring board (A1) contains both the power amplifier circuitry and the power control circuitry.

Unfiltered supply voltage, A+, for the power amplifier circuits enters the assembly via feedthrough capacitor, C1. Power cable W4 routes the A+ from C1 to J103 on the PWB. Filtered A+ voltage for the power control circuit enters the assembly via control cable W13 which connects to the PWB at J201.

The Power Control circuitry sets the output power level by adjusting the PA Power Set level. It keeps the output power constant despite variations in input power, power amplifier gain, or temperature through the use of a feedback control loop in the PA assembly.

### **CIRCUIT ANALYSIS**

### **POWER AMPLIFIER**

The power amplifier section of the PA Board consists of an Exciter, a Small Signal Gain Stage, a Low Level Amplifier, a Driver, and the Power Amplifier Finals. All these gain stages have an input and output impedance of 50 ohms. Figure 1 is a block diagram showing the signal flow within the Power Amplifier Assembly.

## Exciter (U101)

The Exciter stage uses a broadband silicon monolithic microwave integrated circuit (MMIC) amplifier. The signal from transmitter synthesizer, typically 10 dBm (10 mW), is input to the Exciter through a 10 dB resistive pad (R1, R2, and



R31). The Exciter amplifies the resulting 0 dBm (1 mW) signal to 12 dBm (16 mW).

The MMIC requires a 5 volt supply source. The 8 volt regulator (U100) provides the 5 volts to the MMIC via a dropping resistor R30.

#### **Small Signal Gain Stage**

The Small Signal Gain Stage consists of Q7 and its associated bias and matching circuitry. Collector voltage is fed through R39, R40, and L23. Resistor R33 sets the quiescent bias of the part. The transistor input impedance is matched to the 50 ohm output of the Exciter by C59, C61, C62, and C63. L24 provides the necessary output matching. The stage provides 14 dB of gain to amplify the signal from the Exciter to 26 dBm (400 mW).

#### Low Level Amplifier (U102)

The Low Level Amplifier (LLA) stage uses a 50 ohm thick film RF Power Module to amplify and control of the output power. Internally, the module is a three stage amplifier. The power control circuitry controls the gain of the first and second stages by varying the collector voltage level of Q203. The third stage gain remains constant with A+ providing the DC supply voltage.

The signal from the Small Signal Gain stage, typically 26 dBm (400 mW), is input into the LLA. Under typical LBI-38674F

Power Set conditions, the LLA amplifies the signal to a typical output level of 40.5 dBm (11.2 W).

#### Driver (Q1)

The driver is a 6 dB RF amplifier consisting of transistor O1 and its associated circuitry. The signal from the LLA, typically 40.5 dBm (11.2 W), is amplified to 46.5 dBm (45.0 W). The transistor input is matched to 50 ohms by C65, C66, C27, C67, and a piece of printed transmission line. The drive signal is then split with a printed in-phase Wilkenson splitter, providing equal power to each of the final devices.

#### **Power Amplifier Finals (Q2, Q3)**

Each of the Power Amplifier Final devices is capable of producing 5 to 6 dB of gain. The output signal from the Splitter is impedance matched to each of the finals. Under optimum conditions each final amplifies the input signal to between 50 and 70 watts output power (depending on band split). The outputs are then impedance matched to the input of the Combiner. The Combiner is a printed in-phase Wilkinson type which combines (sums) the output power of the finals. This produces an output power of approximately 100W, (depending on band split) which is coupled to the directional coupler (part of A1 PWB) and on to the antenna circuits. In addition, the directional coupler samples both forward and reverse power and sends this sample to the Power Control circuitry.

#### **POWER CONTROL**

The Power Control circuitry performs three basic functions. It keys and unkeys the PA, sets the PA output power, and protects the PA against adverse conditions.

#### Keying and Unkeying the PA

To key the PA, the digital controller places 5 volts on the PA key line, J201-2. Zero volts on the PA key line causes the PA to unkey. If the control cable (W13) is disconnected, with nothing actively driving the PA key line, the PA will remain unkeyed.

#### **PA Output Power Set**

PA output power is set according to the level of the Power Set line. Four (4) volts on this line will produce minimum power. As the voltage increases toward eight (8) volts, the power will increase to its maximum rated output. The PA output power is initially set at the factory. This is done by adjusting R43 while injecting a 10 mW signal at J1 and applying 8 volts to J201-3. After setting the maximum power level, changing the output power in done by varying the voltage applied on the Power Set line.

#### **PA Protection**

The power control also protects the PA against over temperature and high VSWR conditions.

An over temperature condition exists when the flange temperature of the final output transistor reaches 80°C. At this point the output power will drop below its set level. The output power will continue to drop such that when the flange temperature reaches 125°C the PA output drops at least 10 dB below its set level.

Reflected power is limited to 25% of the set power. If the output VSWR degrades to worse than 3:1 the forward power will be reduced to limit the reflected power to 25% of the set power. The Power Sensor line indicates when the PA is operating in a cutback condition. If the PA is keyed and the power control is cutting back, the Power Sensor line will drop to zero (0) volts and the PA alarm light on the station will turn on.

#### **Theory of Operation**

Power control of the MASTR III Power Amplifier is accomplished with a feedback control loop. The three possible feedback signals are: representation of forward power, temperature sensitive scaled representation of forward power, or representation of reflected power. These three signals are input to a diode summing junction which selects the largest of the three for use as the feedback.

The stripline directional coupler samples the output power and produces a voltage, Vf, proportional to the forward output power. The power control compares the forward voltage, Vf, to a reference voltage at U3. The output of U3 controls the current flow thru Q5 and the output of Q203. The collector output of O203 adjusts the control voltage. Vct1 and Vct2. This control voltage is capable of adjusting the total PA output power since it provides the first two stages DC supply to the Low Level Amplifier, U1.

During over temperature operation, a scaled representation of the forward power is maintained constant by varying the control voltage line. Thermal resistor RT1 sensing an increase in temperature causes the output of U3.1 to increase. If the output of U3.1 becomes larger than the other feedback lines, the output of U3.4 will begin to decrease. This in turn will cause the output of Q203 to decrease reducing the supply voltage to U1. Since the scaling is a function of temperature the power is reduced as the temperature increases.

Under VSWR cutback operation the reverse voltage, Vr, representative of the reflected output power is held below a threshold by reducing the control voltage as necessary. If Vr increases at U3.1 beyond the preset threshold an increase at U3.4 will result. This causes a subsequent reduction in the control voltage to U1. Thus the power control circuit reduces the output power in order to limit the reflected power to 25% of the set power.

#### **Signal Interface**

The signal interface to the MASTR III Power Amplifier is supported by a six position feedthrough connector, J201, with the following pinout:

- 1 -PWR Sensor
- 2 -PA Key
- 3 PA PWR Set
- 4 NC
- 5 Ground
- 6 Fil A+

#### **Pwr Sensor**

This line indicates when the PA is experiencing adverse conditions. Under normal operation, while the PA is keyed, this line will be proportional to forward power. Minimum power (zero watts) corresponds to 2.5 volts while maximum power corresponds to 4.5 volts. This voltage is not temperature compensated and no effort is made to calibrate this signal to an absolute power level. It is intended to provide a relative indication of forward power and to discriminate between normal and cutback operation.

Zero volts on this line, when the PA is keyed, indicates the forward power is cutback. This power cutback may be due to high reflected power or may be due to high PA temperatures. This fault condition may indicate a problem with the PA or may indicate a system problem external to the Power Amplifier. High VSWR may be due to a poor antenna and high temperature may be due to a blocked cabinet vent. Zero volts on this line, when the PA is keyed, does not indicate zero forward power. Zero volts indicates the PA is protecting itself due to adverse conditions. If the adverse condition, either high VSWR or high temperature is eliminated, the power will return to normal and the PWR SENSOR voltage will rise above 2.5 volts.

#### PA Key (Interface Connector pin 2)

This line is used to key and unkey the PA. UNKEY = 0volt and KEY = 5 volts. The driver of this line must be capable

# **TROUBLESHOOTING GUIDE**

	SYMPTOM		AREAS TO CHECK	INDICATIONS
1.	No Power or low Power at Antenna Port.	1.	Measure the transmitter output power before the duplexer or antenna switch (for simplex mode).	The presence of power at this port is an indication of a defective duplexer, switch, or cables.
		2.	Measure the transmitter output power before the low pass filter.	The presence of power at this port is an indication of a defective filter or cables.
		3.	Measure the transmitter output power before the optional isolator at the PA output port.	The presene of power at this port is an indication of a defective isolator or cables.
2.	No power at PA output port and PA ALARM is OFF.	1.	Station is in receive mode.	
3.	No power at PA output port and PA ALARM is ON.	1.	No RF input to PA. Check connection between PA and TX Synthesizer.	TX Synthesizer should deliver a minimum of 10 mW (10 dBm) to the PA.
		2.	Check the logic or DC inputs to the PA from the Interface Board through J201.	
			a. J201-2 PA KEY	5volts during transmit
			b. J201-3 POWER SET	4 volts to 8 volts (4 volts represents zero RF power)
			c. J201-6 13.8 VF	13.8 Vdc ±20%
		3.	Defective PA	Replace PA

of supplying 5 volts at 1.0 mA. The appropriate key sequence requires RF from the transmit synthesizer be input to the PA before the KEY line is energized.

#### PA PWR Set (Interface Connector pin 3)

This line is used to set the RF Power Output of the PA. Minimum power output equals 4 volts and maximum power output equals 8 volts. The driver of this line must be capable of supplying 8 volts at 1.0 mA.

#### Fil A+ (Interface Connector pin 6)

This line provides the filtered supply voltage for the Power Control. The driver of this line must be capable of supplying 13.4 volts ±20% at 100 mA.

# **TROUBLESHOOTING GUIDE (cont'd)**

# UHF POWER AMPLIFIER TYPICAL VOLTAGE READINGS (50 ohm, room temperature, 13.4 Vdc supply voltage, and rated output)

SYMPTOM	AREAS TO CHECK	INDICATIONS		
4. Low power at PA output port and PA ALRAM is OFF.	1. Low RF input to PA from TX Synthesizer.	Power should be a minimum of 10 mW (10 dBm).		
	2. Check the voltage on J201-3 (POWER SET).	For minimal output power, this voltage should be above 7 volts.		
	<ol> <li>Check the power supply voltage on the collector of Q1, Q2 and Q3</li> </ol>	Voltage should be minimal 13.4 Vdc.		
	<ol> <li>One of the two final PA transistors (Q2 or Q3) is defective.</li> </ol>	Replace the defective transistor.		
5. Low power at PA output port and PA ALARM is ON.	<ol> <li>Check for over temperature and/ or a high VSWR condition due to a mismatch at the output port.</li> </ol>	The power control circuit protects the PA by cutting back the power. In case of a mismatch, refer to symptom 1.		

#### UHF POWER AMPLIFIER VOLTAGE CHART

PARAMETER (50 ohm, -30°C to +60°C)	REFERENCE SYMBOL	READINGS (volts DC)
SUPPLY VOLTAGE	A+	13.4 V ±20%
CONTROL VOLTAGE	Vct1	0 - 12 V
FORWARD VOLTAGE	Vf	3 - 7 V
REVERSE VOLTAGE	Vr	2 - 6 V
POWER SENSE	J201-1	2.5 - 4 V
PA KEY	J201-2	5 V
POWER SET	J201-3	4 - 8 V
13.8 VF	J201-6	13.8 V ±20%

	Group	Low	Mid	High
Frequency	G3	450 MHZ	460 MHZ	470 MHZ
· ·	G6	403 MHZ	414 MHZ	425 MHZ
	G7	425 MHZ	437 MHZ	450 MHZ
	G8	380 MHZ	390 MHZ	400 MHZ
	G9	470 MHZ	482 MHZ	494 MHZ
	G10	492 MHZ	502 MHZ	512 MHZ
	G11	410 MHZ	420 MHZ	430 MHZ
Vct 1 (Volts DC)	G3	7 - 10 Volts	6 - 8 Volts	4 - 6 Volts
· · · · ·	G6	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
	G7	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
	G8	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
	G9 & G10	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
	G11	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
Vf (Volts DC)	G3	5 - 7 Volts	5 - 7 Volts	5 - 7 Volts
	G6	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
	G7	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
	G8	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
	G9 & G10	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
	G11	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
Vr (Volts DC)	G3	2 - 3 Volts	2 - 3 Volts	2 - 3 Volts
	G6	2 - 3 Volts	2 - 3 Volts	2 - 3 Volts
	G7	2 - 3 Volts	2 - 3 Volts	2 - 3 Volts
	G8	2 - 3 Volts	2 - 3 Volts	2 - 3 Volts
	G9 & G10	2 - 3 Volts	2 - 3 Volts	2 - 3 Volts
	G11	2 - 3 Volts	2 - 3 Volts	2 - 3 Volts
J201 - 1 (Volts DC)	G3	2.5 - 4 Volts	2.5 - 4 Volts	2.5 - 4 Volts
· · · /	G6	2.5 - 4 Volts	2.5 - 4 Volts	2.5 - 4 Volts
	G7	2.5 - 4 Volts	2.5 - 4 Volts	2.5 - 4 Volts
	G8	2.5 - 4 Volts	2.5 - 4 Volts	2.5 - 4 Volts
	G9 & G10	2.5 - 4 Volts	2.5 - 4 Volts	2.5 - 4 Volts
	G11	2.5 - 4 Volts	2.5 - 4 Volts	2.5 - 4 Volts
J201 - 3 (Volts DC)	G3	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
	G6	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
	G7	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
	G8	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
	G9 & G10	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
	G11	6 - 8 Volts	6 - 8 Volts	6 - 8 Volts
J201- 6 (Volts DC)	G3	13.4 Volts	13.4 Volts	13.4 Volts
	G6	13.4 Volts	13.4 Volts	13.4 Volts
	G7	13.4 Volts	13.4 Volts	13.4 Volts
	G8	13.4 Volts	13.4 Volts	13.4 Volts
	G9 & G10	13.4 Volts	13.4 Volts	13.4 Volts
	G11	13.4 Volts	13.4 Volts	13.4 Volts

# LBI-38674F

FREQUENCY MHz	STANDARD @J2	ADJUSTABLE RANGE ©J104	WITH DUPLEXER	WITH ISOLATOR	WITH DUPLEXER AND ISOLATOR
450-470	110W	65-130W	75W	100W	70W
425-450	90W	55-110W	60W	82W	55W
403-425	90W	55-110W	60W	82W	55W
380-400	75W	45-90W	50W	68W	47W
410-430	90W	55-110W	60W	82W	55W
470-494	90W	55-110W	60W	82W	55W
492-512	90W	55-110W	60W	82W	55W

### RATED POWER FOR MASTR III UHF BASE STATION



APPLY SILICONE GREASE BETWEEN THE HEAT SINK, ITEM 2 AND THE MOUNTING SURFACES OF: Q1, Q2, Q3, U1, R28 & R29

RECOMMENDED ASSEMBLY PROCEDURE:
 a PRETIN LEADS
 b ASSEMBLE ALL MOUNTING HARDWARE LOOSE
 c ALIGN LEADS ON DEVICES WITH MICROSTRIP, POSITIONING
 THEM SO THAT MAXIMUM AMOUNT OF LEAD
 IS IN CONTACT WITH MICROSTRIP.
 d TIGHTEN MOUNTING HARDWARE TO 4 ± 1 in. lbs.,
 e SOLDER LEADS TO MICROSTRIP
 USING 2% SILVER
 f TIGHTEN MOUNTING HARDWARE, TORQUE
 TO 0.6 N.m (6 in. lbs.)

LUBRICATE HARDWARE BEFORE ASSEMBLY USING ITEM 10

TORQUE HARDWARE TO 1.1 N.m. (10in. lbs.)

5 TORQUE HARDWARE TO 0.6N.m. (6in. lbs.)

# USE HARDWARE SUPPLIED WITH COMPONENT, TORQUE TO 0.6 N.m. (6in. lbs.)

CARE MUST BE USED IN SOLDERING LEADS OF Q1, Q2, Q3, R28, R29 & U1 TO BOARD, (A1) TO AVOID SHORTING SOLDER TABS TOGETHER.

TERMINATE W10 BY SOLDERING TO C1-1. SLEEVE ENTIRE ELECTRICAL CONNECTION WITH SLEEVING, ITEM 15.

#### POWER AMPLIFIER ASSEMBLY 19D902797G3, G6, G7, G8, G9, G10 & G11

(19D902797 Sh. 3, Rev. 10)



POWER AMPLIFIER ASSEMBLY

19D902797G3, G6, G7, G8, G9, G10 & G11

(19D902797 Sh. 2, Rev. 10)

# COVER ASSEMBLY 19B801659G3

(19B801659, Sh. 2, Rev. 3)

# ASSEMBLY DIAGRAMS



# NOTES:

- TORQUE SCREW, ITEM 5, TO 15.5±1.3 IN-LB.
- TORQUE SCREW, ITEM 6, TO 6 IN-LBS.
- SOLDER CONNECTORS J1 AND J2 AND ITEM 7 TO ITEM 4.
- A COAT THREADS OF SCREW, ITEM 5, WITH LUBRICANT, BEFORE INSTALLING.

# LBI-38674F

### LOW PASS FILTER MODULE 19D902856G3

(19D902856 Sh. 1, Rev. 0)

1	10 WATT UHI	POWER AMPLIFIER 19D902797G3	SYMBOL	PART NO.	DESCRIPTION
90	WATT UHF P	OWER AMPLFIER 19D902797G6, G7	004	24440400040	
,	75 WATT UHF	& G9 - G11 F POWER AMPLFIER 19D902797G8 ISSUE 6	C34 and C35	344A3126P18	Porcelain: 15 pF $\pm$ 5pF, 500 VDCW; simto 150J1500X. (Used in G6, G7 and G11).
YMBOL	PART NO.	DESCRIPTION	C36	344A3126P3	Porcelain: 3.9 pF $\pm 0.25\%,~500$ VDCW; sim to 3R9CT500X. (Used in G8).
		ASSEMBLIES	C36	344A3126P5	Porcelain: 4.7 pF $\pm 0.25\%,\ 500$ VDCW; sim to 4R7CT500X. (Used in G6 and G11).
			C37	344A3126P2	Porcelain: 2.2 pF $\pm 0.25\%,~500$ VDCW; sim to 2R2CT500X. (Used in G8).
		19D902794G3, G6 - G11	C38	19A705205P7	Tantalum: 10 $\mu F,$ 25 VDCW; sim to Sprague 293D. (Used in G8, G9, G10 and G11).
		CAPACITORS	C39	19A705108P40	Mica chip: 120 pF, ±5%, 100 VDCW. temp coef 0 ±50 PPM/°C. (Used in G8, G9, G10 and G11).
	19A116708P2	Feedthru: 0.01uF +100-0%, 500 VDCW; sim to Erie 327- 050-X5W0103P.	C40	19A702052P26	Ceramic: 0.1 $\mu F$ ±10%, 50 VDCW. (Used in G8, G9 and G10).
1	19A702052P26	Ceramic: 0.1 $\mu\text{F}$ ±10%, 50 VDCW,	C41	344A3126P38	Porcelain: 100 pF ±5%, 500 VDCW. sim to 101JT500X.
2 ru 9	19A702061P63	Ceramic: 120 pF $\pm 5\%,$ 50 VDCW, temp coef 0 $\pm 30$ PPM.	C42	19A702052P26	(Used in G11). Ceramic: 0.1 μF ±10%, 50 VDCW.
10	344A3126P38	Porcelain: 100 pE +5% 500 VDCW sim to 101.IT500X	C45		
:11	19A702061P63	Ceramic: 120 pE +5% 50 VDCW temp coef 0 +30 PPM	C46	344A3126P11	Porcelain: 8.2 pF ±5%, 500 VDCW; sim to 8R2CT500X.
12	19A705108P40	Mica chip: 120 pF ±5% 100 VDCW temp coef 0 ±50	and C47		(Used in G9 and G10).
13	344A3126P38	PPM°C. Porcelain: 100 pF ±5%, 500 VDCW. sim to 101JT500X.	C46 and C47	344A3126P13	Porcelain: 15 pF $\pm 5\%,~500$ VDCW; sim to 100JT500X. (Used in G10).
nru C16			C48	194702052P26	Ceramic: 0.1 uE +10% 50 VDCW
C17	19A702052P26	Ceramic: 0.1 µF ±10%, 50 VDCW.	C49	19A702032F20	Coramic: 30 pE +5% 50 VDCW. tomp coof $0+30$ PPM/°C
C18	19A705108P40	Mica chip: 120 pF, ±5%, 100 VDCW. temp coef 0 ±50	C50	19A702052P26	Ceramic: 0.1 µE +10% 50 VDCW
		PPM°C.	C51	19A705205P7	Tantalum: 10 uE 25 VDCW/ sim to Sprague 293D
;19	344A3126P38	Porcelain: 100 pF $\pm$ 5%, 500 VDCW. sim to 101JT500X.	C53	194705205P7	Tantalum: 10 µF, 25 VDCW, sim to Sprague 293D.
.20 nd :21	19A705108P40	Mica chip: 120 pF, $\pm$ 5%, 100 VDCW. temp coef 0 $\pm$ 50 PPM°C.	and C54	13470320317	
22	19A702052P26	Ceramic: 0.1 µF ±10%, 50 VDCW.	C57	19A705205P7	Tantalum: 10 $\mu\text{F}$ , 25 VDCW; sim to Sprague 293D.
nd 23	10170001000		C58	344A3126P11	Porcelain: 8.2 pF $\pm 5\%,500$ VDCW; sim to 8R2CT500X. (Used in G3).
;24 205	19A702061P63	Ceramic: 120 pF ±5%, 50 VDCW, temp coet 0 ±30 PPM.	C58	344A3126P15	Porcelain: 12 pF ±5%, 500 VDCW ; sim to 120JT500X.
25	344A3126P38	Porcelain: 100 pF ±5%, 500 VDCW. sim to 101J I 500X.	C58	344A3126P7	Porcelain: 5.6 pF +0.25%, 500 VDCW: sim to
,20 207	344A3120F02	Porcelain: 1000 pF ±5%, 500 VDCW; sim to 102J1500X.			5R6CT500X. (Used in G9, G10).
21	344A3120F13	(Used in G7 and G8).	C59	19A702061P49	Ceramic: 56 pF $\pm$ 5%, 50 VDCW, temp coef 0 $\pm$ 30 PPM.
27	344A3126P15	Porcelain: 12 pF $\pm 5\%,500$ VDCW; sim to 120JT500X. (Used in G6 and G11).	C60	19A702061P65	Ceramic: 150 pF $\pm 5\%,~50$ VDCW, temp coef 0 $\pm 30$ PPM/°C.
28	344A3126P18	Porcelain: 15 pF $\pm 5\%,~500$ VDCW; sim to 150JT500X. (Used in G8).	C61	19A702061P17	Ceramic: 12 pF $\pm 10$ pF, 50 VDCW, temp coef 0 $\pm 30$ PPM/°C.
28	344A3126P15	Porcelain: 12 pF $\pm 5\%,~500$ VDCW; sim to 120JT500X. (Used in G6).	C62	19A702236P52	Ceramic: 120 pF $\pm 5\%,~50$ VDCW, temp coef 0 $\pm 30$ PPM/°C.
28	344A3126P13	Porcelain: 15 pF ±5%, 500 VDCW; sim to 100JT500X.	C64	344A3126P38	Porcelain: 100 pF ±5%, 500 VDCW; sim to 101JT500X.
228	344A3126P11	Porcelain: 8.2 pF ±5%, 500 VDCW; sim to 8R2CT500X.	C65	344A3126P11	Porcelain: 8.2 pF $\pm 5\%,500$ VDCW; sim to 8R2CT500X. (Used in G3).
29	344A3126P18	(Used in G7). Porcelain: 15 pF ±5%, 500 VDCW; sim to 150JT500X.	C65	344A3126P5	Porcelain:4.7 pF $\pm 0.25\%, 500$ VDCW; sim to 4R7CT500X. (Used in G9, G10).
		(Used in G8).	C66	19A700006P58	Mica/teflon: 47 pF ±2%, 100 VDCW. (Used in G8).
229	344A3126P15	Porcelain: 12 pF $\pm$ 5%, 500 VDCW; sim to 120JT500X. (Used in G6).	C66	19A700006P55	Mica/teflon: 27 pF $\pm 2\%,~100$ VDCW. (Used in G9 and G10).
;29	344A3126P13	Porcelain: 15 pF $\pm$ 5%, 500 VDCW; sim to 100JT500X. (Used in G11).	C66	19A700006P50	Mica/teflon: 39 pF $\pm 2\%,$ 100 VDCW. (Used in G6, G7, and G11).
29	344A3126P11	Porcelain: 8.2 pF $\pm$ 5%, 500 VDCW; sim to 8R2CT500X. (Used in G7).	C66	19A700006P48	Mica/teflon: 33 pF $\pm 2\%,$ 100 VDCW. (Used in G3).
230	344A3126P15	Porcelain: 12 pF $\pm 5\%,500$ VDCW; sim to 120JT500X. (Used in G8).	C67	19A700006P58	Mica/teflon: 47 pF $\pm 2\%$ , 100 VDCW. (Used in G6 and G11).
C30	344A3126P11	Porcelain: 8.2 pF ±5%, 500 VDCW; sim to 8R2CT500X.	C67	19A700006P50	Mica/teflon: 39 pF $\pm 2\%$ , 100 VDCW. (Used in G7 and G8).
231	344A3126P15	Porcelain: 12 pF ±5%, 500 VDCW; sim to 120JT500X.	C67 C67	19A700006P49 19A700006P55	Mica/teflon: 36 pF $\pm$ 2%, 100 VDCW (G3). Mica/teflon: 27 pF $\pm$ 2%, 100 VDCW. (Used in G9 and
231	344A3126P11	Porcelain: 8.2 pF ±5%, 500 VDCW; sim to 8R2CT500X.	C68	19A700006P58	G10). Mica/teflon: 47 pF $\pm$ 2%, 100 VDCW. (Used in G8 and
32 Ind	344A3126P1	Porcelain: 3.3 pF ±.25pF, 500 VDCW; sim to 3R3CT500X. (Used in G3).	C68	19A700006P50	G11). Mica/teflon: 39 pF ±2%, 100 VDCW. (Used in G6, G7, and
:33			C68	19A700006P48	Mica/teflon: 33 pF ±2%. 100 VDCW (G3)
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PARTS LIST

SYMBOL	PART NO.	DESCRIPTION	] [	SYMBOL	PART NO.	DESCRIPTION
C68	104700006P53	Mice/(offee) 22 pE +29/ 100 \/DC\// (Llead in C10)		C93	194700006P48	Mica/teflon: 33 nE +2% 100 VDCW (Used in G3)
and	13/1000001 33			C93	19A700006P55	Mica/teflon: 27 pF $\pm 2\%$ 100 VDCW. (Used in G9 and G10)
C68	194700006P55	Mica/toflap: 27 pE +2% 100 VDCW/ (Used in G9)		C94	19A700006P57	Mica/teflon: 43 pF $\pm 2\%$ 100 VDCW (Used in G8)
C69	194700006P49	Mica/teflop: 26 pF $\pm 2\%$ , 100 VDCW. (Used in G9).		C94	19A700006P49	Mica/teflon: 36 pF ±2% 100 VDCW (GZ)
C60	19A700006P58	Mice/teffon: 47 pE $\pm 2\%$ , 100 VDCW (GS).		C94	19A700006P58	Mica/teflon: 47 pE $\pm 2\%$ , 100 VDCW (Used in G6 and G11)
C69	19A700000F38	Mica/teflop: 20 pE $\pm 2\%$ , 100 VDCW. (Used in 66 and 611).		C94	19A700006P48	Mica/teflon: 33 pE $\pm 2\%$ , 100 VDCW. (Used in G3, G9, and
C69	194700006P55	Mica/teffon: 27 pF $\pm 2\%$ , 100 VDCW (G7).		001		G10).
C69	19A700006P57	Mica/teflop: 43 pE $\pm 2\%$ , 100 VDCW. (Used in G9).				
C70	194702061P49	Coromic: 56 pE $\pm$ 5%, 50 V/DCW, (osed in G6).				DIODES
C71	19A702061P63	Ceramic: 120 pE +5% 50 VDCW, temp coef 0 +30 PPM		D1 thru	19A705377P4	Silicon: Hot Carrier; sim to HP HSMS-2802.
C72	19A702052P26	Coramic: $0.1 \text{ uE} \pm 10\%$ , 50 VDCW, temp coel $0 \pm 30 \text{ PPM}$ .		D3		
and C73	10/11/02/02/120	Gerannic. 0.1 μι ±10%, 30 VDCVV.		D4 thru D6	19A700053P3	Silicon: 2 Diodes in Series, Common Cathode; sim to MBAV70L.
C75 thru C77	19A702052P26	Ceramic: 0.1 $\mu F$ ±10%, 50 VDCW.				JACKS
C78	19A705205P7	Tantalum: 10 µF, 25 VDCW; sim to Sprague 293D.		.1101	19A705512P1	Connector RE SMB Series: sim to AMP No. 221111-1
and C79				.1103	19A134263P1	Contact electrical sim to Selectro 229-1082-00-0-590
C81	344A3126P62	Porcelain: 1000 pF ±5%, 500 VDCW; sim to 102JT500X.		J104	7777145P5	Receptacle: sim to Amphenol 82-97.
C82	19A705108P40	Mica chip: 120 pF, ±5%, 100 VDCW, temp coef 0 ±50 PPM/°C.		J201	19A704852P32	Printed wire, two part: 6 contacts, sim
and C83						to Molex 22-29-2061.
C84	19A702061P89	Ceramic: 1500 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.(Used in G3, G6-G9, G11).				······ INDUCTORS ·····
C85 and	19A705108P40	Mica chip: 120 pF, ±5%, 100 VDCW, temp coef 0 ±50 PPM/°C.		L1	19C320617P10	Coil.(Used in G3, G6-G9 and G11).
C86				L1	19C320617P17	Coil.(Used in G10).
C87	19A700006P60	Mica/teflon: 56 pF ±2%, 100 VDCW. (Used in G8).		L2	19A701091G1	Coil (Used in G6, G7, G8 and G11).
C87	19A700006P58	Mica/teflon: 47 pF $\pm$ 2%, 100 VDCW. (Used in G6, and G11).		L3	19C320617P10	Coil (Used in G6, G7, G8, G10 and G11).
C87	19A700006P57	Mica/teflon: 43 pF ±2%, 100 VDCW. (Used in G7).		L4	19C320617P28	Coil.
C87	19A700006P50	Mica/teflon: 39 pF ±2%, 100 VDCW. (Used in G3).		L5	19A701091G1	Coil (Used in G6, G7, G8 and G11).
C87	19A700006P48	Mica/teflon: 33 pF $\pm$ 2%, 100 VDCW. (Used in G9 and G10).		L6	19C320617P10	Coil (Used in G6, G7, G8, G10 and G11).
C88	19A700006P59	Mica/teflon: 51 pF $\pm$ 2%, 100 VDCW. (Used in G6, G8, and G11).		L7	19A705470P4	Coil, Fixed: 15 nH; sim to Toko 380NB-15nM.
C88	19A700006P57	Mica/teflon: 43 pF ±2%, 100 VDCW. (Used in G7).		L8	19A705470P8	Coil, Fixed: 39 nH; sim to Toko 380NB-39nM.
C88	19A700006P50	Mica/teflon: 39 pF ±2%, 100 VDCW. (Used in G3).		L14	19C320617P17	Coil.
C88	19A700006P48	Mica/teflon: 33 pF $\pm$ 2%, 100 VDCW. (Used in G9 and G10).		L15 thru	19A700024P13	Coil, RF: 1.0 μH ±20%.
C89	19A700006P59	Mica/teflon: 51 ohms ±2%, 100 VDCW. (Used in G6, G8, and		L17		
		G11).		L18	19C320617P17	Coil.
C89	19A700006P57	Mica/teflon: 43 pF ±2%, 100 VDCW. (Used in G7).		L23	19A705470P8	Coil, Fixed: 39 nH; sim to Toko 380NB-39nM.
C89	19A700006P50	Mica/teflon: 39 pF ±2%, 100 VDCW. (Used in G3).		L25	19A701091G1	Coil.
C89	19A700006P48	Mica/teflon: 33 pF $\pm$ 2%, 100 VDCW. (Used in G9 and G10).		and	19C320617P10	Coll.
C90	19A700006P60	Mica/teflon: 56 pF ±2%, 100 VDCW. (Used in G8).		L30		
C90	19A700006P58	Mica/teflon: 47 pF $\pm$ 2%, 100 VDCW. (Used in G6 and G11).				TRANSISTORS
C90	19A700006P57	Mica/teflon: 43 pF ±2%, 100 VDCW. (Used in G7).		01	2444204904	
C90	19A700006P50	Mica/teflon: 39 pF ±2%, 100 VDCW. (Used in G3).			344A3946P1	Silicon, NPN: 440-312 MHz, 50W; Sim to MRF 650.
C90	19A700006P48	Mica/teflon: 33 pF $\pm$ 2%, 100 VDCW. (Used in G9 and G10).		and	344A4134F1	Silicon, NEN. 470-312 MID2, 65W, SIII to MICE 656.
C91	19A700006P57	Mica/teflon: 43 pF ±2%, 100 VDCW. (Used in G8).		Q3	10A700076P2	Silicon NDN: cim to MMRT2004 low profile
C91	19A700006P58	Mica/teflon: 47 pF $\pm$ 2%, 100 VDCW. (Used in G9 and G11).		and	13410001012	Sincon, W W. sin to WWD 13304, low prome.
C91	19A700006P49	Mica/teflon: 36 pF ±2%, 100 VDCW. (Used in G7).		07	104701040D1	Silicon NDN: cim to MDE EE0
C91	19A700006P48	Mica/teflon: 33 pF $\pm$ 2%, 100 VDCW. (Used in G3, G9 and G10).		Q7	344A3058P1	Silicon, NPN.
C92	19A700006P59	Mica/teflon:(Used in G8).		Q203	19A700055P1	Silicon, PNP.
C92	19A700006P57	Mica/teflon: 43 pF $\pm 2\%,$ 100 VDCW. (Used in G6 and G11).				
C92	19A700006P50	Mica/teflon: 39 pF $\pm 2\%,$ 100 VDCW. (Used in G7).				RESISTORS
C92	19A700006P48	Mica/teflon: 33 pF $\pm$ 2%, 100 VDCW. (Used in G3).		R1 and	19B800607P270	Metal film: 27 ohms $\pm$ 5%, 1/8 w.
C92	19A700006P55	Mica/teflon: 27 pF $\pm 2\%,$ 100 VDCW. (Used in G9 and G10).		R2		
C93	19A700006P59	Mica/teflon: 51 ohms $\pm 2\%$ , 100 VDCW. (Used in G8).		R3 thru	19B801486P101	Metal film: 100 ohms $\pm$ 5%, 1/2 w.
C93	19A700000F57	Mica/terion: 45 pr $\pm 2\%$ , 100 VDCW. (Used in Gb and G11).		R6 P7	19B800607P183	Motal film: 19K abma ±5% 1/2 ···
			<u> </u>			Wotai IIIII. TON UTITIS ±370, 1/0 W.

\* COMPONENTS, ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

# PARTS LIST & PRODUCTION CHANGES

SYMBOL	PART NO.	DESCRIPTION	SYMBOL	PART NO.	DESCRIPTION	SYMBOL	PART NO.	DESCRIPTION	SYMBOL	PART NO.	DESCRIPTION
					IACKS						
R8	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.			JACKS	35	19A705469P1	Insulator Plate, TO-220.	L3 thru	19B227929P1	Coil.
R10			J1		Part of W1.	36	19A700068P1	Insulator, bushing.	L6		
R11	19B800607P223	Metal film: 22K ohms ±5%, 1/8 w.	J104	7777145P5	Receptacle: sim to Amphenol 82-97.	37	19A134455P3	Flat washer.			
R12	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.			TRANSISTORS	38	19B801659G3	Cover (see separate parts list).			
R18			01	2444204004		41	19A700033P6	Loackwasher, external tooth, M3.5.			19D902023G9
R19	19B800607P472	Metal film: 4.7K ohms ±5%, 1/8 w.	Q1	344A3948P1	Silicon, NPN: UHF Amplifier; sim to Motorola MRF 650.	45	N405P5B6	Lockwasher.			CARACITORS
R20			and	344A4134P1	Silicon, NPN: OFF Amplilier.	40	19A701312P4	Tab scrow TOPX Drive M3-0.5 x 8		40470000004	
R21	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.	Q3	40470005504	Silicon DND: Derlington: ein to TID 425	51	19A70230TF 400	Resistor Spacer	01	19A700006P1	Mica: 4.7 pF ±10%, 100 VDCW.
R23			Q203	19A700055P1	Silicon, PNP: Danington; sim to TIP-125.	51	13470310011	Resistor opacer.	and	19A700006P3	Mica: 6.8 pF ±10%, 100VDCW.
R24	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.			····· RESISTORS ······			COVER	C3		
R26			R28	19A143832P6	Power: 100 ohm 5%, 40 w.		10000010101	19B801659G3			······ INDUCTORS ······
R27	19B800607P822	Metal film: 8.2K ohms ±5%, 1/8 w.	and R29	10,11,100021,0		2	19D902421P1	Power Amplifier Cover.	1.1	10C320617P17	Coil
R28	19A143832P6	Power: 100 ohms ±5%, 40 w.	1120			4	19A702381P522	Screw, thread forming:	thru	19032001711	Con.
R29					INTEGRATED CIRCUITS	5	19A701365P4	Washel.	L4		
R30	19B800607P750	Metal film: 75 ohms ±5%, 1/8w.	U1	19A705457P2	PA module: 440-470 MHz; sim to M57704H. (Used in G3).	13	5/03/77P0	Avial fan			MISCELLANEOUS
R31	19B800607P330	Metal film: 33 ohms ±5%, 1/8 w.	U1	19A705457P1	PA module: 400-450 MHz; sim to M57704M. (Used in G7).	13	5493477P10	Grille	11	194702455P5	Nut self clinching
R32	19A700050P17	Wirewound: 2.2 ohms $\pm 10\%,$ 2 w. (Used in G3, G9, and G10).	U1	19A705457P3	PA module: 470-512 MHz; sim to M57704SH. (Used in G9	14	N80P13028B6	Machine screw		1347024331 3	Nut, son einennig.
R33	19B800607P392	Metal film: 3.9K ohms ±5%, 1/8 w.			and G10).	16	N210P21B6	Machine orew.			
R34	19B801486P100	Metal film: 10 ohms ±5%, 1/2 w.	U1	19A705457P7	PA module: 380-400 MHz; sim to M57704UL. (Used in G8).	17	19A701312P5	Flatwasher: M3.5.			
R35	19A700050P17	Wirewound: 2.2 ohms ±10%, 2 w. (Used in G3, G9).	U1	19A705457P4	PA module: 400-420 MHz; sim to M57704L. (Used in G6).	18	19A701863P10	Clip, loop.		PR	ODUCTION CHANGES
R36	19B801486P101	Metal film: 100 ohms $\pm$ 5%, 1/2 w. (Used in G40, G3, and G6).	02	19A702293P3	Linear: Dual Op Amp; sim to LM358D.	20	19A702364P410	Machine screw.	Changes	s in the equipr	ment to improve performance or to simplify
R37	19B801486P331	Metal film: 330 ohms ±5%, 1/2 w. (Used in G3, G6-G9, G11).	03	19A701789P4	Linear: Quad Op Amp; sim to LM224D.	24	N405P37B6	Lock washer.	circuits a	are identified b	y a "Revision Letter" which is stamped after
R38	19B800607P223	Metal film: 22K ohms ±5%, 1/8 w.	U7 U100	344A3907P1	Integrated Circuit Linear (Positive Voltage Regulator); sim to	25	L401P23B6	Split washer.	the mod	el number of	the unit. The revision stamped on the unit
R39	19B800607P100	Metal film: 10 ohms ±5%, 1/8 w.	0100	19A705532P2	MC78T15CT.	26	19A700034P5	Hex nut.	descripti	ons of parts at	ffected by these revisions.
R40											
R41	19A702931P333	Metal film: 21.5K ohms ±1%, 200 VDCW, 1/8 w.			CABLES	. <u></u>					
R42	19A702931P293	Metal film: 9090 ohms ±1%, 200 VDCW, 1/8 w.	W1	19B801529G4	RF Input Cable. Includes the following:		LOV	V PASS FILTER MODULE 19D902856G3 & G9	REV. A	POWER AM	PLIFIER 19D902797G3 PLIFIER BOARD 19D902794G3
R43	19A700109P5	Variable, cermet: 25 ohms to 10K ohms ±20%, 1/4 w.		19B800560P2	RF Cable.			ISSUE 2		To make unit	t ETS compliant.
R44	19B801486P101	Metal film: 100 ohms $\pm$ 5%, 1/2 w.		19A705512P3	Connector, RF SMB series: sim to AMP 228213-1.	SYMBOL	PART NO.	DESCRIPTION		C17, C44, C4	45 were 19A702052P33.
R46				19A115938P1	Connector, coaxial: (BNC Series); sim to Amphenol 31-318.					C50 was 0.0	68 μF (19A702052P24).
R47	19B801486P750	Metal film: 75 ohms $\pm$ 5%, 1/2 w.	W4	19B801695G11	Power Cable. Includes the following:			JACKS		C61 was 8.2	pF (19A702061P12). pF (19A702061P33).
R48				19B209268P115	Solderless terminal.	J1	7777145P5	Receptacle: sim to Amphenol 82-97.		C84 was 100	00 pF (19A705108P40).
R49	19B801486P101	Metal film: 100 ohms $\pm$ 5%, 1/2 w. (Used in G3, G6-G9, G11).		19B209260P11	Solderless terminal.	J2				D1, D2, D3 v	vere (19A700047P3)
R50	19B800607P1	Metal film: Jumper. (Used in G8, G9, G10 and G11).		19A115959P2	vvire, stranded.					124 was 15n	were (19A700024P37). H (19A705470P3)
R51	19B801486P331	Metal film: 330 ohms $\pm 5\%,1/2$ w.(Used $$ in G3, G6-G9, G11).		19A701503P2	Cable: battery, red.			MISCELLANEOUS		R33 was 5.6	K (19B800607P562).
R52	19B801486P100	Metal film: 10 ohms $\pm$ 5%, 1/2 w.		10B200268B116	Solderloss terminal	2	19D903063P1	Casting.		R34 was 3.9	ohms composition (19A700113P5).
R53	19B800607P1	Metal film: Jumper.	W10	19B209200F110	Power cable	3	19D903064P1	Casting.		L26 and L27	were removed.
R54	19B800607P472	Metal film: 4.7 ohms ±5%, 1/8 w.	W13	19B801739P1	Power control cable	5	19A702381P513	Screw, thread forming: TORX, No. M3.5 - 0.6 X 13.		C1, (19A702	052P26) was added.
R55	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.				6	19A702364P210	Machine screw, metric: M2.545 x 10.		C25, C26 (34	44A3126P38) were added.
R56	19B800607P330	Metal film: 33 ohms ±5%, 1/8 w.			MISCELLANEOUS	7	19A134455P3	Flatwasher.		R37, R51 (19	B801486P331) were added.
R57	19B800607P222	Metal film: 2.2 ohms ±5%, 1/8 w.	2	19D902420P6	Heatsink.	8	19A700032P3	LOCKWASNER, tooth, steel, metric: 2.5.		Q7 was 19A7	701940P1.
R58 and	19A700113P7	Composition: 4.7 ohms $\pm$ 5%, 1/2 w (Used in G10).	5	19A702381P510	Screw, thread forming: TORX DRIVE No. M3.5 0.6 x 10.			UHF FILTER BOARD		RT1 (19A705	5813P2) was added.
R59			6	7139898P3	Nut, hex, brass: No. 1/4-28.			19D902853G3		VR2 (19A700	0083P102) was added.
			11	19A702364P310	Machine screw, TORX Drive: No. M3-0.5 x 10.				REV. B	POWER AM	PLIFIER 19D902797G3
		THERMISTOR	14	19B209268P113	Terminal, solderless: sim to AMP 2-34835-4. (Used in G11).			CAPACITORS		POWER AM	PLIFIER BOARD 19D902794G3
RT1	19A705813P2	Thermistor: sim to AL03006-58.2K-97-G100.		19A115959P2	Wire, stranded. (Used in G11).	C1	19A700006P2	Mica: 5.6 pE +10% 100 VDCW: sim to Underwood		PWB change	ed
				19B209268P116	Solderless terminal. (Used in G11).	thru		3HS0020.		C26 was 100	) pF (344A3126P38).
		····· voliage regulators ·····	15	7147306P2	Insulator.	C4	19A700006P1	Mica: 4.7 pE +10% 100VDCW		C81 was 100	) pF (344A3126P38).
VR1 and	19A700083P102	Silicon: 5.1 Volt Zener; sim to BZX84-C5V1.	16	19A700136P7	Insulated sleeving.	C5	19470000000	Mice: 5.6 pE $\pm 10\%$ 100 VDCW, sim to Underwood		C27 thru C29	9 added: 8.2 pF (344A3126P11). 5 added: 12 pF (344A3126P15)
VR2			21	19A701863P27	Clip, loop.	0.5	13A100000F2	3HS0020.		R36 was 150	) ohms (19B801486P151).
		040407000	22	19A701312P5	Flatwasher: M3.5.			······ INDUCTORS ······		R44 thru R46	6 were 150 ohm (19B801486P151).
		CAPACITORS	28	19A702364P316	Machine Screw: Pan Head, Steel.	L1	19C320618P7	Coil.		R47 and R48	3 were 39 ohm (19B801486P390).
C1	19A116708P2	Ceramic feedthru: 0.01 μF -0 +100%, 500 VDCW; sim to Erie 327-050-X5W0103P.	29	19A700034P4	Nut, hex: No. M3 x 0.5MM.	L2				R32 and R35	auueu. 2.2 01111 (19A700050P17).
			30	19A700033P5	Lock washer, external tooth: No. 3.	* COMPONE	ENTS ADDED DEI	LETED OR CHANGED BY PRODUCTION CHANGES			

# LBI-38674F

- REV. C <u>POWER AMPLIFIER 19D902797G3</u> <u>POWER AMPLIFIER BOARD 19D902794G3</u> To update PWB for new band splits.
- REV. D POWER AMPLIFIER 19D902797G3 POWER AMPLIFIER BOARD 19D902794G3 To update PWB for new band splits and add power monitor circuitry Added U2, C48, R54, R53, R55.
- REV. A POWER AMPLIFIER 19D902797G6 To update PWB to new band splits.
- REV. A POWER AMPLIFIER 19D902797G7 POWER AMPLIFIER BOARD 19D902794G7 To update PWB to new band splits and add power monitor circuitry Added U2, C48, R54, R53, R55.
- REV. A <u>POWER AMPLIFIER 19D902797G8, G9, G11</u> <u>POWER AMPLIFIER BOARD 19D902794G8, G9, G11</u>
- REV. B <u>POWER AMPLIFIER 19D902797G6, G7</u> <u>POWER AMPLIFIER BOARD 19D902794G6, G7</u>
- REV. E POWER AMPLIFIER 19D902797G3 POWER AMPLIFIER BOARD 19D902794G3
- To update PWB to new band splits for 492-512 MHz. REV. B POWER AMPLIFIER BOARD 19D902797G11
- Improve reliability. C67 was 39 pF (19A700006P50).



(19D902794 Sh. 2, Rev. 14)



**POWER AMPLIFIER BOARD A1** 19D902856G3, G6, G7, G8, G9, G10 & G11

#### **COMPONENT SIDE**



### SCHEMATIC DIAGRAM



### LBI-38674F

# 19D902797G3, G6, G7, G8, G9, G10 & G11

(19D903622 Sh. 1, Rev. 11)

# OUTLINE AND SCHEMATIC DIAGRAMS

LBI-38674F

# TABLE I

REF. DES.	380-400 MHz	403-425 MHz	425-450 MHz	450-470 MHz	470-494 MHz	492-512 MHz	410-430 MHz
C27	10.0 pf	12.0 pf	10.0 pf	not used	not used	not used	12.0 pf
C28	15.0 pf	12.0 pf	82 pf	not used	not used	not used	10.0 pf
C29	15.0 pf	12.0 pF	8.2 pF	not used	not used	not used	10.0 pf
C30	12.0 pF	not used	not used	8.2 pF	8.2 pF	8.2 pF	not used
C31	12.0 pF	not used	not used	8.2 pF	8.2 pF	8.2 pF	not used
C32	not used	not used	not used	3.3 pF	not used	not used	not used
C33	not used	not used	not used	3.3 pF	not used	not used	not used
C34	not used	15.0 pF	15.0 pF	not used	not used	not used	15.0 pF
C35	not used	15.0 pF	15.0 pF	not used	not used	not used	15.0 pF
C36	3.9 pF	4.7 pF	not used	not used	not used	not used	4.7 pF
C58	12.0 pF	12.0 pF	12.0 pF	8.2 pF	5.6 pF	5.6 pF	12.0 pF
C65	not used	not used	not used	8.2 pF	4.7 pF	4.7 pF	not used
C66	47.0 pF	39.0 pF	39.0 pF	33.0 pF	27.0 pF	27.0 pF	39.0 pF
C67	47.0 pF	47.0 pF	39.0 pF	36.0 pF	27.0 pF	27.0 pF	47 pF
C68	47.0 pF	39.0 pF	39.0 pF	33.0 pF	27.0 pF	22.0 pF	39.0 pF
C69	47.0 pF	47.0 pF	39.0 pF	36.0 pF	27.0 pF	22.0 pF	43.0 pF
C87	56.0 pF	47.0 pF	43.0 pF	39.0 pF	33.0 pF	33.0 pF	47.0 pF
C88	51.0 pF	51.0 pF	43.0 pF	39.0 pF	33.0 pF	33.0 pF	51.0 pF
C89	51.0 pF	51.0 pF	43.0 pF	39.0 pF	33.0 pF	33.0 pF	51.0 pF
C90	56.0 pF	47.0 pF	43.0 pF	39.0 pF	33.0 pF	33.0 pF	47.0 pF
C91	51.0 pF	47.0 pF	36.0 pF	33.0 pF	33.0 pF	33.0 pF	43.0 pF
C92	51.0 pF	43.0 pF	39.0 pF	33.0 pF	27.0 pF	27.0 pF	43.0 pF
C93	51.0 pF	43.0 pF	39.0 pF	33.0 pF	27.0 pF	27.0 pF	43.0 pF
C94	51.0 pF	47.0 pF	36.0 pF	33.0 pF	33.0 pF	33.0 pF	43.0 pF
L2	BEAD	BEAD	BEAD	not used	not used	not used	BEAD
L3	AIR COIL	AIR COIL	AIR COIL	not used	not used	not used	AIR COIL
L5	BEAD	BEAD	BEAD	not used	not used	not used	BEAD
L6	AIR COIL	AIR COIL	AIR COIL	not used	not used	not used	AIR COIL
R32	not used	not used	not used	2.2 pF	2.2 pF	not used	not used
R35	not used	not used	not used	2.2 pF	2.2 pF	not used	not used
C37	2.2 pF	not used					
R53	not used	0	0	0	not used	not used	not used
R50	0	not used	not used	not used	0	0	0
C41	not used	100.0 pF					
C46	not used	not used	not used	not used	8.2 pF	10.0 pF	not used
C47	not used	not used	not used	not used	8.2 pF	10.0 pF	not used
R58	not used	4.7 pF	not used				
R59	not used	4.7 pF	not used				
R49	100	100	100	100	100	not used	100
R37	330	330	330	330	330	not used	330
R51	330	330	330	330	330	not used	1200 pF
C84	1200 pF	not used	1200 pF				
L1	3 turn	1 turn	3 turn				

### POWER AMPLIFIER ASSEMBLY 19D902797G3, G6, G7, G8, G9,G10 & G11

(19D903622 Sh.2 Rev. 11)

# **COMPONENT SIDE**





SOLDER SIDE



(19D902853, Sh. 2, Rev. 0) (19D903638, Solder Side, Rev. 0)



LOW PASS FILTER MODULE 19D902856G3

(19D903623 Sh.1, Rev. 1)

# SCHEMATIC DIAGRAM & IC DATA

**U1** 19A705457P1, P2 AND P4 **PA Amplifier Module** 



U7

- I. Pin 2. V<sub>CC1</sub>-1ST STAGE 3. Vcc - 2ND STAGE 4. Vcc - OUTPUT STAGE 5. Pout 6. FIN - GROUND





LOW PASS FILTER MODULE 470 - 512 MHz 19D902856G9

(19B804157, Rev. 0)



# LBI-38674F

# **U100** 19A705532P2 Voltage Regulator





