MAINTENANCE MANUAL
ORION™
VHF POWER AMPLIFIER UNITS

344A4572P1	JHM-271PEA	25 WATT	136 - 153 MHz
344A4572P2	JHM-271PEB	25 WATT	150 - 174 MHz
344A4572P3	JHM-271PLA	50 WATT	136 - 153 MHz
344A4572P4	JHM-271PLB	50 WATT	150 - 174 MHz
344A4572P5	JHM-271PHA	110 WATT	136 - 153 MHz
344A4572P6	JHM-271PHB	110 WATT	150 - 174 MHz

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ILLUSTRATIONS

Ericsson GE Mobile Communications Inc.
Mountain View Road • Lynchburg, Virginia 24502

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LBI-39002

DESCRIPTION

RF Power Amplifiers for the Ericsson GE VHF **ORION**™ mobile radio are provided in three different power levels designated as follows:

- 344A4572P1, P2 - 136-174 MHz, 25 WATT used in low power applications
- 344A4572P3, P4 - 136-174 MHz, 50 WATT Used in mid power applications
- 344A4572P5, P6 - 136-174 MHz, 110 WATT used in high power applications

The exciter for each of the three power amplifiers is located on Synthesizer/Receiver/Exciter board CMN-352-1. This exciter circuit provides approximately 500 milliwatt input to the PA (refer to Maintenance Manual ***LBI-38910***). The PA utilizes a single power amplifier module (HC1) as the driver unit. In the case of the 25 watt amplifier the power module is the only power amplifying unit. With the other two power levels the power module drives other power transistors to provide the power output required. Each power amplifier is provided with an antenna switch and limiter circuit to isolate the receive circuit from the transmit circuit, limiting the receiver input from being over driven due to large RF signals. Each power amplifier has a power detect circuit which controls an **A**utomatic **P**ower **C**ontrol (**APC**) circuit to keep the power output constant. A low-pass filter is provided in the antenna circuit to reduce harmonic emissions. A keyed **Tx 9V** regulator is provided to power the APC circuits.

CIRCUIT ANALYSIS

25 WATT

The 25 Watt PA assembly uses one power module (HC1) to provide the output power.

Supply voltage for the power amplifier is connected from power leads on the System Interface Board to J3 (A+) and G (A-) on the PA Board. Capacitors C1001 and C1002 on the flexible interface printed wire board, prevent RF from getting on the power leads. Diode CD8 will cause the fuse to blow if the polarity of the power leads is reversed. Diode CD7 is a surge protector to suppress pulses on the power leads.

The Exciter output is coupled through connector J2 on the Synthesizer/Receiver/Exciter Board to input connector J1 on the PA board. The 500 milliwatt RF input at J1 is coupled to power module HC1 through an attenuator pad consisting of resistors R1-R3. This pad attenuates the power to about 300 milliwatt and provides isolation between Exciter and PA. The power module (HC1) amplifies the 300 milliwatt input to 30 Watts.

The power module consists of a two-stage RF amplifier (Refer to **IC DATA**). The first stage power supply voltage is supplied by the power control circuit. The second stage power supply voltage is supplied by **SMOOTHING FILTER** transistor TR1. The second RF amplifier operates in class C.

The 25 Watts output of HC1 is coupled to the **ANTENNA** and **ANTENNA SWITCH & LIMITER** circuits through 50 ohm stripline Z1.

Antenna Switch & Limiter

The Antenna Switch circuit consists of two PIN diodes, CD3 and CD4, and a quarter-wave circuit with "lumped" constants capacitor C25 and inductor L8. Capacitor C25 and inductor L8 and take the place of a quarter-wave micro strip line. When the transmit circuit is keyed and **TX9V** output goes high, bias current flows through switching diodes CD3 and CD4. A low impedance now exists at the anode of CD4 and a high impedance exists at the node connection of C25 and L8. This isolates the transmitter power from the receiver. Diode CD3 is now an RF short and, along with capacitor C12, couples the power to the low pass filter and on to the antenna.

The limiter circuit consists of transistors TR7, TR8, diode package CD13 and other associated components. While receiving, if the received signal level exceeds +10 dBm, the rectified currents of CD13 provide forward bias to TR7, TR8 and PIN diode CD4 proportional to the received signal level. This causes the quarter-wave circuit (lumped constants C25 and L8) to turn on when the received signal exceeds +10 dBm and protects the receiver from excessively high receive signal levels.

In the receive mode, signals from the antenna are coupled through this filter and limiter to the receiver input.

Tx 9V Switch

When the **$\overline{\text{TX EN}}$** lead, located on the Synthesizer/Receiver/Exciter board, goes low, the DC voltage on J102 goes low. On the PA board, the DC voltage on J1 also goes low completing the circuit for diode CD9. With CD9 conducting **TX 9V** Switch transistor TR6 conducts applying A+ (13.32 V) to the input of +9 Volt Regulator IC1. The regulated +9 volts applies bias to IC2, TR2 and the switching diodes CD3 and CD4.

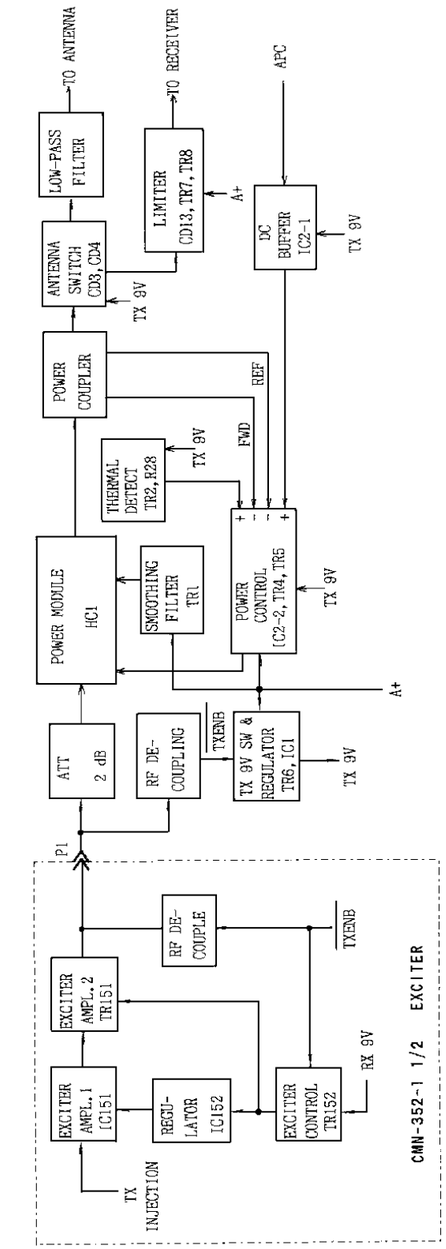

Figure 1 - Block Diagram For 25-Watt Power Amplifier

LBI-39002

Power Control

The **A**uto **P**ower **C**ontrol (**APC**) circuit protects the transmitter PA from damage due to:

a. excessive output power

b. excessive reflected power

or

c. excessive temperature

The output power control circuit allows the RF output power to be set at rated power by the APC voltage from the Logic/IF/Audio Board. If the output power of the PA increases, the detected voltage and the input to operational amplifier IC2-2 increases. The output voltage of operational amplifier IC2-2 decreases. This causes **DC DRIVER** transistor TR5 to conduct less. This increases the base voltage on PNP **DC PASS** transistor TR4, causing it to conduct less. This results in less voltage being applied to the first amplifier stage in RF Power Module HC1, reducing the output power of the PA in proportion to the increases in output power detected by the circuit.

To protect the PA against badly mismatched loads, a reverse power detector circuit (**VSWR**) consisting of diode CD11, operational amplifier IC2-2, transistor TR5 and pass transistor TR4 detects reverse (reflected) power. When sufficient power is detected by CD11 to cause IC2-2 to conduct, the voltage at the output of IC2-2 decreases, causing the Power Module to lower the output power, protecting the PA.

The PA is protected against temperature increases by a thermal detector circuit. This circuit consists of resistor R28, **THERMAL DETECT** transistor TR2, **DC DRIVER** transistor TR5 and DC AMPL operational amplifier IC2-2. As temperature increases, the resistance to ground through thermal detector resistor R28 increases. This causes IC2-2 to conduct less, causing a decrease in PA output until the temperature level is reduced. The temperature level is set by resistor R28. When the heat sink temperature rises above 90*C, the resistance of R28 increases and the power output is reduced.

50 WATT

The 50 Watt PA assembly uses one power module (HC1) and one RF power transistor (TR1) to provide the output power.

Supply voltage for the power amplifier is connected from power leads on the System Interface Board to J3 (A+) and G (A-) on the PA Board. Diode CD11 is a surge protector to suppress pulses on the power leads. (*Diode CD1001 in the PA Interconnection will cause a fuse to blow if the voltage polarity is reversed. Refer to the PA INTERCONNECTION DIAGRAM*)

Test **P**oints (**TP**) are the printed board terminals for measuring control voltage as follows:

TP1 A+ (13.42V)
TP2 Control Voltage (4.72V)
TP3 Forward Power Detect (2.64V)
TP4 Tx 9V (9.12V)
TP5 APC Voltage on output of DC AMPL IC2-1 (2.64V)
TP6 Voltage to HC1, pins 3 &4 (12.5V)
TP7 APC Voltage (3.5V)

The Exciter output is coupled through connector J102 on the Synthesizer/Receiver/Exciter Board to input Jack P1 on the PA board. The 500 milliwatt RF input at P1 is coupled to power module HC1 through an attenuator pad consisting of resistors R1-R4. This pad attenuates the 500 milliwatt to about 300 milliwatt and provides isolation between Exciter and PA. The power module (HC1) amplifies the 300 milliwatt input to 14 Watts.

The power module consists of a two-stage RF amplifier (Refer to IC DATA). The first stage power supply voltage is supplied by the power control circuit. The second stage power supply voltage is supplied by **SMOOTHING FILTER** transistor TR7. The second RF amplifier operates in class C.

The 14 Watts output of HC1 is coupled to **POWER AMPL** transistor TR1 through impedance matching components consisting of capacitors C4 through C9, inductors L1 and L2 and stripline Z1. Transistor TR1 amplifies the 14 Watt level to 60 Watts. The output of TR1 is coupled to the **ANTENNA** and **ANTENNA SWITCH** through impedance matching components consisting of capacitors C13 through C15, C159, C166, C168, C173, inductors L3 and L4, and impedance matching network Z2 through coupling capacitor C16 and 50 ohm stripline Z7.

Antenna Switch

The Antenna Switch circuit consists of capacitor C57 and inductor L24 and takes the place of a quarter-wave micro strip line. When TX9V output goes high, bias current flows through switching diodes CD1, CD3 and CD5. A low impedance now exists at the anode of CD3 and a high impedance exists at the node connection of C57 and L24. This isolates the transmitter power from the receiver. Diode CD1 is now an RF short and, along with capacitor C48, couples the power to the low pass filter and on to the antenna.

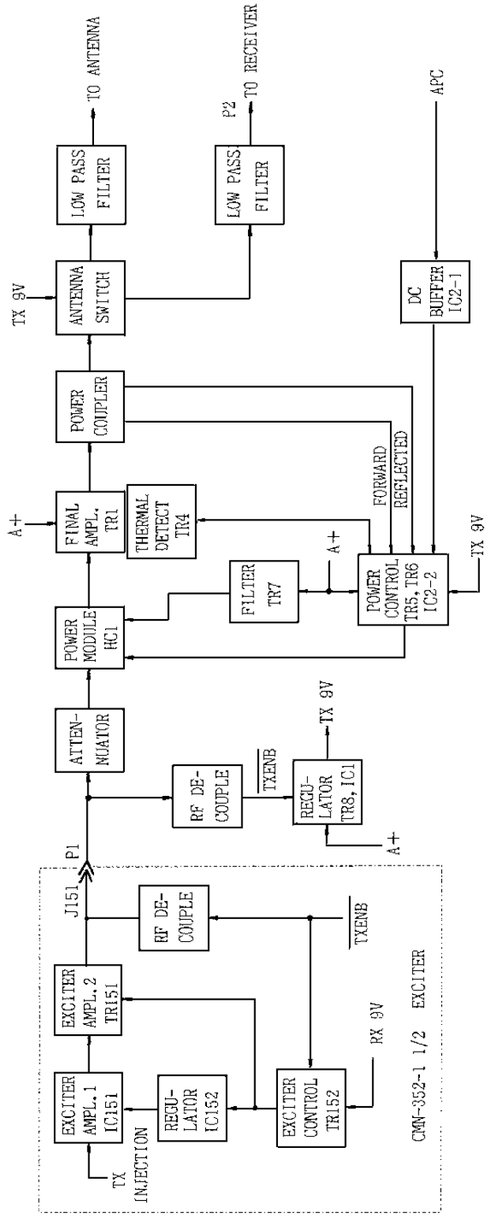

Figure 2 - Block Diagram For 50-Watt Power Amplifier

LBI-39002

Tx 9V Switch

When the $\overline{\text{TX EN}}$ lead goes low, **TX 9V** switching transistor TR8 conducts, applying A+ (13.32 V) to the input of +9 Volt Regulator IC1. The regulated +9 volts (**TX 9V**) applies bias to IC2, TR4, forward and reverse detector diodes CD6 and CD7 and switching diodes CD1, CD3 and CD5.

Power Control

The **A**uto **P**ower **C**ontrol (**APC**) circuit protects the transmitter PA from damage due to:

a. excessive output power

b. excessive reflected power

or

c. excessive temperature

The output power control circuit allows the RF output power to be set at rated power by the APC voltage from the Logic/IF/Audio Board. If the output power of the PA increases, the detected voltage and the input of operational amplifier IC2-2 increases. The output voltage of IC2-2 decreases. This causes **DC DRIVER** transistor TR6 to conduct less. This increases the base voltage on PNP **DC PASS** transistor TR5, causing it to conduct less. This results in less voltage being applied to the first amplifier stage, in driver module (HC1), reducing the output power of the PA in proportion to the increases in output power detected by the circuit.

To protect the PA against badly mismatched loads, a reverse power detector circuit (**VSWR**) consisting of diode CD7, transistor TR6, operational amplifier IC2-2 and pass transistor TR5 detects reverse (reflected) power. When sufficient power is detected by CD7 to cause it to conduct, the voltage at the output of IC2-2 decreases, causing the driver module to lower the output power, protecting the PA. The reverse power level is set by resistor R19 connected in series with diode CD7.

The PA is protected against temperature increases by a thermal detector circuit. This circuit consists of resistor R31, transistors TR4, TR5, TR6 and operational amplifier IC2-2. As temperature increases, the resistance to ground through thermal detector resistor R31 increases. This causes IC2-2 to conduct less, causing a decrease in PA output until the temperature level is reduced. The temperature level is set by resistor R31. When the heat sink temperature rises above 90*C, the resistance of R31 increases and the power output is reduced.

110 WATT

The 110 Watt PA assembly uses one power module (HC1) and three RF power transistors (TR1, TR2 and TR3) to provide the output power.

Supply voltage for the power amplifier is connected from power leads on the System Interface Board to J3 (A+) and G (A-) on the PA Board. Capacitors C87 and C88 prevent RF from getting on the power leads. Diode CD10 causes a fuse to blow if the polarity of the power leads is reversed. Diode CD11 is a surge protector to suppress pulses on the power leads.

Test **P**oints (**TP**) are the printed board terminals for measuring control voltage as follows:

TP1	A+ (13.32V)
TP2	Control Voltage (4.27V)
TP3	Forward Power Detect (3.2V)
TP4	Tx 9V (9.2V)
TP5	APC Voltage on output of DC AMPL IC2-1 (2.66V)
TP6	Voltage to HC1, pins 3 & 4 (12.8V)
TP7	APC Voltage (3.5V)

The exciter output is coupled through connector J102 on the Synthesizer/Receiver/Exciter Board to input Jack P1 on the PA board. The 500 milliwatt RF input at P1 is coupled to power module HC1 through an attenuator pad consisting of resistors R1 through R4. This pad attenuates the 500 milliwatt input to 300 milliwatt and provides isolation between the Exciter and PA. Power Module HC1 amplifies the 300 milliwatt input to 40 Watts.

The power module (HC1) consists of a two stage RF amplifier. The first stage of the module is controlled by the voltage from the power control circuit. The amplifier consist of two Class C driver amplifiers.

The 40 watt output from HC1 is coupled to a power **SPLITTER** circuit through a 50 ohm stripline. The power **SPLITTER** circuit consists of capacitors C15, C17 and C29 and inductors L7, L8 and L32. Resistor R8 absorbs any unbalance in the drive to **DRIVER AMPL-1/AMPL-2** transistors TR2 and TR3. The power amplifier stages (TR2 and TR3) are two identical paralleled class-C amplifiers. The output of the power SPLITTER circuit is coupled to transistors TR2 and TR3 through coupling capacitors C19, C20 and impedance matching components consisting of capacitors C21 through C28, inductors L9 and L10 and impedance matching networks Z3 and Z5.

The output of TR2 and TR3 is coupled to a power **COMBINER** through impedance matching components consisting of capacitors C33 through C42, C169 through C172, C174 and C175 , inductors L11 and L12 and impedance matching networks Z4 and Z6. The power **COMBINER** consists of capacitors C43 through C46 and inductors L13, L14 and L19. Resistor R9 absorbs the difference in the output power of TR2 and TR3. Transistors TR2 and TR3 each amplify the input level from 20 watts to 80 watts. The output of the **COMBINER** is coupled to the **ANTENNA SWITCH** through 50-ohm stripline Z7.

Antenna Switch

The antenna switch circuit consists of capacitor C57 and inductor L24 and takes the place of a quarter-wave micro strip line. When **TX9V** output goes high, bias current flows through switching diodes CD2 through CD5. A low impedance now exists at the anode of CD3 and CD4 and a high impedance exists at the node connection of C57 and L24. This isolates the transmitter power from the receiver. Diode CD2 is now an RF short and, along with capacitor C48, couples the power to the low pass filter and on to the antenna.

Tx 9V Switch

When the $\overline{\text{TX EN}}$ lead goes low, **TX 9V** switch transistor TR8 conducts applying A+ (13.32 V) to the input of +9 Volt Regulator IC1. The regulated +9 volts (**TX 9V**) applies bias to IC2, TR4, forward and reverse detector diodes CD6 and CD7 and switching diodes CD2 through CD5.

Power Control

The **A**utomatic **P**ower **C**ontrol (**APC**) circuit protects the transmitter PA from damage due to:

a. excessive output power

b. excessive reflected power

or

c. excessive temperature

The output power control circuit allows the RF output power to be set at rated power by the APC voltage from the LOGIC/IF/AUDIO Board. If the output power of the PA increases, the detected voltage and the input of operational amplifier IC2-2 increases. The output voltage of operational amplifier IC2-2 decreases. This causes transistor TR6 to conduct less. This increases the base voltage on PNP pass transistor TR5, causing it to conduct less. This results in less voltage being applied to the first amplifier stage in driver module (HC1), reducing the output power of the exciter/ PA in proportion to the increases in output power detected by the circuit.

To protect the PA against badly mismatched loads, a reverse power detector circuit (**VSWR**) consisting of diode CD7, transistor TR6, operational amplifier IC2-2 and pass transistor TR5 detect reverse (reflected) power. When sufficient power is detected by CD7 to cause IC2-2 to conduct, the voltage at the output of IC2-2 decreases, causing the driver module to lower the output power, protecting the PA. The reverse power level is set by resistor R19 connected in series with diode CD7.

The PA is protected against temperature increases by a thermal detector circuit. This circuit consists of resistor R31, transistors TR4, TR5, TR6 and operational amplifier IC2-2. As temperature increases, the resistance to ground through thermal detector resistor R31 increases. This causes IC2-2 to conduct less, causing a decrease in PA output until the temperature level is reduced. The temperature level is set by resistor R31. When the heat sink temperature rises above 90 C, the resistance of R31 increases and the power output is reduced.

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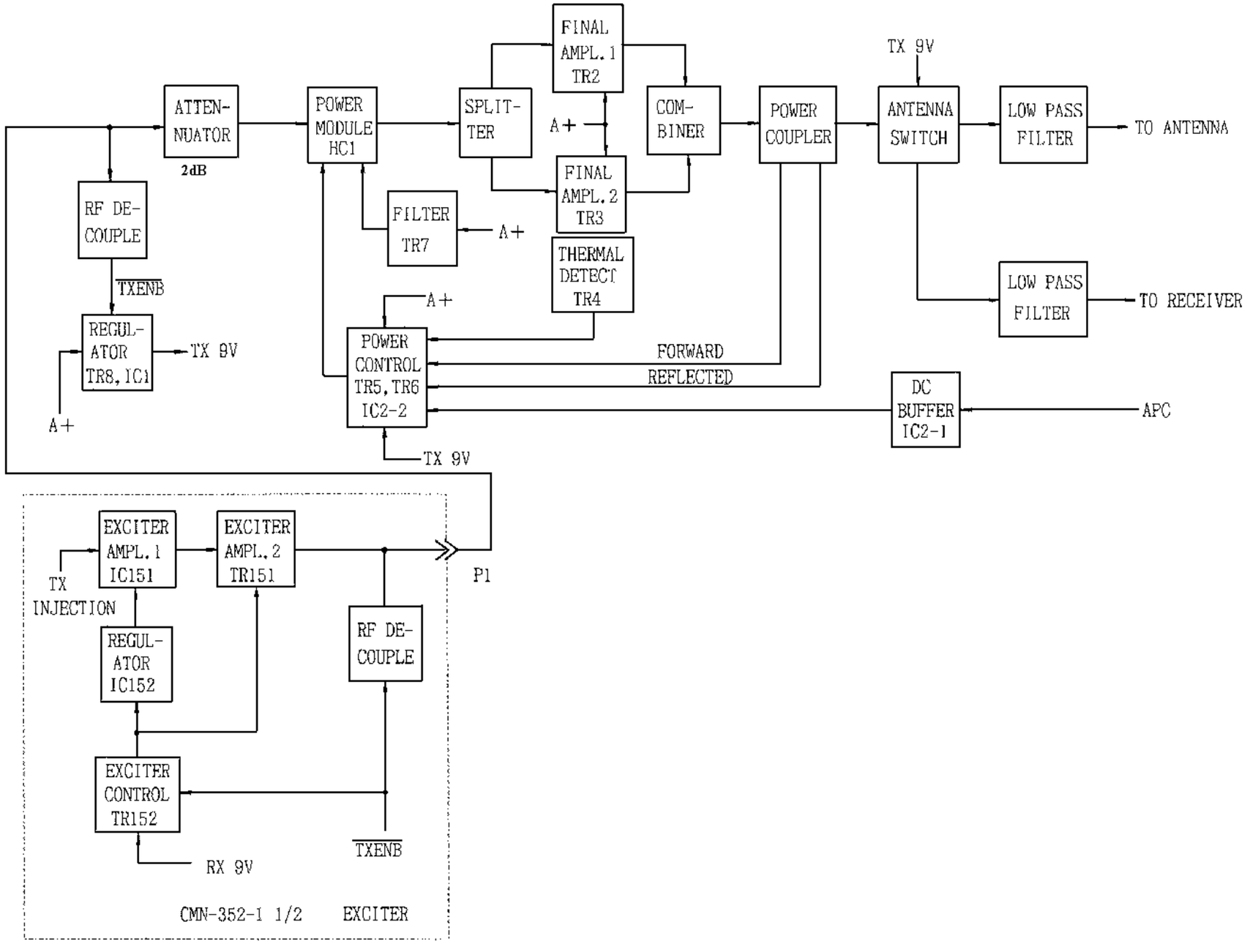
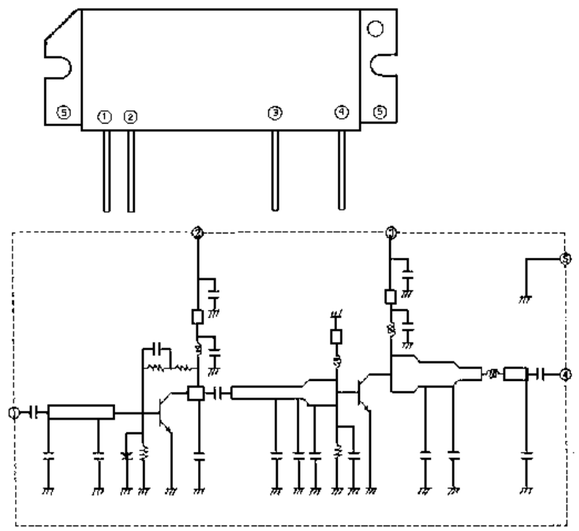


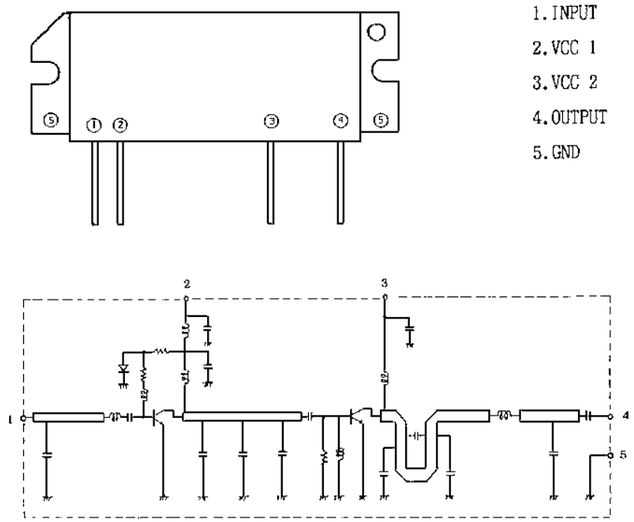
Figure 3 - Block Diagram For 110-Watt Power Amplifier

25-WATT POWER MODULE HC1



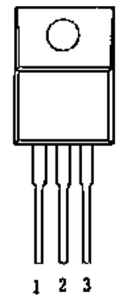
1. INPUT
2. VCC 1
3. VCC 2
4. OUTPUT
5. GND

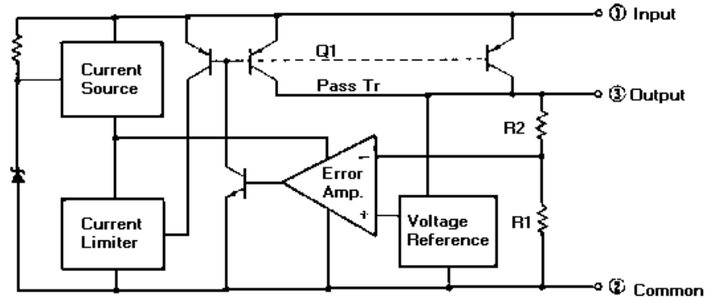
14-WATT POWER MODULE HC1



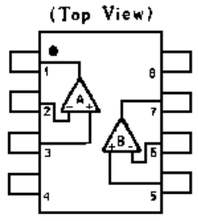
1. INPUT
2. VCC 1
3. VCC 2
4. OUTPUT
5. GND

9 VOLT REGULATOR IC1

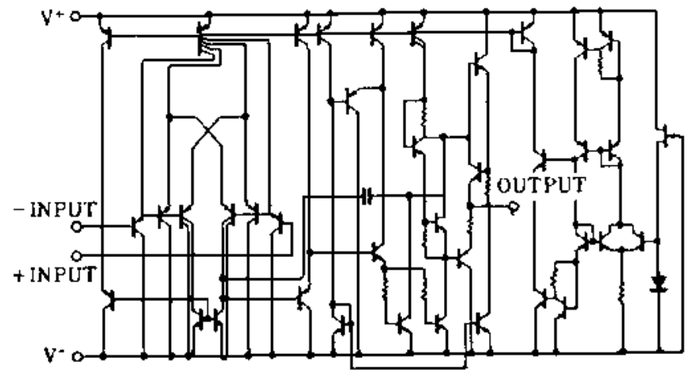




OPERATIONAL AMPLIFIER IC2



1. A OUTPUT
2. A−INPUT
3. A+INPUT
4. V⁻
5. B+INPUT
6. B−INPUT
7. B OUTPUT
8. V+



PA UNIT (EUROPEAN MODEL)
344A4572P1/JHM-271PEA
344A4572P2/JHM271PEB

SYMBOL	PART NO.	DESCRIPTION
A1	NOTE: Parts listed	PA CIRCUIT CAH-515EA (Used in 344A4572P1)
A1	are for reference	PA CIRCUIT CAH-515EB (Used in 344A4572P2)
A2	only. Refer to Service Section for serviceable parts.	INTERFACE CMH-1231E
		---------- CAPACITORS ----------
C1001 and C1002		Ceramic: 1000 pF +50%,-20% 50 VDCW temp coef ±15%.
		----------CONNECTORS----------
J1001		H-6JALD00005
TB1001		ALB-01A
		----------WIRE----------
W1001		250V-HV-19/0.18-(2).
		---------- COAXIAL CABLES ----------
ZC1002		H-6JJLD17125A
ZC1003		H-6JJLD17060A

PA UNIT (USA MODEL)
344A4572P3/JHM-271PLA
344A4572P4/JHM-271PLB
344A4572P5/JHM-271PHA
344A4572P6/JHM-271PHB

SYMBOL	PART NO.	DESCRIPTION
A1001	NOTE: Parts listed	PA CIRCUIT CAH-515LA (Used in 344A4572P3)
A1001	are for reference	PA CIRCUIT CAH-515LB (Used in 344A4572P4)
A1001	only. Refer to	PA CIRCUIT CAH-515HA (Used in 344A4572P5)
A1001	Service Section for	PA CIRCUIT CAH-515HB (Used in 344A4572P6)
A1002	serviceable parts.	INTERFACE (Used in 344A4572P3,P4)
A1002		INTERFACE (Used in 344A4572P5,P6)
		---------- CAPACITORS ----------
C1001		Ceramic: 1000 pF +200%,-0%, 50 VDCW temp coef +20%,-55%.
C1002		Ceramic: 1000 pF +200%,-0%, 50 VDCW temp coef +20%,-55%. (Used in 344A4572P5,P6)
C1004		Ceramic: 1000 pF +50-20% 50 VDCW.
		---------- DIODE ----------
CD1001		Silicon fwd current 3A, 200 PIV ;sim to MOTOROLA MR751. Used in 344A4572P3, P4)
		---------- JACKS ----------
J1001		Connector: TNC-R888.
J1002		CCT9402-0501R.
J1004		2-171822-4.
J1004-1 thru J1004		170204-4.
		---------- WIRES ----------
W1001		250V-HV-19/0.18-(1).
W1002		250V-HV-19/0.18-(9).
W1003		250V-HV-19/0.18-(2).
W1004		250V-HV-19/0.18-(0).
		----------COAXIAL CABLE----------
ZC1002		H-6ZCLD41060
ZC1003		H-6ZCLD40111 (Used in 344A4572P5, P6)
ZC1003		H-6ZCLD40009 (Used in 344A4572P3, P4)

POWER AMPLIFIERS
CAH-515EA (Used in 344A4572P1)
CAH-515EB (Used in 344A4572P2)

SYMBOL	PART NO.	DESCRIPTION
		---------- CAPACITORS ----------
C1 and C2	NOTE: Parts listed are for reference only. Refer to	Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
C3	Service Section for	Electrolytic: 33 µF 20% 25 VDCW, temp coef ±20%.
C4	serviceable parts.	Film: 0.1 µF ±5% 50 VDCW.
C6		Ceramic: 4.7 µF ±10% 50 VDCW, temp coef ±10%.
C12		Ceramic: 1000 pF ±10% 500 VDCW, temp coef ±15%.
C21		Electrolytic: 220 µF ±20% 25 VDCW, temp coef ±20%.
C22		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
C25		Ceramic: 10 pF ±0.5 pF 500 VDCW, temp coef 060 PPM.
C26		Ceramic: 22 pF ±5% 50 VDCW, temp coef 0±30 PPM.
C27		Ceramic: 10 pF ±0.5 pF 50 VDCW, temp coef 0±30 PPM.
C28		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
C30		Tantalum: 4.7 µF ±20% 25 VDCW.
C31		Electrolytic: 10 µF ±20% 25 VDCW, temp coef ±20%.
C32		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±10%.
C33		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
C34		Tantalum: 10 µF ±20% 16 VDCW.
C35		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
C36		Tantalum: 1 µF ±20% 16 VDCW.
C37		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
C38		Ceramic: 0.1 F +80-20% 25 VDCW, temp coef, +30%,-80%.
C39 and C40		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
C45		Ceramic: 12 pF ±5% 500 VDCW, temp coef 060 PPM.
C46		Ceramic: 5 pF 0.25 pF 500 VDCW, temp coef 060 PPM.
C47		Ceramic: 8 pF ±0.5 pF 500 VDCW, temp coef 060 PPM.
C48		Ceramic: 22 pF ±5% 500 VDCW, temp coef 060 PPM.
C49		Ceramic: 12 pF ±5% 500 VDCW, temp coef 060 PPM.
C50 thru C53		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.
C54		Ceramic: 12 pF ±5% 500 VDCW, temp coef 060 PPM.
C55		Ceramic: 5 pF 0.25 pF 500 VDCW, temp coef 060 PPM.
C56		Ceramic: 9 pF ±0.5 pF 500 VDCW, temp coef 060 PPM.
C57		Ceramic: 22 pF ±5% 500 VDCW, temp coef 060 PPM.
C58		Ceramic: 20 pF ±5% 500 VDCW, temp coef 060 PPM.
C59		Ceramic: 3 pF 0.25 pF 500 VDCW, temp coef 0120 PPM.
		---------- DIODES ----------
C60 thru C62		Ceramic: 1000 pF ±10% 50 VDCW, temp coef ±15%.

SYMBOL	PART NO.	DESCRIPTION
CD3 and CD4		PIN DIODE
CD7		BARISTOR: Sim to PANASONIC ERZ-CF2MK220
CD8		Silicon: sim to Motorola MR751
CD9		Silicon: fast recovery (2 diodes in cathode common): sim to TOSHIBA 1SS184.
CD10 and CD11		Silicon: Sim to PANASONIC MA741-TX.
CD13		Silicon: fast recovery : sim to TOSHIBA 1SS226.
		---------- HYBRID CIRCUIT ----------
HC1		RF Power Amplifier : sim to MITSUBISHI M67781L-38 (Used in EA)
HC1		RF Power Amplifier : sim to MITSUBISHI M67781H-38 (Used in EB)
		---------- INTEGRATED CIRCUITS ----------
IC1		Linear: Positive Voltage Regulator; sim to PANASONIC AN6541.
IC2		Linear: Positive Voltage Regulator; sim to NEW JRC NJM3404AM-T1.
		---------- CONNECTORS ----------
J1 and J2		Connector
J3		Connector
J4		Connector
		----------INDUCTORS----------
L1		Coil: 0.68 µH.
L2		Coil: 1 µH.
L3		RF Coil:
L4		RF Coil:
L5		RF Coil:
L6		RF Coil:
L7		RF Coil:
L8		Coil: RF 63 µH.
L9		Coil: 56 nH
L10		Coil: 0.68 µH
		---------- RESISTORS ----------
R1		Metal film: 470 ohms ±5%, 100 VDCW 1/10W.
R2		Metal film: 12 ohms ±5%, 200 VDCW 1/4W.
R3		Metal film: 470 ohms ±5%, 100 VDCW 1/10W.
R4 and R5		Metal film: 22 ohms ±5%, 200 VDCW 1/2W.
R14		Metal film: 27K ohms ±5%, 100 VDCW 1/10W.
R15		Metal film: 2.7K ohms ±5%, 100 VDCW 1/10W.
R16		Metal film: 390 ohms ±5%, 200 VDCW 1/4W.
R17		Metal film: 470 ohms ±5%, 200 VDCW 1/4W.
R18		Metal film: 1K ohms ±5%, 100 VDCW 1/10W.
R19 thru R21		Metal film: 2.2K ohms ±5%, 200 VDCW 1/10W.
R22		Metal film: 100k ohms ±5%, 100 VDCW 1/10W.
R23		Metal film: 3.3K ohms ±5%, 100 VDCW 1/10W.
R24		Metal film: 4.7K ohms ±5%, 100 VDCW 1/10W.
R25		Metal film: 2.2K ohms ±5%, 100 VDCW 1/10W.
R26		Metal film: 47K ohms ±5%, 100 VDCW 1/10W.
R27		Metal film: 1K ohms ±5%, 100 VDCW 1/10W.
R28		Posistor: sim to MURATA PTH9M04BC222TS2F333.
R29 thru R32		Metal film: 100 ohms ±5%, 100 VDCW 1/10W.

SYMBOL	PART NO.	DESCRIPTION
R33		Metal film: 100 ohms ±5%, 250 VDCW 1W.
R34		Metal film: 47K ohms ±5%, 200 VDCW 1/8W.
R35		Metal film: 100 ohms ±5%, 250 VDCW 1W.
R36		Metal film: 10K ohms ±5%, 100 VDCW 1/10W.
RV1		Variable: 10K ohms
		---------- TRANSISTOR ----------
TR1		Silicon, NPN: sim to PANASONIC 2SD1445A.
TR2		Silicon, NPN sim to NEC 2SD596-T1B DV3.
TR4		Silicon, PNP: sim to PANASONIC 2SB953A.
TR5		Silicon, NPN: sim to NEC 2SD596-T1B DV3.
TR6		Silicon, PNP: sim to NEC 2SB624-T1B BV3.
TR7		Silicon, NPN: sim to NEC 2SD596-T1B DV3.
TR8		Silicon, PNP: sim to NEC 2SB624-T1B BV3.
		----------TRANSFORMER----------
T1		RF Trans.

POWER CIRCUIT
CAH-515LA (Used in 344A4572P3)
CAH-515LB (Used in 344A4572P4)
CAH-515HA (Used in 344A4572P5)
CAH-515HB (Used in 344A4572P6)

SYMBOL	PART NO.	DESCRIPTION
		---------- CAPACITORS ----------
C1	NOTE: Parts listed	Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%.
C2	are for reference	Electrolytic: 47 µF ±20% 25 VDCW, temp coef ±20%.
C3	only. Refer to Service Section for	Ceramic: 0.1 µF +80,-20% 50 VDCW, temp coef +30,-80%.
C4	serviceable parts.	Ceramic: 120 pF ±5% 500 VDCW, temp coef 0±60 PPM (Used in LA, LB)
C5		Ceramic: 36 pF ±5% 500 VDCW, temp coef 0±60 PPM. Used in LA)
C5		Ceramic: 30 pF ±5% 500 VDCW, temp coef 0±60 PPM. Used in LB)
C6		Ceramic: 75 pF ±5% 500 VDCW, temp coef 0±60 PPM. Used in LA)
C6		Ceramic: 56 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in LB)
C7		Ceramic: 150 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in LA)
C7		Ceramic: 120 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in LB)
C8		Ceramic: 270 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in LA)
C8		Ceramic: 220 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in LB)
C9		Ceramic: 270 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in LA)
C9		Ceramic: 220 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in LB)
C10		Mica; 1000 pF ±5% 500 VDCW. (Used in LA, LB)
C11		Ceramic: 0.1 µF ±10% 50 VDCW, temp coef ±15%. (Used in LA, LB)
C12		Electrolytic: 22 µF ±20% 40 VDCW. (Used in LA, LB)
C13		Metal mica: 180 pF ±5% 100 VDCW. (Used in LA)
C14		Ceramic: 56 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in LA, LB)
C15		Ceramic: 33 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in LA, LB)
C15		Ceramic: 39 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA).
C15		Ceramic: 27 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB).
C16		Ceramic: 120 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in LA, LB).

SYMBOL	PART NO.	DESCRIPTION
C17		Ceramic: 56 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA).
C17		Ceramic: 68 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB).
C19		Ceramic: 200 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA)
C19		Ceramic: 180 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB).
C20		Ceramic: 200 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA)
C20		Ceramic: 180 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB)
C21 and C22		Ceramic: 68 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA)
C21 and C22		Ceramic: 39 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB).
C23 and C24		Ceramic: 100 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA)
C23 and C24		Ceramic: 91 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB)
C25 thru C28		Ceramic: 270 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA)
C25		Ceramic: 220 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB)
C26 and C27		Ceramic: 200 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB)
C28		Ceramic: 220 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB)
C29		Ceramic: 36 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA)
C29		Ceramic: 27 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB)
C30		Electrolytic: 22 µF ±20% 40 VDCW. (Used in HA, HB)
C31		Ceramic: 0.1 µF ±10% 50 VDCW, temp coef ±15%. (Used in HA, HB)
C32		Mica: 1000 pF ±5% 500 VDCW. (Used in HA, HB)
C33 and C34		Mica: 47 pF ±5% 500 VDCW. (Used in HA, HB)
C35 thru C38		Metal mica: 180 pF ±5% 100 VDCW. (Used in HA)
C39 and C40		Ceramic: 33 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA)
C39 and C40		Ceramic: 4 pF 0.25 pF 500 VDCW, temp coef 0±60 PPM. (Used in HB)
C41 and C42		Mica: 270 pF ±5% 500 VDCW. (Used in HA)
C41 and C42		Mica: 120 pF ±5% 500 VDCW. (Used in HB)
C43		Ceramic: 56 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA)
C43		Ceramic: 39 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB)
C44		Ceramic: 33 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA)
C44		Ceramic: 24 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB)
C45		Ceramic: 56 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA)
C45		Ceramic: 39 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB).
C46		Mica: 33 pF ±5% 500 VDCW. (Used in HA).
C46		Mica: 27 pF ±5% 500 VDCW. (Used in HB)

SYMBOL	PART NO.	DESCRIPTION
C47		Mica: 220 pF ±5% 500 VDCW. (Used in HA, HB)
C48		Ceramic: 200 pF ±5% 500 VDCW, temp coef 0±60 PPM.
C49		Ceramic: 6 pF ±0.5 pF 500 VDCW, temp coef 0±60 PPM. (Used in HA, HB)
C49		Ceramic: 5 pF 2.5 pF 500 VDCW, temp coef 0±60 PPM. (Used in LA, LB)
C50		Ceramic: 15 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA, LA)
C50		Ceramic: 12 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB, LB)
C51		Ceramic: 22 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA, LA).
C51		Ceramic: 20 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB, LB)
C52		Ceramic: 5 pF 0.25 pF 500 VDCW, temp coef 0±60 PPM (Used in HA, LA)
C52		Ceramic: 4 pF 0.25 pF 500 VDCW, temp coef 0±60 PPM. (Used in HB, LB)
C53		Ceramic: 24 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA, LA)
C53		Ceramic: 20 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB, LB)
C54		Ceramic: 5 pF 0.25 pF 500 VDCW, temp coef 0±60 PPM. (Used in HA, LA)
C54		Ceramic: 4 pF 0.25 pF 500 VDCW, temp coef 0±60 PPM. (Used in HB, LB).
C55		Ceramic: 24 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA, LA).
C55		Ceramic: 20 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB, LB).
C56		Ceramic: 10 pF ±0.5 pF 500 VDCW, temp coef 0±60 PPM. (Used in HA, LA).
C56		Ceramic: 8 pF ±0.5 pF 500 VDCW, temp coef 0±60 PPM. (Used in HB, LB).
C57		Ceramic: 20 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA).
C57		Ceramic: 18 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in LA).
C57		Ceramic: 15 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB, LB)
C58		Ceramic: 47 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HA).
C58		Ceramic: 33 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB, LA).
C58		Ceramic: 27 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in LB).
C59		Ceramic: 22 pF ±5% 50 VDCW, temp coef 0±30 PPM. (Used in HA)
C59		Ceramic: 15 pF ±5% 50 VDCW, temp coef 0±30 PPM. (Used in LA, HB).
C59		Ceramic: 12 pF ±5% 50 VDCW, temp coef 0±30 PPM. (Used in ,LB).
C60		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%.
C61		Ceramic: 8 pF ±0.5 pF 50 VDCW, temp coef 30 PPM. (Used in HB)
C61		Ceramic: 22 pF ±5% 500 VDCW, temp coef 0±30 PPM. (Used in LA, LB).
C62		Ceramic: 33 pF ±5% 50 VDCW, temp coef 0±30 PPM. (Used in HA).
C62 and C63		Ceramic: 22 pF ±5% 500 VDCW, temp coef 0±30 PPM. (Used in HB).
C63		Ceramic: 27 pF ±5% 50 VDCW, temp coef 0±30 PPM. (Used in HA, LA).
		C63
		Ceramic: 33 pF ±5% 50 VDCW, temp coef 0±30 PPM. (Used in LB).
C65		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%.
C66		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%. (Used in HA, HB).

SYMBOL	PART NO.	DESCRIPTION
C67		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%.
C68 and C69		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%. (Used in HA, HB).
C68		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%. (Used in LA, LB).
C70		Ceramic: 1000 pF ±10% 500 VDCW, temp coef ±15%. (Used in HA, HB).
C70		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%. (Used in LA, LB).
C71 and C72		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%.
C73		Ceramic: 0.1 µF +80,-20% 25 VDCW, temp coef +30,-80%.
C74		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%.
C75		Electrolytic: 1 µF ±20% 16 VDCW.
C76		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%.
C77		Electrolytic: 220 µF ±20% 25 VDCW, temp coef ±20%. (Used in HA, HB).
C77		Electrolytic: 47 µF ±20% 25 VDCW, temp coef ±20%. (Used in LA, LB).
C78		Tantalum: 4.7 µF ±10% 16 VDCW.
C79		Ceramic: 0.1 µF +80,-20% 50 VDCW, temp coef +30,-80%.
C80		Electrolytic: 33 µF ±20% 25 VDCW.
C86		Ceramic: 1000 pF ±10% 500 VDCW, temp coef ±15%. (Used in HA, HB).
C87		Electrolytic: 33 µF ±20% 25 VDCW. (Used in HA, HB).
C88		Ceramic: 1000 pF ±10% 500 VDCW, temp coef ±15%. (Used in HA, HB).
C89		Electrolytic: 47 µF ±20% 25 VDCW.
C90		Tantalum: 10 µF ±10% 16 VDCW.
C91 and C94		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%.
C95		Ceramic: 1 pF 0.25 pF 500 VDCW, temp coef 0250 PPM. (Used in HA, HB).
C95		Ceramic: 3 pF 0.25 pF 500 VDCW, temp coef 0120 PPM. (Used in LA, LB).
C158		Ceramic: 4700 pF ±10% 50 VDCW, temp coef 015%.
C159		Mica: 47 pF ±5% 500 VDCW. (Used in LA, LB).
C160 and C161		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%. (Used in LA, LB).
C165		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%. (Used in LA, LB).
C166 and C168		Metal mica: 180 pF ±5% 100 VDCW. (Used in LA).
C166 and C168		Metal mica: 150 pF ±5% 100 VDCW. (Used in LB).
C169 thru C172		Metal mica: 150 pF ±5% 100 VDCW. (Used in HB).
C173		Ceramic: 15 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in LA).
C174 and C175		Ceramic: 33 pF ±5% 500 VDCW, temp coef 0±60 PPM. (Used in HB).
C177		Ceramic: 200 pF ±5% 500 VDCW, temp coef 0±60 PPM.
C178		Ceramic: 1000 pF ±10% 50 VDCW, temp coef 015%. (Used in HA, HB).
		---------- DIODES ----------
CD1		Pin Diode. (Used in LA, LB).

SYMBOL	PART NO.	DESCRIPTION
CD2		Pin Diode. (Used in HA, HB).
CD3		Pin Diode
CD4		Pin Diode (Used in HA, HB).
CD5		Pin Diode
CD6 and CD7		Diode: optoelectronic, red sim to TOSHIBA 1SS154. (Used in LA, LB)
CD6 and CD7		Diode: optoelectronic, red sim to PANASONIC MA741WK. (Used in HA, HB).
CD9		Silicon: fast recovery (2 diodes in cathode common); sim to TOSHIBA 1SS184 .
CD10		Diode: sim to MR751 (Used in HA, HB).
CD11		Ceramic Varistor; sim to HOKURIKU 22ZR-10D.
CD12 and CD13		Silicon: fast recovery, (RF Switch); sim to MITSUBISHI MI301.
		----------INTEGRATED CIRCUITS----------
IC1		Linear: Positive Voltage Regulator; sim to PANASONIC AN6541.
IC2		Linear: OP AMP
		----------CONNECTORS----------
J3		Connector.
J4		Connector.
		----------POWER MODULES----------
HC1		M67781L-38. (Used in HA).
HC1		M67781H-38. (Used in HB).
HC1		M57719M-38. (Used in LA).
HC1		M57719-38. (Used in LB).
		----------INDUCTORS----------
L1		Coil: RF (Used in LA, LB).
L2		Coil: RF (Used in LA).
L2		Coil: RF (Used in LB).
L3		Coil: RF (Used in LA).
L3		Coil: RF (Used in LB).
L4		Coil: RF (Used in LA).
L4		Coil: RF (Used in LB).
L5		Coil: RF (Used in LA, LB).
L6		Coil: RF (Used in LA, LB).
L7		Coil: RF (Used in HA, HB).
L8		Coil: RF (Used in HA, HB).
L9 thru L12		Coil: RF (Used in HA).
L9 and L10		Coil: RF (Used in HB).
L11 and L12		Coil: RF (Used in HB).
L13		Coil: RF (Used in HA).
L13		Coil: RF (Used in HB).
L14		Coil: RF (Used in HA).
L14		Coil: RF (Used in HB).
L15		Coil: RF (Used in HA, HB).
L16		Coil: RF (Used in HA, HB).
L17		Coil: RF (Used in HA, HB).
L18		Coil: RF (Used in HA, HB).
L19		Coil: RF(Used in HA).
L19		Coil: RF
L20		Coil: RF

SYMBOL	PART NO.	DESCRIPTION
L21 and L22		Coil: RF
L23		Coil: RF
L24		Coil: RF
L25		Coil: RF (Used in HA, HB).
L25		Coil: R (Used in LA, LB).F
L26 and L27		Coil: RF (Used in HA, HB).
L26		Coil: RF (Used in LA).
L26		Coil: RF (Used in LB).
L28		Coil: RF (Used in HA, HB).
L28		Coil: RF 1H ±10%. (Used in LA, LB).
L29		Coil: RF
L30		Coil: RF 0.68 H ±10%. (Used in HA, HB).
L30		Coil: RF 1.2 H ±10%. (Used in LA, LB).
L32		Coil: RF (Used in HA).
L32		Coil: RF (Used in HB).
		----------COAXIAL CABLES----------
P1		Coaxial cable with connector. (Used in HA, HB).
P1		Coaxial cable with connector. (Used in LA, LB).
P2		Coaxial cable with connector. (Used in HA, HB).
P2		Coaxial cable with connector. (Used in LA, LB).
		----------RESISTORS ----------
R1		Metal film: 22 ohms ±5%, 100 VDCW 1/10W.
R2		Metal film: 27 ohms ±5%, 100 VDCW 1/10W.
R3 and R4		Metal film: 390 ohms ±5%, 100 VDCW 1/10W.
R5		Metal film: 1.5 ohms ±5%, 250 VDCW 1W. (Used in LA, LB).
R6 and R7		Metal film: 1.5 ohms ±5%, 250 VDCW 1W. (Used in HA, HB).
R8		Metal film: 24 ohms ±5%, 350 VDCW 3W. (Used in HA, HB).
R9		Metal film: 18 ohms ±5%, 350 VDCW 3W. (Used in HA).
R9		Metal film: 22 ohms ±5%, 350 VDCW 3W. (Used in HB).
R11 thru R14		Metal film: 120 ohms ±5%, 100 VDCW 1/10W. (Used in HA, HB).
R11		Metal film: 51 ohms ±5%, 100 VDCW 1/10W. (Used in LA, LB).
R13		Metal film: 56 ohms ±5%, 100 VDCW 1/10W. (Used in LA, LB).
R15 and R16		Metal film: 120 ohms ±5%, 250 VDCW 1W. (Used in HA, HB).
R15 and R16		Metal film: 180 ohms ±5%, 250 VDCW 1W. (Used in LA, LB).
R18		Metal film: 47K ohms ±5%, 200 VDCW 1/4W.
R19		Metal film: 100 ohms ±5%, 100 VDCW 1/10W.
R20		Metal film: 6.8K ohms ±5%, 100 VDCW 1/10W. (Used in HA, HB).
R20		Metal film: 3.3K ohms ±5%, 100 VDCW 1/10W. (Used in LA).
R20		Metal film: 2.7K ohms ±5%, 100 VDCW 1/10W. (Used in LB).
R21		Metal film: 4.7K ohms ±5%, 100 VDCW 1/10W.
R22		Metal film: 22K ohms ±5%, 100 VDCW 1/10W.
R23		Metal film: 47K ohms ±5%, 100 VDCW 1/10W.
R24		Metal film: 1K ohms ±5%, 100 VDCW 1/10W.
R25		Metal film: 18K ohms ±5%, 100 VDCW 1/10W. Used in HA, HB).
R25		Metal film: 22K ohms ±5%, 100 VDCW 1/10W. (Used in LA, LB).
R26		Metal film: 27K ohms ±5%, 100 VDCW 1/10W.
R27 and R28		Metal film: 2.2K ohms ±5%, 100 VDCW 1/10W. (Used in HA, HB).
R27		Metal film: 5.6K ohms ±5%, 100 VDCW 1/10W. (Used in LA, LB).
R28		Metal film: 1.5K ohms ±5%, 100 VDCW 1/10W. (Used in LA, LB).
R29		Metal film: 1.5K ohms ±5%, 200 VDCW 1/10W. (Used in HA, HB).
R29		Metal film: 3.3K ohms ±5%, 100 VDCW 1/10W. (Used in LA, LB).
R30		Metal film: 10K ohms ±5%, 100 VDCW 1/10W.
R31		Posistor: PTH9M04BE222TS2F333.
R32 and R33		Metal film: 820 ohms ±5%, 100 VDCW 1/10W.
R34 and R35		Metal film: 470 ohms ±5%, 100 VDCW 1/10W. (Used in HA, HB).
R34 and R35		Metal film: 820 ohms ±5%, 100 VDCW 1/10W. (Used in LA, LB).
R36		Metal film: 5.6 ohms ±5%, 100 VDCW 1/8W. (Used in HA, HB).
R36		Metal film: 18 ohms ±5%, 100 VDCW 1/8W. (Used in LA, LB).
R50		Metal film: 3.3K ohms ±5%, 100 VDCW 1/10W.
R51		Metal film: 750 ohms ±5%, 200 VDCW 1/4W.
R52		Metal film: 8.2K ohms ±5%, 100 VDCW 1/10W. (Used in LA, LB).
R53		Metal film: 1K ohms ±5%, 100 VDCW 1/10W. (Used in LA, LB).
R55		Metal film: 100K ohms ±5%, 100 VDCW 1/10W.
RV2		Variable: 10K ohms.
		---------- TRANSISTORS----------
TR1		Silicon, NPN: TOSHIBA 2SC2782. (Used in LA, LB).
TR2 and TR3		Silicon, NPN: TOSHIBA 2SC2782. (Used in HA, HB).
TR4		Silicon, PNP: sim to NEC 2SB/D596-T1B BV3.
TR5		Silicon PNP: sim to PANASONIC 2SB953A.
TR6		Silicon, PNP: sim to NEC 2SB/D596-T1B BV3.
TR7		Silicon NPN: sim to PANASONIC 2SD1445A-Q. (Used in HA, HB)
TR7		Silicon NPN: sim to PANASONIC 2SD1271-A. (Used in LA, LB).
TR8		Silicon PNP: sim to NEC 2SB624-T1B BV3.
TR5-1 and TR7-1		Accessory (Used in HA, HB).
		----------WIRE----------
W1		Jumper wire: (Used in HA, HB).

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 on the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for the description of parts affected by these revisions.

REV. A - <u>Power Amplifier Unit 344A4572P3</u>

To reduce spurious emitions. Changed capacitor C6 from 0.022 µF to 4.7 µF.

Δ COMPONENT IDENTIFICATION CHART

50 Watt Power Amplifier

PART	CAH-515LA 136 - 153 MHz	CAH-515LB 150 - 173 MHz
C5	36 pF	30 pF
C6	75 pF	56 pF
C7	150 pF	120 pF
C8	270 pF	220 pF
C9	270 pF	220 pF
C13	180 pF	-
C50	15 pF	12 pF
C51	22 pF	20 pF
C52	5 pF	4 pF
C53	24 pF	20 pF
C54	5 pF	4 pF
C55	24 pF	20 pF
C56	10 pF	8 pF
C57	18 pF	15 pF
C58	33 pF	27 pF
C59	15 pF	12 pF
C63	27 pF	33 pF
C166	180 pF	150 pF
C168	180 pF	150 pF
C173	15 pF	-
L2	6LALD20630	6LALD20640
L3	6LALD20680	6LALD20640
L4	6LALD12025	5LALD12024
L26	64 nH	56 nH
R20	3.3 k Ω	2.7 k Ω
HC1	M57719M-38	M57719M-38

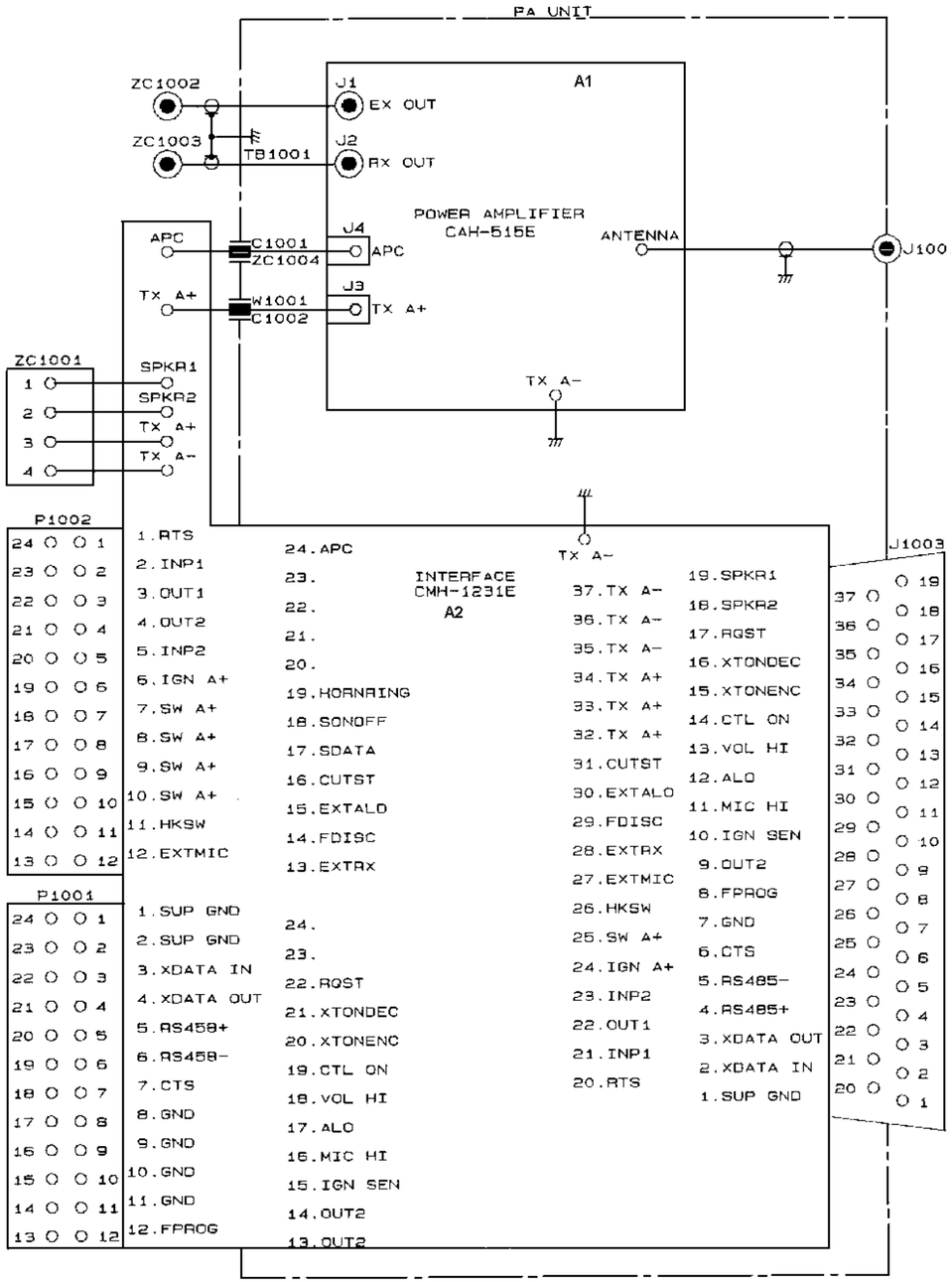
(MADE FROM DD00-CAH-515L 2/2)

Δ COMPONENT IDENTIFICATION CHART

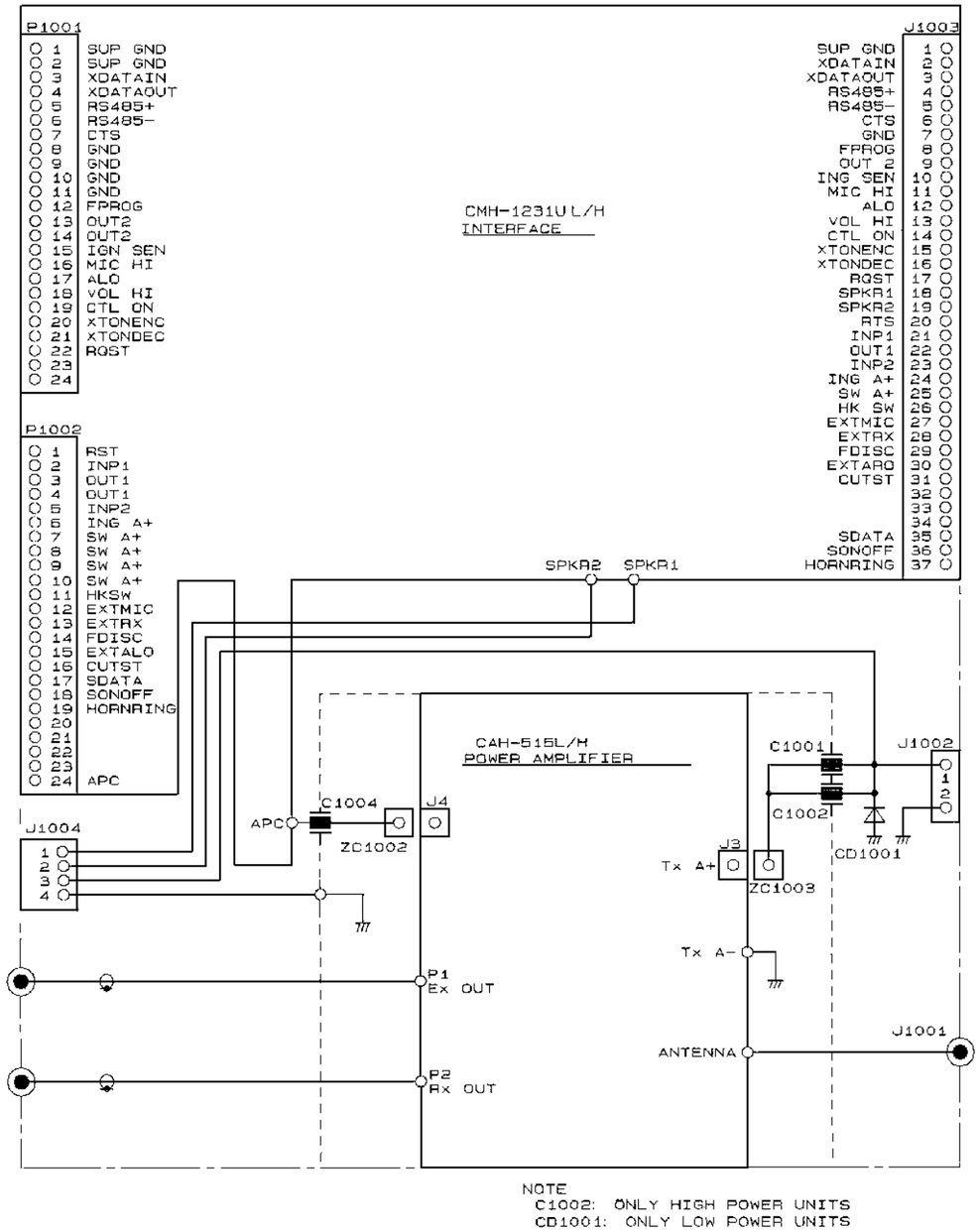
110 Watt Power Amplifier

PART	CAH-515HA 136 - 153 MHz	CAH-515HB 150 - 173 MHz
C15	39 pF	27 pF
C17	56 pF	68 pF
C19	200 pF	180 pF
C20	200 pF	180 pF
C21	68 pF	39 pF
C22	68 pF	39 pF
C23	100 pF	91 pF
C24	100 pF	91 pF
C25	270 pF	220 pF
C26	270 pF	200 pF
C27	270 pF	200 pF
C28	270 pF	220 pF
C29	6 pF	27 pF
C35	180 pF	-
C36	180 pF	-
C37	180 pF	-
C38	180 pF	-
C39	33 pF	4 pF
C40	33 pF	4 pF
C41	270 pF	120 pF
C42	270 pF	120 pF
C43	56 pF	39 pF
C44	33 pF	24 pF
C45	356 pF	39 pF
C46	33 pF	27 pF
C50	15 pF	12 pF
C51	22 pF	20 pF
C52	5 pF	4 pF
C53	24 pF	20 pF
C54	5 pF	4 pF
C55	24 pF	20 pF
C56	10 pF	8 pF
C57	20 pF	15 pF
C58	47 pF	33 pF
C59	22 pF	15 pF
C61	-	8 pF
C62	33 pF	22 pF
C63	27 pF	22 pF
C169	-	150 pF
C170	-	150 pF
C171	-	150 pF
C172	-	150 pF
C174	-	33 pF
C175	-	33 pF
HC1	M67781L-38	M67781H-38
L9	6LALD20640	6LALD20630
L10	6LALD20640	6LALD20630
L11	6LALD20640	6LALD20670
L12	6LALD20640	6LALD20670
L13	6LALD12014	6LALD12013
L14	6LALD13014	6LALD12013
L19	6LALD21115	6LALD21112
L32	6LALD12025	6LALD12026
R9	18 Ω	22 Ω

(MADE FROM DD00-CAH-515H 2/2)

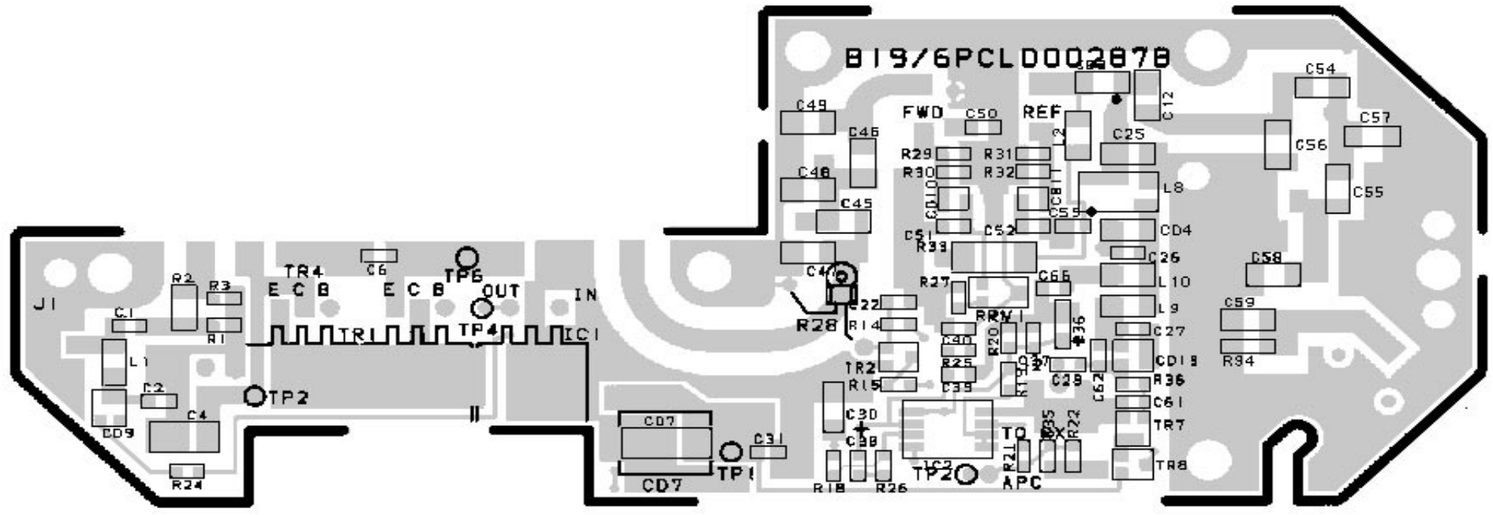


EUROPEAN VHF PA UNIT
(DD00-JHM-271PE)

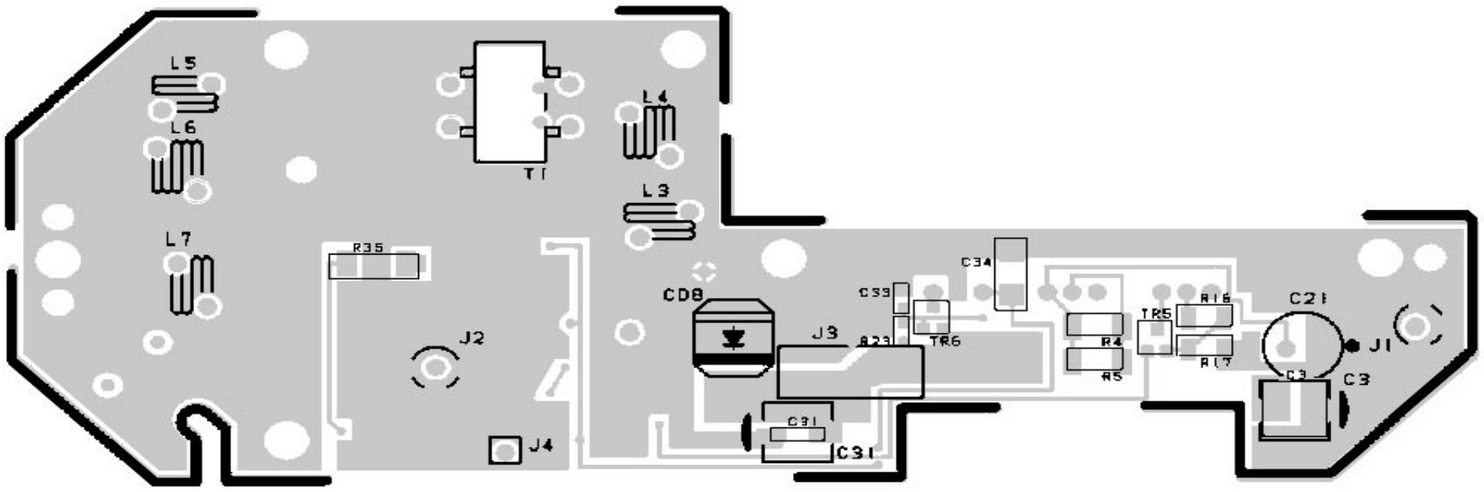


VHF PA UNIT
(DD00-JHM-271PL/H)

COMPONENT SIDE



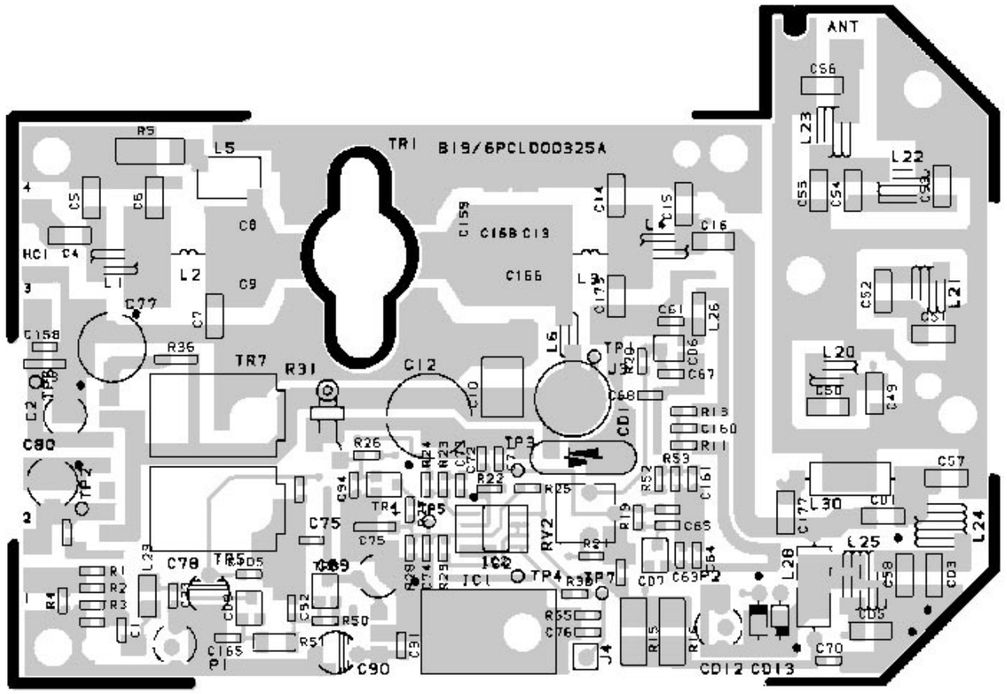
SOLDER SIDE



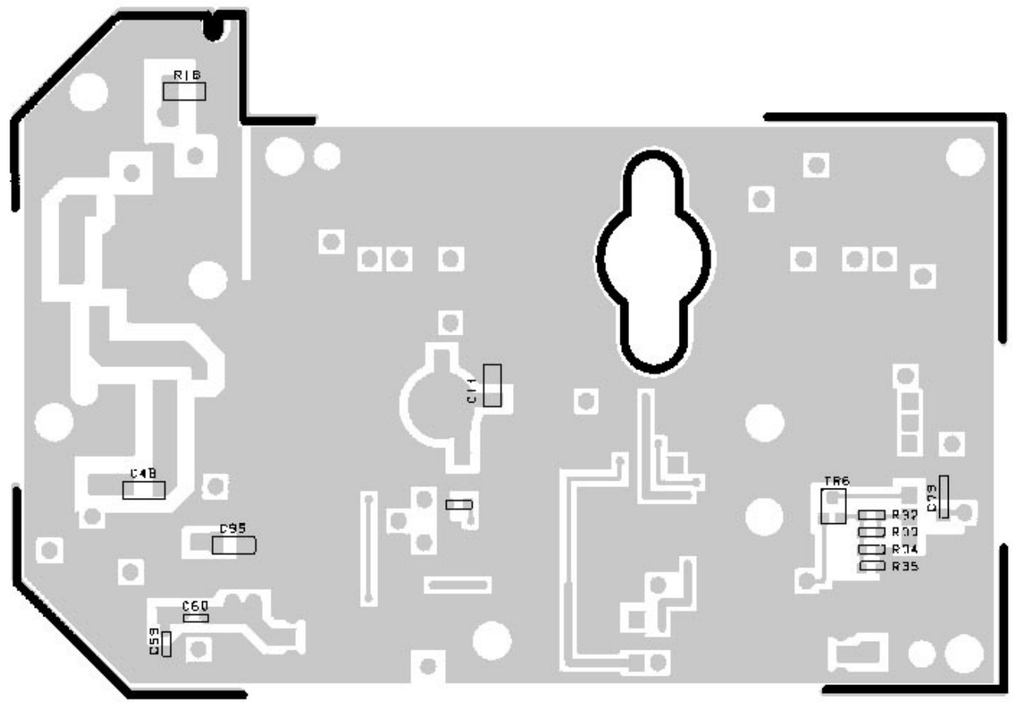
25 Watt Power Amplifier
CAH-515E

(B19/6PCLD00287B, Component Side Layout)
(B19/6PCLD00287B, Chip Components)
(B19/6PCLD00287B, Component Side)
(B19/6PCLD00287B, Solder Side)

COMPONENT SIDE



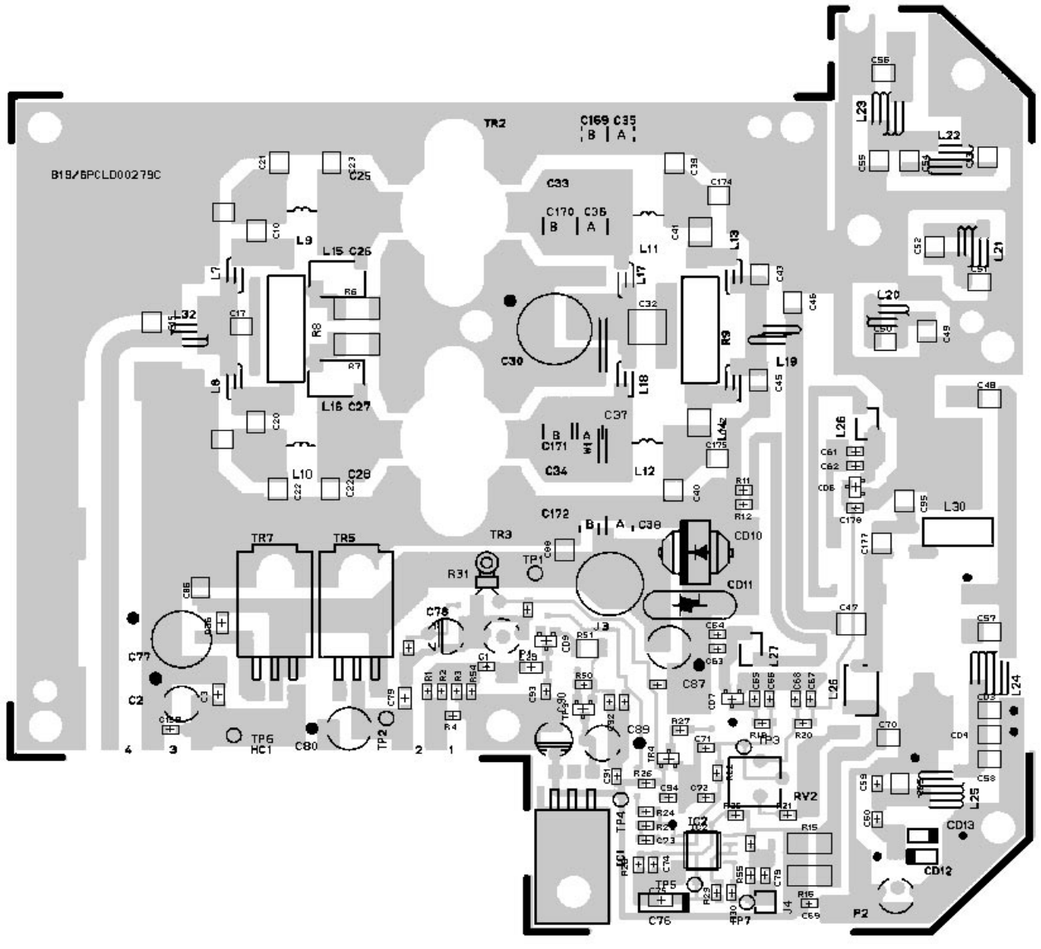
SOLDER SIDE



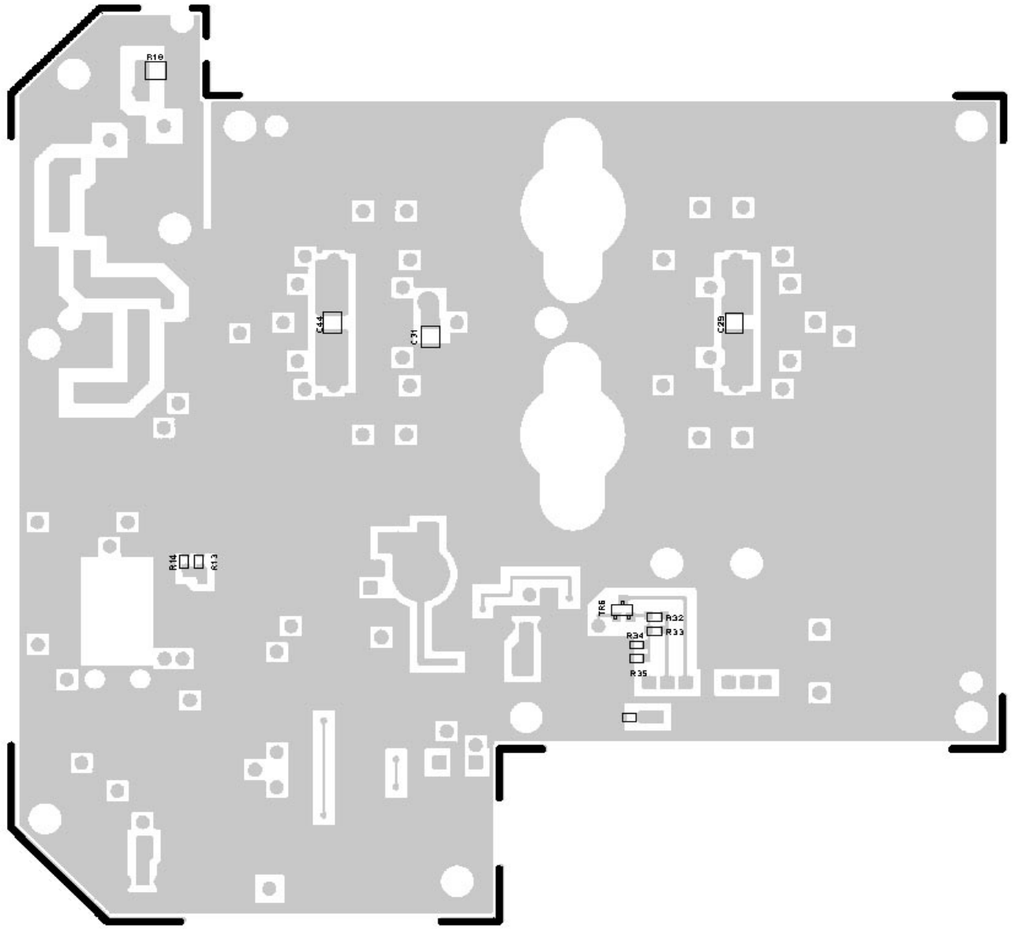
50 Watt Power Amplifier
CAH-515L

(B19/6PCLD00325A, Component Side Layout)
(B19/6PCLD00325A, Chip Components)
(B19/6PCLD00325A, Component Side)
(B19/6PCLD00325A, Solder Side)

COMPONENT SIDE

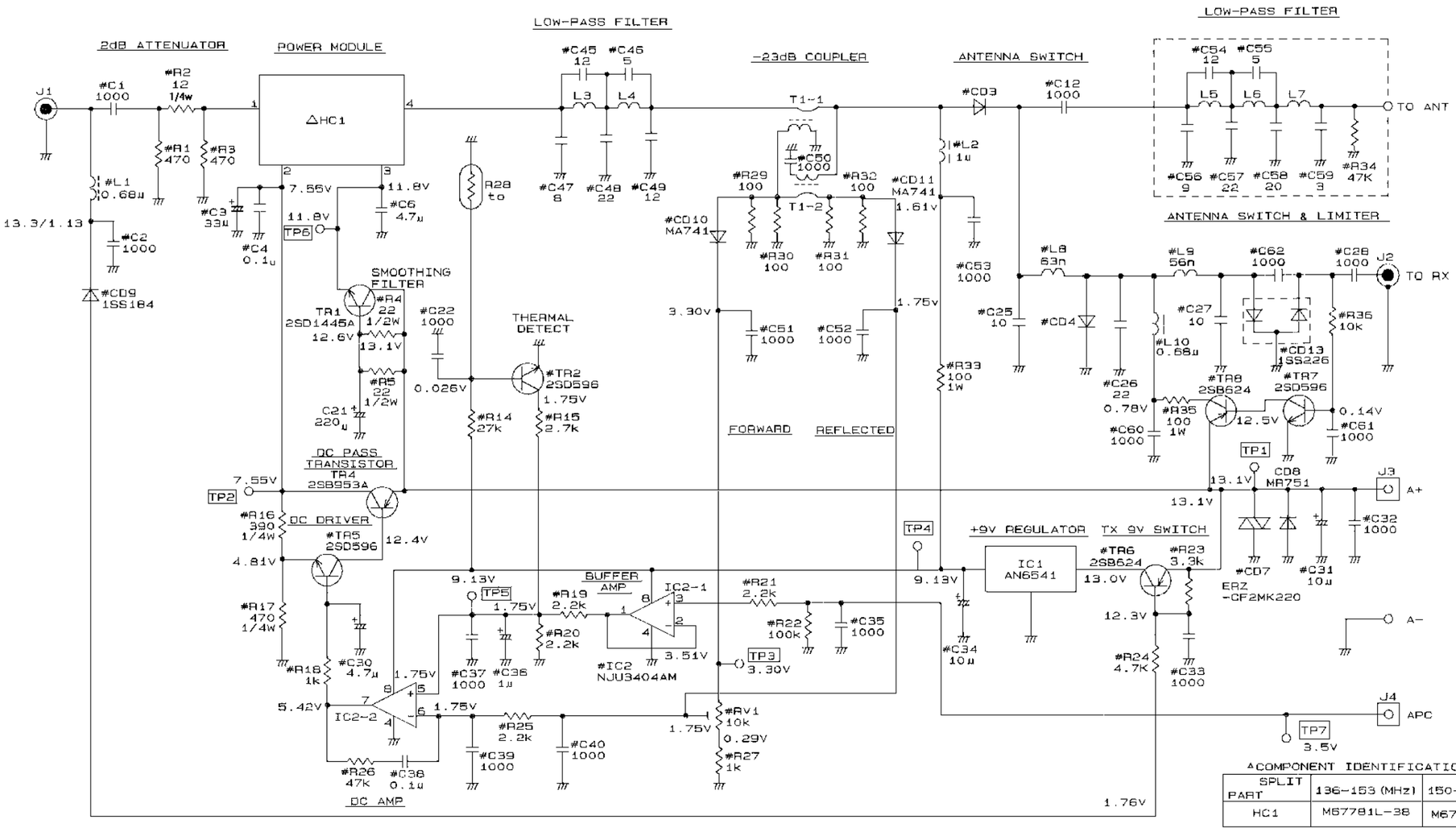


SOLDER SIDE



110 Watt Power Amplifier
CAH-515H

(B19/6PCLD00279C, Component Side Layout)
(B19/6PCLD00279C, Chip Components)
(B19/6PCLD00279C, Component Side)
(B19/6PCLD00279C, Solder Side)



A COMPONENT IDENTIFICATION CHART

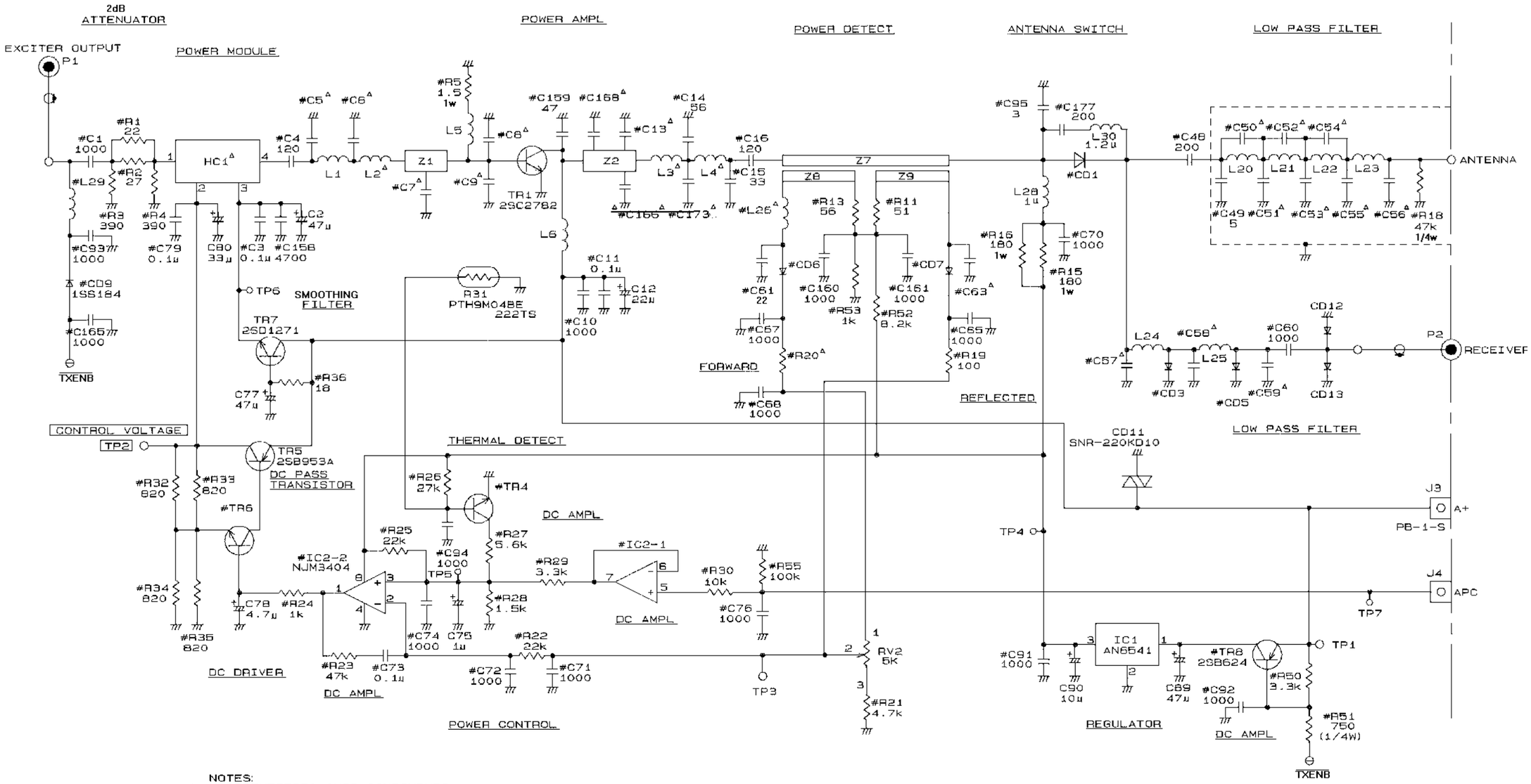
SPLIT / PART	136-153 (MHz)	150-174 (MHz)
HC1	M67781L-38	M67781H-38

NOTES
1. "#"IDENTIFIES CHIP COMPONENTS (EXAMPLE #R12 OR R12#) WHICH ARE LOCATED ON THE COMPONENT SIDE OF THE BOARD
2. Z1, Z2 AND Z3 ARE STRIPLINE PART OF PWB.
3. RV1 IS FACTORY TUNED AND DOES NOT REQUIRE FURTHER ADJUSTMENT.

ALL RESISTORS ARE 1/10 OR 1/8 WATT UNLESS OTHERWISE SPECIFIED.
RESISTOR VALUES IN Ω UNLESS FOLLOWED BY MULTIPLIER K OR M.
CAPACITOR VALUES IN P UNLESS FOLLOWED BY MULTIPLIERμ .
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m ORμ .

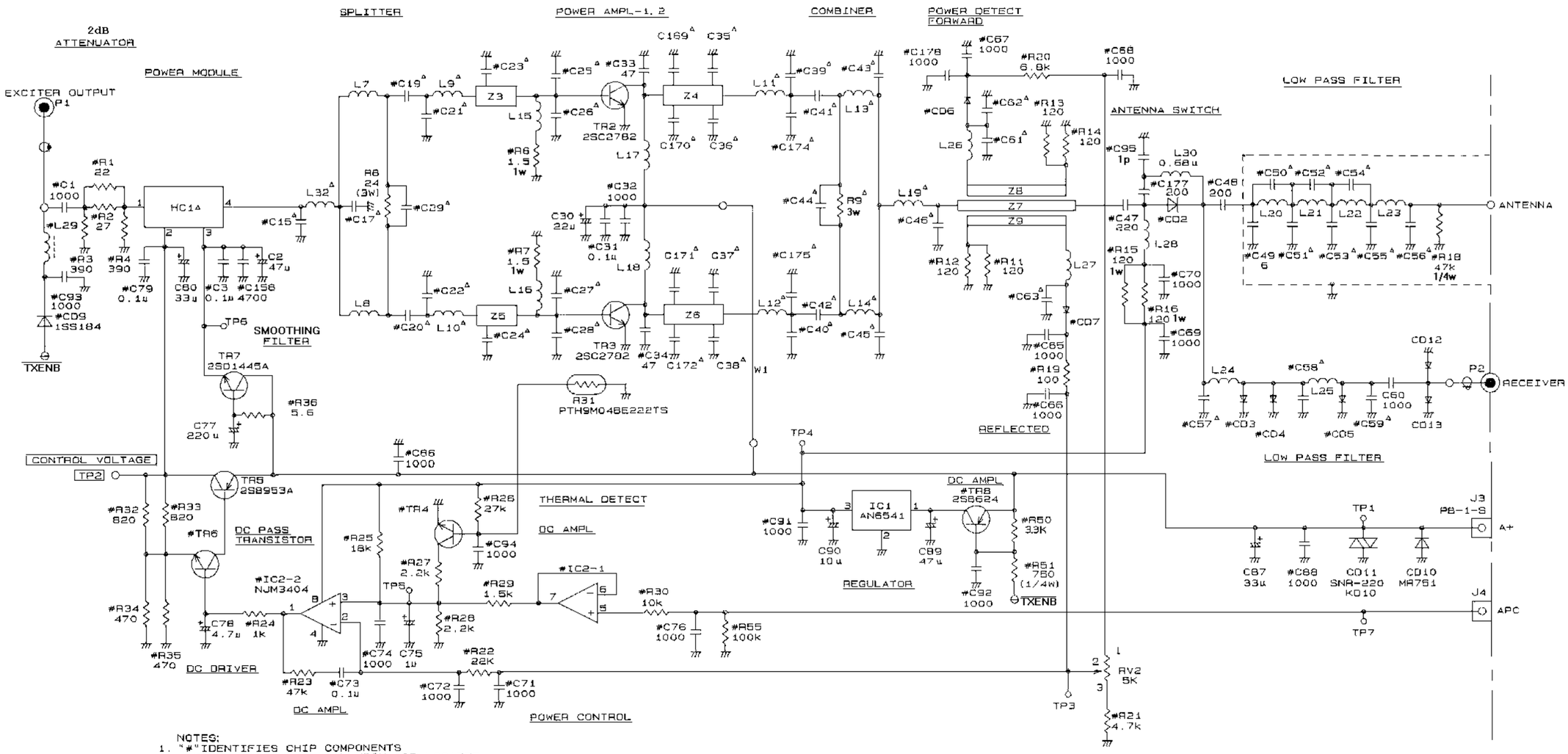
DC VOLTAGE READINGS
ALL VOLTAGES ARE TYPICAL. VOLTAGES ARE MEASURED WITH A 10Meg OHM PER VOLT METER. REFEAENCE TO GROUND.
VOLTAGE READINGS ARE TAKEN WITH THE TRANSMITTER UNKEYED/KEYED. EX .45 (UNKEYED) / .05 (KEYED) .

25 Watt Power Amplifier
CAH-515E
(DD00-CAH-515E)



NOTES:
1. "#"IDENTIFIES CHIP COMPONENTS (EXAMPLE #R12 OR R12#) WHICH ARE LOCATED ON THE COMPONENT SIDE OF THE BOARD.
2. Z1-Z2 AND Z3 STRIPLINE PART OF PWB.
3. RV2 IS FACTORY TUNED AND DOES NOT REQUIRE FURTHER ADJUSTMENT.
   ALL RESISTORS ARE 1/10 OR 1/8 WATT UNLESS OTHERWISE SPECIFIED.
   RESISTOR VALUES IN Ω UNLESS FOLLWED BY MULTIPLIER K OR M.
   CAPACITOR VALUES IN P UNLESS FOLLWED BY MULTIPLIER u .
   INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR u .

50 Watt Power Amplifier
CAH-515L
(DD00-CAH-515L 1/2)



NOTES:
1. "#" IDENTIFIES CHIP COMPONENTS (EXAMPLE #R12 OR R12#) WHICH ARE LOCATED ON THE COMPONENT SIDE OF THE BOARD.
2. Z3-Z9, STRIPLINE PART OF PWB.
3. RV2 IS FACTORY TUNED AND DOES NOT REQUIRE FURTHER ADJUSTMENT.
   ALL RESISTORS ARE 1/10 OR 1/8 WATT UNLESS OTHERWISE SPECIFIED.
   RESISTOR VALUES IN Ω UNLESS FOLLWED BY MULTIPLIER K OR M.
   CAPACITOR VALUES IN P UNLESS FOLLWED BY MULTIPLIER u
   INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR u .

110 Watt Power Amplifier
CAH-515H
(DD00-CAH-515H 1/2)