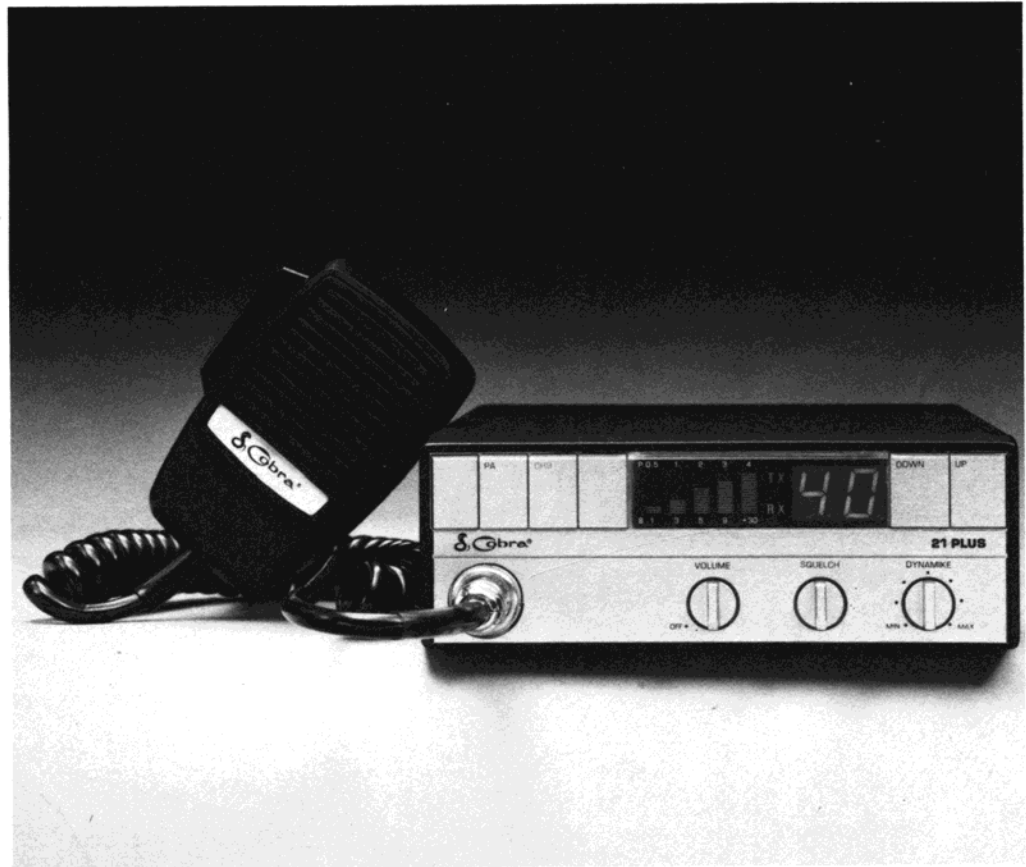


# SERVICE MANUAL

# SERVICE MANUAL

## MODEL 21 PLUS



COBRA "21 Plus" Mobile CB Radio with Electronic Tuning, "Channel Saver," LED Bar Graph Meter, "DynaMike," and Instant Emergency Channel 9 Tuning

 **Cobra**<sup>®</sup>  
CONSUMER ELECTRONICS GROUP  
**DYNASCAN CORPORATION**

6500 West Cortland Street • Chicago, Illinois 60635  
(312) 889-8870 TELEX: 244-332

# TABLE OF CONTENTS

DESCRIPTION	PAGE NUMBER
TABLE OF CONTENTS.....	1
NOTES.....	2
SPECIFICATIONS.....	3-4
BLOCK DIAGRAM.....	5
CIRCUIT DESCRIPTIONS.....	6-7
FREQUENCY CHART.....	8-9
ALIGNMENT PROCEDURE.....	10-13
TROUBLE SHOOTING.....	14-16
ADDITIONAL PARTS ON THE BOTTOM.....	17
MAIN P.C. BOARD (TOP VIEW).....	18
MAIN P.C. BOARD (BOTTOM VIEW).....	19
FRONT P.C. BOARD (TOP VIEW).....	20
LED P.C. BOARD (TOP VIEW).....	20
FRONT P.C. BOARD (BOTTOM VIEW).....	21
LED P.C. BOARD (BOTTOM VIEW).....	21
WIRING DIAGRAM.....	22
COPPER PATTERN LAYOUT.....	23
VOLTAGE CHART.....	24
TRANSISTOR VOLTAGE CHART.....	25
IC VOLTAGE CHART.....	26
SEMI-CONDUCTOR LEAD IDENTIFICATION.....	27
IC INTERNAL DIAGRAMS.....	28-30
SCHEMATIC DIAGRAM.....	31-32
EXPLODED VIEW.....	33
PARTS LIST.....	34
MECHANICAL PARTS LIST.....	35

## NOTES

# SPECIFICATIONS

## GENERAL

Channels	40.
Frequency Range	26.965 to 27.405 MHz.
Frequency Control	Phase-Locked Loop (PLL) synthesizer.
Frequency Tolerance	0.005%
Operating Temp. Range	-30°C to +50°C.
Microphone	Plug-in type; dynamic.
Input Voltage	13.8 V DC nom. Positive or negative ground.
Current Drain	Transmit: AM full mod., 1.5 A. (maximum). Receive: (Squelched, 0.3 A; full audio output 1.2 A. (nominal). Channel Saver: Unit off 25 mA.
Size	8 <sup>1</sup> / <sub>2</sub> "D × 6 <sup>1</sup> / <sub>4</sub> "W × 2 <sup>1</sup> / <sub>8</sub> "H. (216 mm×159 mm×56 mm)
Weight	3 lbs., 14 oz.
Antenna Connector	UHF, SO-239.
Semiconductors	30 transistors, 30 diodes, 6 integrated circuits, 11 LEDs.
Meter	Indicates relative power output and received signal strength.

## TRANSMITTER

Power Output	4 watts.
Modulation	High-and low-level Class B amplitude.
Frequency	300 to 2500 Hz.
Output Impedance	50 ohms, unbalanced.

## RECEIVER

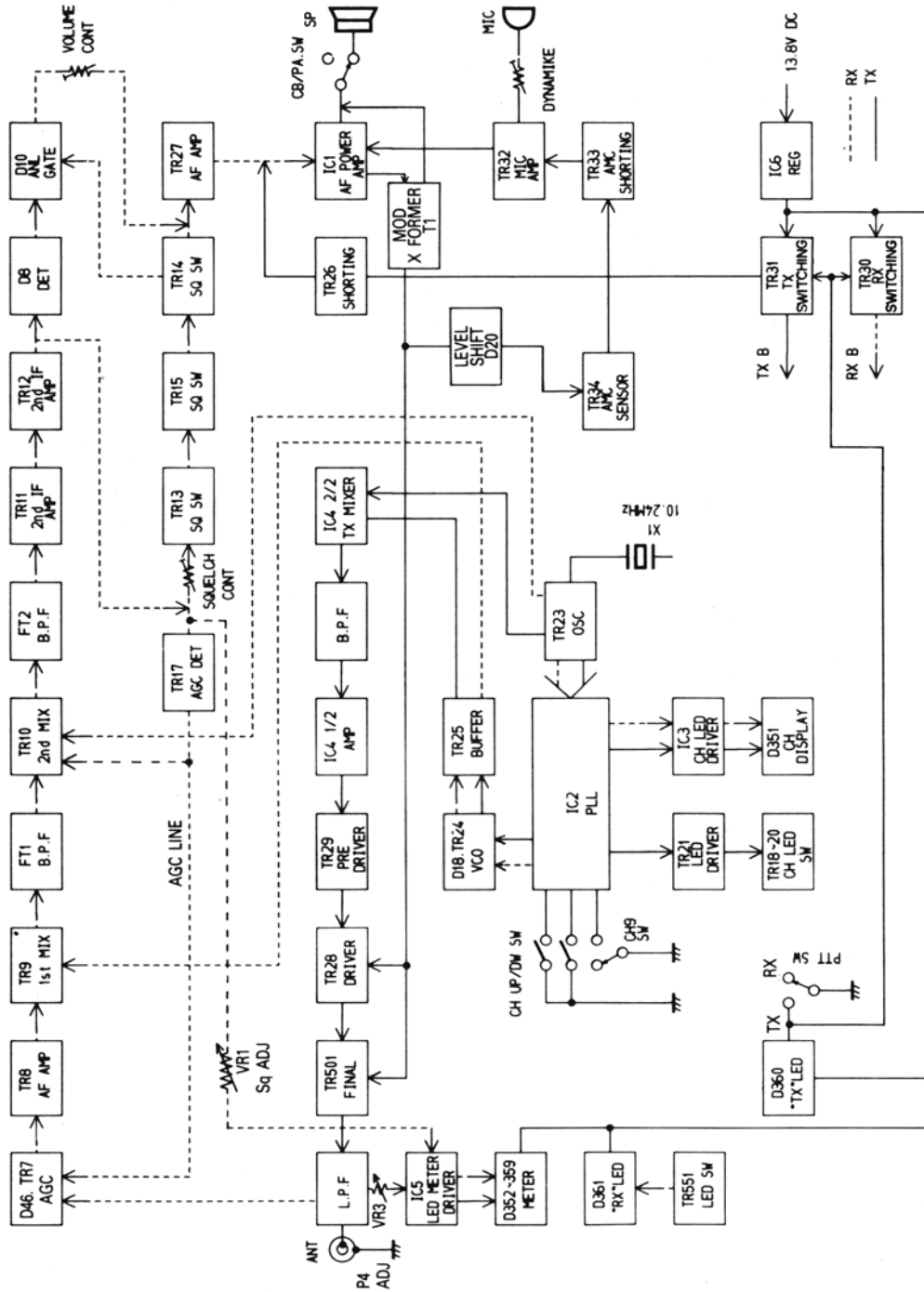
Sensitivity	Less than 1 $\mu$ V for 10 dB (S+N)/N.
Selectivity	6 dB @ 7 KHz, 60 dB @ 10 KHz.
Image Rejection	80 dB, typical.
Adjacent Ch. Rejection	60 dB, typical.
IF Frequencies	Double conversion, 1st: 10.695 MHz. 2nd: 455 KHz.
Automatic Gain Control (AGC)	Less than 10 dB change in audio output for inputs from 10 to 50,000 microvolts.
Squelch	Adjustable; threshold less than 1 $\mu$ V.
Audio Output Power	4 watts.
Frequency Response	300-3000 Hz.
Distortion	Less than 7% @ 3 watts @ 1000 Hz.
Built-in Speaker	8 ohms, round.
External Speaker	8 ohms; disables internal speaker when connected.

## **PA SYSTEM**

Power Output	4 watts into external speaker.
External Speaker for PA	8 ohms; a separate jack is provided.

(SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE)

# BLOCK DIAGRAM 21 PLUS

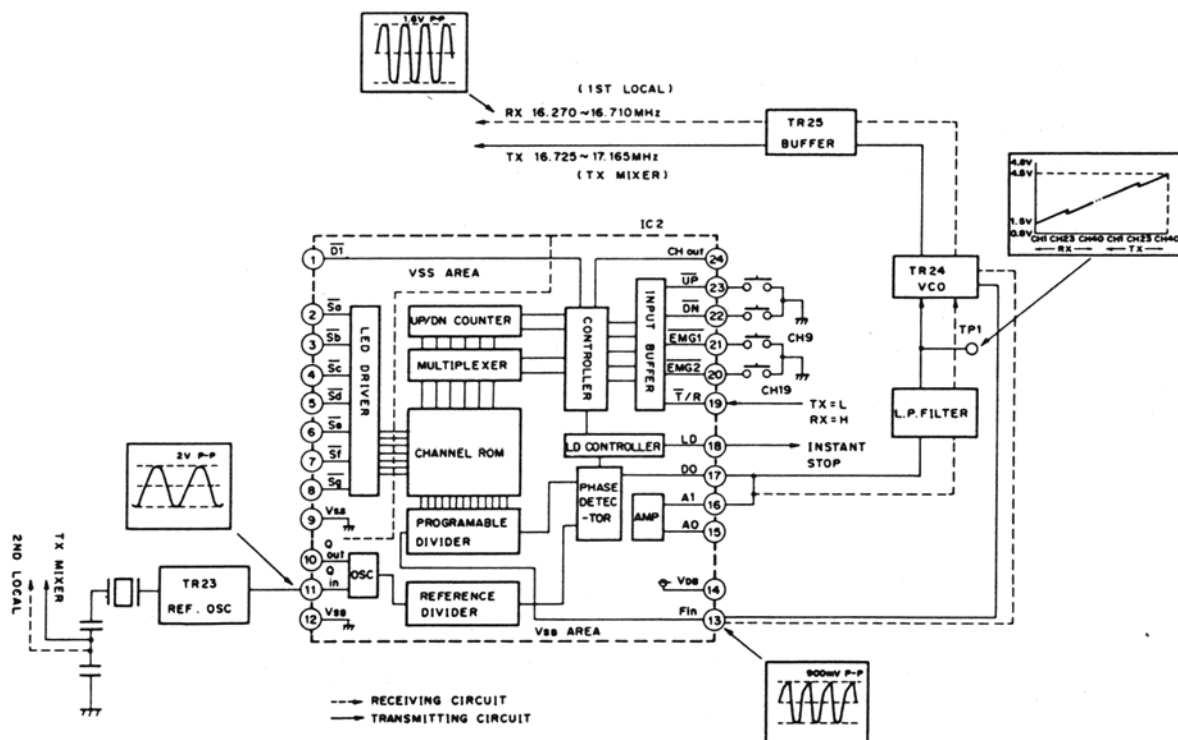


# CIRCUIT DESCRIPTIONS

## 1. PHASE LOCK LOOP

The PLL circuit shown below precisely controls the transmit frequency for each channel and generates a precise 1st local mixer frequency for the selected channel of the receiver. The 7 major parts are the Voltage Controlled Oscillator (VCO), 1/N Divider, a Phase Detector, a Low Pass Filter, a Reference Oscillator (10.24 MHz), 1/2048 Divider and a Channel ROM (Read Only Memory).

### PLL CIRCUIT



The VCO is an oscillator which controls oscillation frequency in accordance with input voltage change. The VCO output is mixed with a signal in the transmitter or receiver circuitry. A portion of the VCO frequency is fed to IC2 (1/N divider).

"N" for the 1/N divider is determined by the Channel Up/Down switch whose output is selected by a Channel ROM.

As shown in the frequency chart, N is different between transmit and receive modes, since only one crystal is used with this PLL circuitry.

The output from the 1/N divider is fed to the Phase Detector. The frequency from the reference OSC, 10.24 MHz, is divided to 5 kHz, by the 1/2048 divider and applied to another input of the Phase Detector.

The Phase Detector compares the phase difference between these two input signals (both 5 kHz), generating an error voltage (DO), which acts on the VCO to bring the two frequencies exactly in-phase. When this condition occurs, the PLL circuit is locked.

A Low Pass Filter integrates the output of the Phase Detector which controls the VCO frequency. The program divider 1/N changes the frequency of the VCO (Fvco) in 10 kHz increments. For Example Channel No. 1 transmit divide Ratio "N" is programmed to 3345.

Therefore  $F_{vco} = 5 \times 3345 = 16.725$  (MHz).

Fvco is determined the same way for all other channels as shown in table A.

### **Channel Selection Program**

The Up/Down channel switches change the input voltage at either pin #22 or pin #23 of IC2 to select the desired channel. The divide ratio of the programmable frequency divider in IC2 is then determined through a code converter and the state of the transmit/receive mode switch (T/R) in IC2. The PTT switch determines the state of T/R in IC2 by changing the voltage at pin #19 from HIGH (receive) to LOW (transmit). The change between the two modes produces a 455 kHz change in VCO frequency.

### **Transmitter Output Frequency**

The transmitter local oscillator of 10.24 MHz is produced by TR23 and crystal X1. The transmitter mixer IC4 mixes the local oscillator frequency 10.24 MHz, which is fed into pin #4 of IC4 and PLL Local Oscillator frequency (Fvco) produced by TR24/D18, which is fed into pin #1 of IC4. The sum of these two frequencies determines the transmitter carrier frequency (Ft).  $F_t = F_{vco} + 10.24$  (MHz)

### **Receiver IF/Mixers**

The 1st IF/Mixer TR9 receives the PLL local oscillator (Fvco) and receiver RF frequency (Fr) to produce 10.695 MHz.

$1ST\ IF = Fr - VCO = 10.695$  MHz.

The 2nd IF/Mixer (TR10) receives the 1st IF frequency (10.695 MHz) and local oscillator frequency (10.24 MHz) to produce the 2ND IF frequency, 455 kHz.

$2ND\ IF = 10.695 - 10.24 = 455$  (kHz).

## **2. CIRCUIT FOR PREVENTION OF UNAUTHORIZED FREQUENCY EMISSION**

This Transceiver has a built-in circuit which prevents transmission of unauthorized frequencies during the time the PLL circuit is not locked.

When the PLL circuit is not locked or the program data input is not for channels 1–40, Pin 18 in IC2 produces a low level digital control signal. This signal is fed to Pin 7 of IC4 transmitter mixer through D31 diode. When this signal is at low level, IC4 is disabled; and no RF signals are fed to the next stages.

IC2 is designed internally to operate only with valid data required for channels 1–40, thereby eliminating the RF signal output, and preventing any unauthorized frequencies.



**TABLE A: FREQUENCY CHART OF Fvco AND DIVIDE RATIO N**

Antenna Frequency (MHz)	Channel Number	For transmit (Pin 19 of IC2=L)		For Receive (Pin 19 of IC2=H)	
		Divide Ratio (N)	VCO Frequency (MHz)	Divide Ratio (N)	VCO Frequency (MHz)
26.965	1	3345	16.725	3254	16.270
26.975	2	3347	16.735	3256	16.280
26.985	3	3349	16.745	3258	16.290
27.005	4	3353	16.765	3262	16.310
27.015	5	3355	16.775	3264	16.320
27.025	6	3357	16.785	3266	16.330
27.035	7	3359	16.795	3268	16.340
27.055	8	3363	16.815	3272	16.360
27.065	9	3365	16.825	3274	16.370
27.075	10	3367	16.835	3276	16.380
27.085	11	3369	16.845	3278	16.390
27.105	12	3373	16.865	3282	16.410
27.115	13	3375	16.875	3284	16.420
27.125	14	3377	16.885	3286	16.430
27.135	15	3379	16.895	3288	16.440
27.155	16	3383	16.915	3292	16.460
27.165	17	3385	16.925	3294	16.470
27.175	18	3387	16.935	3296	16.480
27.185	19	3389	16.945	3298	16.490
27.205	20	3393	16.965	3302	16.510
27.215	21	3395	16.975	3304	16.520
27.225	22	3397	16.985	3306	16.530
27.255	23	3403	17.015	3312	16.560
27.235	24	3399	16.995	3308	16.540
27.245	25	3401	17.005	3310	16.550
27.265	26	3405	17.025	3314	16.570
27.275	27	3407	17.035	3316	16.580
27.285	28	3409	17.045	3318	16.590
27.295	29	3411	17.055	3320	16.600
27.305	30	3413	17.065	3322	16.610
27.315	31	3415	17.075	3324	16.620
27.325	32	3417	17.085	3326	16.630
27.335	33	3419	17.095	3328	16.640
27.345	34	3421	17.105	3330	16.650
27.355	35	3423	17.115	3332	16.660
27.365	36	3425	17.125	3334	16.670
27.575	37	3427	17.135	3336	16.680
27.385	38	3429	17.145	3338	16.690
27.395	39	3431	17.155	3340	16.700
27.405	40	3433	17.165	3342	16.710

### **3. RX OPERATIONS (Refer to block and schematic diagrams)**

In the receive mode, switching transistor TR30 is turned ON to supply B+ voltage to the receiver section. TR33 is turned ON to mute the mic input. The transmit B+ switching transistor TR31 is OFF disabling the transmitter mixer IC4 and TR26 RX Audio mute transistor. The TX predriver TR29 is turned OFF by applying a B+ voltage to its emitter. The 2nd IF Amp TR12 modulated signal output is demodulated by detector diode D8. The recovered audio is amplified by TR27, fed to the power amp IC1 and then to the speaker. The output of TR12 also drives or controls the output levels of the AGC detector TR17 and the squelch circuit. When a Low RF signal is received by the antenna, the output of the AGC line is low and TR7 and diode D46 are OFF allowing maximum RF signal to reach TR8 and maximum IF gain of TR10. When the RF signal strength increases, the AGC line voltage increases and causes current to flow through TR7 and D46. This attenuates the RF input signal level to TR8, and decreases the gain of TR10, thereby preventing overload distortion and cross modulation deterioration. TR12 drives diode D9, producing a negative voltage at C31 to offset the squelch preset level and turn OFF TR13. Current flows through TR15 causing TR14 to turn "OFF" and unsquelch the output. Automatic Noise Limiting (ANL) is performed by diode D10.

### **4. TX OPERATION (Refer to block and schematic diagrams)**

In transmit mode, switching transistor TR31 is turned ON to supply Bias voltages to TX mixer IC4 and to turn "ON" TR26 to mute receive output. TR30 is turned "OFF" allowing TR29 to turn ON and TR33 (AMC) to operate. The mic input signal is amplified by TR32 and fed to IC1 to drive the modulation Xformer T1 secondary which causes the TX stages B+ voltage to vary with mic signal amplitude. Automatic modulation control (AMC) is accomplished by level shift diode D20, TR33 and TR34. When mic input signal increases above a critical level, D20 conducts current causing TR34 to turn on TR33 which attenuates the mic input level, controlling the modulation level.

### **5. PA OPERATION**

In PA standby mode the receiver is "ON" and incoming signals can be monitored on the PA speaker. TX predriver TR29 B+ is disconnected to disable the transmitter. When the PTT switch is ON, TR30 is turned OFF disabling the receiver. TR31 is turned ON driving TR26 in saturation to mute the RX Audio pre-amp TR26. Mic signal is amplified by TR32 and fed to input of IC1 which drives the PA speaker.

### **6. CHANNEL 9 CIRCUIT**

When the CH 9 switch is ON, Pin 21 of IC2 is set low to activate channel 9 only.

# ALIGNMENT PROCEDURE

## 1. PLL SECTION ALIGNMENT

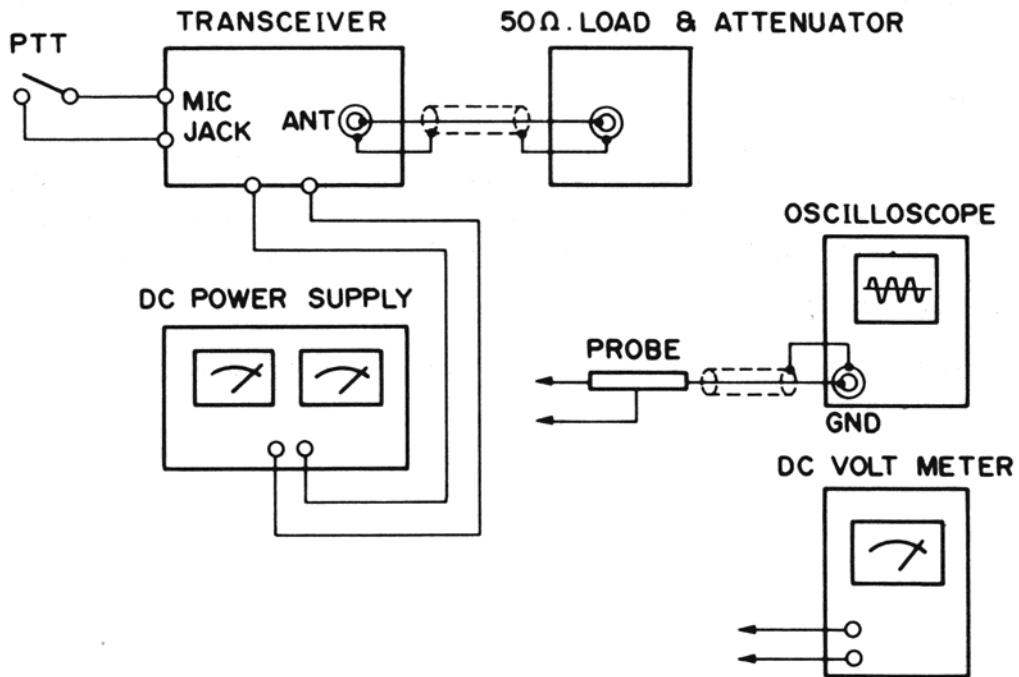
### 1.1 Test Equipment Required

DC Power Supply (13.8 V)  
 DC Voltmeter  
 Oscilloscope  
 Dummy Load (50 ohm) & Attenuator

### 1.2 Alignment Procedures

STEP	PRESET TO	ADJUSTMENT	REMARKS
1	CH : 40 Mode : TX	L8	Connect DC Voltmeter to TP1. Adjust for 4.5 V. After alignment, lock the core of L8 with paraffin.
2	CH : 19 Mode : RX	L9	Connect Oscilloscope probe to TP2. Adjust for maximum reading on Oscilloscope.

### 1.3 Test Equipment Connection



## 2. TRANSMITTER SECTION ALIGNMENT

### 2.1 Test Equipment Required

DC Power Supply (13.8 V)  
 AF Generator (Audio Frequency Oscillator)  
 Oscilloscope  
 RF Power Meter  
 Dummy Load (50 ohm) & Attenuator

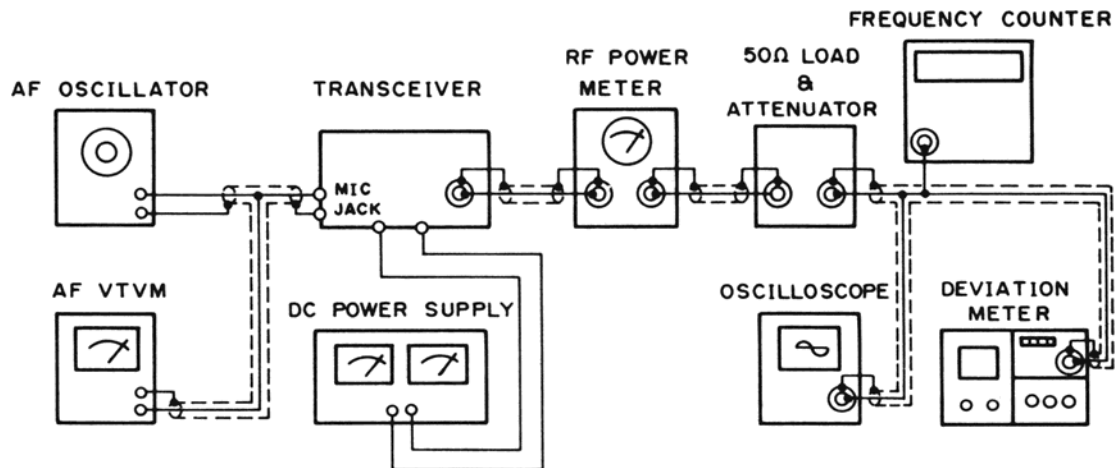
### 2.2 Preset to

- a) CH 9 : OFF
- b) PA : OFF
- c) DYNAMIKE : Maximum (full clockwise)

### 2.3 Alignment Procedures

STEP	PRESET TO	ADJUSTMENT	REMARKS
1	CH : 19 No mod.	L16, L17 and L18	Connect Oscilloscope probe to TP3. Adjust coils for maximum reading.
2	CH : 19 No mod.	L15 and L12	Connect RF Power Meter to Antenna Jack (J501). Adjust coils for maximum reading.
3	CH : 19 No mod.	L12	Adjust for 4.0W on RF Power Meter. After adjustment, lock L12 with paraffin.
4	CH : 19 No mod.	VR3	1. Reduce DC voltage to obtain 3.1 W on RF power meter. 2. Adjust VR3 to the point at which 5th LED just lights.

### 2.4 Test Equipment Connection



### 3. RECEIVER SECTION ALIGNMENT

#### 3.1 Test Equipment Required

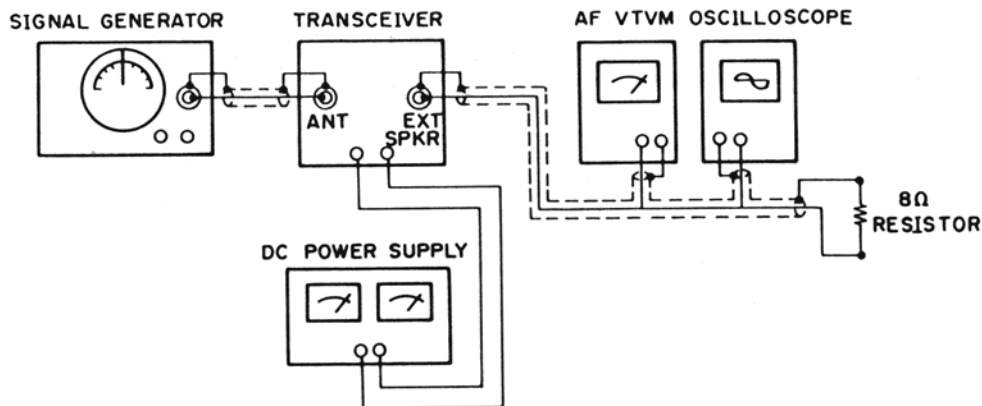
DC Power Supply (13.8 V)  
 S.S.G. (Standard Signal Generator, with Attenuator)  
 AF Voltmeter  
 Oscilloscope  
 Dummy Load (8 ohm)

#### 3.2 Preset to

- a) CH 9 : OFF
- b) PA : OFF
- c) NB : OFF
- d) SQUELCH : Minimum (full counterclockwise)
- e) RF GAIN : Maximum (full clockwise)
- f) S.S.G. : 27.185 MHz (19 CH)  
 modulation 1 kHz 30%

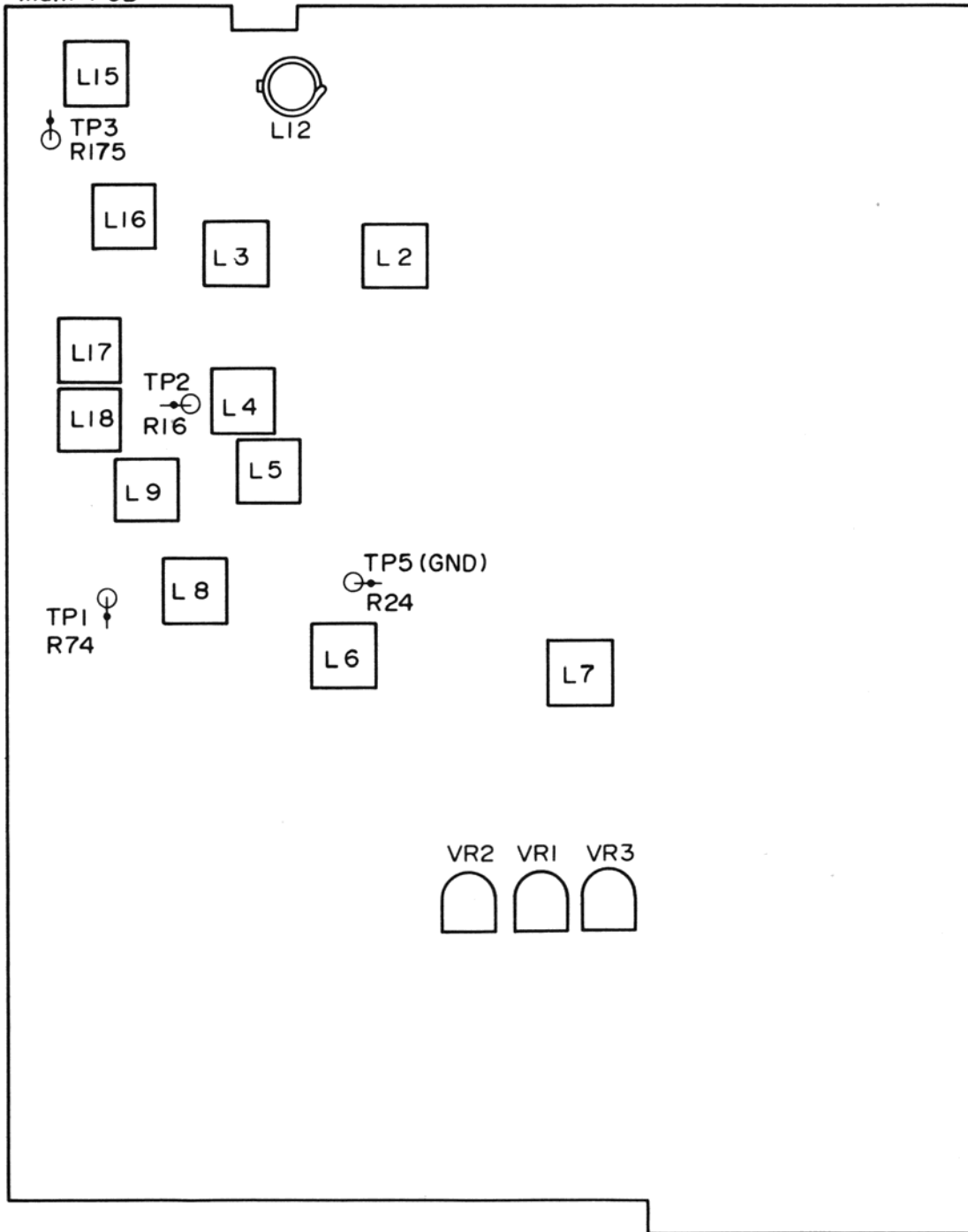
#### 3.2 Alignment Procedure

STEP	PRESET TO	ADJUSTMENT	REMARKS
1	CH : 19 VOLUME : Max. S.S.G. : Mod. on	L2, L3, L4, L5, L6 & L7	Connect S.S.G. to Antenna Jack(J501). Connect AF Voltmeter and Oscilloscope to EXT SP Jack (J3). Adjust coils for maximum reading. During this alignment, decrease RF signal level as required to obtain 2 V on AF VTVM.
2	CH : 19 S.S.G. : 100 $\mu$ V No mod.	VR1	Adjust so S9 of Transceivers LED Meter illuminates.
3	CH : 19 VOLUME : Max. SQUELCH : Max. S.S.G. : 1 mV Mod. on @ 30%	VR2	Connect AF Voltmeter and Oscilloscope to EXT SP Jack (J3). Adjust so that the AF signal will just appear on Oscilloscope.



# ALIGNMENT POINTS

Main PCB



# TROUBLESHOOTING HINTS

## UNIT WILL NOT TURN ON

1. Blown fuse.
2. Defective Power Switch.
3. Defect in Power Supply Circuit.

## NO SOUND RECEIVED

1. Defective external speaker jack.
2. Bad contact in the microphone jack.
3. Bad PTT switch in the microphone.
4. Unlocked PLL circuit or improper alignment.
5. Defect in squelch circuit.
6. Defective PA switch.

## NO TRANSMISSION

1. Defective microphone jack.
2. Defective PTT switch on microphone.
3. Unlocked PLL circuit or improper alignment.
4. Defective PA switch.

## NO TX MODULATION

1. Defective microphone and/or circuit.
2. Defect in modulation circuit.

FOR MORE HINTS, SEE BELOW

## NO TRANSMISSION

Connect current meter in series with power cable.

Check current reading for transmit mode:

- A. If current reads more than 1 amp (but less than 2 A.), the final output transistor is OK. Check for bad contacts or short circuits between PC Board and Antenna Connector. A current reading of less than 0.5 A indicates no drive to Final Transistor. Check drive or early RF stages.
- B. Defective PLL?  
Check voltage at Pin 18 of IC2. If less than 5 V, PLL is unlocked. If more than 5 V, PLL is OK.
- C. Short Circuit in Transmitter Circuit?  
Voltage on Pin 1 of IC6 should be less than 7 V in TX mode, and should increase to more than 7 V in RX mode.
- D. If voltage reading is more than 7 V on TR31 collector, it is OK. If voltage of more than 2 V is measured at the D21 anode, check microphone circuit.
- E. If RF voltage (27 MHz) is more than 1.5 V P-P at TP3, previous stages are OK.
- F. No voltage readings at TR28 and TR501 collector: check D19 or T-1
- G. No Channel LED light: If one particular segment does not light, the LED is defective. If LED does not light in any channel position, check IC3.

### **CHANNEL UP/DOWN SWITCH INOPERATIVE**

If channel does not go up or down when Channel Up/Down Switch is pressed, check IC2 and connection of Channel Up/Down Switch.

### **CHANNEL LED DOES NOT LIGHT**

If one particular channel does not light, check molex, LED, or Channel Up/Down Switch. If no channel lights, check IC3 or molex.

### **NO TX MODULATION**

If receiver operates correctly, but there is no TX modulation, the problem should be in TR32, TR33, TR34, or a short circuit in the microphone circuit. Audio power IC1 is used both for TX and RX modes.

### **NO RECEPTION**

Before troubleshooting, check Squelch Control full CCW, RF Gain Control full CW, and microphone connected.

A) Connect Signal Generator to antenna. Check that Signal Strength Meter (S meter) LEDs light.

S meter LEDs light:

Antenna is OK through IF stage; check circuit through ANL, Squelch and Audio amplifier. If Detector circuit is normal, negative voltage should be present at anode of D8 diode during S meter illumination.

S meter LEDs do not light:

To check PLL:

1. 16 MHz frequency should be present at TP2 (0.9 V P-P or more).
2. The frequencies shown in the frequency chart should be correct when the Channel Up-Down Switch is changed from CH 1 through CH 40.
3. 10.24 MHz frequency should be present at C51 (0.4 V P-P or more). If PLL is OK, check circuit through TR8, TR9, TR10, TR11 and TR12.

B) Check Audio stage for operation: Connect Speaker to PA Speaker Jack, and set PA-CB switch to PA. If there is an audible click when PTT switch is pressed, Audio stage is OK. If there is no audible click, IC1 Audio Amplifier is defective, or T-1 transformer is bad. (Transformer DC resistance should be approximately 0.5 ohm for both primary and secondary windings.)

C) Defective Audio Power IC?

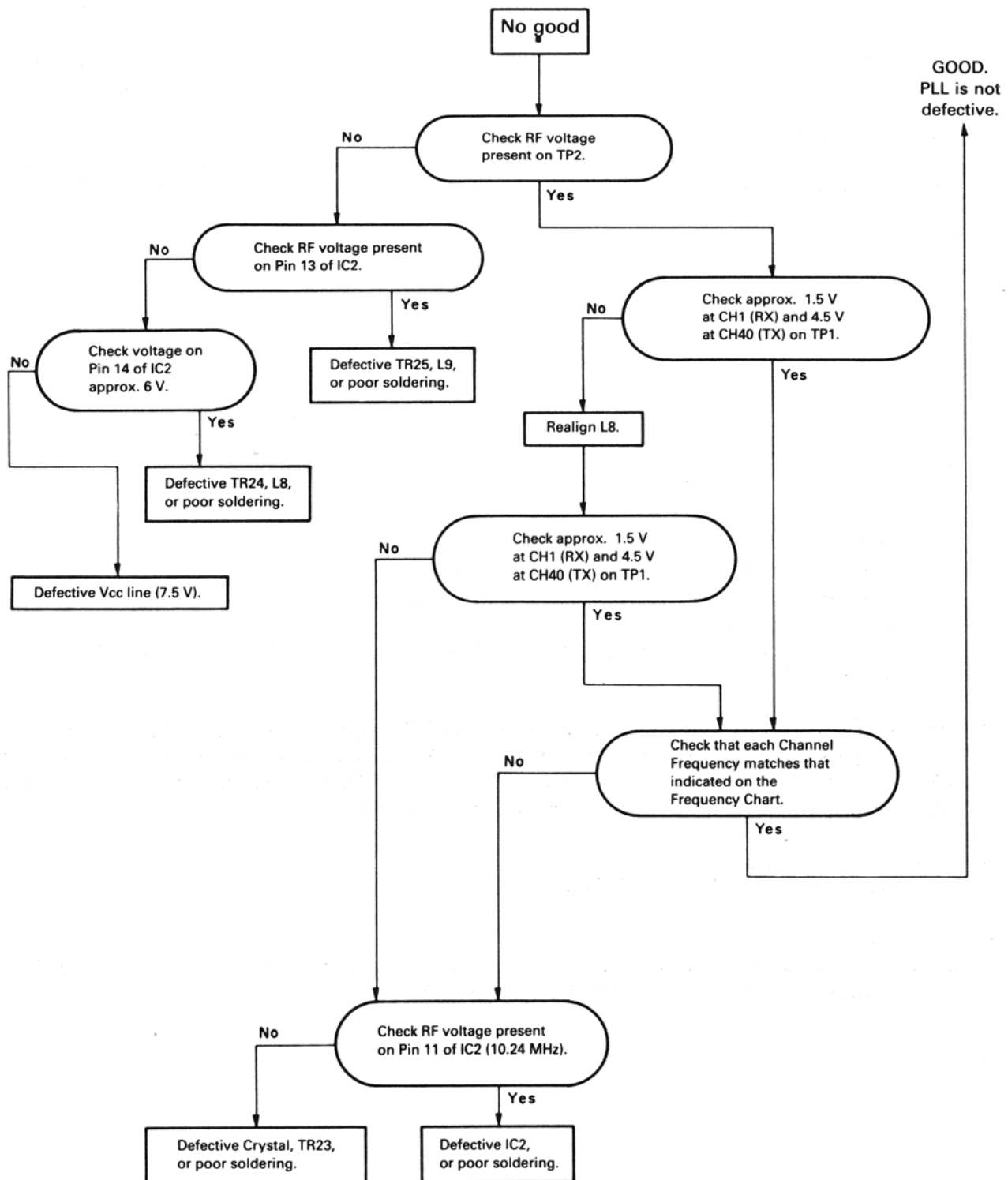
If voltage at Pin 6 is 7 V (VCC/2), IC1 is OK.

D) Squelch constantly "on".

If voltage at the base of TR15 is 0 V, TR13 is defective. If reading is less than 0.7 V, check TR15 circuit and/or Squelch control ground connection for cold solder.

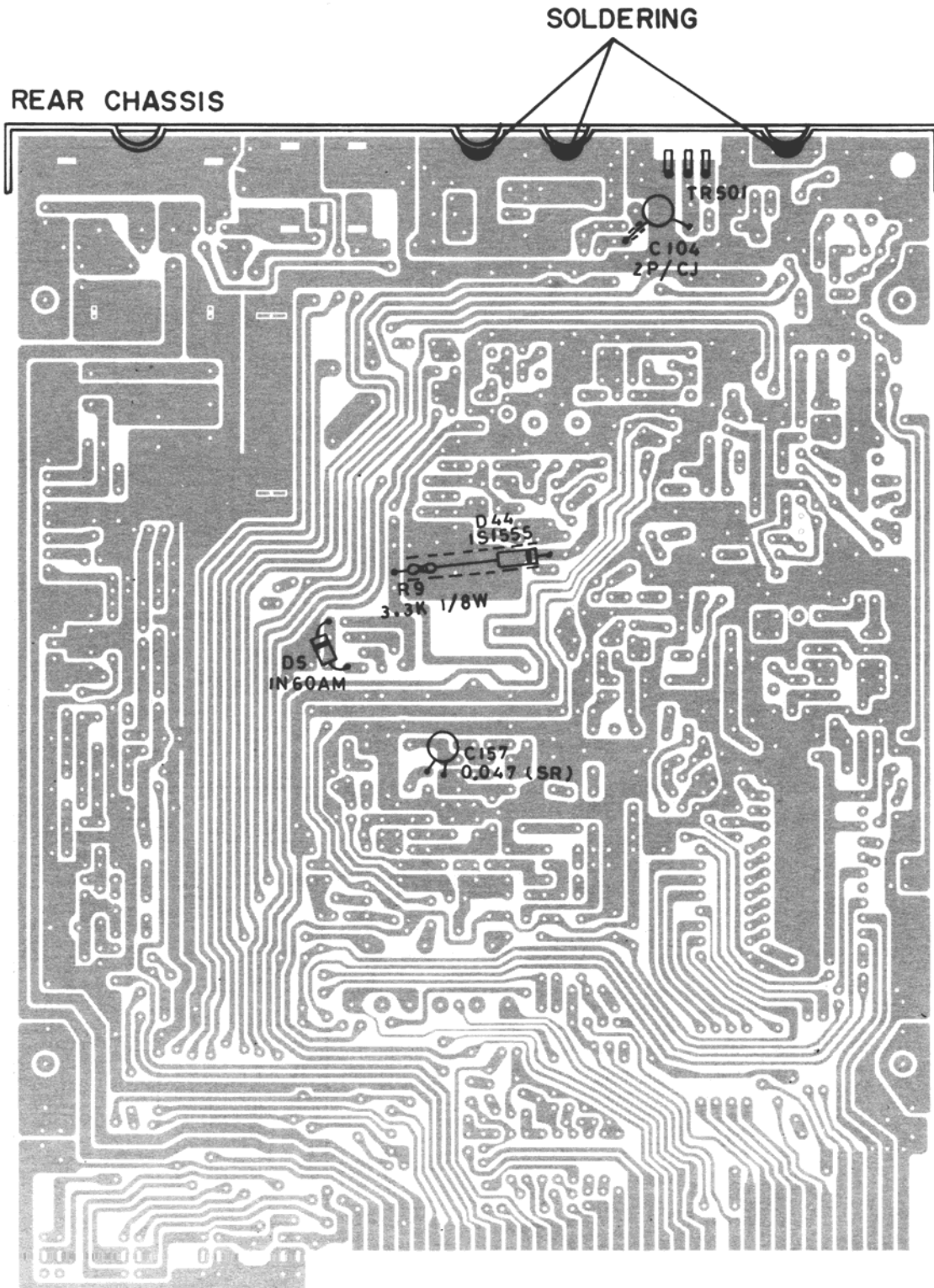


# PLL CIRCUIT TROUBLESHOOTING HINTS

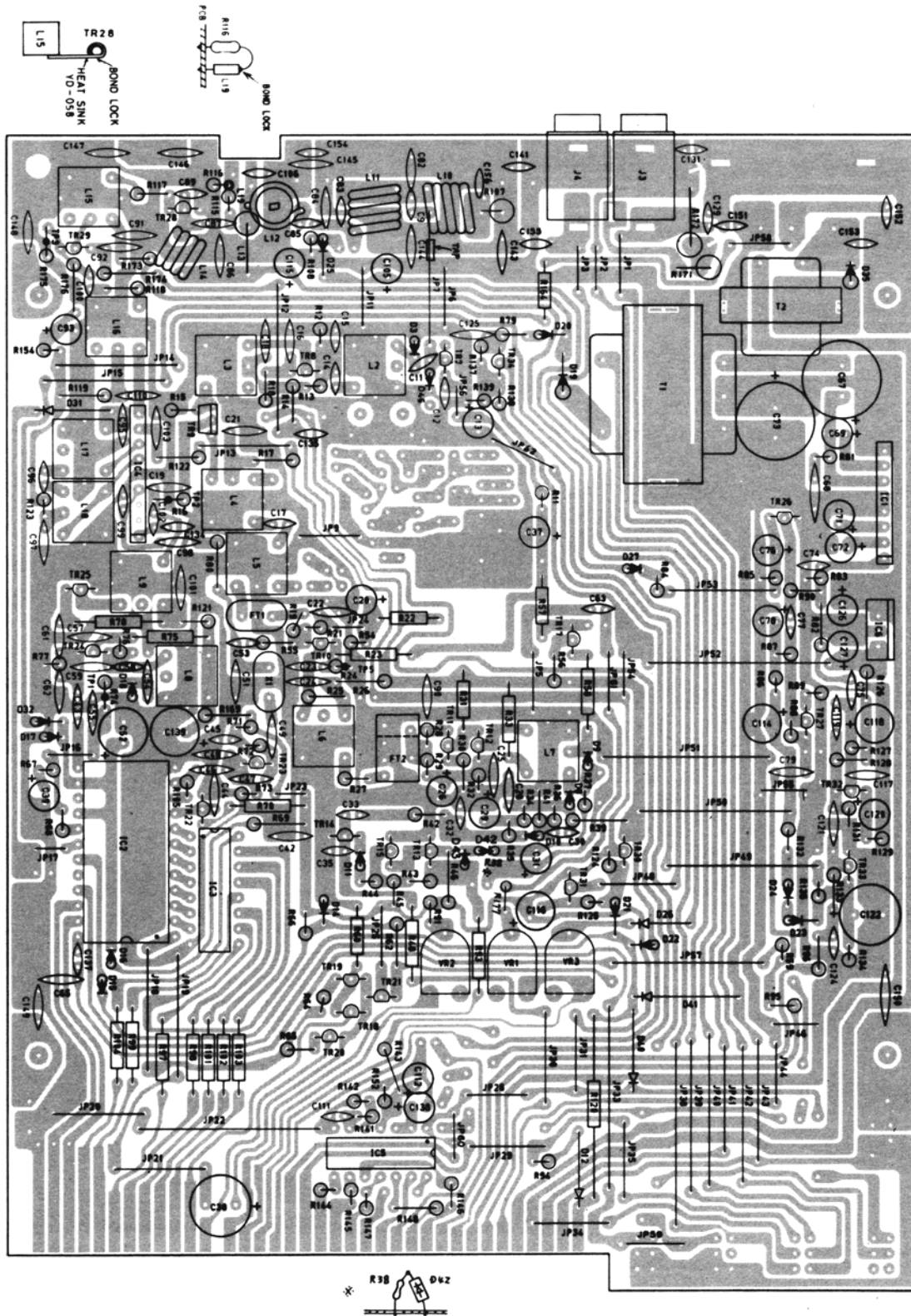


# ADDITIONAL PARTS ON THE BOTTOM

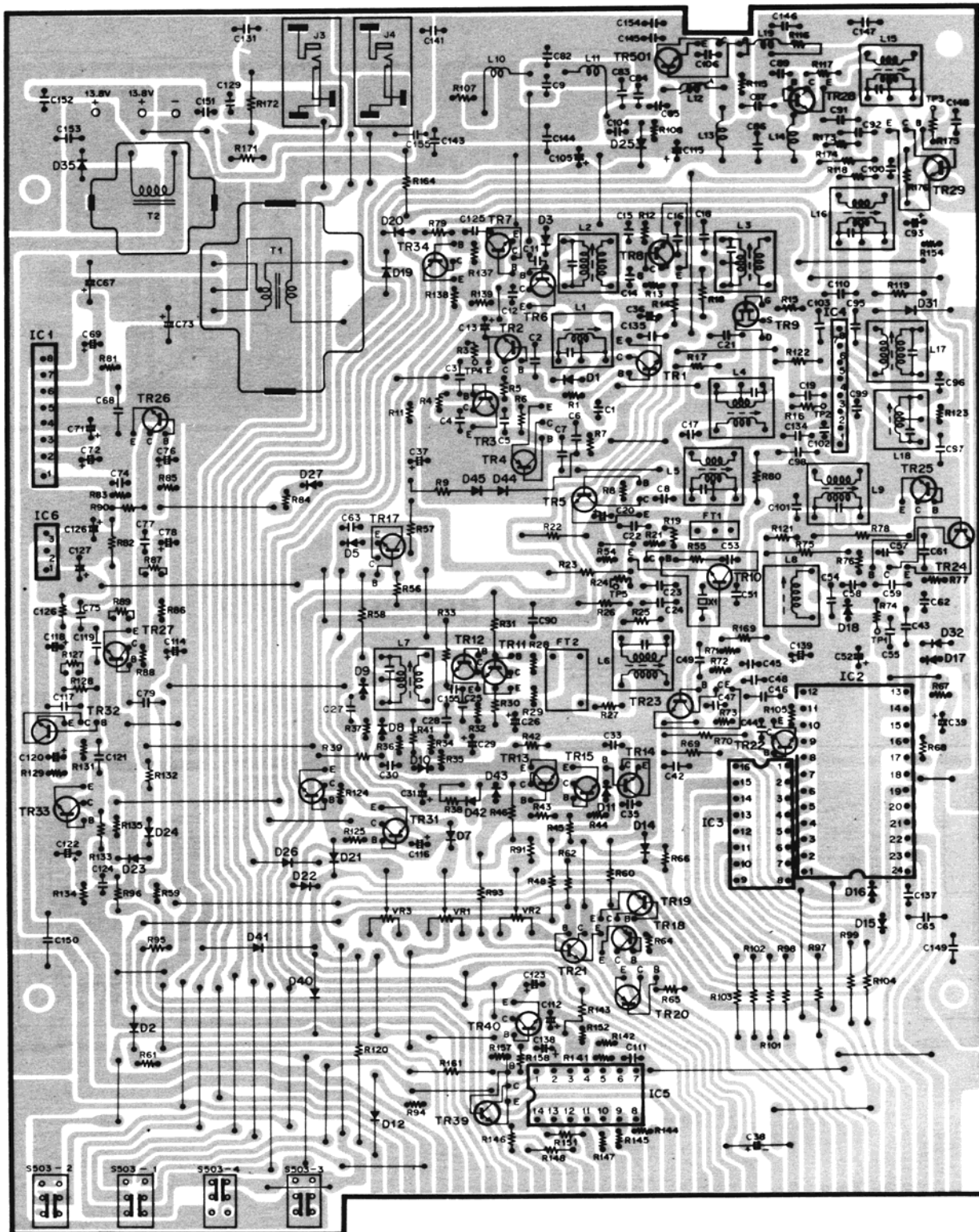
MAIN P.C. BOARD



# MAIN P.C. BOARD (TOP VIEW)

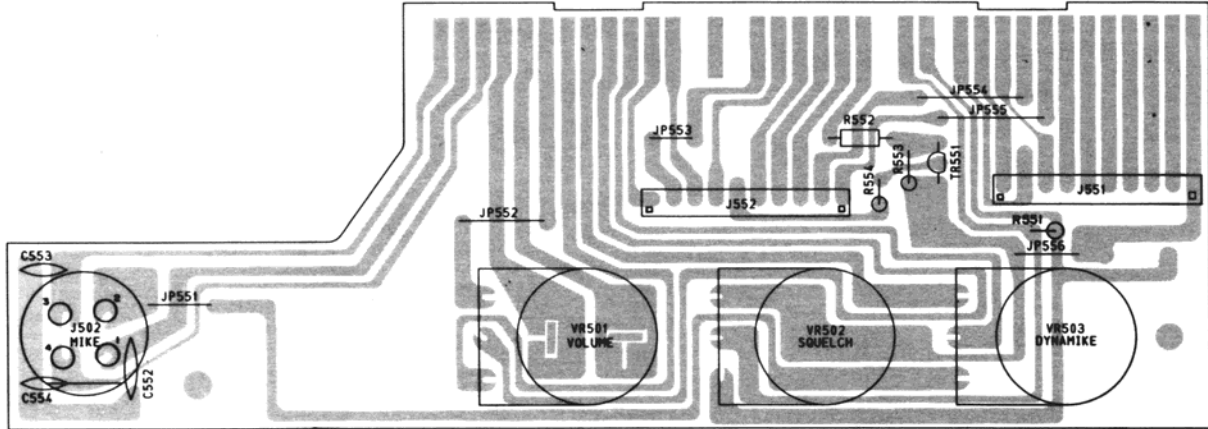


# MAIN P.C. BOARD (BOTTOM VIEW)



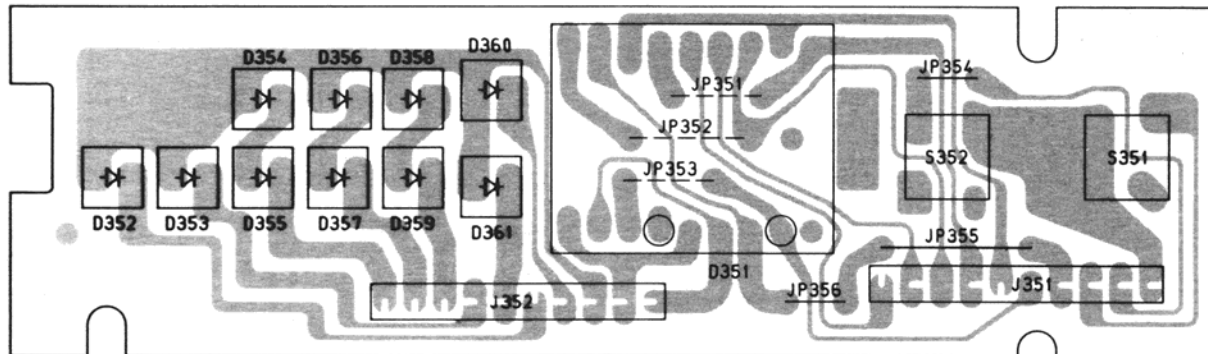
# FRONT P.C. BOARD

(TOP VIEW)



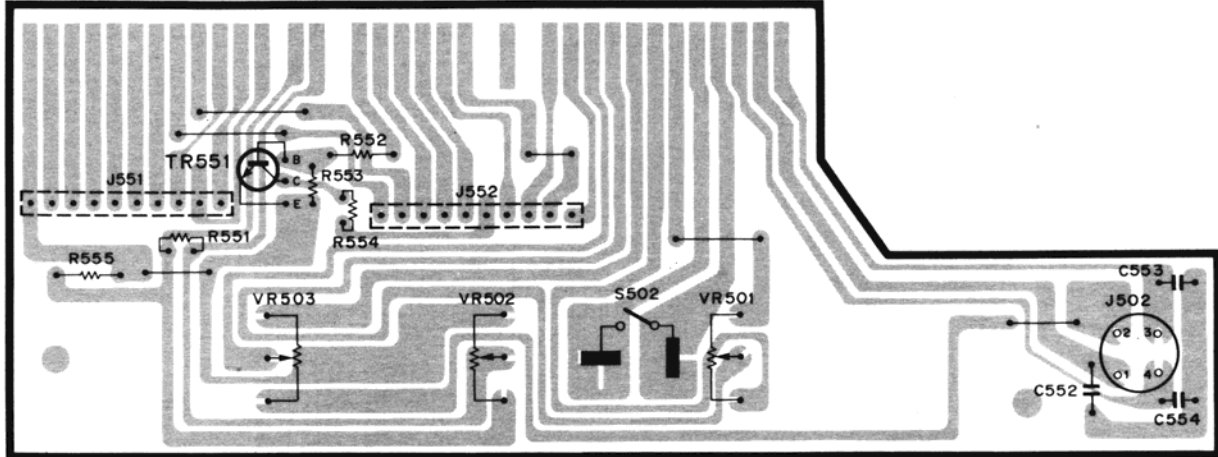
# LED P.C. BOARD

(TOP VIEW)



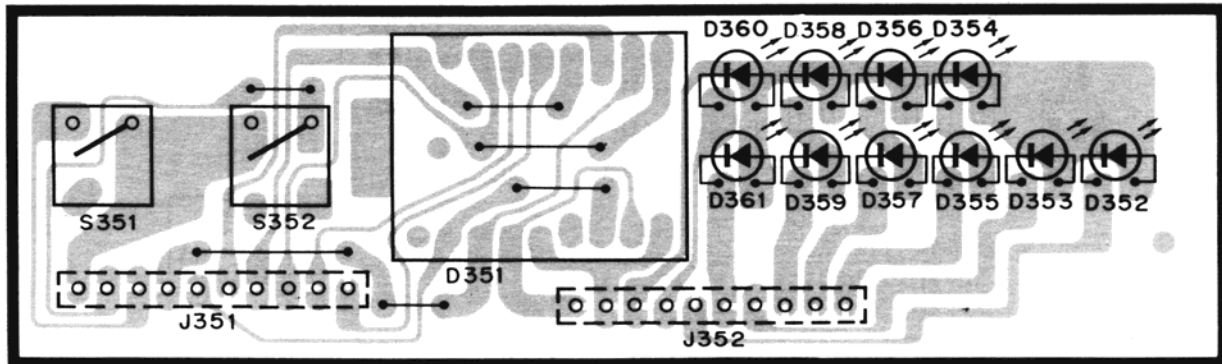
# FRONT P.C. BOARD

(BOTTOM VIEW)



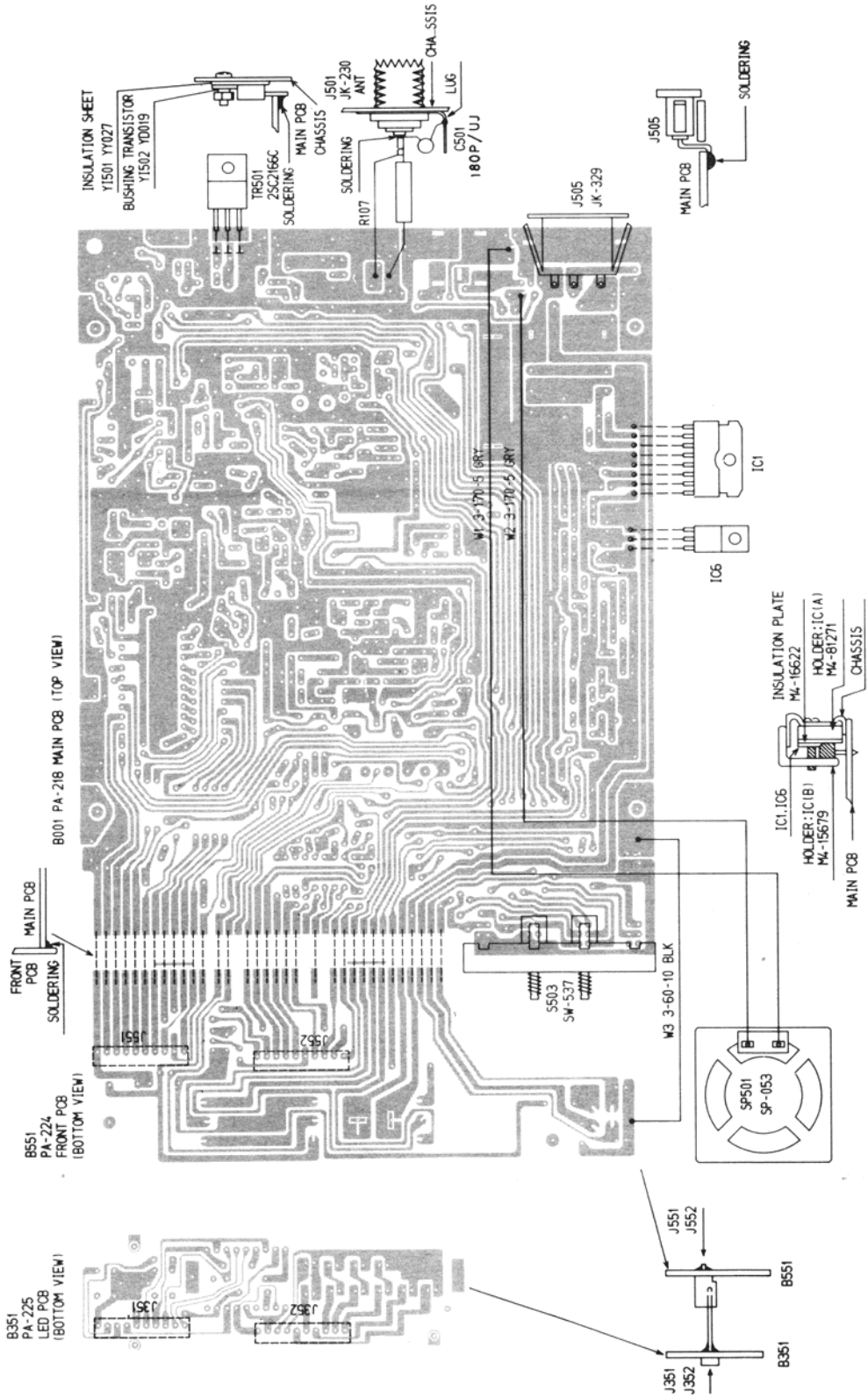
# LED P.C. BOARD

(BOTTOM VIEW)



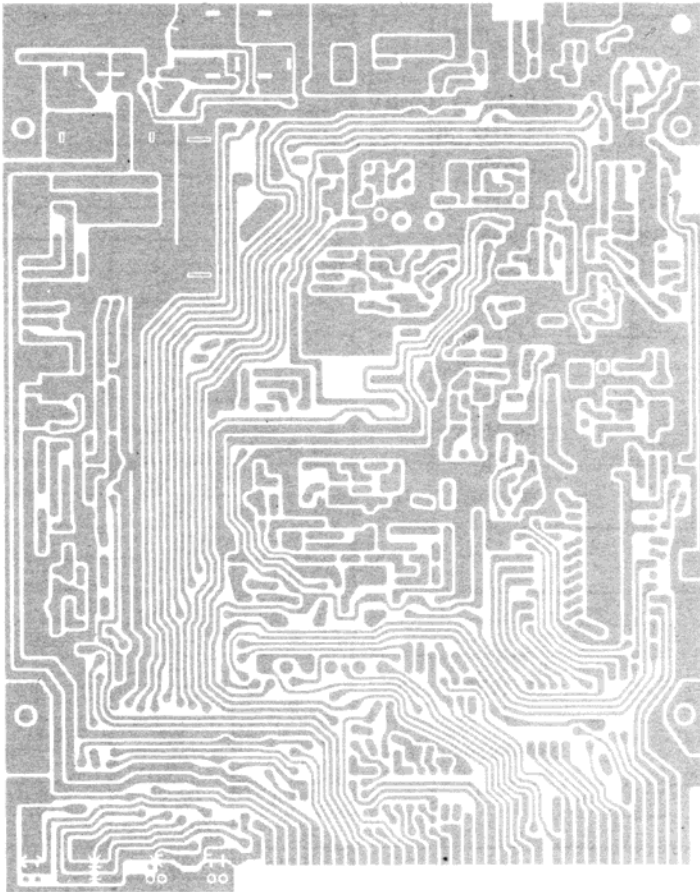
# WIRING DIAGRAM

UT309M/WIR::51:1

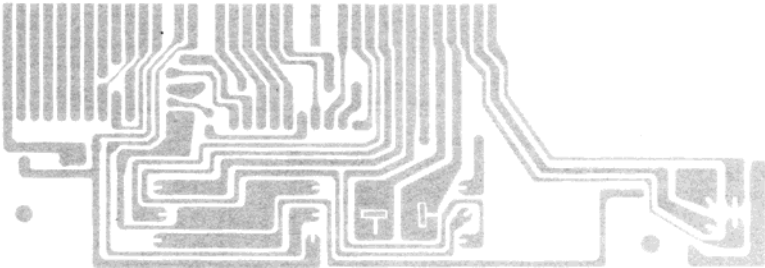


# COPPER PATTERN LAYOUT

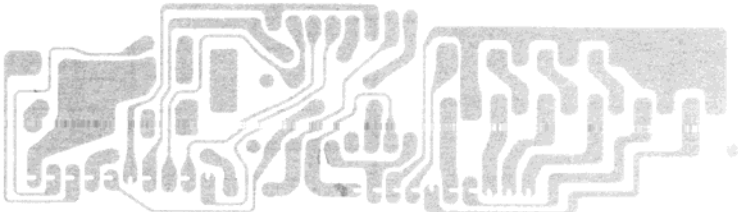
MAIN P.C. BOARD



FRONT P.C. BOARD



LED P.C. BOARD





# VOLTAGE CHART

## MEASUREMENT CONDITION

Power Supply Voltage:	13.8 V, DC
Antenna Impedance:	50 ohm
Temperature:	25°C
SSG Output level:	0 dB = 0.5 $\mu$ V
SSG Modulation:	1 kHz, 30%
Standard Audio level	0.5W
Standard Output frequency	1 kHz
Audio Frequency Impedance:	8 ohm
Channel:	19 CH (27.185 MHz)
PA:	OFF
CH9:	OFF
VOLUME:	MAX.
SQUELCH:	MIN.
DYNAMIKE:	MAX.

# TRANSISTOR VOLTAGE CHART

No.	NAME	B	C	E
6	2SC1675L	0	0	0
		0	0	0.23
7	2SC1675L	0.12	0	0
		0	0	0
8	2SC1674L	1.1	7.4	0.2
		0.1	1.2	0
9	2SK192ABL	0	2.8	8
		0	2.8	8
10	2SC1675L	1	7.5	0.4
		0.06	1.2	0
11	2SC1675L	0.7	2.5	0
		0.1	0.95	0
12	2SC941TM (O)	2.5	1.3	1.8
		1	1	0.4
13	2SC945AQ	0 (0.6)	0.7 (0)	0 (0)
		0 (0.6)	0.36 (0.45)	0 (0)
14	2SC945AQ	0 (0.7)	0 (0)	0 (0)
		0.05 (0.7)	0 (0)	0 (0)
15	2SC945AQ	0.7 (0)	0.06 (4.6)	0 (0)
		0.65 (0.38)	0 (5.4)	0 (0)
17	2SC945AQ	0	7.5	0.125
		0	1.2	0
18	2SB525C	4 (3.2)	2 (1.7)	4.5 (3.5)
		4 (3.2)	2 (1.7)	4.5 (3.5)
19	2SA733P	4.5 (4.3)	4 (3)	4.5 (3.4)
		4.5 (4.3)	4 (3)	4.5 (3.4)
20	2SB525C	4.5 (4.3)	2 (1.7)	4.5 (3.4)
		4.5 (4.3)	2 (1.7)	4.5 (3.4)
21	2SC3242AE	5 (4.1)	8 (8.4)	4.5 (3.2)
		5 (4.1)	8 (8.4)	4.5 (3.2)
22	2SC945AQ	0.7	0	0
		0.7	0	0
23	2SC1675L	5	7.5	5
		5	7.5	5
24	2SC1675L	6.5	7.7	6.5
		6.5	7.7	6.5
25	2SC1675L	0.16	6.4	0
		0.3	6	0
26	2SC945AQ	0.175	0	0
		0.65	0	0

No.	NAME	B	C	E
27	2SC945AQ	0.1	3.8	0.26
		0	0.8	0
28	2SC2086D	0	13	0
		0	12	0
29	2SC941TM (O)	0.6 (0.66)	13.5 (0.2)	7.5 (7.5)
		3 (13)	12 (0.7)	2.5 (0.7)
30	2SC945AQ	8	8	7.4
		1.1	8.4	1.1
31	2SA733P	8	1.3	8.2
		7.5	8.2	8.2
32	2SC945AQ	2	4.6	1.6
		2	4.6	1.6
33	2SC945AQ	0.7	0	0
		0.1	0	0
34	2SA733P	4	0.7	3.5
		4	0.15	3.5
501	2SC2166C	0	13	0
		0	12	0
551	2SC945AQ	0.7	0.5	0
		0.5	4.2	0

Upper : RX mode  
Lower : TX mode

( )—TR13 to TR15 : SQ "MAX."  
TR18 to TR21 : DIM "ON"  
TR39 to TR40 : DIM "ON"  
TR20 : PA "ON"

## IC VOLTAGE CHART

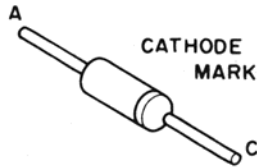
	IC1	IC2	IC3	IC4	IC5	IC6
Pin No.	μPC1242H	SM5123A	LB1710	TA7310PU	LB1417	HA17808W
1	0	3	2.9	2.3	8	13.5
	0	2.9	2.9	2.3	8	13.5
2	2	0.13	2.9	2.1	2.8	0
	2	0.13	2.9	2	2.8	0
3	1.2	0.13	0.13	1.2	2.8	8.2
	1.2	0.13	0.13	1.2	2.8	8.2
4	0	2.9	0.13	1.9	0	
	0	2.9	0.13	2.4	0.2	
5	0	0.13	2.9	0	0	
	0	0.13	2.9	0	0.55	
6	7	0.13	0.13	1.3	0.1	
	6.6	0.13	0.13	8	3.2	
7	12.5	2.9	0.13	1.9	0	
	12	2.9	0.13	2	0	
8	13	2.9	0	4.2	5	
	12	2.9	0	4.5	0.36	
9		0	5.6	1.3	5	
		0	5.6	6.5	0.78	
10		3	0.7		5	
		3	0.7		1.1	
11		3	0.7		5	
		2.9	0.7		0.68	
12		0	1.8		5	
		0	1.8		0.68	
13		1	0.7		5	
		1	0.7		0.45	
14		5.5	0.7		5	
		5.5	0.7		0.25	
15		0	1.8			
		0	1.8			
16		5.5	1.8			
		5.5	1.8			
17		2.3				
		3.8				
18		5.5				
		5.5				
19		4.5				
		0.7				
20		4.5				
		4.5				
21		4.5				
		4.5				
22		4.5				
		4.5				
23		4.5				
		4.5				
24		0				
		0				

Upper : RX mode  
Lower : TX mode

# SEMI-CONDUCTOR LEAD IDENTIFICATION

Diodes A: ANODE  
C: CATHODE

IN60AM  
IN60P  
IS2076A  
IN4003  
IS1555  
ISV73-EB  
HZ6A3

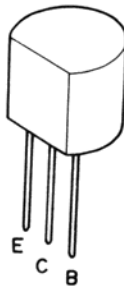


RT-242 PRS  
RT-242 YS

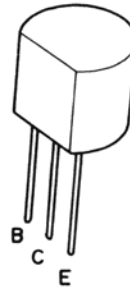


Transistors B: BASE  
C: COLLECTOR  
E: EMITTER

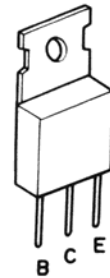
2SA733A-P  
2SC941TM-O  
2SC945A-Q  
2SC1674-L  
2SC1675-L  
2SC3242A-E



2SB525-C  
2SC2086-D



2SC2166-C

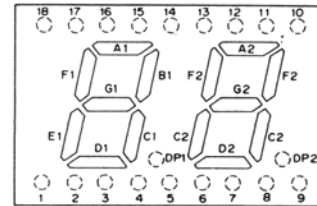


FET D: DRAIN  
S: SOURCE  
G: GATE

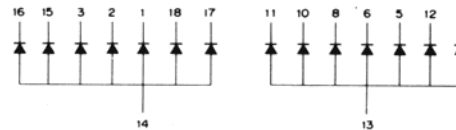
2SK192A-BL



LL-2253YG



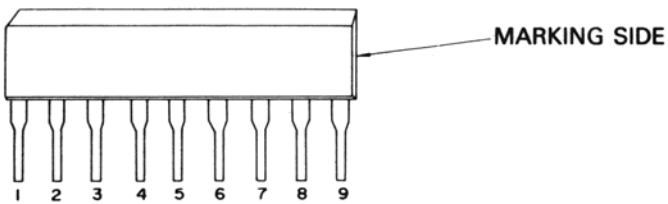
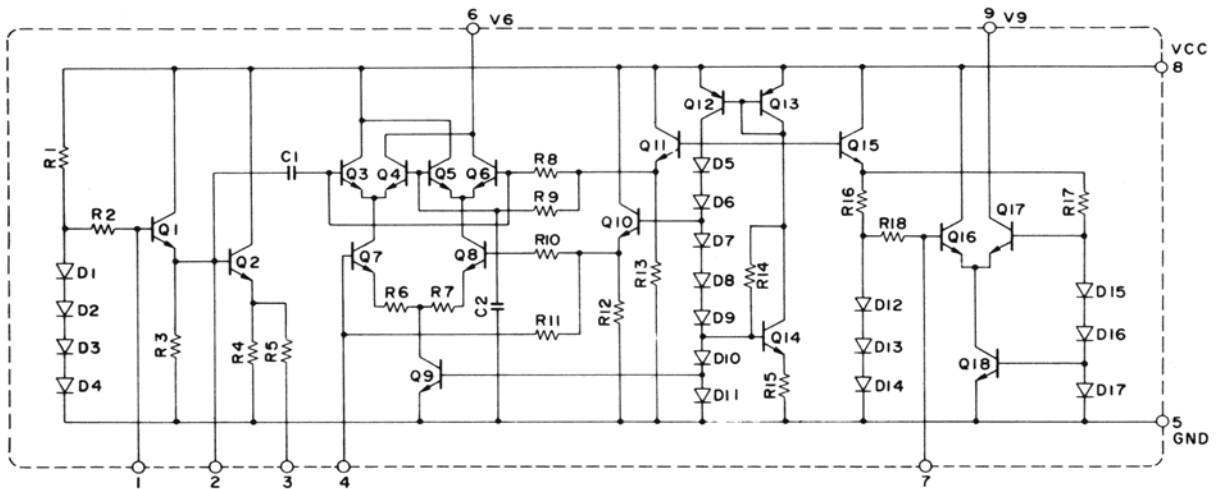
COMMON ANODE



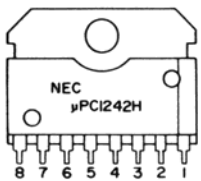
Pin no.	Function	Pin no.	Function
1	E1 Cathode	10	B2 Cathode
2	D1 Cathode	11	A2 Cathode
3	C1 Cathode	12	F2 Cathode
4	NC Cathode	13	DIGIT 2 Anode
5	E2 Cathode	14	DIGIT 1 Anode
6	D2 Cathode	15	B1 Cathode
7	G2 Cathode	16	A1 Cathode
8	C2 Cathode	17	G1 Cathode
9	NC Cathode	18	F1 Cathode

# IC INTERNAL DIAGRAMS

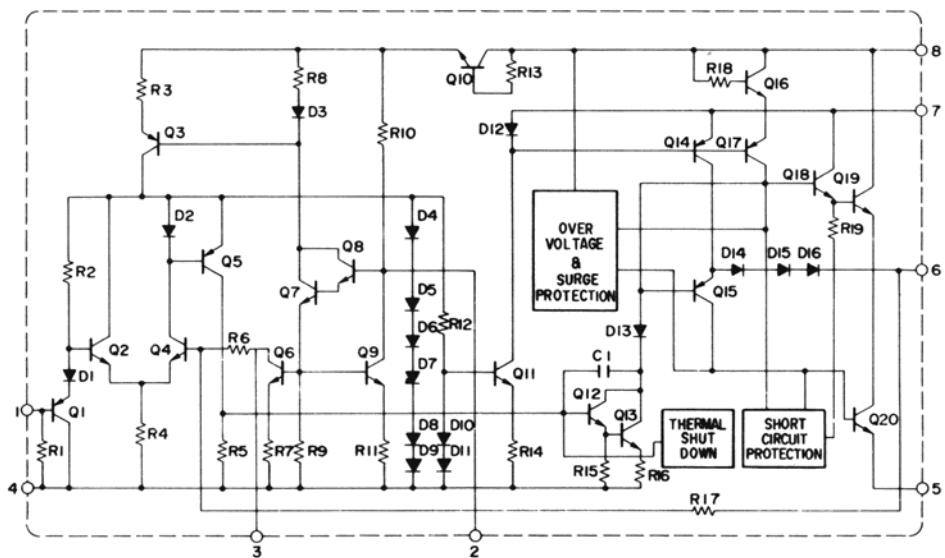
TA7310P-U



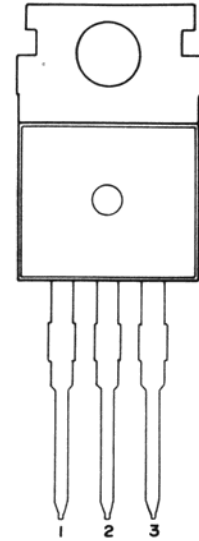
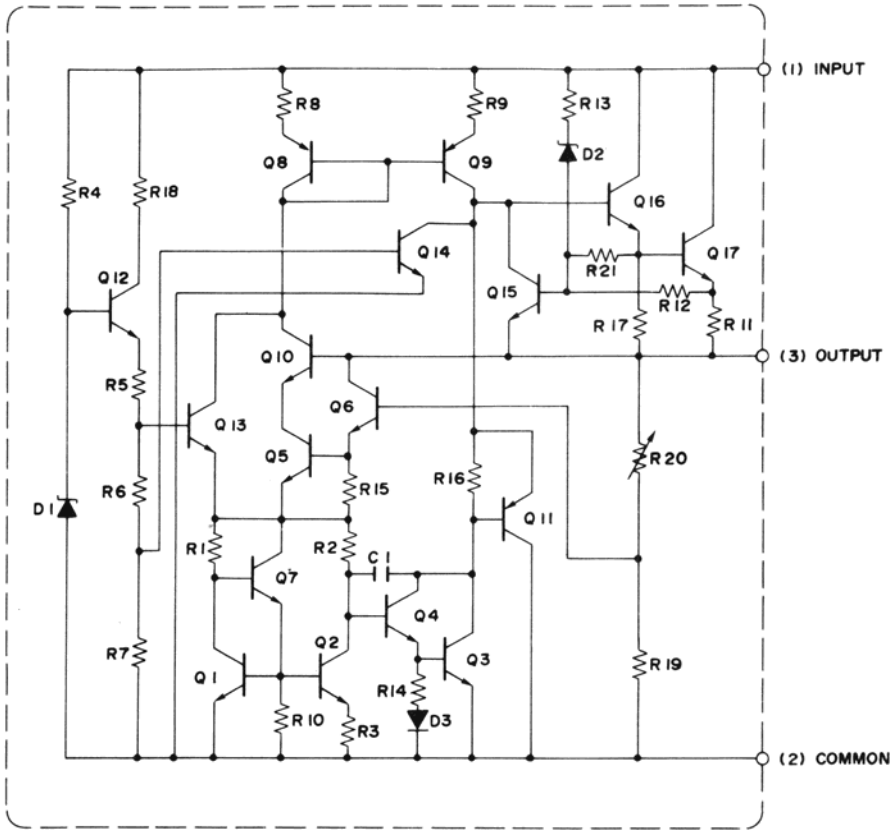
μPC1242H



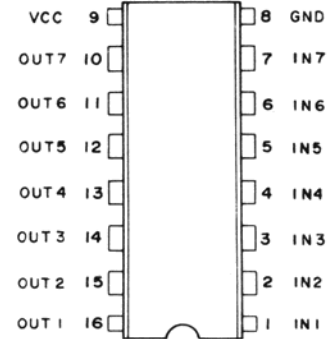
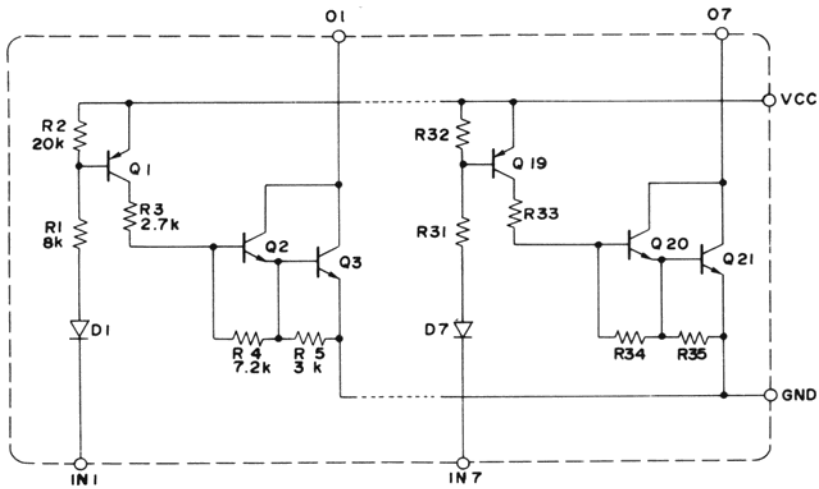
NO	μPC1242H
1	INPUT
2	RIPPLE FILTER
3	N. F. B.
4	GND
5	GND
6	OUTPUT
7	BOOTSTRAP
8	V+



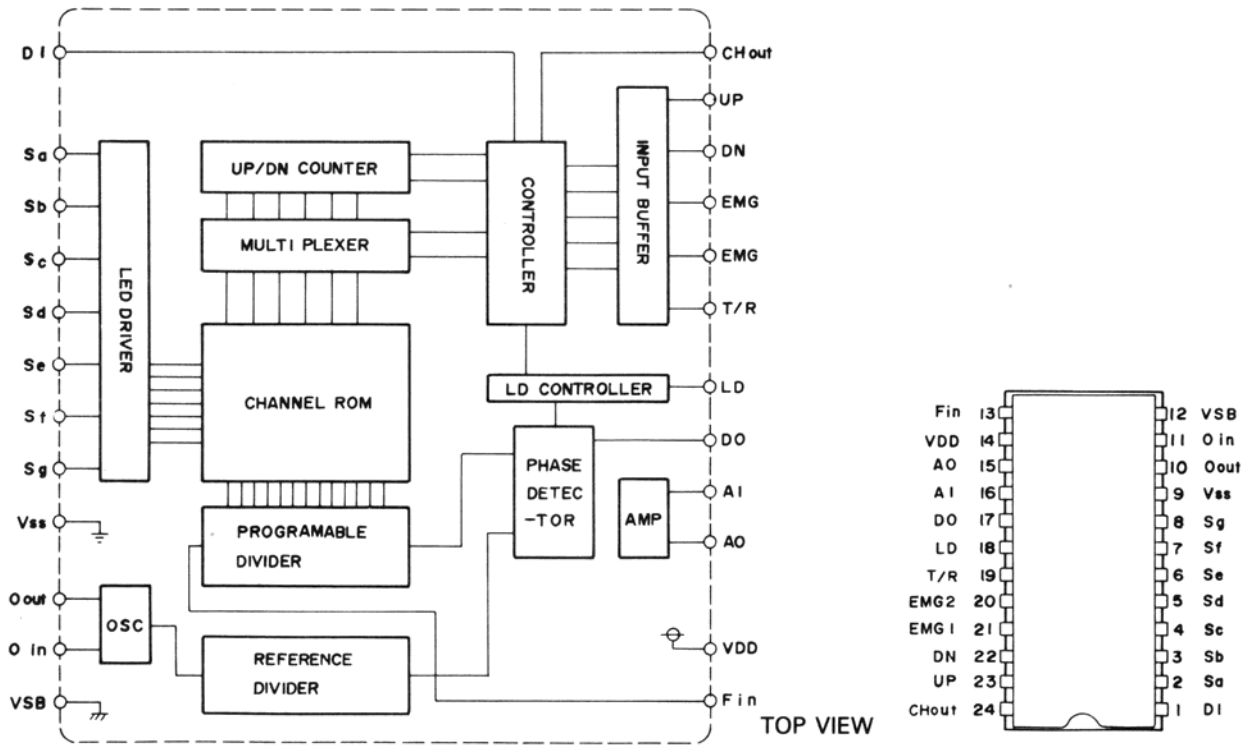
# HA17808W



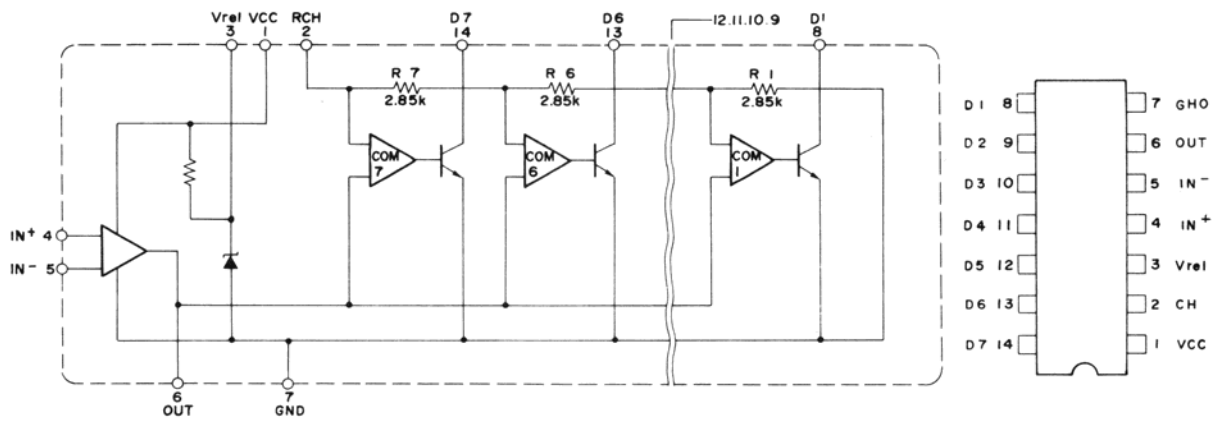
# LB1710



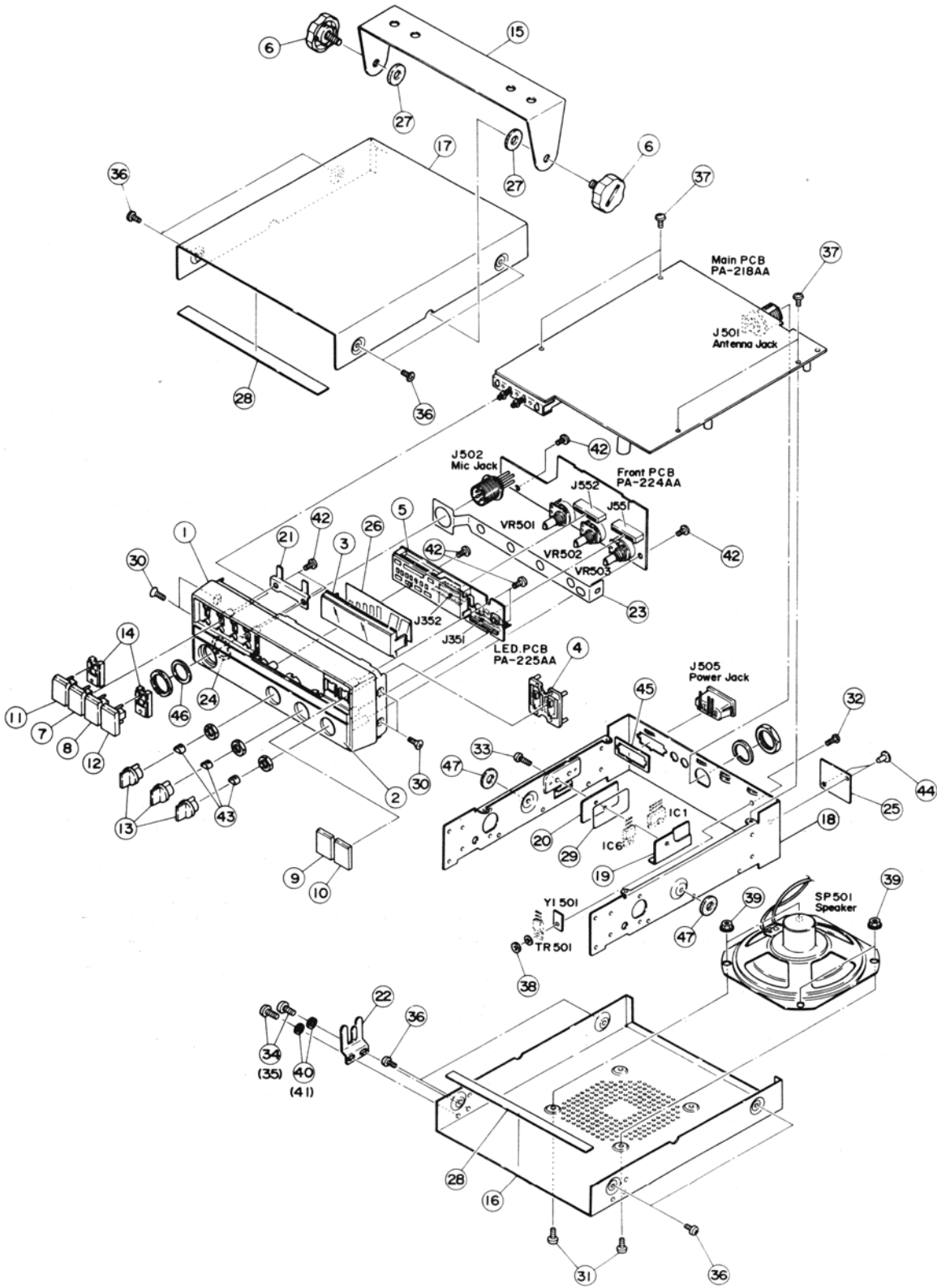
### SM5123A



### LB1417



# EXPLODED VIEW





## PARTS LIST 21 PLUS

## PARTS LIST 21 PLUS

SYMBOL	DESCRIPTION	PART NO.	SYMBOL	DESCRIPTION	PART NO.
D005, 007, 009	DIODE 1N60 AM	150 014 9 001	L009	COIL LA-166 TKXC-18501N	066 025 9 005
D008	DIODE 1S2076A	151 101 9 001	L007	COIL LA-204 RMC-41997N	046 024 9 003
D019, 035	DIODE 1N4003	151 083 9 001	L015	COIL LA-208 TKXC-24341AC	060 029 9 004
D003, 010-012, 015, 016, 020-027 031, 040-043	DIODE 1S1555	151 028 9 007	L003, 017	COIL LA-260 TKXC-25114N	060 030 9 014
D018	DIODE 1SV73-EB	151 137 9 001	L005	COIL LA-277 TKAC-25365N	046 025 9 004
D014, 017	DIODE: ZENER HZ6A-3	152 156 9 001	L018	COIL LA-373 TKXC-28319Y	047 004 9 002
D351	DIODE: LED (LL-2253)	158 070 9 001	L012	COIL LC-074	044 040 9 002
D358-360	DIODE: LED (GL-9HD4)	158 071 9 001	L013	COIL LD-168	047 046 9 001
D356, 357	DIODE: LED (GL-9HY4)	158 071 9 002	L019	COIL LD-087	044 048 9 003
D352-355, 361	DIODE: LED (GL-9NG4)	158 071 9 003	L010, 011	COIL LE-096 8-1/2T	047 044 9 001
TR019, 031, 034	XSTOR DB-003 2SA733-P	177 020 9 001	L014	COIL LE-151 C-7931 D4.0 6-1/2T	041 128 9 001
TR018, 020	XSTOR DB-106 2SB525-C	177 045 9 001	MC951	MICROPHONE MK-341	561 008 9 001
TR012, 029	XSTOR DB-301 2SC941TM-O	176 089 9 004	B351	PC BOARD:LED PA-225AA	302 947 9 001
TR013-015, 017, 022, 027, 030, 032, 033, 026, 551	XSTOR DB-224 2SC945A-Q	176 062 9 001	X001	CRYSTAL QZ-074 10.240	132 027 9 001
TR008	XSTOR DB-295 2SC1674-L	176 081 9 002	R172	RES: METAL OXIDE 15 2 W J	011 002 5 150
TR006, 007, 010, 011, 023, 024, 025	XSTOR DB-259 2SC1675-L	176 065 9 001	R171	RES: METAL OXIDE 2.7 2 W J	011 002 5 279
TR028	XSTOR DB-228 2SC2086-D	176 108 9 002	VR002, 001	RES: SEMI-FIXED RT-182 TT24R 100KB	008 465 9 003
TR501	XSTOR DB-331 2SC2166-C	176 108 9 001	VR003	RES: SEMI-FIXED RT-182 TT24R 200KB	008 465 9 005
TR021	XSTOR DB-383 2SC3242A-E	176 191 9 001	VR503	RES: VARIABLE RV-614 1KA	008 843 9 004
TR009	FIELD EFFECT XSTOR DC-019 2SK192A-BL	182 076 9 001	VR502	RES: VARIABLE RV-615 50KB	008 843 9 005
IC004	INTEGRATED CIRCUIT TA7310-P-U	307 328 9 001	VR501	RES: VARIABLE RV-616 50KA	008 843 9 006
IC001	INTEGRATED CIRCUIT UPC1242H	307 415 9 001	SP501	SPEAKER SP-053	580 073 9 001
IC006	INTEGRATED CIRCUIT HA17808W	307 415 9 002	S503	SWITCH:PUSH SW-537	088 149 9 001
IC003	INTEGRATED CIRCUIT (LB1710)	307 415 9 003	S351, 352	SWITCH:TACT SW-539	084 155 9 001
IC002	INTEGRATED CIRCUIT (SM5123A)	307 415 9 004	T002	XFMR:AF CHOKE TF-083	042 021 9 001
IC005	INTEGRATED CIRCUIT (LB1417)	307 415 9 005	T001	XFMR:OUTPUT TF-177	061 050 9 001
FT002	FILTER: CERAMIC FL-009 C FU-455H2	140 009 9 001	WA951	DC CORD WZ-383	426 107 9 001
FT001	FILTER: CRYSTAL (FL-055 10M-7A1)	143 011 9 001		PANEL:FRONT ABS, BLACK	380 539 9 001
F951, 952	FUSE FS-014 2A	191 251 3 002		CONTROL PLATE ABS, CR THUMBSCREW, ACCY ABS INST CLR BLACK	380 541 9 001 634 204 9 001
J003, 004	JACK JK-089 HSJ0615	773 086 9 001		BUTTON:PUSH (PA)	384 075 9 003
J551, 552	JACK JK-221 10P	777 050 9 002		ABS, CR, SILK PRINT	
J501	JACK: ANT JK-230 M-BR-23D	777 050 9 004		BUTTON:PUSH (CH9)	384 075 9 006
J502	JACK JK-325 4S-L-D107	777 050 9 005		ABS, CR, SILK PRINT	384 075 9 007
J351	JACK JK-328 5551-10	777 050 9 007		BUTTON:PUSH (UP)	384 075 9 008
J352	JACK JK-328 5551-18	777 051 9 002		ABS, CR, SILK PRINT	
J505	JACK JK-329	777 050 9 009		BUTTON:PUSH ABS, CR	384 077 9 001
L002	COIL LA-029 TKXN-22160BU	060 023 9 001		BUTTON:PUSH ABS, CR	384 077 9 002
L016	COIL LA-088 TKXC-24124N	066 019 9 002		KNOB ABS, CR	751 313 9 001
L004	COIL LA-120 TKAC-24073F	046 037 9 001		MOUNTING BRKT SPCC, 1.6T, BLACK	250 197 9 001
L006	COIL LA-163 ROC-42066N	060 022 9 001		COVER:BOTTOM VINYLTOP, SB-K08, 1.0T, BLACK	252 055 9 001
L008	COIL LA-165 VTKXNA-XT231ZO-TW	044 046 9 001		COVER:TOP VINYLTOP, SB-K08, 1.0T, BLACK	253 135 9 001

## MECHANICAL PARTS LIST

REF. NO.	DESCRIPTION	DYNASCAN PART NO.
1	Panel, Front ABS, Black	380-539-9-001
2	Control Plate ABS,CR	380-541-9-001
3	Window AS,Gray Smoke	
4	Support ABS, Black	
5	LED Housing ABS, White	
6	Screw, Mounting ABS INST CLR,Black	634-204-9-001
7	Button, Push (PA) ABS, CR, Silk Print	384-075-9-003
8	Button, Push (CH9) ABS, CR, Silk Print	384-075-9-006
9	Button, Push (DOWN) ABS, CR, Silk Print	384-075-9-007
10	Button, Push (UP) ABS, CR, Silk Print	384-075-9-008
11	Button, Push ABS, CR	384-077-9-001
12	Button, Push ABS, CR	384-077-9-002
13	Knob ABS, CR	751-313-9-001
14	Spacer Push Button ABS, Black	
15	Mounting Bracket SPCC, 1.6T, Black	250-197-9-001
16	Cover, Bottom Vinytop, SB-K08, 1.0T, Black	252-055-9-001
17	Cover, Top Vinytop, SB-K08, 1.0T, Black	253-135-9-001
18	Chassis SPCC, 1.0T, ZMC	
19	Holder, IC (B)	SECC,1T Non Oil
20	Holder, IC (A)	ALP,2T Non Oil
21	Holder, Switch	SECC, 1.0T
22	Hanger, Microphone SPCC, 1.0T, NI	
23	Shield Plate	ALP, 0.1T
24	Shield Plate	ALP, 0.1T
25	ID Plate, FCC	ALP, 0.5T
26	Display Plate Mylar 0.35T	
27	Washer, Rubber, Neoprene, Black, 7*15*2.0T	
28	Wool-coated Paper, Wool Tack, Wool Paper, 10*150*0.3T	
29	Insulation Plate	Mylar 0.1T
30	Screw, Flat HD +	M3×5 NI
31	Screw, Bind HD +	M3×8 BNI
32	Screw, Bind HD +	M3×8 NI
33	Screw, Bind HD +	M3×12 NI
34	Screw, Tapping Round HD +	D3.5×8 NI
35	Screw, Tapping Round HD +	D5×10 NI
36	Screw, Taptight Bind HD +	M3×6 BNI
37	Screw, Taptight Bind HD +	M3×6 NI
38	Hex Nut	M3.0 NI
39	Nut Flange	M3 NI
40	Washer, Lock	D3.5 NI
41	Washer, Star	D5 NI
42	Screw, P Tight Bind HD +	D×8 NI
43	Spring Plate, Knob	D6
44	Rivet, AL, ID Plate	D3.2×3.2
45	Spacer, Connector PVC 0.5T	
46	Washer SPT 0.35T	
47	Spacer, Wool Track, 0.3T, Black	