MAINTENANCE MANUAL
EXCITER/POWER AMPLIFIER
CAH-282A/B
FOR
MLSU140 & MLSU240
TWO-WAY MOBILE RADIO COMBINATIONS

TABLE OF CONTENTS

DESCRIPTION

Exciter/PA Board CAH-282A/B (A803) for the MLS UHF mobile radio combinations provides 40 Watts of RF power in the 403 to 420 MHz and 450 to 470 MHz frequency ranges and mounts in the back and bottom of the radio frame assembly as shown in Figure 1 - Exciter/PA Location. Circuit board CAH-282A is for the 403 to 420 MHz frequency range and circuit board CAH-282B is for the 450 to 470 MHz frequency range. This Exciter/PA Board consists of an exciter circuit, a power amplifier circuit, power control circuitry and a voltage regulator and transmitter switch circuit (refer to Figure 2 - Block Diagram).

The exciter circuit consists of transistors TR101 through TR104 plus an attenuator at the input and a low-pass filter circuit at the output.

The power amplifier circuit consists of an attenuator circuit at the input, PRE-DRIVER circuit HC1 (M57714), PA transistors TR1 and TR2, and a low-pass filter on the output. The output of the PA connects through ANTENNA SWITCH K1 to the input of the low-pass filter. The ANTENNA SWITCH (relay K1) is also part of circuit board A803.

The power control circuitry consists of 9-Volt SWITCH transistor TR7, DC AMPLifier 1 transistor TR6, POWer DOWN SWITCH transistor TR5, DC AMPLifier 2 transistor TR4, POWER CONTROL transistor TR3 and SMOOTHER (BUFFER) transistor TR8.

The transmit switch circuitry consists of 9-Volt regulator IC101 and EX9V SWITCH transistor TR105.

CIRCUIT ANALYSIS

9-Volt Regulator

The 9-Volt regulator operates from the switched A+ (13.6 volts) line. The regulator circuit consists of 9-volt regulator IC101 and Ex 9-volt Switch transistor TR105. Switches are controlled by the $\overline{\text{TX ENAB}}$ lead from System Control & Synthesizer board A801 (refer to Maintenance Manual LBI-31755).

When the $\overline{\text{TX ENAB}}$ lead is activated (PTT keyed) Transistor Switch TR105 turns on and applies the regulated ouput of IC101 to exciter amplifier transistors TR101 through TR104.

Exciter

The exciter input is coupled through an attenuator circuit (R101, R103) which provides approximately 4 dB attenuation. This attenuated input is coupled to the input of four amplifier stages, transistors TR101 through TR104. These four amplifier stages provide an RF input of 300 milliwatts to PRE-DRIVER module HC1.

40-Watt PA

The 40-Watt PA uses PRE-DRIVER module HC1 and PA transistor TR1 and TR2 to provide the 40-Watts of RF power output. The PRE-DRIVER module (HC1) contains three broadband amplifiers. The Auto Power Control circuit supplies voltage to the first amplifier. Continuous 13.6 Volts is supplied to the second and third amplifiers. The output of the PRE-DRIVER module is coupled through a 50-ohm impedance matching

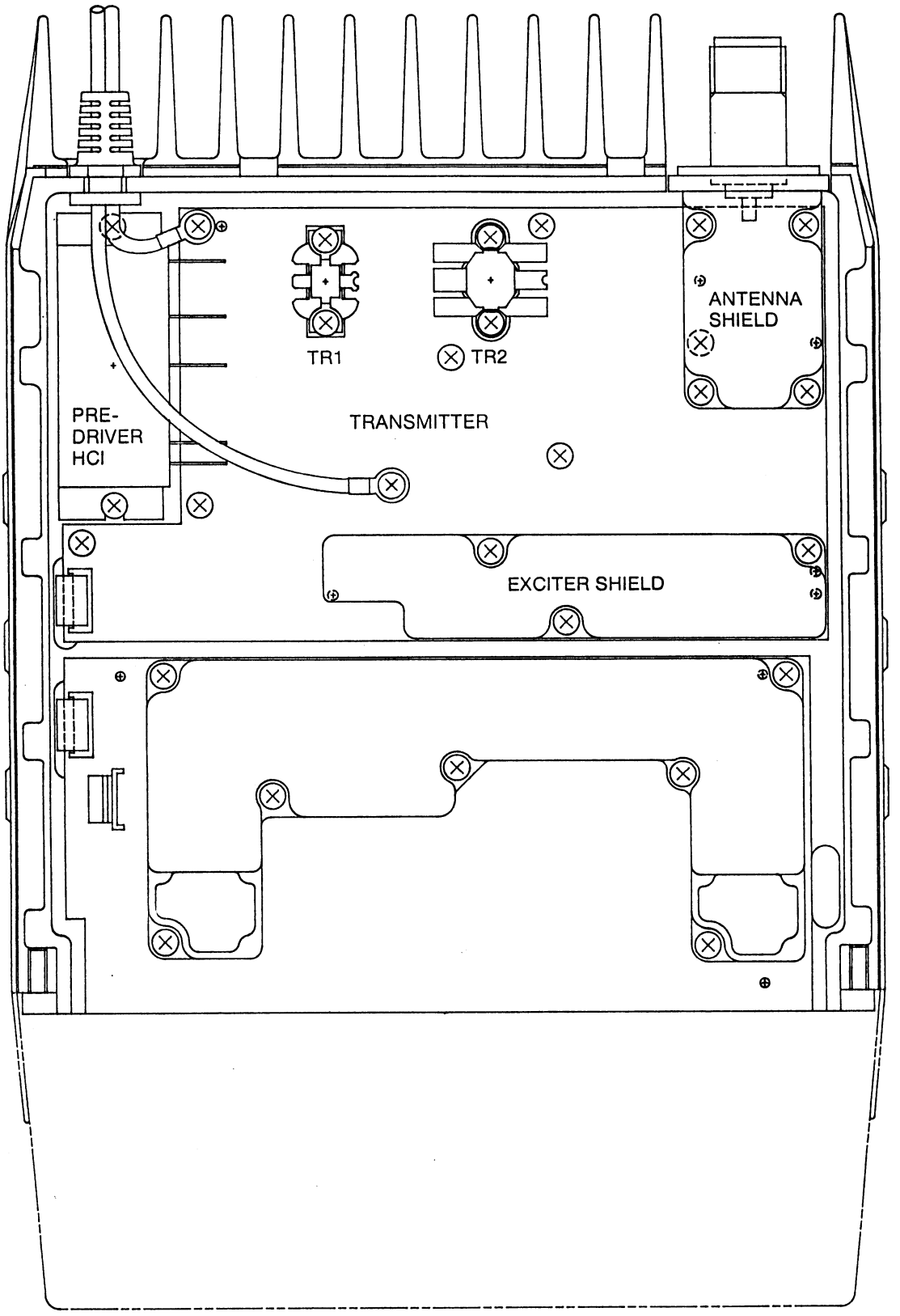

Figure 1 - Exciter/PA Location (Bottom View)

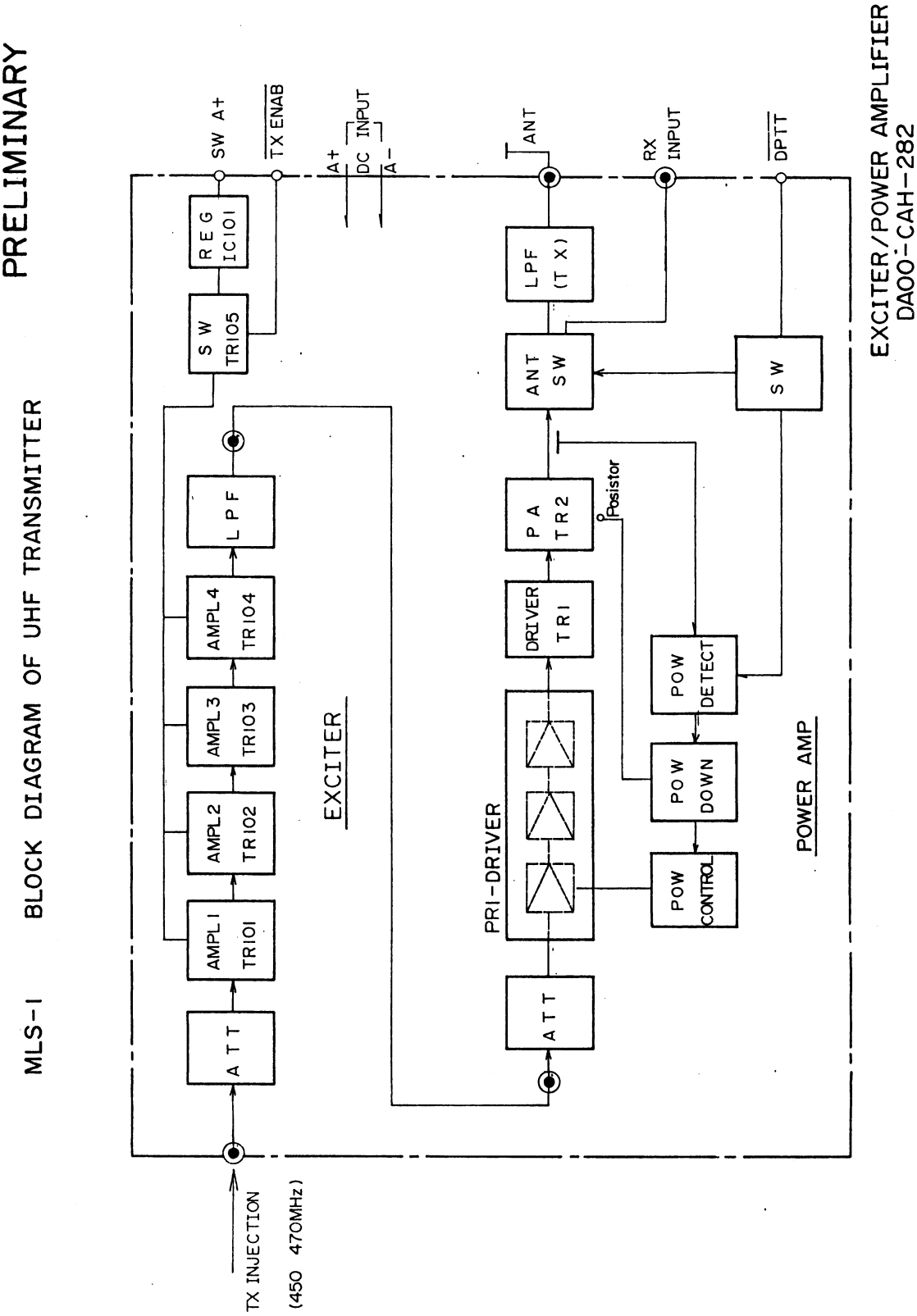

Figure 2 - Block Diagram

network consisting of capacitors C3, C5, C6 and a 50-ohm stripline (printed circuit pattern) to the base of Class C amplifier transistor TR1.

The output of TR1 is taken from the collector and coupled to the base of final PA amplifier transistors TR2 through an impedance matching network consisting of capacitors C7 through C15 and the 50-ohm stripline. Transistor TR2 operates as a Class C amplifier.

The output of TR2 is taken from the collector and coupled to the low-pass filter through a 50-ohm impedance matching network consisting of capacitor C17 through C22 and a 50-ohm stripline. The PA output is matched to antenna connector J2 through antenna relay K1 (ANTENNA SWITCH) and the low-pass filter consisting of inductors L6 through L8 and capacitors C30 through C36. Continuous 13.6 volts A+ source voltage is applied to transistor TR1 through inductors L12 and L13 and to transistor TR2 through inductors L14 and L15.

Antenna Relay

Antenna relay K1 is controlled by the delayed PTT ($\overline{\text{DPTT}}$) output of the System Control 1/Synthesizer Board. When the $\overline{\text{DPTT}}$ output goes low, antenna relay K1 couples the PA output through the low-pass filter to the antenna connector J2.

APC Circuits

Auto Power Control (APC) circuit protects the transmitter PA from damage due to excessive output power, reflected power or temperature. The output power control circuit allows the RF output power to be set at the rated output by POWER ADJ variable resistor RV1.

If the output power of the PA increases, the detected voltage and the base input of transistor TR6 increases. The collector voltage of TR6 decreases. This causes transistor TR4 to conduct less. Transistor TR4 conducting less increases the base voltage on PNP pass transistor TR3, causing it to conduct less. This results in less voltage being applied to the first amplifier stage in the PRE-DRIVER module (HC1) reducing the power output of the exciter/PA in proportion to the increase in output power detected by the circuit.

To protect the PA against badly mismatched loads, a reverse power (VSWR) detector circuit consisting of diode CD10, transistors TR4 and TR6 and pass transistor TR3, detect reverse (reflected) power. When sufficient power is detected by CD10 to cause TR6 to conduct, the voltage at the collector of TR3 decreases, causing the exciter/PA module to lower the output power, protecting the PA. The reverse power level is set by resistor R22 connected in series with diode CD10.

The PA is protected against temperature increases by a thermal detector circuit consisting of R20, TR3, TR4, TR5 and TR6. As temperature increases, the resistance to ground of thermal detector R20 increases. This causes TR3 to conduct less, causing a decrease in the PA output until the temperature level is reduced. The temperature level is set by resistor R11.

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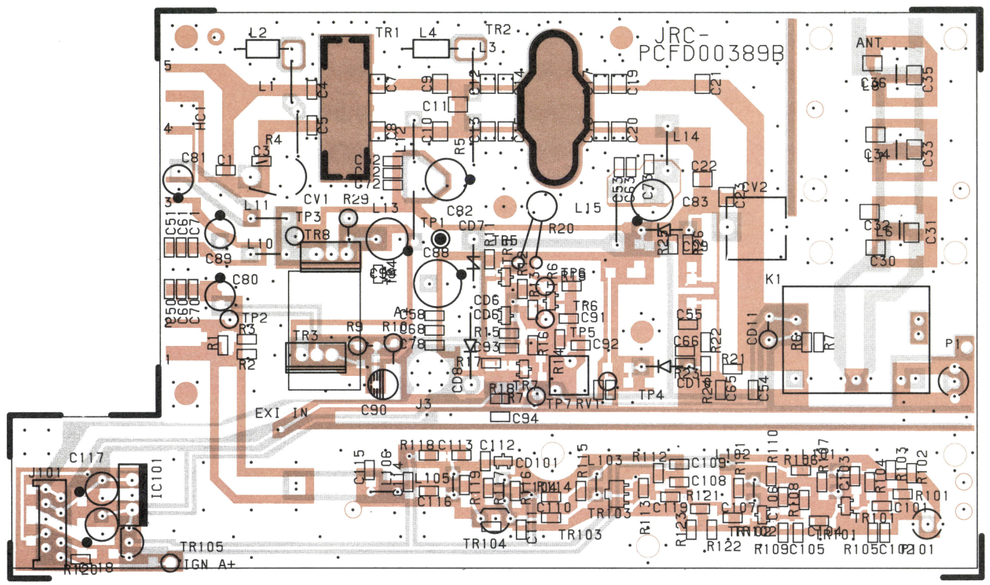
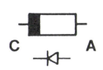
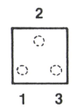


LEAD IDENTIFICATION FOR TR104 (TOP VIEW)

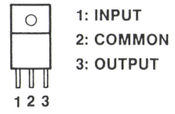
LEAD IDENTIFICATION FOR DIODES (TOP VIEW)



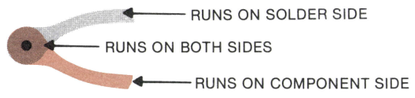
LEAD IDENTIFICATION FOR RV1, RV2 (TOP VIEW)



LEAD IDENTIFICATION FOR IC101 (TOP VIEW)



RC-5439

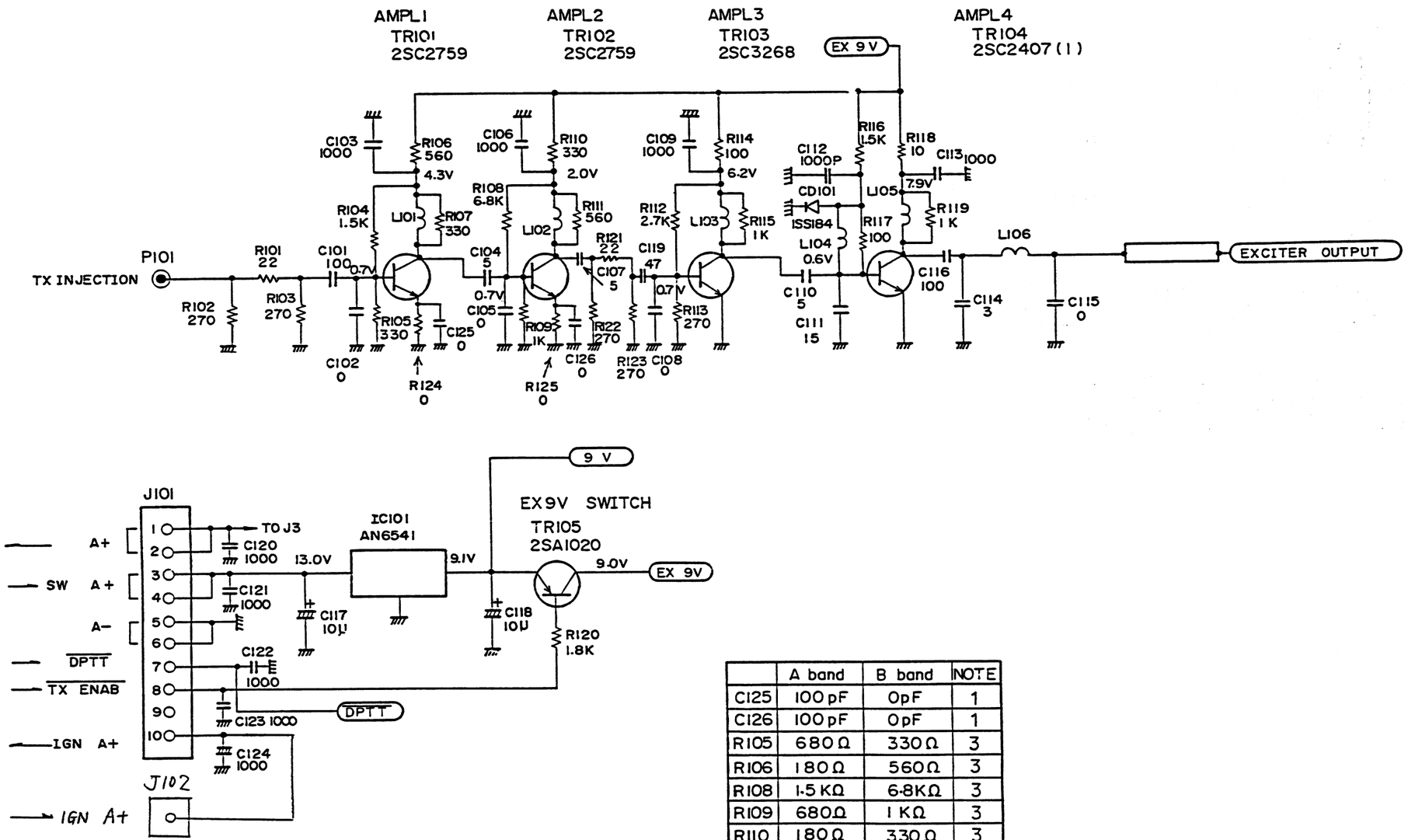


OUTLINE DIAGRAM

Exciter/PA Board

Issue 1

EXCITER



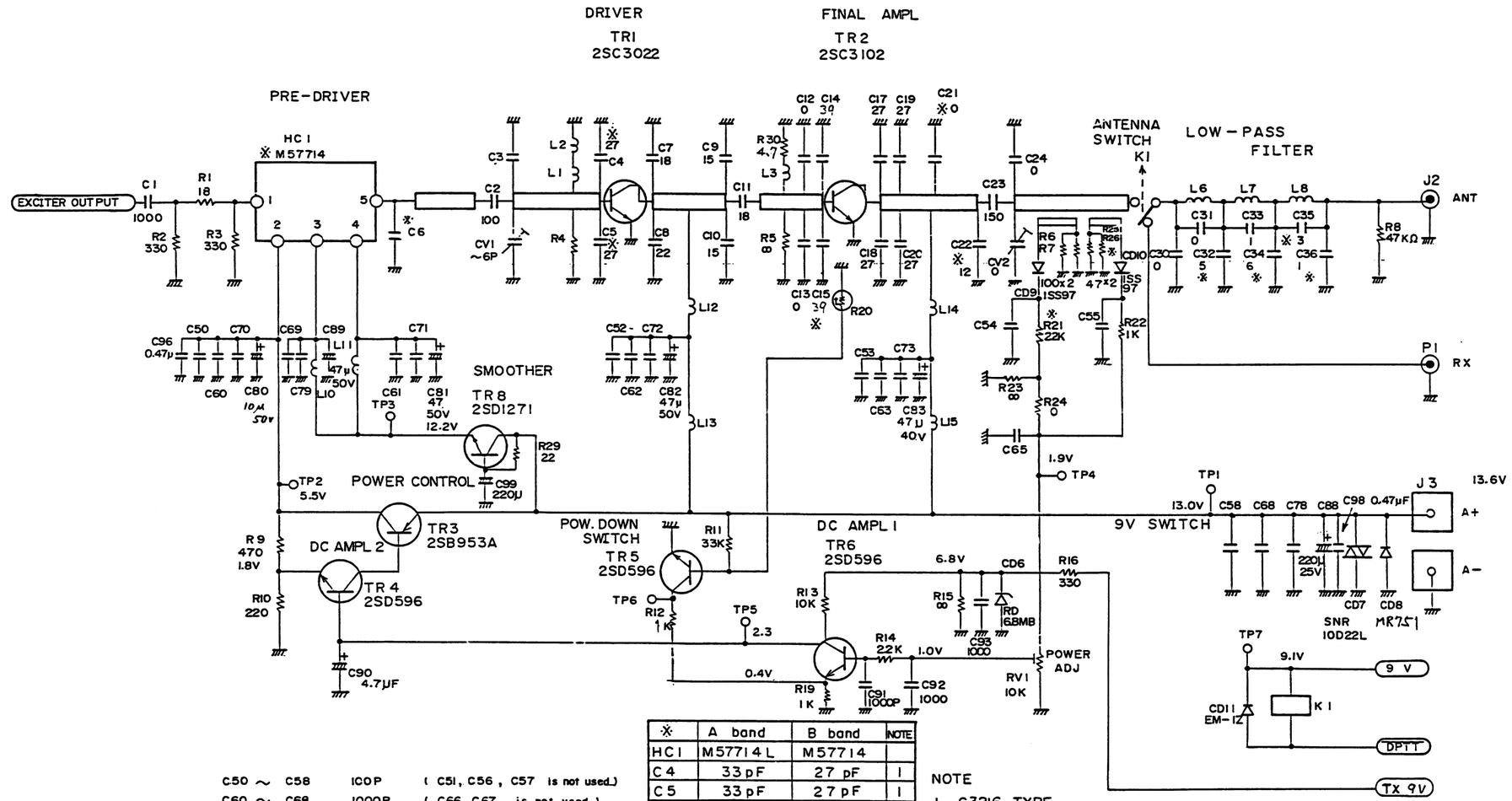
	A band	B band	NOTE
C125	100 pF	0pF	1
C126	100 pF	0pF	1
R105	680 Ω	330 Ω	3
R106	180 Ω	560 Ω	3
R108	1·5 KΩ	6·8KΩ	3
R109	680Ω	1 KΩ	3
R110	180 Ω	330 Ω	3
R124	47Ω	0 Ω	3
R125	47Ω	0 Ω	3

SCHEMATIC DIAGRAM

Exciter

6 Issue 1

40 WATTS TRANSMITTER POWER AMPLIFIER



C50 ~ C58 1000P (C51, C56, C57 is not used.)
C60 ~ C69 1000P (C66, C67 is not used)
C70 ~ C79 0.01μ (C74~C77 is not used)

※	A band	B band	NOTE
HC1	M57714L	M57714	
C4	33pF	27 pF	1
C5	33pF	27pF	1
C6	10pF	0pF	1
C15	47pF	39 pF	2
C21	15pF	0 pF	2
C22	18pF	12 pF	2
C32	6pF	5 pF	2
C33	2pF	1 pF	2
C34	7pF	6 pF	2
C36	3pF	1 pF	2
R21	18 kΩ	22 kΩ	3
R25	100Ω	47 Ω	3
R26	100Ω	47 Ω	3

NOTE
1. C3216 TYPE . Cer, 50V
2. UC23 TYPE MICA, 500V
3. ERJ TYPE Resister, 1/8w
4. ERD TYPE 1/4W

	A band	B band	
R4	47Ω	-	4
C3	15pF	5 pF	1
C14	47 pF	39 pF	2

SCHEMATIC DIAGRAM

Power Amplifier

PARTS LIST

PA BOARD
CAH-282A (403-420 MHz)
CAH-282B (450-470 MHz)
ISSUE 1

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	JRC/5CAAD00878	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef +350 1000 PPM.
C2	JRC/5CAAD00780	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM.
C3	JRC/5CAAD00787	Ceramic: 15 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM. (Used in A).
C3	JRC/5CAAD00800	Ceramic: 5 pF ±0.25 pF, 50 VDCW, temp coef 0 ±60 PPM. (Used in B).
C4 and C5	JRC/5CAAD00795	Ceramic: 1 pF ±0.25%, 50 VDCW, temp coef 0 ±60 PPM. (Used in A).
C4 and C5	JRC/5CAAD00793	Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM. (Used in B).
C6	JRC/5CAAD00785	Ceramic: 10 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. (Used in A).
C7	JRC/5CMAB01398	Mica: 18 pF ±5%, 500 VDCW, temp coef 0 ±100 PPM.
C8	JRC/5CMAB01206	Mica: 22 pF ±5%, 500 VDCW, temp coef 0 ±100 PPM.
C9 and C10	JRC/5CMAB01351	Mica: 15 pF ±5%, 500 VDCW, temp coef 0 ±100 PPM.
C11	JRC/5CMAB01398	Mica: 18 pF ±5%, 500 VDCW, temp coef 0 ±100 PPM.
C12 and C13	JRC/6ZZAB10000	Spare
C14 and C15	JRC/5CMAB01252	Mica: 47 pF ±5%, 500 VDCW, temp coef 0 ±60 PPM. (Used in A).
C14 and C15	JRC/5CMAB01430	Mica: 39 pF ±5%, 500 VDCW, temp coef 0 ±100 PPM. (Used in B).
C17 thru C20	JRC/5CMAB01155	Mica: 27 pF ±5%, 500 VDCW, temp coef 0 ±100 PPM.
C21	JRC/5CMAB01351	Mica: 15 pF ±5%, 500 VDCW, temp coef 0 ±100 PPM. (Used in A).
C22	JRC/5CMAB01398	Mica: 18 pF ±5%, 500 VDCW, temp coef 0 ±100 PPM. (Used in A).
C22	JRC/5CMBA01443	Mica: 12 pF ±5%, 500 VDCW, temp coef 0 ±100 PPM. (Used in B).
C23	JRC/5CMAB01444	Mica: 150 pF ±5%, 500 VDCW, temp coef 0 ±50 PPM.
C24	JRC/6ZZAB10000	Spare
C30 and C31	JRC/6ZZAB10000	Spare
C32	JRC/5CMAB01330	Mica: 6 pF ±0.5 pF, 500 VDCW, temp coef 0 ±200 PPM. (Used in A).
C32	JRC/5CMBA01304	Mica: 5 pF ±0.5 pF, 500 VDCW, temp coef 0 ±100 PPM. (Used in B).
C33	JRC/5CMAB01170	Mica: 2 pF ±0.25 pF, 500 VDCW, temp coef 0 ±200 PPM. (Used in A).
C33	JRC/5CMBA01169	Mica: 1 pF ±0.25 pF, 500 VDCW, temp coef 0 ±100 PPM. (Used in B).
C34	JRC/5CMAB01328	Mica: 7 pF ±0.5 pF, 500 VDCW, temp coef 0 ±200 PPM. (Used in A).
C34	JRC/5CMAB01330	Mica: 6 pF ±0.5 pF, 500 VDCW, temp coef 0 ±100 PPM. (Used in B).
C35	JRC/5CMAB01124	Mica: 3 pF ±0.25 pF, 500 VDCW, temp coef 0 ±200 PPM.
C36	JRC/5CMAB01124	Mica: 3 pF ±0.25 pF, 500 VDCW, temp coef 0 ±200 PPM. (Used in A).
C36	JRC/5CMAB01169	Mica: 1 pF ±0.25 pF, 500 VDCW, temp coef 0 ±100 PPM. (Used in B).
C50 thru C55	JRC/5CAAD00780	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM.
C58	JRC/5CAAD00780	Ceramic: 100 pF ±5%, 500 VDCW, temp coef 0 ±60 PPM.
C60 thru C63	JRC/5CAAD00782	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef +350 -1000 PPM.
C65 and C66	JRC/5CAAD00782	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef +350 -1000 PPM.
C68	JRC/5CAAD00782	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef +350 -1000 PPM.
C70 thru C73	JRC/5CAAD00789	Ceramic: 0.01 uF ±10%, 50 VDC, temp coef 10%.
C78 and C79	JRC/5CAAD00789	Ceramic: 0.01 uF ±10%, 50 VDC, temp coef ±10%.
C80	JRC/5CEAA01931	Electrolytic: 10 uF ±20%, 50 VDC.
C81 and C82	JRC/5CEAA01373	Electrolytic: 47 uF ±20%, 50 VDC.
C83	JRC/5CEAA00439	Electrolytic: 47 uF ±20%, 50 VDC.
C88	JRC/5CEAA01844	Electrolytic: 220 uF ±20%, 25 VDC.
C89	JRC/5CEAA01373	Electrolytic: 47 uF ±20%, 50 VDC.
C90	JRC/5CSAC00322	Tantalum: 47 uF ±20%, 35 VDC
C91 thru C93	JRC/5CAAD00782	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef +350 -1000 PPM.
C96 and C97	JRC/5CBAB00364	Ceramic: 0.47 uF ±5%, 50 VDC.
C99	JRC/5CEAA01844	Electrolytic: 220 uF ±20%, 25 VDC.
C101	JRC/5CAAD00780	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM.
C102	JRC/6ZZAB10000	Spare
C103	JRC/5CAAD00878	Ceramic: 1000 pF ±5%, 50 VDCW temp coef +350 -1000 PPM.
C104	JRC/5CAAD00993	Ceramic: 5 pF ±0.25 pF, 50 VDCW, temp coef 0 ±60 PPM.
C105	JRC/6ZZAB10000	Spare
C106	JRC/5CAAD00878	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C107	JRC/5CAAD00993	Ceramic: 5 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM.
C108	JRC/6ZZAB10000	Spare
C109	JRC/5CAAD00878	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C110	JRC/5CAAD00993	Ceramic: 5 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM.
C111	JRC/5CAAD00787	Ceramic: 15 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM.
C112 and C113	JRC/5CAAD00878	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C114	JRC/5CAAD00796	Ceramic: 3 pF ±0.25 pF, 50 VDCW, temp coef 0 ±60 PPM.
C115	JRC/6ZZAB10000	Spare
C116	JRC/5CAAD00780	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM.
C117	JRC/5CEAA01845	Electrolytic: 10 uF ±20%, 25 VDC.
C118	JRC/5CSAC00323	Tantalum: 10 uF ±20%, 35 VDC.
C119	JRC/5CAAD00864	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM.
C120 thru C124	JRC/5CAAD0878	Ceramic: 1000 pF ±10%, 50 VDCW, temp coef +350 -1000 PPM.
C125 and C126	JRC/5CAAD0780	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM.
		- - - - - - - - - - DIODES - - - - - - - - - -
CD6	JRC/5TXAA00402	Zener: 6.8V, sim to NEC RD 6.8 MB-T1
CD7	JRC/5TZAA00045	Varistor: sim to Sanken SNR-10D22L
CD8	JRC/5TXAD00136	Silicon: sim to Toshiba 3DZ61
CD9 and CD10	JRC/5TXAA00326	Silicon, (Schottky Barrier): sim to NEC 1SS97.
CD11	JRC/5TXAN00061	Silicon: fwd current 1A, 200 PIV: sim to Sanken EMIZ.
CD101	JRC/5TXAD00291	Silicon, fast recovery, (RF switch): sim to Toshiba 1SS184.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
CV1 and CV2	JRC/6ZZAB10000	Spare
		- - - - - - - - - - HYBRID CIRCUITS - - - - - - - - - -
HC1	JRC/5DDAB00167	RF Power Amplifier: sim to Mitsubishi M57714L. (Used in A)
HC1	JRC/5DDAB00243	RF Power Amplifier: sim to Mitsubishi M57714-37. (Used in B).
		- - - - - - - - - - INTEGRATED CIRCUITS - - - - - - - - - -
IC101	JRC/5DAAR00021	Linear, Positive Voltage Regulator: sim to Matsushita AN6541.
		- - - - - - - - - - JACKS - - - - - - - - - -
J2	JRC/6JAFD00002	Connector, RF: H-6JAFD00002.
J3	JRC/5JTCW00060	Connector, power source: PB-1-S L=10.
J101	JRC/5JWBS00060	Connector, 10 pins: FH3-10S-1.25DSA(G).
J102	JRC/5JSAS00001	Connector: WP22-1W.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1	JRC/5KALAD00626	Relay 9 VDC: RG1T-9V.
		- - - - - - - - - - COILS - - - - - - - - - -
L1	JRC/6LAFD01180	Coil, RF
L2	JRC/6LAFD01129	Coil, RF
L3	JRC/6LAFD01191	Coil, RF
L6 and L7	JRC/6LAFD01175	Coil, RF
L8	JRC/6LAFD01177	Coil, RF
L10 and L11	JRC/6LAFD01180	Coil, RF
L12	JRC/6LAFD01181	Coil, RF
L13	JRC/6LAFD01129	Coil, RF
L14	JRC/6LAFD01181	Coil, RF
L15	JRC/6LAFD01129	Coil, RF
L101 and L102	JRC/6LAFD01185	Coil, RF
L103	JRC/6LAFD01187	Coil, RF
L104	JRC/6LAFD01188	Coil, RF
L105	JRC/6LAFD01187	Coil, RF
L106	JRC/6LAFD01190	Coil, RF
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1	JRC/6JJFD00086	Coaxial cable.
P2	JRC/6ZCFD00165	Power cable.
P101	JRC/6JJFD00087	Coaxial cable.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

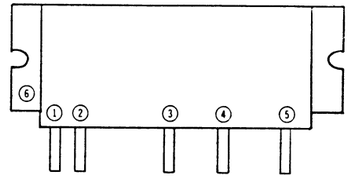
SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	JRC/5REAG00990	Metal film: 18 ohms ±5%, 200 VDCW, 1/8 W.
R2 and R3	JRC/5REAG00597	Metal Film: 330 Ohms ±5%, 200 VDCW, 1/8 W.
R4	JRC/5RDAA01313	Metal film: 47 Ohms ±5%, 500 VDCW, 1/4 W.
R5		Spare
R6 and R7	JRC/5REAG00586	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 W.
R8	JRC/5REAG00578	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 W.
R9	JRC/5RDAA01337	Metal film: 470 ohms ±5%, 500 VDCW, 1/4 W.
R10	JRC/5RDAA01329	Metal film: 220 ohms ±5%, 500 VDCW, 1/4 W.
R11	JRC/5REAG00592	Metal film: 33K ohms ±5%, 200 VDCW, 1/8 W.
R12	JRC/5REAG00572	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 W.
R13	JRC/5REAG00576	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 W.
R14	JRC/5REAG00575	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 W.
R15	JRC/6ZZAB10000	Spare
R16	JRC/5REAG00597	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 W.
R19	JRC/5REAG00579	Metal film: 470 ohms ±5%, 200 VDCW, 1/8 W.
R20	JRC/5RXAE00028	Posistor: less than 300 ohms at 25°C, above 2.2K ohms at 90°C.
R21	JRC/5REAG00682	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 W. (Used in A).
R21	JRC/5REAG00581	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 W. (Used in B).
R22	JRC/5REAG00572	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 W.
R23	JRC/6ZZAB10000	Spare
R24		Spare
R25 and R26	JRC/5REAG00586	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 W. (Used in A).
R25 and R26	JRC/5REAG00580	Metal film: 47 ohms ±5%, 200 VDCW, 1/8 W. (Used in B).
R29	JRC/5RDAA01305	Metal film: 22 ohms ±5%, 500 VDCW, 1/4 W.
R30	JRC/5REAG00412	Metal film: 4.7 ohms ±5%, 350 VDCW.
R33	JRC/5REAG00589	Metal film: 3.3K ohms ±5%, 350 VDCW, 1/8 W.
R101	JRC/5REAG00619	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 W.
R102 and R103	JRC/5REAG00622	Metal film: 270 ohms ±5%, 200 VDCW, 1/8 W.
R104	JRC/5REAG00574	Metal film: 1.5K ohms ±5%, 200 VDCW, 1/8 W.
R105	JRC/5REAG00591	Metal film: 680 ohms ±5%, 200 VDCW, 1/8 W.
R106	JRC/5REAG00908	Metal film: 180 ohms ±5%, 200 VDCW, 1/8 W.
R107	JRC/5REAG00597	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 W.
R108	JRC/5REAG00506	Metal film: 1.5K ohms ±5%, 200 VDCW, 1/8 W.
R109	JRC/5REAG00591	Metal film: 680 ohms ±5%, 200 VDCW, 1/8 W.
R110	JRC/5REAG00908	Metal film: 180 ohms ±5%, 200 VDCW, 1/8 W.
R111	JRC/5REAG00623	Metal film: 560K ohms ±5%, 200 VDCW, 1/8 W.
R112	JRC/5REAG00623	Metal film: 2.7K ohms ±5%, 200 VDCW, 1/8 W.
R113	JRC/5REAG00622	Metal film: 270 ohms ±5%, 200 VDCW, 1/8 W.
R114	JRC/5REAG00586	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 W.
R115	JRC/5REAG00572	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 W.
R116	JRC/5REAG00574	Metal film: 1.5K ohms ±5%, 200 VDCW, 1/8 W.
R117	JRC/5REAG00586	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 W.
R118	JRC/5REAG00617	Metal film: 10 ohms ±5%, 200 VDCW, 1/8 W.
R119	JRC/5REAG00572	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 W.
R120	JRC/5REAG00582	Metal film: 1.8K ohms ±5%, 200 VDCW, 1/8 W.
R121	JRC/5REAG00619	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 W.

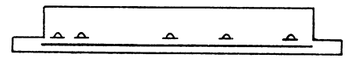
SYMBOL	PART NO.	DESCRIPTION
R122 and R123	JRC/5REAG00622	Metal film: 270 ohms ±5%, 200 VDCW, 1/8 W.
R124 and R125	JRC/5REAG00580	Metal film: 47 ohms ±5%, 200 VDCW, 1/8 W.
RV1	JRC/5RVAB00279	Variable: 10K ohms ±30%, 0.1 W.
RV2	JRC/5RMAB00061	Variable: 2K ohms ±30%, 0.1 W.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
TR1	JRC/5TCAD00087	Silicon, NPN: sim to Mitubishi 25C3022.
TR2	JRC/5TCAD00088	Silicon, NPN: sim to Mitubishi 25C3102.
TR3	JRC/5TBAR00001	Silicon, PNP: sim to Matsushita 2SB953A.
TR4	JRC/5TDAB00055	Silicon, PNP: sim to NEC 2SD596-T2 DV3.
TR5	JRC/5TDAB00054	Silicon, NPN: sim to NEC 2SD596-T1 DV3.
TR6	JRC/5TDAB00055	Silicon, NPN: sim to NEC 2SD596-T2 DV3.
TR7	JRC/5TBAB00055	Silicon, PNP: sim to NEC 2SB B624-T1 BV3.
TR8	JRC/5TDAR00014	Silicon, NPN: sim to Matushita 2SD1271.
TR101 and TR102	JRC/5TCAB00246	Silicon, NPN: sim to NEC 2SC2759-T2 U22.
TR103	JRC/5TCAF00472	Silicon, NPN: sim to Toshiba 2SC3268 TE 12 L.
TR104	JRC/5TCAB00180	Silicon, NPN: sim to NEC 2SC2407.
TR105	JRC/5TAAG00146	Silicon, PNP: sim to Toshiba 2SA1020-Y.

IC DATA

PRE-DRIVER

HC 1





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