REALISTIC®

Service Manual

21-1527

TRC-469

CB TRANSCEIVER

Catalog Number: 21-1527

CUSTOM MANUFACTURED FOR RADIO SHACK A DIVISION OF TANDY CORPORATION

TABLE OF CONTENTS

1. SPECIFICATIONS

GENERAL:

Transmitter/Receiver	Frequency synthesizing circuit with digital phase-locked loop
Communicating frequencies	26.965 MHz to 27.405 MHz (all 40 channels)
Operating voltage	11—16V DC (positive or negative ground)
Temperature and Humidity Range	-20°C to +60°C and 10% to 90%
Transmitter/Receiver switching	Electronic (diode switching)
Antenna	52 ohm (coaxial connector)
Microphone	600 ohm Dynamic Type
Speaker	8 ohm, 2 Watt
Size	2-3/16" x 6-1/4" x 9" (HWD) (approx.) (5.5 x 16 x 22.7 cm [HWD])
Weight	5 lbs. (approx.) (2.3 kg)
Accessories	DC Cord with in-line Fuse, Microphone and Microphone Hanger and Mounting Brackets

STANDARD TEST CONDITIONS:

Battery supply voltage	13.8V DC
Modulation	1000 Hz, 30%
Audio output power	500 mW
Audio output load	8 ohm
Antenna impedance	50 ohm (non-inductive load)
Ambient conditions	
Temperature	25°C ±5°C
Humidity	50% to 70%

TRANSMITTER:

	UNIT	NOMINAL	LIMIT
Frequency Tolerance 25°C 13.8 V	%	0.0005	0.003
RF Power Output	W	4 (Max.)	3.6 – 4.0
AMC Range 50% – 100% Mod	dB	36	30
Modulation Frequency Response (-6 dB)			
a. Lower Frequency 450 Hz	dB	-6	-6 ± 3 dB
b. Upper Frequency 2500 Hz	dB	-6	-6 ± 3 dB
Microphone Sensitivity 1 kHz 50% Mod	mV	1	2
Modulation Distortion at 1 kHz 80% Mod	%	3	8
RF Power Output Uniformity Ch. to Ch.	W	0.2	0.5
Modulation Capability Positive/Negative	%	95/95	80/85
RF Power Output at 12.0 V	W	2.7	2.2
Battery Drain			
a. at no Modulation	mA	950	1200
b. at 80% Modulation	mA	1550	2000

RECEIVER: (ANL: OUT)

	UNIT	NOMINAL	LIMIT
Maximum Sensitivity	μV	0.3	0.5
Sensitivity for 10 dB S/N	μV	0.5	1
AGC Figure of Merit 50 mV	dB	90	80
Overload AGC 50 mV – 1 V	dB	+4	+6 -2
Squelch Sensitivity at Threshold	μV	0.25	2
Squelch Sensitivity at Tight	μV	1000	355 – 2820
Adjacent Channel Selectivity			
a. at ±10 kHz	dB	70	60
Spurious Radiation	dB	80	60
Spurious Response Attenuation			
a. 455/2 kHz	dB	80	60
Image Rejection Ratio			
a. -910 kHz	dB	90	70
IF Rejection Ratio			
a. 10.695 MHz	dB	90	80
b. 455 kHz	dB	115	90
Cross Modulation	dB	60	50
Desensitization (3 dB Desens.)			
at 100 μV	dB	60	55
Audio Power Output			
a. Maximum	W	5	4
b. 10% THD	W	4	3
Audio Frequency Response (-6 dB)			
a. Lower Freq. 450 Hz	dB	-6	-6 ± 3 dB
b. Upper Freq. 2500 Hz	dB	-6	-6 ± 3 dB
THD at 500 mW Audio Output			
a. Input 1 mV 30% Mod	%	2	4
b. 50% Mod	%	4	6
c. 80% Mod	%	6	8
Signal-to-Noise Ratio at 1000 μV	dB	45	35
RF Gain Control Range	dB	40	30
S-Meter Sensitivity at "S9"	μV	100	50 – 200
Oscillator Drop-out Voltage	V	7	10
Battery Drain			
a. at no signal	mA	250	600
b. at Max. AF Output	mA	800	1500

PUBLIC ADDRESS:

	UNIT	NOMINAL	LIMIT
Microphone Sensitivity for 4 W Output Power at 1 kHz	mV	4	10
Power Output			
a. Maximum	W	5	4
b. 10% THD	W	4	3
Audio Freq. Response (-6 dB)			
a. Lower Frequency 450 Hz	dB	-6	-6 ± 3 dB
b. Upper Frequency 2500 Hz	dB	-6	-6 ± 3 dB
Battery Drain			
a. at no signal	mA	300	700
b. at Max. AF Output	mA	1000	1500

2. DISASSEMBLY INSTRUCTIONS

Figure 1

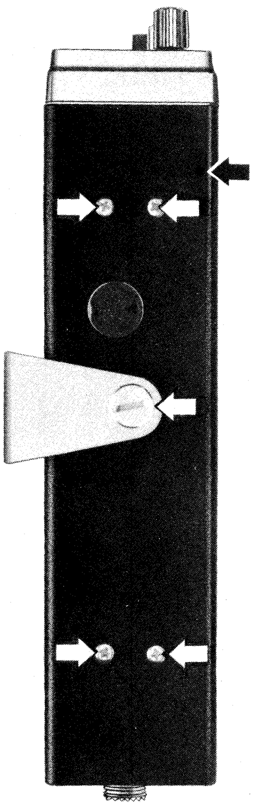


Figure 2

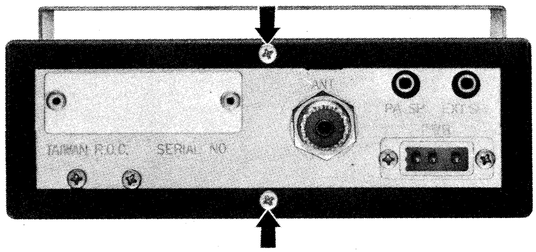
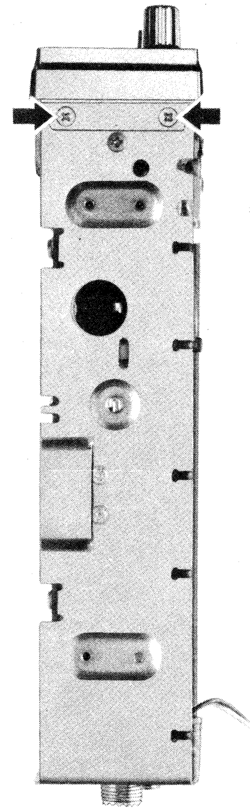


Figure 3



TO REMOVE TOP AND BOTTOM COVER (Figure 1 & 2):

Remove 4 screws from each side and a screw from top. Remove 2 screws from rear of the chassis. Slide top and bottom cover toward rear of the chassis and remove.

TO REMOVE FRONT PANEL (Figure 3):

Remove 2 screws from each side.

Figure 4

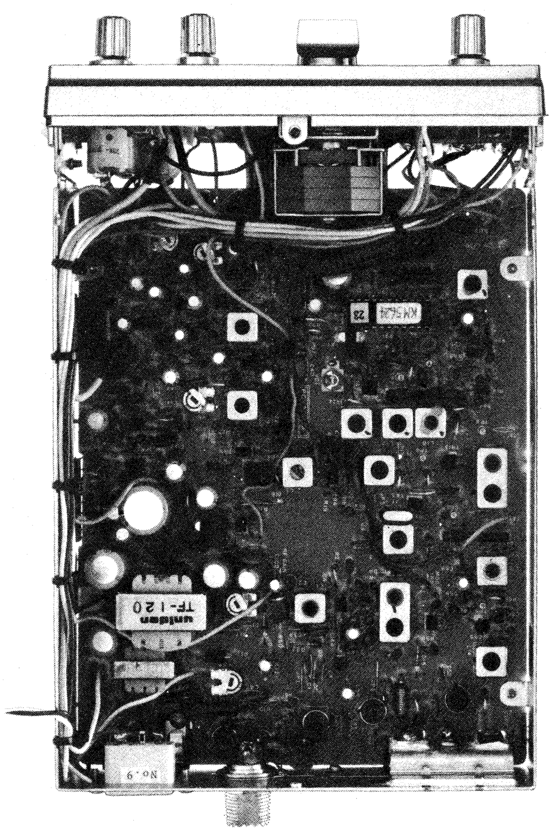
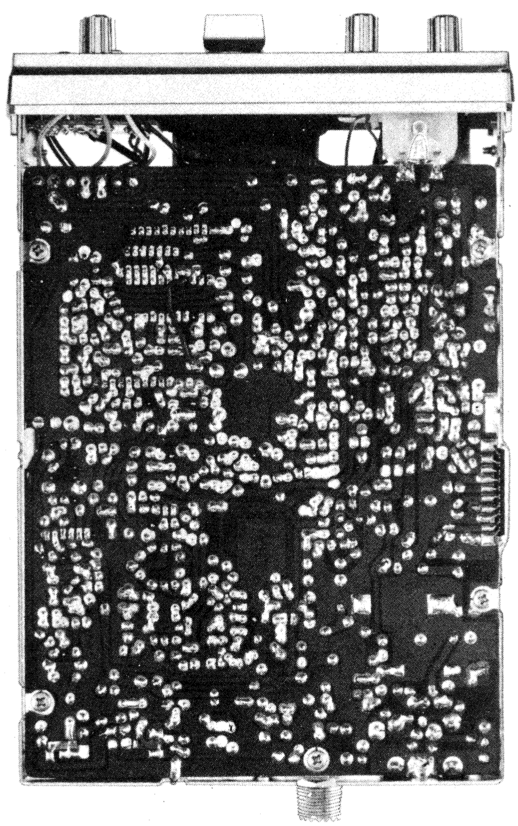
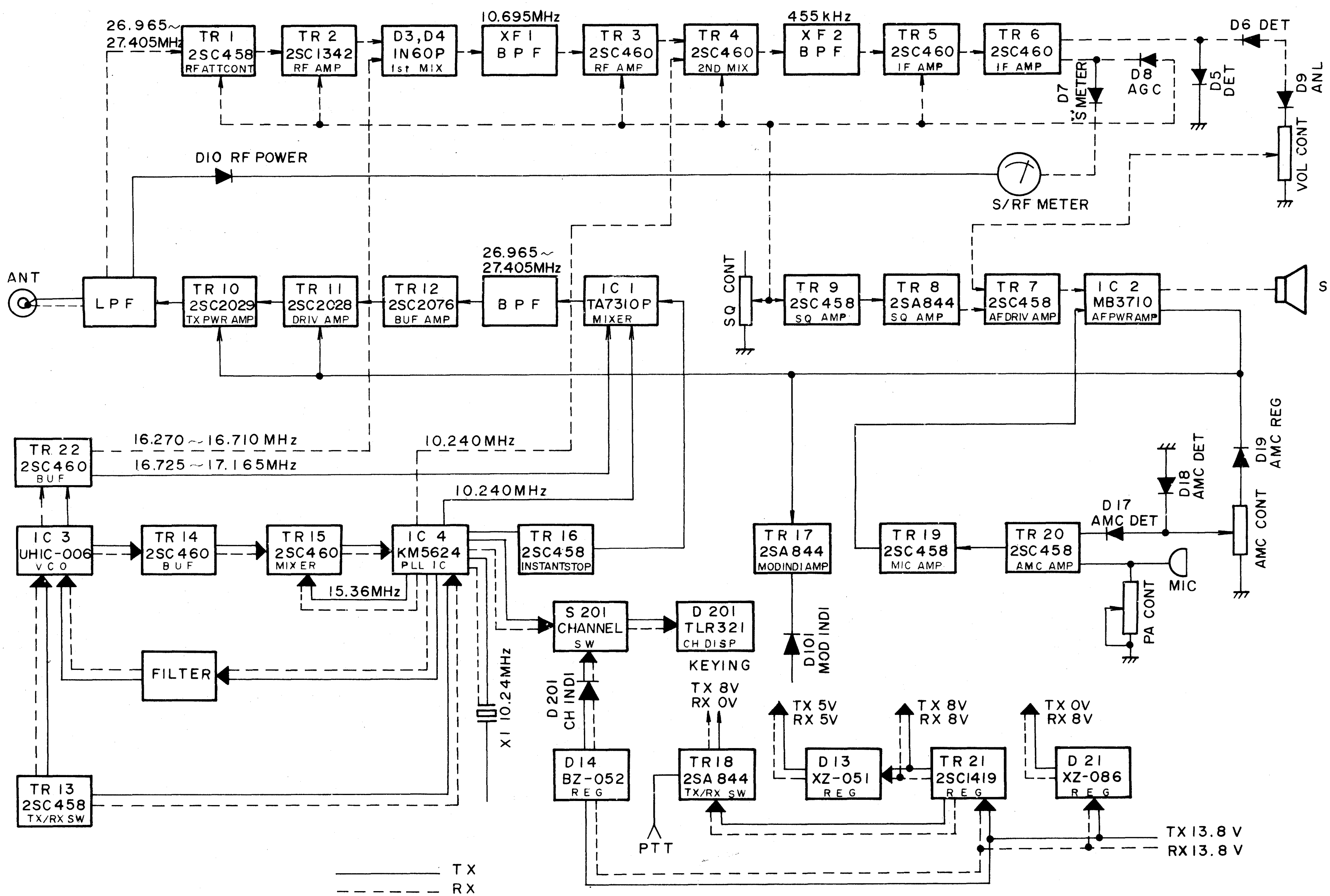


Figure 5



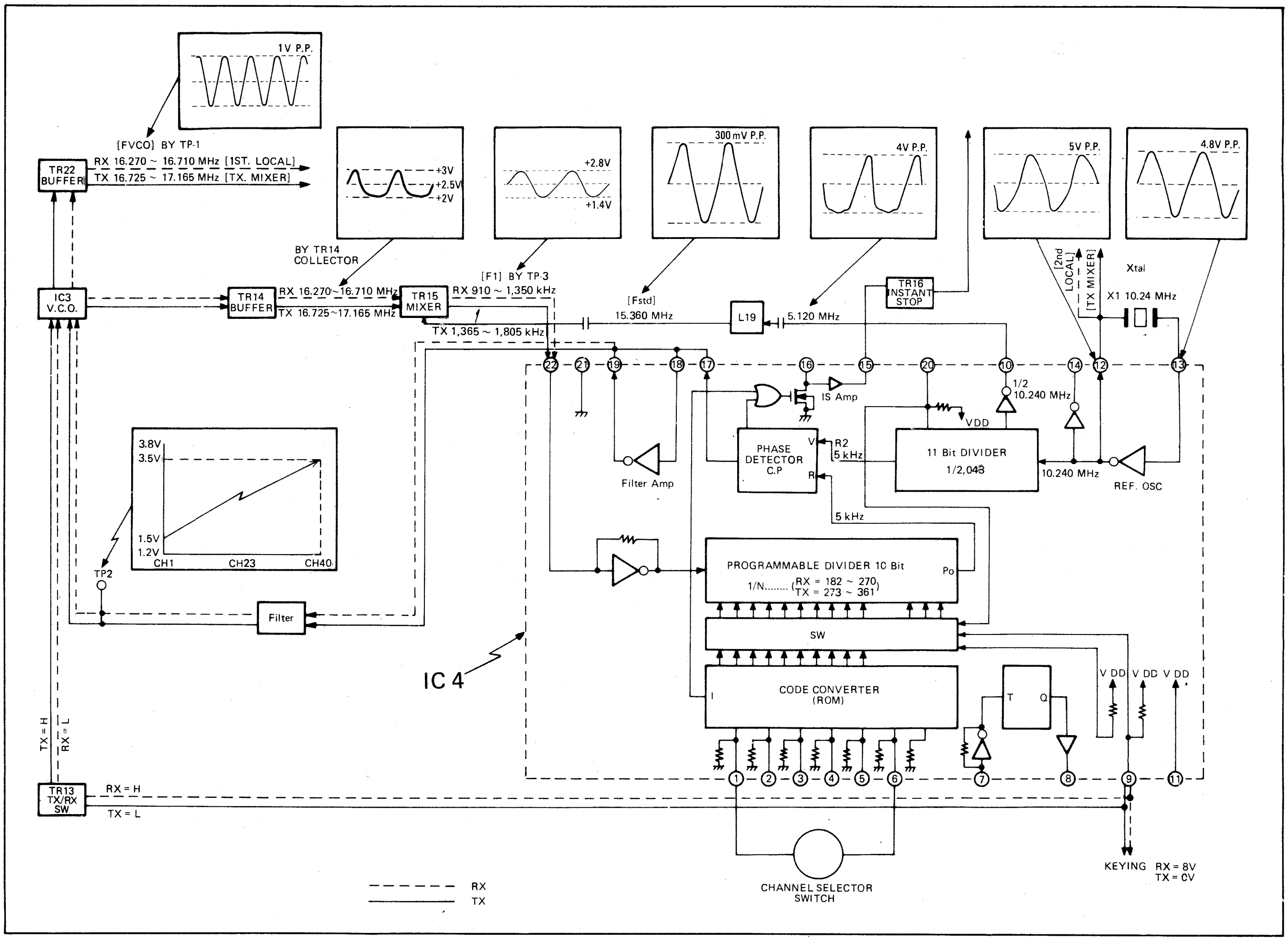
3. BLOCK DIAGRAM



4. CIRCUIT DESCRIPTIONS

PLL CIRCUIT:

The PLL circuit used in TRC-469 consists of 7 major parts: Voltage Controlled Oscillator(VCO), 1/N Divider, Phase Detector, Low Pass Filter, Reference Oscillator (10.24 MHz), 1/2048 divider and Code Converter ROM(Read Only Memory).



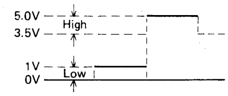
WAVE FORM OF IC 4

IC 4 PIN NO.	22	21, 20, 7	19	18, 17	16, 11	15	13	12
WAVE FORM	+2.8V / +1.4V RX = 910 ~ 1,350 kHz TX = 1,365 ~ 1,805 kHz	0 V	2.4V DC 2.4V 0	1.4V DC 1.4V 0	5V DC 5V 0	H = LOCKED L = UNLOCKED Where H = 3.5 ~ 5V L = 0 ~ 1.0V	4.8V P.P. 10.240 MHz	5V P.P. 10.240 MHz
IC4 PIN NO.	1	2	3	4	5	6	9	10
CH \ ROM	1A	1B	1C	1D	2A	2B	H = RECEIVE L = TRANSMIT Where H = 3.5 – 5V L = 0 – 1.0V	4V P.P. 5.120 MHz
CH 1	H	L	L	L	L	L		
~								
CH 18	L	L	L	H	H	L		
~								
CH 23	H	H	L	L	L	H		
~								
CH 40	L	L	L	L	L	L		

NOTE: SCOPE WAVE FORMS FOR LEVEL REFERENCE

H = High (3.5V ~ 5 V)
L = Low (0V ~ 1 V)

PIN NO. 1 through 4,5, & 6 are as in program input data chart.



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 through TR14 Buffer Amp and then added to TR15. This frequency is mixed with a 15.36 MHz frequency then goes to IC4 (1/N divider).

"N" for the 1/N divider is determined by Channel Selector Switch whose output is selected by a Code Converter ROM.

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

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

The Phase Detector detects the difference of these two input signals and produces a voltage which controls the VCO frequency.

The Low Pass Filter integrates the output of the Phase Detector which controls the VCO frequency and the 1/N divider produces a 5 kHz frequency. Thus the Phase Detector receives two input signals (both 5 kHz). It compares the phase difference between the two, generating an error voltage, which acts on the VCO to bring the two frequencies exactly in-phase. When this condition occurs, the PLL circuit is locked.

Fvco (the Frequency of the VCO) is changeable in 10 kHz increments, by varying the program divide ratio, N.

For example, the divide ratio, N is programmed to 273 for channel No. 1 Transmit; therefore Fvco is calculated as follows:

$$\text{Fvco} = 15{,}360 + 5 \times 273 = 15{,}360 + 1{,}365 = 16{,}725 \text{ (kHz)}$$

In the same manner, Fvco for channel No. 2 through No. 40 is determined as shown in Table A.

Transmitter Local Oscillator

The Transmitter local oscillator frequency of 10.240 MHz is produced by IC4 oscillator, IC4 and crystal, X'tal 1.

Channel Selection Program

The divide ratio of the Programmable Frequency Divider in IC4 is determined through the Code Converter and Transmit/Receive mode switch in IC4 by the voltage supplied to the program input terminals, Pin No. 1 through Pin No. 6 of IC4.

The program input voltage for Pins 1 through 6 is supplied from the Channel Selector switch according to the Channel Number.

The Transmit/Receive mode switch in IC4 changes the divide ratio of the Programmable Divider by changing Pin 9 voltage (High level for Receive, Low level for Transmit), to produce a 455 kHz change in VCO frequency when changing between the two modes.

When changing between Receive and Transmit modes, a varactor diode in the VCO IC, IC3, is switched in or out, respectively.

The bias voltage on this varactor is so designed that the VCO control voltage does not change when switching between modes, thus reducing lock-up time.

Table A shows Frequency Chart of Fvco and Divide Ratio vs. Antenna Frequency, and Program input data.

CIRCUIT FOR DETERMINING FREQUENCY:

Output Frequency of the Transmitter

Transmit frequency, Ft, is taken from the output of the Transmitter Mixer IC1.

One of the inputs of IC1 is the 1st local frequency, Fvco, which is produced by the PLL Local Oscillator circuit. The other input is the transmitter local oscillator frequency of 10.240 MHz produced by IC4.

The sum of these frequencies determines the transmit frequency as follows:

$$\text{Ft} = \text{Fvco} \div 10.240 \text{ (MHz)}$$

PLL Local Oscillator

Fvco, the output frequency of the VCO (Voltage Controlled Oscillator), IC3, is fed to one of the inputs of the PLL Mixer, TR15.

The offset frequency, Fstd, 15.360 MHz (10.240 MHz ÷ 2 x 3) is fed to another input of TR15.

The input frequency to the Programmable Divider, F1, is calculated as follows:

$$\text{F1} = \text{Fvco} + \text{Fstd (15.360 MHz)}$$

F1 is fed to the Programmable Divider in the PLL IC, IC4 and divided by N, through the Programmable Divider.

The 10.240 MHz frequency produced by the Reference Oscillator in IC4 is divided by 2,048 (the Reference Frequency Divider in IC4) and the resultant frequency, F2, is:

$$\text{F2} = 10.240 \text{ MHz} \div 2{,}048 = 5 \text{ kHz}$$

The output frequency of the Programmable Divider is compared with F2 at the Phase Detector in IC4. When the frequency and phase of these two signals are precisely the same, the PLL circuit is "locked".

Therefore, Fvco is determined by the following formula.

$$\text{Fvco} = \text{Fstd (15,360 kHz)} + 5 \times \text{N (kHz)}$$

CIRCUIT FOR PREVENTION OF UNAUTHORIZED FREQUENCY EMISSION:

This Transceiver has a built-in circuit which prevents transmission of unauthorized frequencies during the time when the PLL circuit is not locked or when the Channel Selector switch is between channels.

When the PLL circuit is not locked or the program data input is not for channel 1 – 40, pin 15 in IC4 produces a low level digital control signal. This signal is fed to the base of RF signal Disable Transistor, TR16 (INSTANT STOP).

When the Channel Selector is switched from one channel to another, it may produce a non-valid input (other than data required for channels 1 – 40). However, between channels, the Channel Selector produces a control signal at ground potential, and this signal is fed to the base of RF signal Disable Transistor, TR16.

In either case, when the base of TR16 is at low level, TR16 will not conduct and thus reduces the supply voltage to the Amplifier stage inside IC1 to zero. This eliminates the RF signal output, and prevents any transmission on unauthorized frequencies.

TABLE A: FREQUENCY CHART OF Fvco AND DIVIDE RATIO N

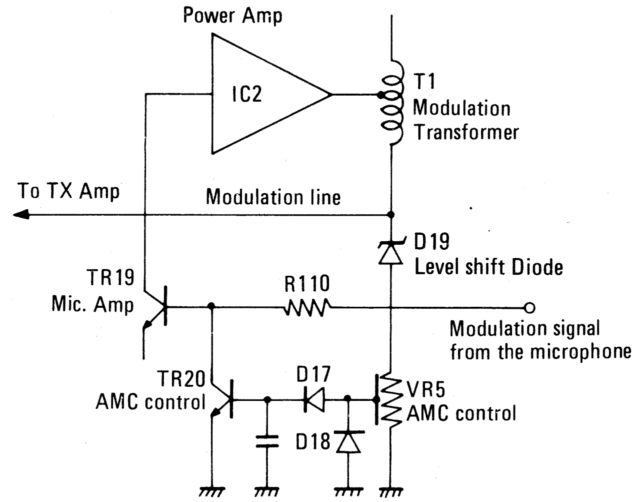
Antenna Frequency (MHz)	Channel Number	For Transmit			For Receive			Program input data					
		Divide Ratio (N)	F1 (kHz)	VCO Frequency (MHz)	Divide Ratio (N)	F1 (kHz)	VCO Frequency (MHz)	1A	1B	1C	1D	2A	2B
26.965	1	273	1,365	16.725	182	910	16.270	H	L	L	L	L	L
26.975	2	275	1,375	16.735	184	920	16.280	L	H	L	L	L	L
26.985	3	277	1,385	16.745	186	930	16.290	H	H	L	L	L	L
27.005	4	281	1,405	16.765	190	950	16.310	L	L	H	L	L	L
27.015	5	283	1,415	16.775	197	960	16.320	H	L	H	L	L	L
27.025	6	285	1,425	16.785	194	970	16.330	L	H	H	L	L	L
27.035	7	287	1,435	16.795	196	980	16.340	H	H	H	L	L	L
27.055	8	291	1,455	16.815	200	1,000	16.360	L	L	L	H	L	L
27.065	9	293	1,465	16.825	202	1,010	16.370	H	L	L	H	L	L
27.075	10	295	1,475	16.835	204	1,020	16.380	L	L	L	L	H	L
27.085	11	297	1,485	16.845	206	1,030	16.390	H	L	L	L	H	L
27.105	12	301	1,505	16.865	210	1,050	16.410	L	H	L	L	H	L
27.115	13	303	1,515	16.875	212	1,060	16.420	H	H	L	L	H	L
27.125	14	305	1,525	16.885	214	1,070	16.430	L	L	H	L	H	L
27.135	15	307	1,535	16.895	216	1,080	16.440	H	L	H	L	H	L
27.155	16	311	1,555	16.915	220	1,100	16.460	L	H	H	L	H	L
27.165	17	313	1,565	16.925	222	1,110	16.470	H	H	H	L	H	L
27.175	18	315	1,575	16.935	224	1,120	16.480	L	L	L	H	H	L
27.185	19	317	1,585	16.945	226	1,130	16.490	H	L	L	H	H	L
27.205	20	321	1,605	16.965	230	1,150	16.510	L	L	L	L	L	H
27.215	21	323	1,615	16.975	232	1,160	16.520	H	L	L	L	L	H
27.225	22	325	1,625	16.985	234	1,170	16.530	L	H	L	L	L	H
27.255	23	331	1,655	17.015	240	1,200	16.560	H	H	L	L	L	H
27.235	24	327	1,635	16.995	236	1,180	16.540	L	L	H	L	L	H
27.245	25	329	1,645	17.005	238	1,190	16.550	H	L	H	L	L	H
27.265	26	333	1,665	17.025	242	1,210	16.570	L	H	H	L	L	H
27.275	27	335	1,675	17.035	244	1,220	16.580	H	H	H	L	L	H
27.285	28	337	1,685	17.045	246	1,230	16.590	L	L	L	H	L	H
27.295	29	339	1,695	17.055	248	1,240	16.600	H	L	L	H	L	H
27.305	30	341	1,705	17.065	250	1,250	16.610	L	L	L	L	H	H
27.315	31	343	1,715	17.075	252	1,260	16.620	H	L	L	L	H	H
27.325	32	345	1,725	17.085	254	1,270	16.630	L	H	L	L	H	H
27.335	33	347	1,735	17.095	256	1,280	16.640	H	H	L	L	H	H
27.345	34	349	1,745	17.105	258	1,290	16.650	L	L	H	L	H	H
27.355	35	351	1,755	17.115	260	1,300	16.660	H	L	H	L	H	H
27.365	36	353	1,765	17.125	262	1,310	16.670	L	H	H	L	H	H
27.575	37	355	1,775	17.135	264	1,320	16.680	H	H	H	L	H	H
27.385	38	357	1,785	17.145	266	1,330	16.690	L	L	L	H	H	H
27.395	39	359	1,795	17.155	268	1,340	16.700	H	L	L	H	H	H
27.405	40	361	1,805	17.165	270	1,350	16.710	L	L	L	L	L	L

AMC(Automatic Modulation Control) CIRCUIT:

The modulation control used in the TRC-469 functions as follows: Modulation signals from the mic are amplified by TR19 and IC2 and fed to the Transmitter's final RF Amplifier stage through Modulation Transformer T1.

The level shift diode D19 (an 8-volt Zener diode) "shifts" any voltage that exceeds a predetermined level and this voltage is fed to the base of TR20 through D17 rectifier diode.

When the modulation signal from the mic increases past this predetermined voltage level, D17 applies a voltage to TR20, which causes base current flow. This reduces the equivalent C-E resistance of TR20. Note that R110 and TR20 C-E resistance forms a voltage divider for the audio signal applied to TR19 Mic Amp. Thus this circuitry effectively limits the level of modulation. VR5 sets the predetermined level which causes D17 to conduct.



RF (Radio Frequency) ATTENUATOR CIRCUIT:

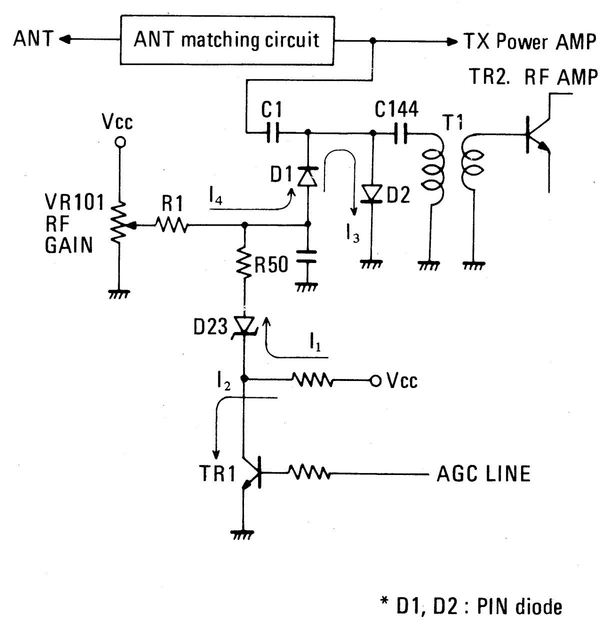
This unit incorporates an RF attenuator circuit using P-I-N diodes; The Equivalent RF resistance of a P-I-N diode is controlled by the current which flows into the diode. Thus any receiver audio distortion caused by excess input signal from the antenna or cross modulation caused by RF gain can be prevented by these P-I-N diodes.

Since reverse-AGC is used with this Transceiver, the voltage on the AGC line becomes lower with strong antenna input signals (with no input signal, approximately 1.4 volts appears on the AGC line).

Furthermore, with no input signal, current from the AGC line flows into the base of TR1 which turns TR1 "on", causes collector current I_2 to flow and thus D23 will not conduct; therefore, no current will flow into D1 and D2 P-I-N diodes. As a result, there is no attenuation of the input signal from the antenna.

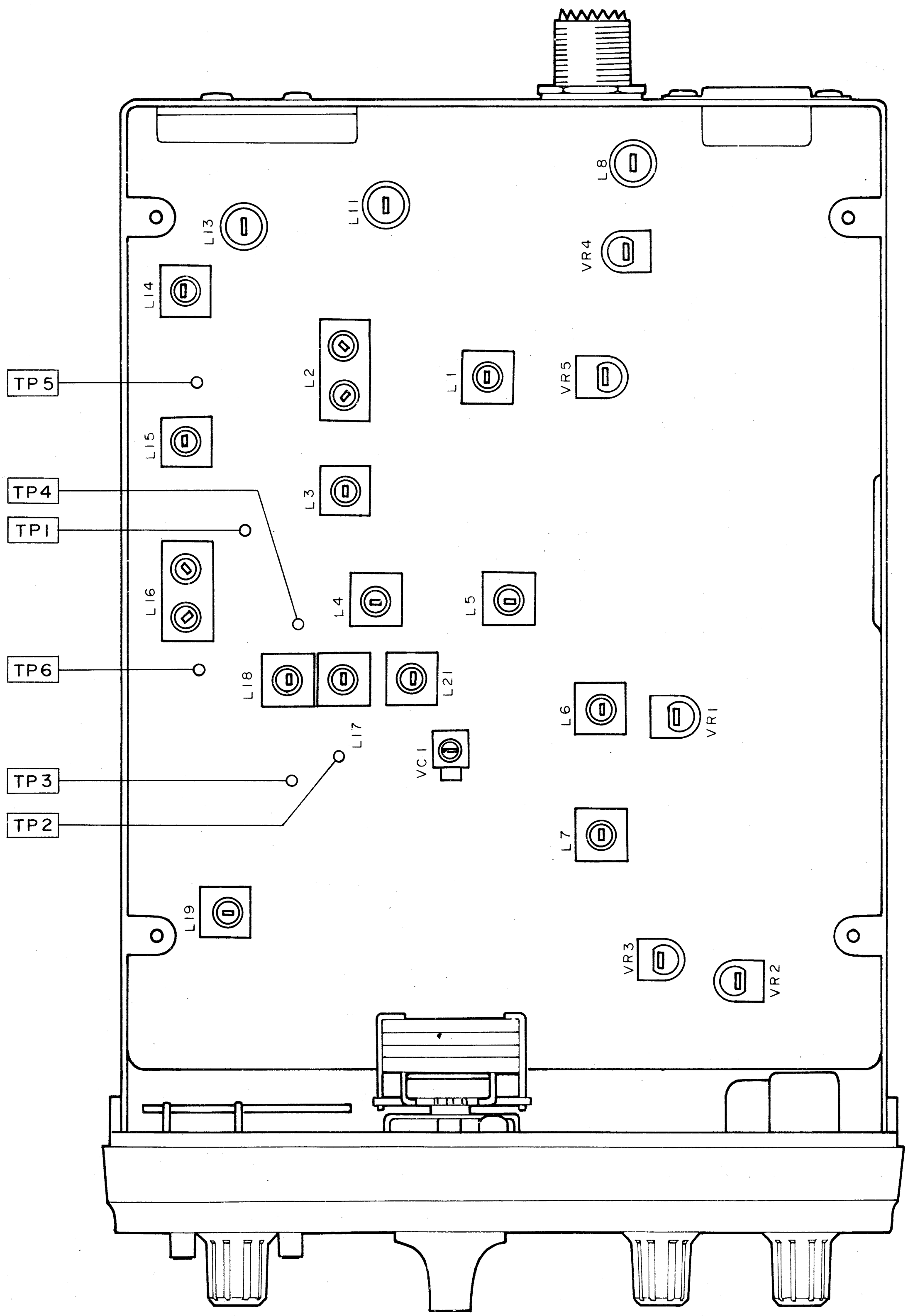
With a strong input signal, the voltage on the AGC line decreases which turns TR1 "off" and decreases I_2 current, which increases the collector voltage of TR1, current I_1 will flow through D23, and current I_3 will flow into D1 and D2 P-I-N diodes. Thus, the equivalent RF resistance of P-I-N diodes will drop and the excess input from the antenna to TR2 will be bypassed by these diodes.

In addition to the above, the attenuation level is controlled by changing VR1 (RF Gain) manually, which causes I_4 current to flow, which varies the attenuation level of D1.



5. ALIGNMENT INSTRUCTIONS

CHASSIS LAYOUT—ALIGNMENT POINTS:



ALIGNMENT OF PLL PORTION:

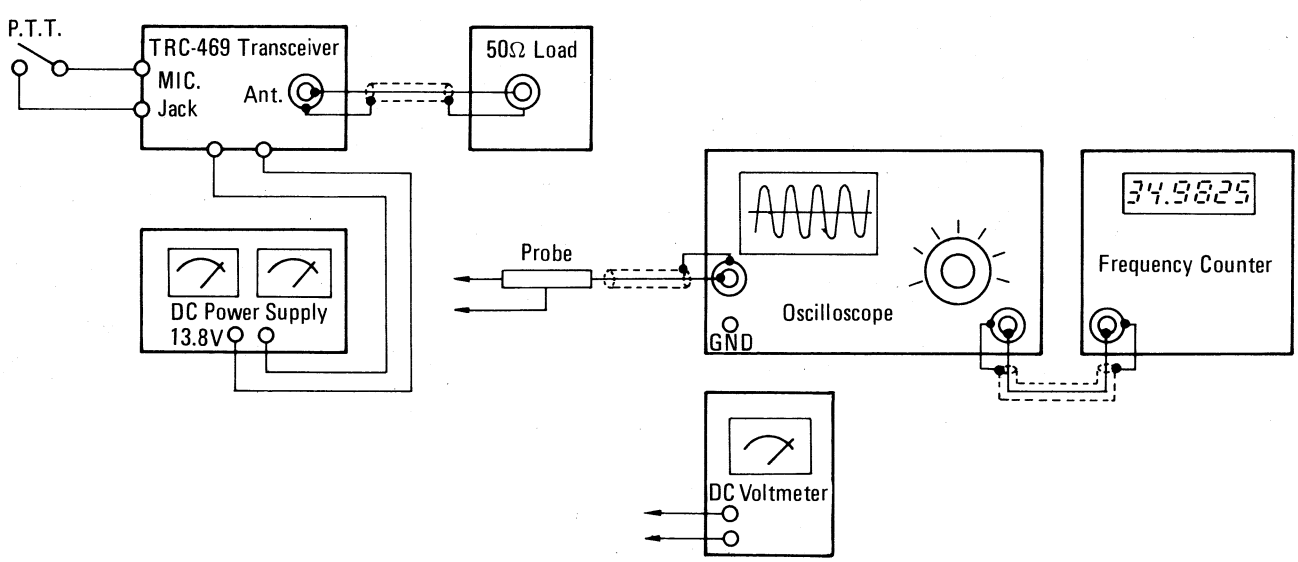
1. Test Equipment Required

a. Oscilloscope (0 — 50 MHz)
b. Frequency Counter (0 — 50 MHz)
c. DC Volt Meter (10 Volts maximum, 100K ohm/Volt)
d. 50 ohm Load
e. DC Power Supply (13.8 V/2-Amp)

2. Alignment Procedure (See Pages 7 and 11)

Step	Preset to	Connections	Adjustment	Remarks
1	Receiver mode, Channel 40	Oscilloscope to secondary of L21 (TP4)	L21	Adjust L21 for the maximum indication on Oscilloscope.
2	Same as step 1	Frequency Counter to secondary of L21 (TP4)	VC1	Adjust VC1 to obtain 10.240 MHz indication.
3	Same as step 1	Frequency Counter to Pin 22 of IC4 (TP3)	L19	Adjust L19 to obtain 15.360 MHz indication.
4	Same as step 1	DC Volt Meter to Pin No. 4 of IC3 (TP2)	L18	Adjust L18 to obtain approx. 3.50V reading.
5	Same as step 1	Frequency Counter to secondary of L17 (TP1)	VC1	Adjust VC1 for 16.710000 MHz.

PLL TEST EQUIPMENT SETUP



ALIGNMENT OF TRANSMITTER PORTION:

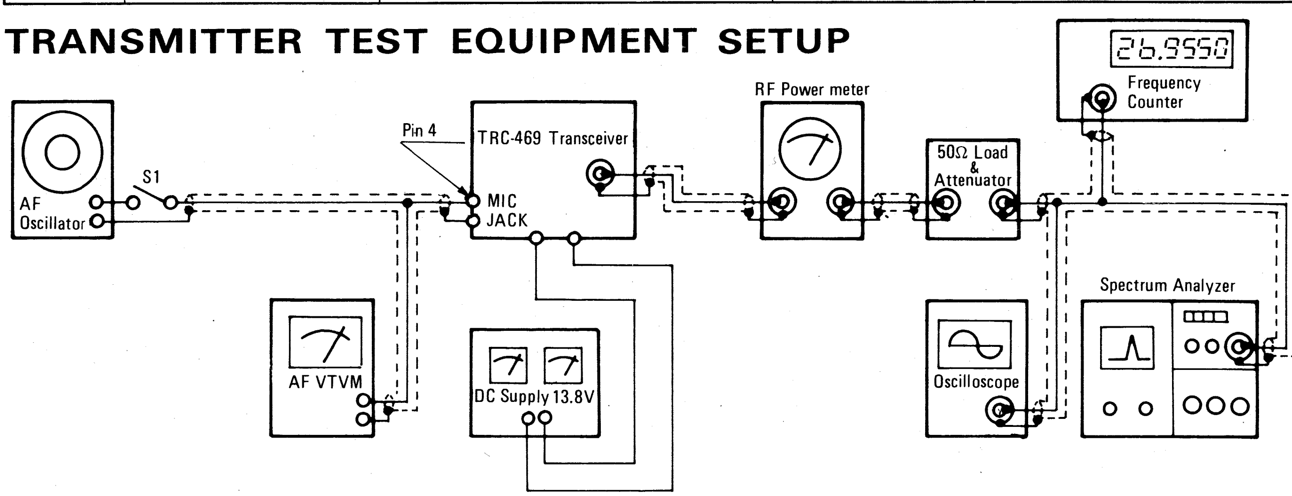
1. Equipment Required

a. VTVM (full scale: 1V DC with RF Probe)
b. RF Output Power Meter
c. Turnable Field Strength Meter
(Wave Meter or Spectrum Analyzer)
d. Frequency Counter (0 – 30 MHz)
e. DC Power Supply (13.8V/2–Amp)
f. 50 ohm Load and Attenuator
g. Oscilloscope (0 – 30 MHz)
h. AF Oscillator

2. Procedure (See Page 11)

Step	Preset to	Conditions	Alignment	Remarks
1	TX Mode, No Modulation, Channel 19	RF Output Power Meter to ANT. Jack J101. VTVM to TP5	L15,16,17, 21	Adjust for a maximum indication on VTVM.
2	Same as step 1	RF Output Power Meter to ANT. Jack J101	L11,13,14	Adjust for a maximum indication on RF Output Power Meter.
3	Same as step 1	Same as step 2	L11	Adjust to obtain Nominal 3.8 W of RF Output Power.
4	Same as step 1	Tunable Field Strength Meter to Ant. Jack (J101) through a suitable load and attenuator (Use Spectrum Analyzer if available)	L8	Adjust for minimum 2nd Harmonic Output.
5	Repeat above adjustments, until no further change can be noted.			
6	TX Mode, Ch19, 1 kHz 100mV applied to Mic Input for MOD	Audio Generator to Pin 4 of Microphone Jack (J3). Oscilloscope to ANT. Jack (J101) through a suitable load and attenuator	VR5	Adjust for 95% Modulation.
7	Same as step 1	RF Output Power Meter to Ant. Jack J101	VR4	Check that RF Output Power Meter reads 3.8W, then adjust VR4 so that the Transceiver's Meter just approaches the 4 mark.
8	TX Mode, No Modulation, All channels	Frequency Counter to Ant. Jack (J101) through a suitable load and attenuator		Check Frequency of all channels.

TRANSMITTER TEST EQUIPMENT SETUP



ALIGNMENT OF RECEIVER PORTION:

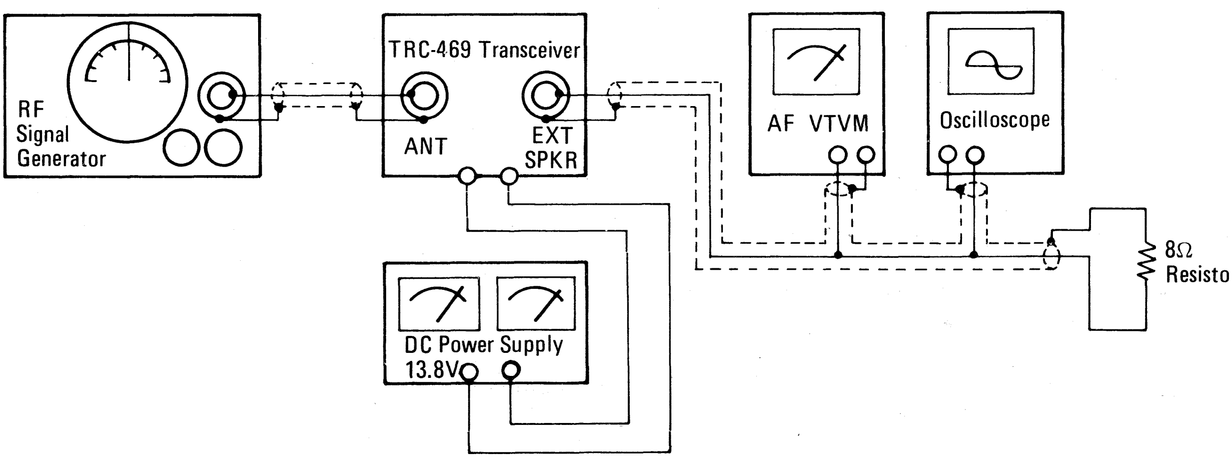
1. Equipment Required

a. Signal Generator (27 MHz Band, 1000 Hz, 30% AM Modulation, Output Impedance = 50 ohm)
b. Audio VTVM
c. Oscilloscope
d. Dummy Load (8 ohms, 5 watts, resistive)
e. DC Power Supply (13.8 V, 2 Amp.)

2. Procedure **(See page 11)**

Step	SG Connection: Frequency	Preset to	Audio VTVM	Adjustment	Remarks
1	To Ant. Connector (J101) Freq: 27.185 MHz	Channel 19 Volume: Max. Squelch: Min.	To EXT. SPK. Jack (J2)	L1,2,3,4,5, 6,7	Adjust for a max. Audio Output
2	Same as step 1	Same as step 1	Same as step 1	VR1	Adjust for 2 V output with SG level of 0.3 μV
3	Same as step 1	Volume: Max. Squelch: Max.	Same as step 1	VR2 (Squelch)	Adjust for 2 V output with SG output level of 1000 μV.
4	Same as step 1	Same as step 1	Same as step 1	VR3	Adjust for a reading of S-9 on the Transceiver's S-meter with SG output level of 100 μV.

RECEIVER TEST EQUIPMENT SETUP



6. TROUBLESHOOTING HINTS

UNIT WILL NOT TURN ON

1. Defective Power Switch
2. Blown Fuse
3. Defective Power Switch
4. Defect in Power Supply circuitry

NO RECEIVE SOUND

1. Defective external speaker jack
2. Bad contact in the microphone jack
3. Bad PTT switch in the microphone
4. Unlocked PLL circuitry
5. Defect in Squelch circuitry
6. Defective PA-MON-CB switch

NO TRANSMIT

1. Defective Microphone jack
2. Defective PTT switch on Microphone
3. Off-tuned main or local Oscillator
4. Defective PA-MON-CB switch

NO TX MODULATION

1. Defective microphone and/or circuitry
2. Defect in Modulation circuitry

FOR MORE HINTS, SEE BELOW (Also Refer to Pages 7-10) :

NO TRANSMIT

A. Connect current meter in series with power cable and check the current reading for transmit mode:

If current reads more than 1 ampere (but less than 2 A.), it means the final output transistor is OK, so check for bad contacts or short circuits between PC Board and Antenna Connector. If current reads less than 0.5A: it indicates there is no drive to Final Transistor, so check drive or early RF stages.

B. Defective PLL ?
Check if voltage at the emitter of TR16 is less than 3 Volts. If less than 3V then PLL is unlocked or Channel Selector Switch is between Channels. If more than 3V then PLL is OK.

C. Short Circuit in Transmitter Circuitry ?
Voltage at emitter of TR21 should be less than 7 Volts (TX mode) should increase to more than 7 Volts in RX mode.

D. If voltage reading is more than 7 Volts at the collector of TR18, problem is not here. If voltage of more than 2 Volts is measured between R101 and D16, then check microphone circuitry or D16 diode.

E. If RF voltage (27 MHz) is more than 200 mV P-P at TP-5, previous stages are OK.

F. No voltage readings at collector of TR10 and TR11: check D11 or T-1.

G. No Channel LED light: If one particular segment does not light, the problem is with the entire LED or a bad contact in the Channel Selector Switch or a broken Flexible Printed Circuit. If LED does not light in any channel position, check D14 or FPC. With a defective FPC, transmit will not operate.

NO CHANNEL LED LIGHT

If one particular channel does not light, check Flexible Printed Circuit Board or LED itself or Channel Selector Switch.

If no channel lights, check D16 diode or socket for Flexible Printed Circuit Board.

NO TX MODULATION

If receiver operates correctly but with no modulation on TX, then problem should be TR19, TR20 or short circuit in the microphone circuitry, since audio power IC2 is used for both TX and RX modes.

NO RECEIVE

Before trouble shooting, be sure that Squelch Control is fully CCW and microphone is connected.

A) Connect Signal Generator to antenna and see if Signal Strength Meter (S meter) deflects:

S meter deflects:

Antenna through IF stage should be all right; check the circuit through ANL, Squelch and Audio amplifier. During the deflection of S meter, negative voltage should be present at cathode of D6 diode if Detector circuit is normal.

S meter does not deflects:

To determine whether PLL is OK, check following:

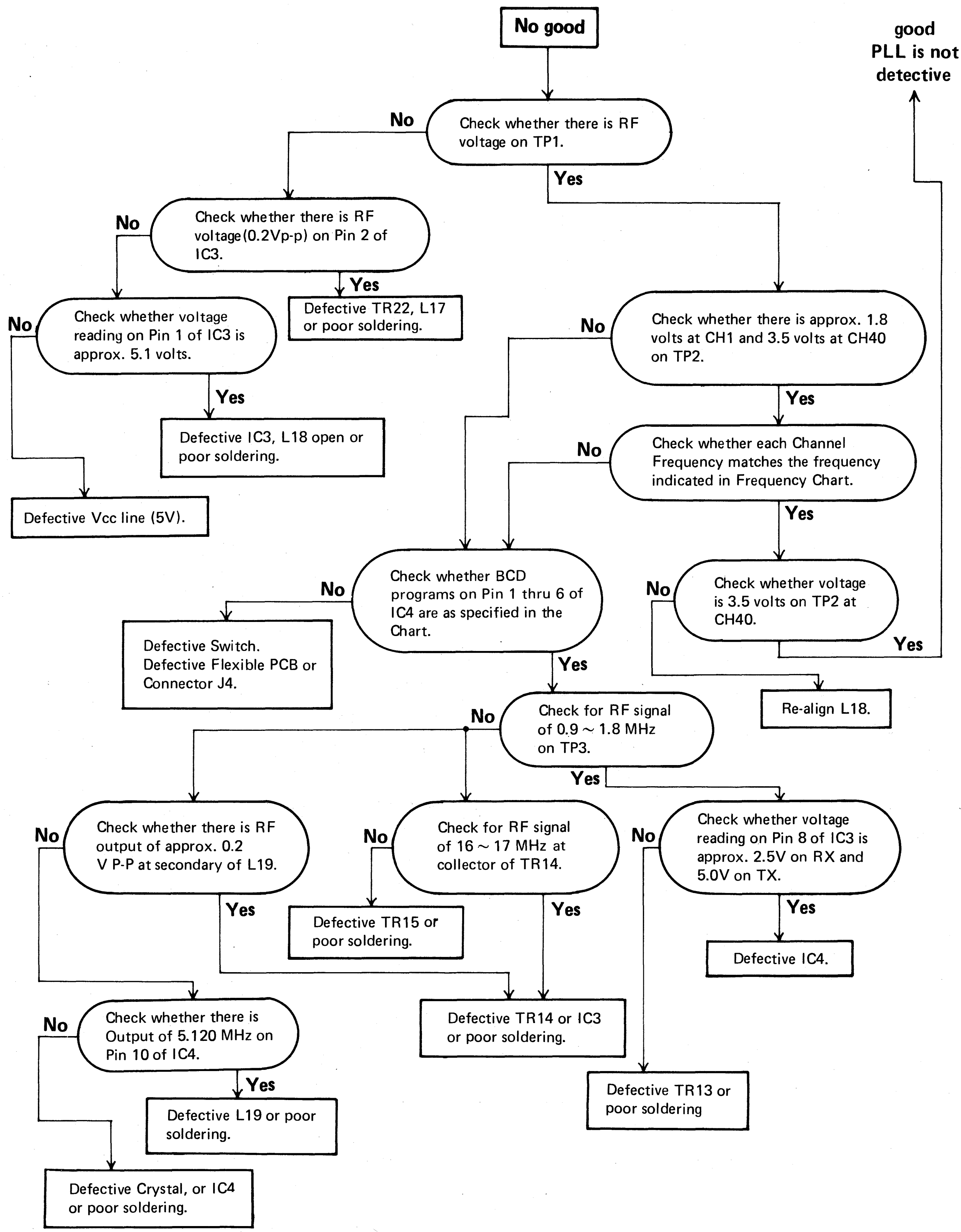
1. A frequency in the range of 16 MHz should be present at TP-1 (0.5V P-P or more).
2. The frequencies shown on page 11 should be correct when Channel Selector Switch is changed from CH 1 through CH 40.
3. A frequency of 10.24 MHz should be present at TP 4 (0.2V P-P or more). If PLL is OK, then check circuitry through TR6, TR5, TR4, TR3, TR2 and TR1.

B) Check whether Audio stage operates: Connect Speaker to PA Speaker Jack and set PA-CB switch to PA position. If click noise is audible when PTT switch is pressed, Audio Stage is OK. If no click noise, IC2 Audio Amplifier is defective or bad T-1 Transformer. (Transformer DC resistance should be approximately 0.5 ohm for both primary and secondary windings.)

C) Defective Audio Power IC ?
If voltage reading at pin 10 = 7V (VCC/2), IC2 should be all right.

D) Squelch is on all the time
TR7 is defective if voltage at the collector of TR8 is more than 5 volts. If reading is less than 2 volts, check TR9 circuitry and/or Squelch control's ground connection for cold solder.

PLL CIRCUIT TROUBLESHOOTING HINTS (also Refer to Page 7):



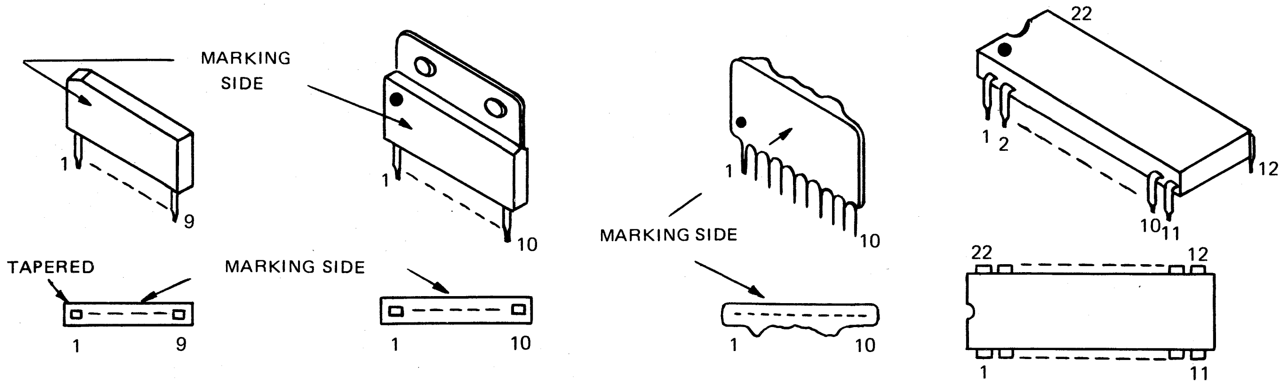
7. IC, TRANSISTOR, DIODE & LED LEAD IDENTIFICATION

IC-1 TA7310P

IC-2 MB3710

IC-3 UHIC006

IC-4 KM5624

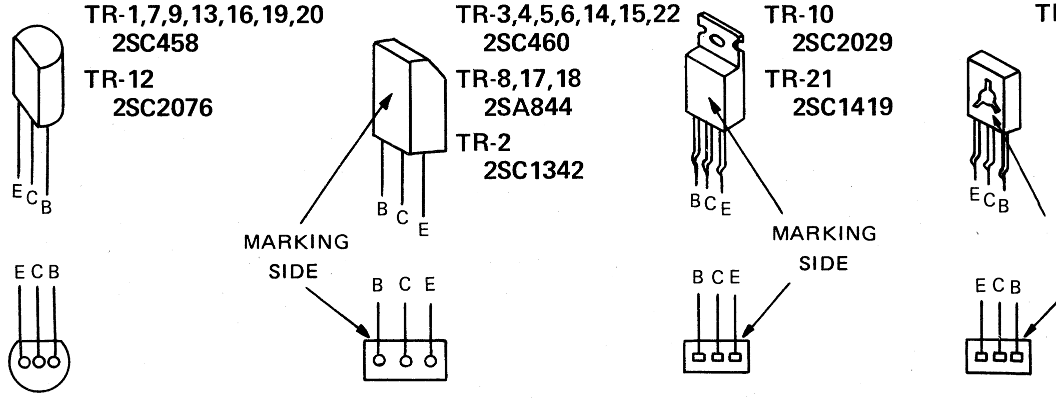


TR-1,7,9,13,16,19,20
2SC458
TR-12
2SC2076

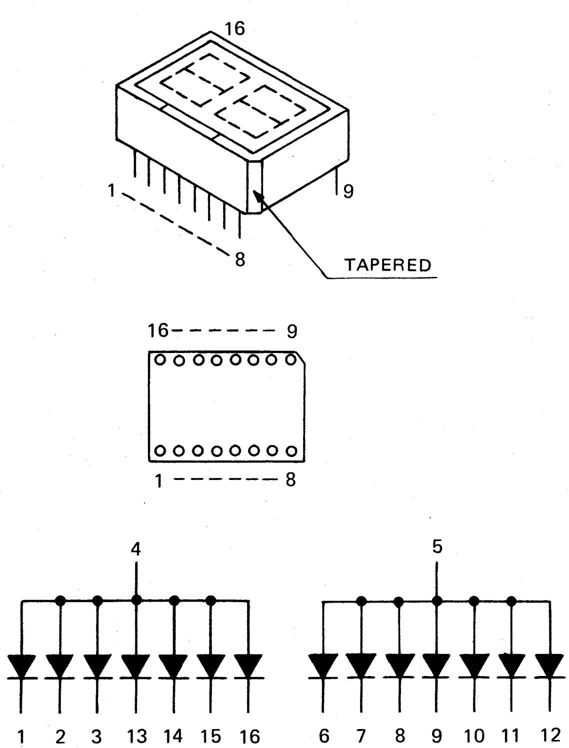
TR-3,4,5,6,14,15,22
2SC460
TR-8,17,18
2SA844
TR-2
2SC1342

TR-10
2SC2029
TR-21
2SC1419

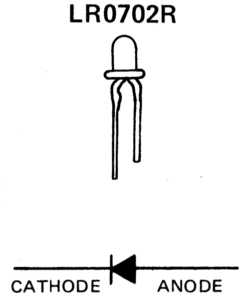
TR-11
2SC2029

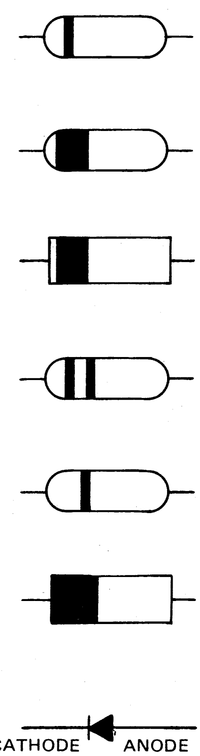


D-201 TLR321



L-101
LR0702R





D-9,10,12,15,16,24
1S2076

D-1,2
MC301

D-11,22
SR1K1

D-5,6,7,8,17,18,25
1N60AM

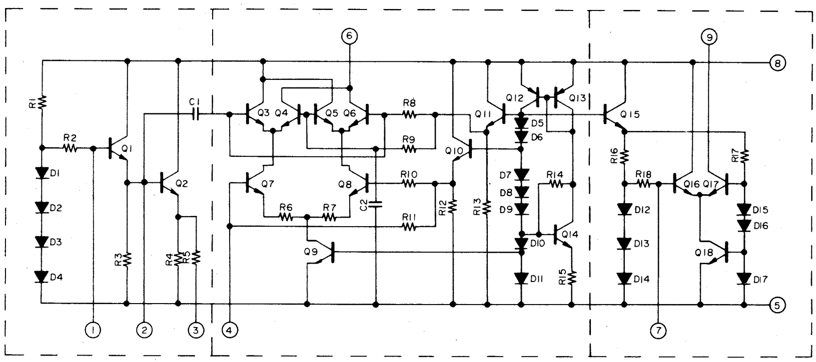
D-3,4
1N60P

D-20,21,19 XZ086
D-13,23 XZ051
D14 BZ052

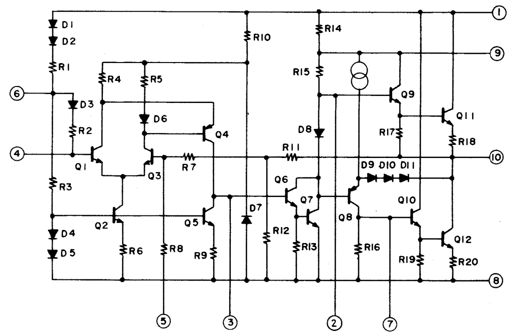
CATHODE ANODE

8. IC & COMPOUND PARTS INTERNAL DIAGRAMS

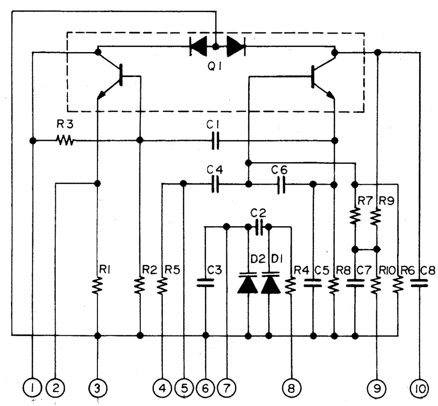
IC-1, TA7310P



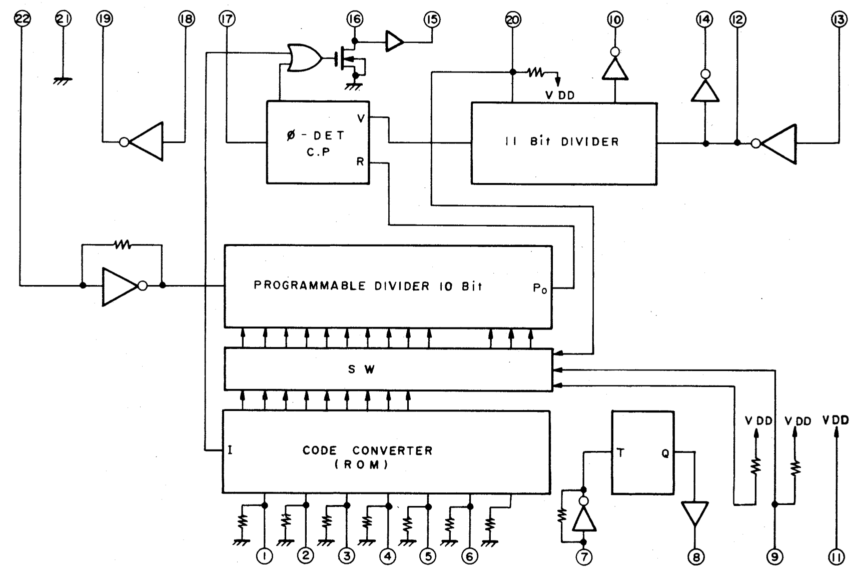
IC-2, MB3710



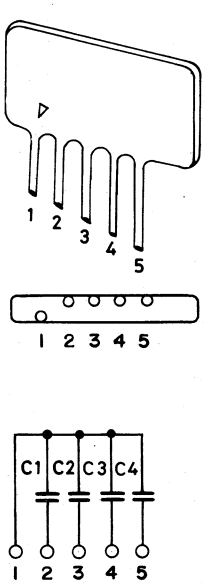
IC-3, UHIC006



IC-4, KM5624

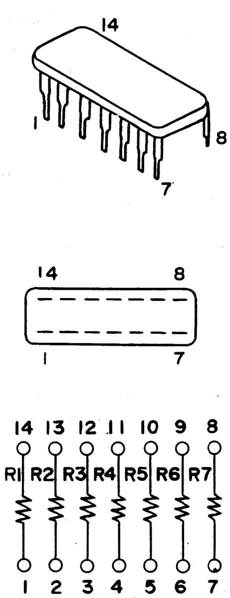


CC-1 HA-003



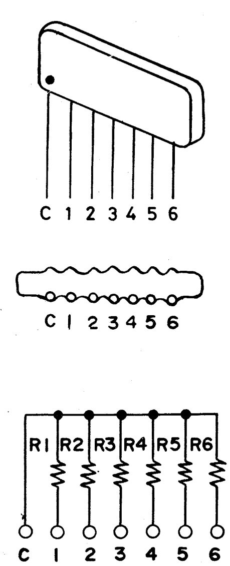
0.01 x 4

RR-2,3 HA-013



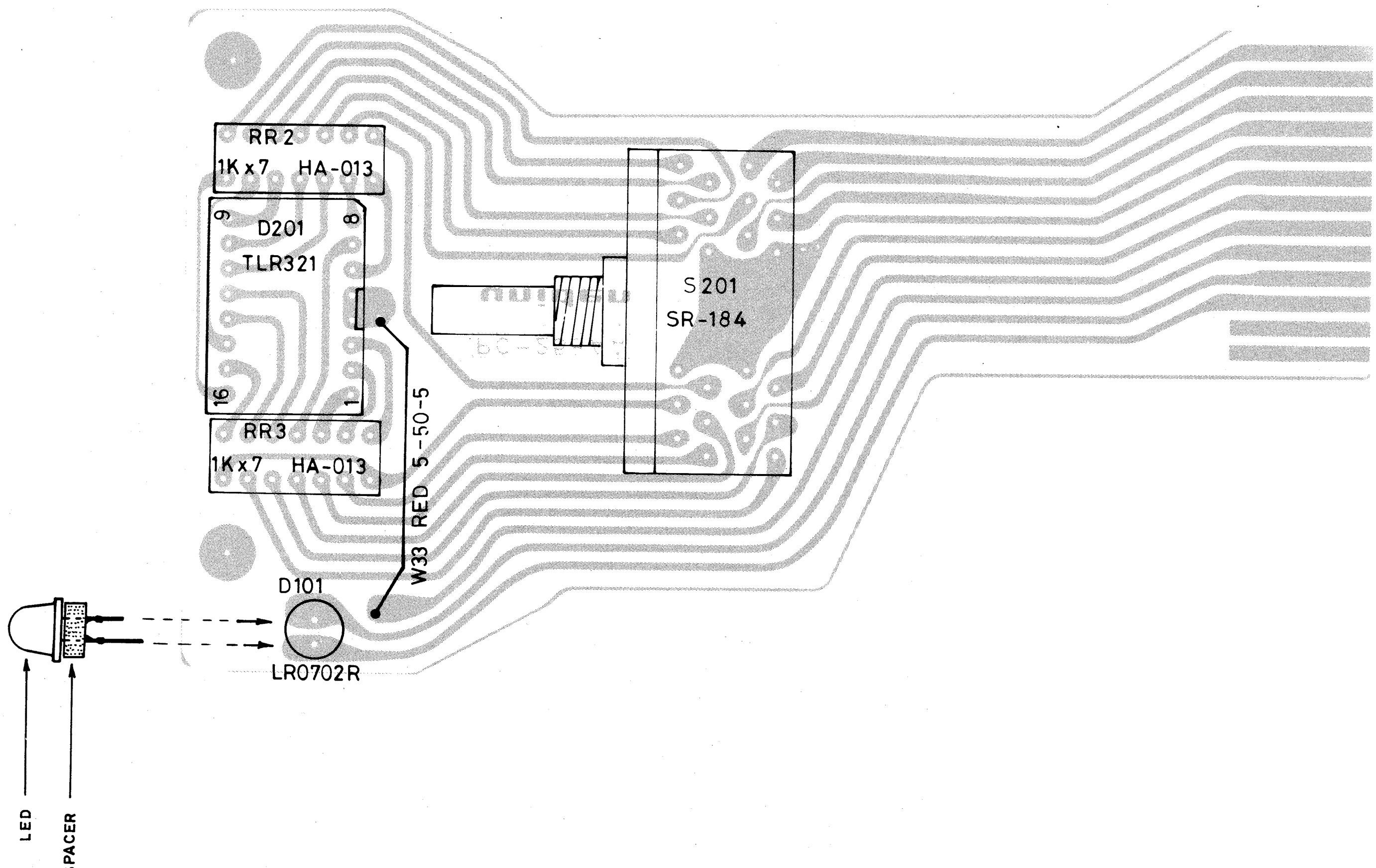
1K x 7

RR-1 HA-014

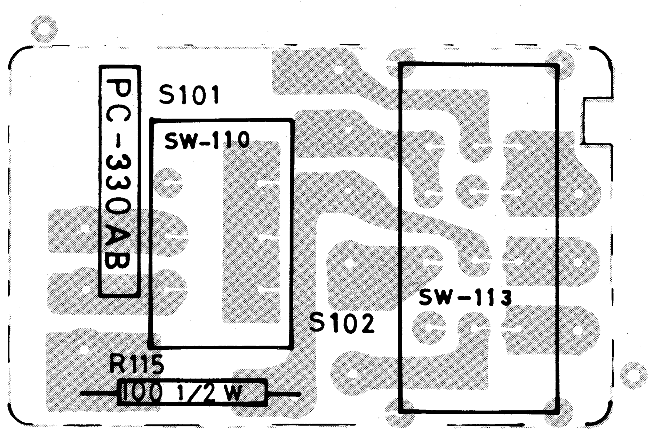


3.3K x 6

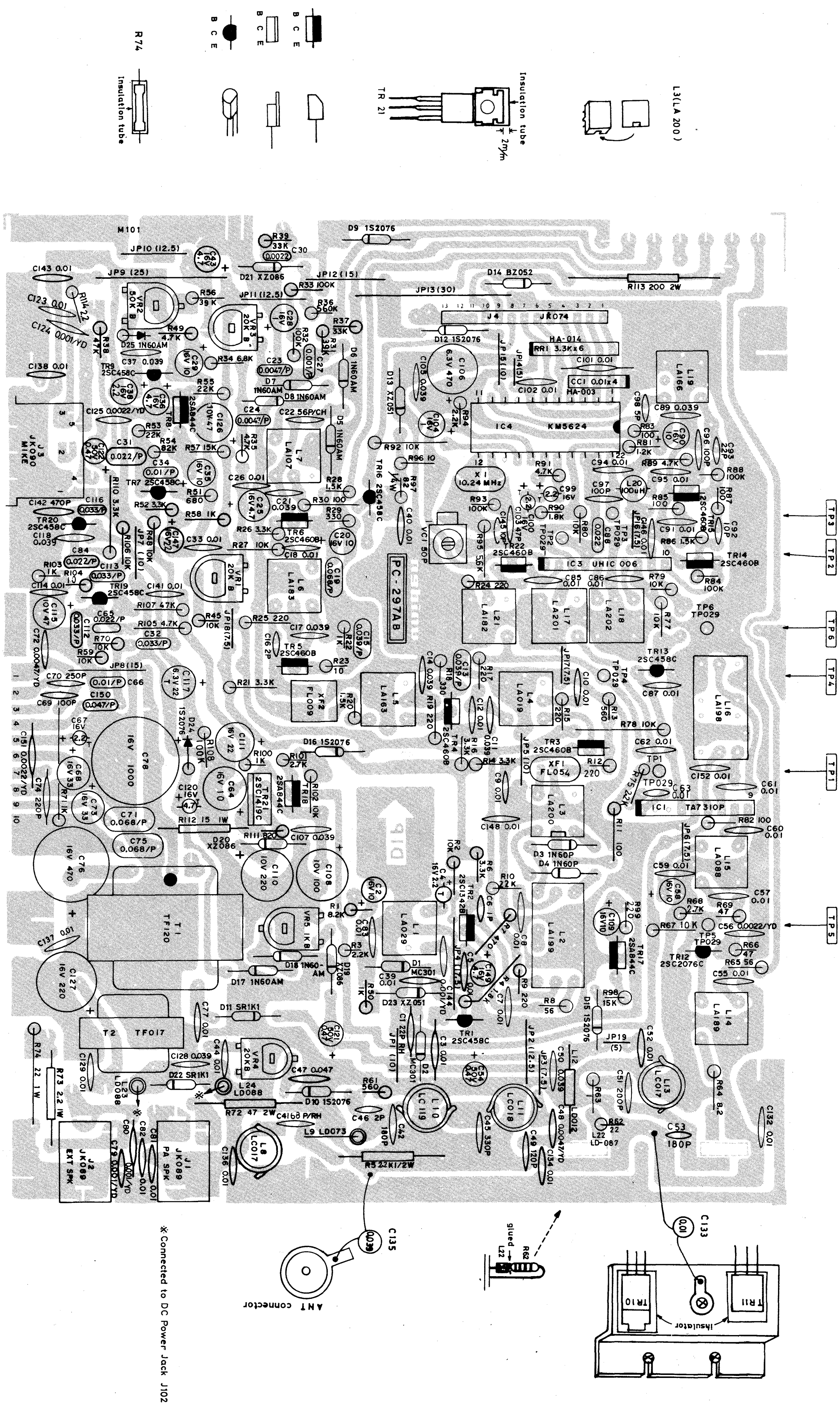
9. FLEXIBLE P.C. BOARD (TOP VIEW)



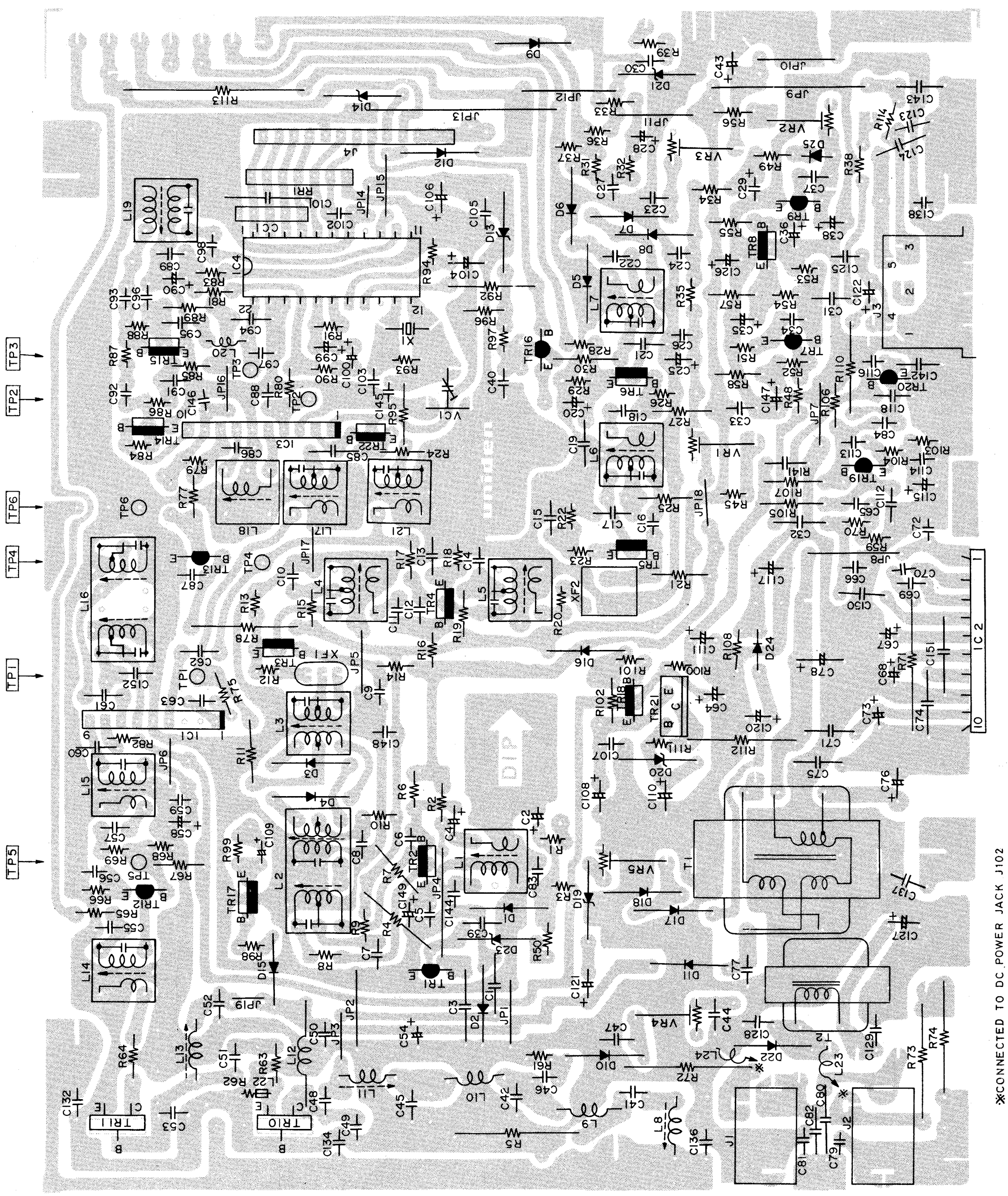
10. SWITCH P.C. BOARD (ANL, PA-MON-CB)



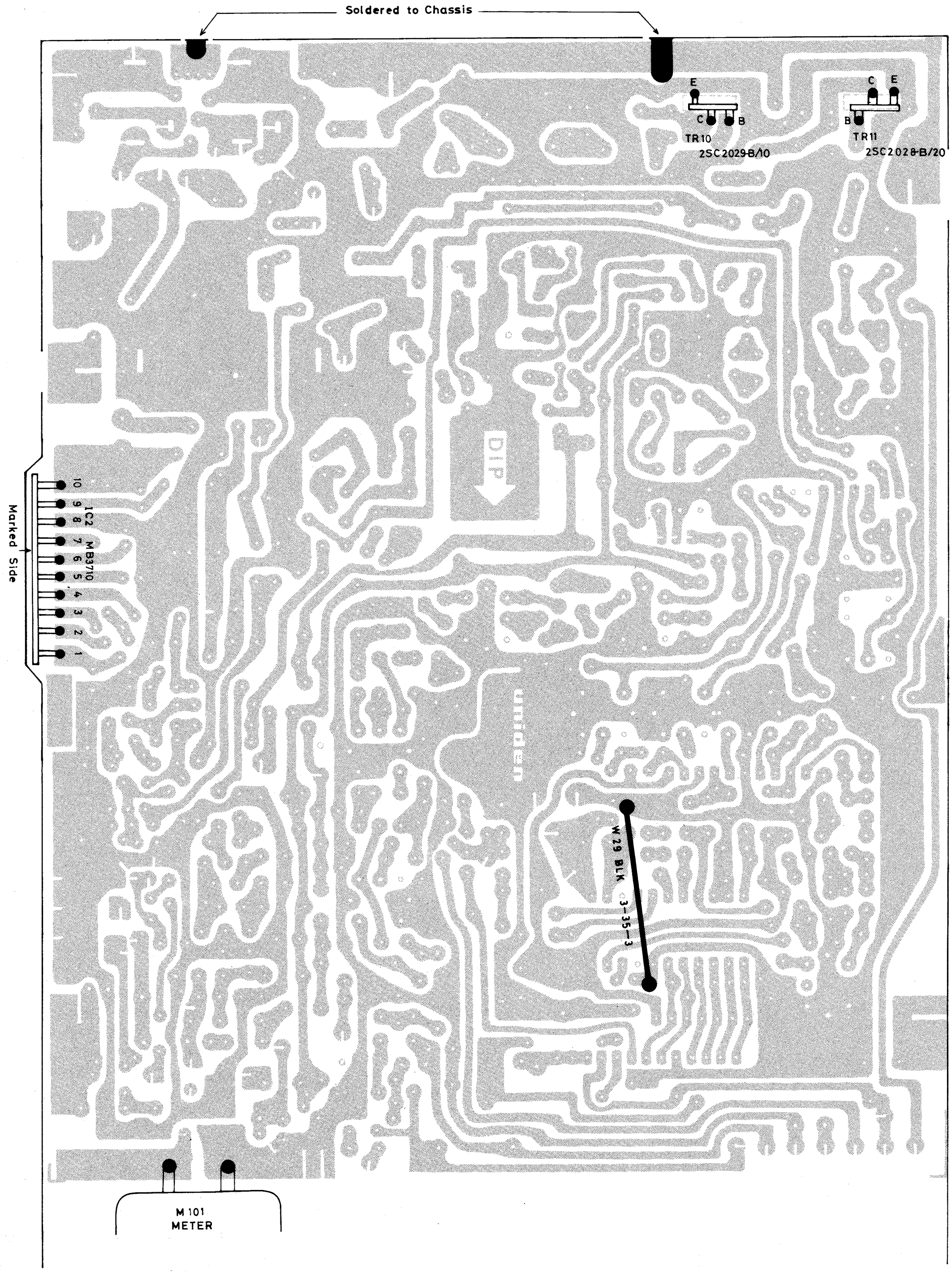
11. MAIN P.C. BOARD (TOP VIEW)



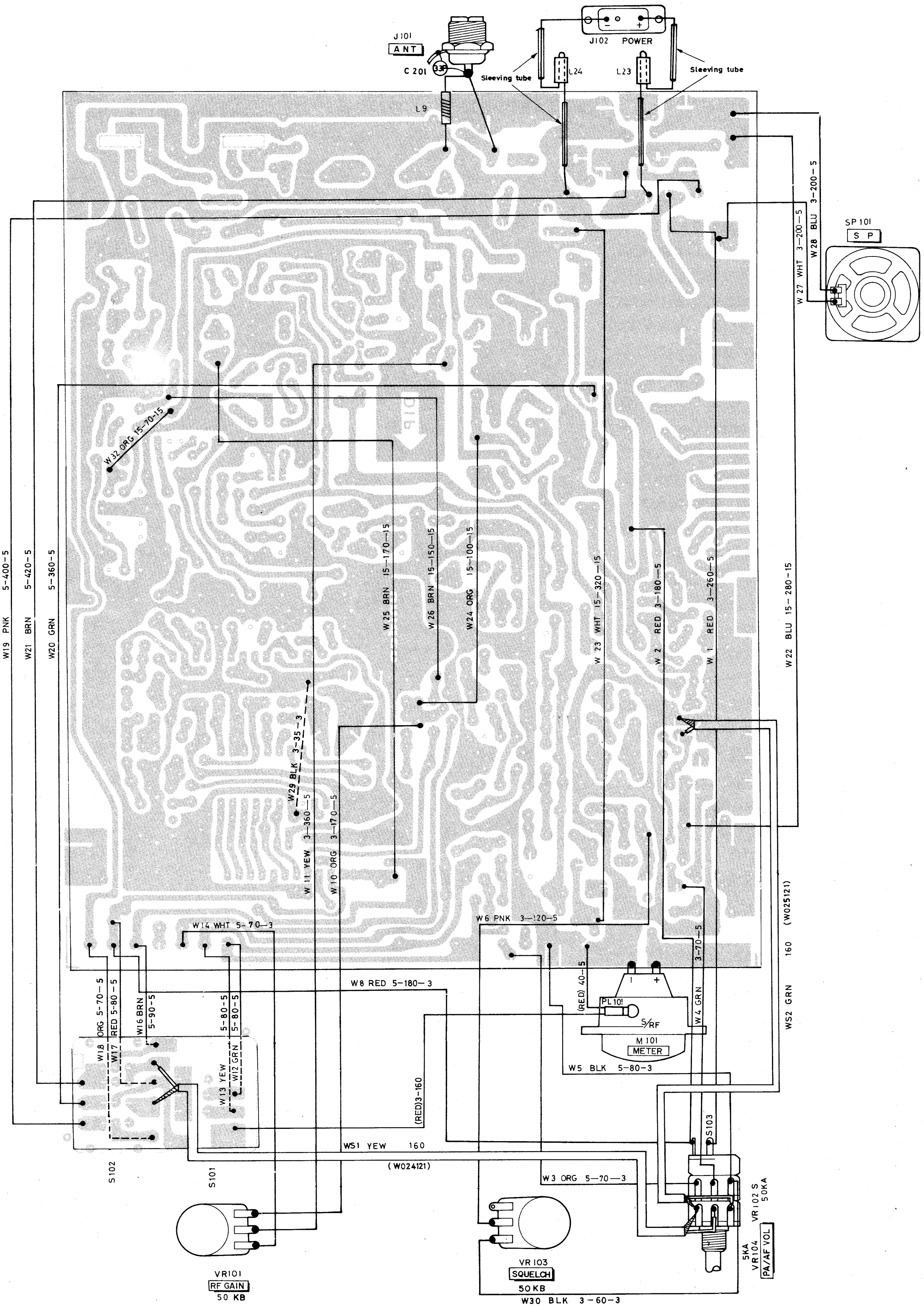
12. MAIN P.C. BOARD (BOTTOM VIEW)



13. ADDITIONAL PARTS ON THE BOTTOM



14. WIRING DIAGRAM



REVISION
FOR
AUSTRALIAN MODEL OF TRC-469

Catalog Number: 21-9469

When servicing Australian model of TRC-469(Catalog Number 21-9469), refer to the Service Manual for TRC-469(Catalog Number 21-1527) as well as the following revision:

1. SPECIFICATIONS

Page 3

GENERAL:

Communicating Frequencies .... **27.015 MHz** to **27.225 MHz** (All 18 channels)

Temperature and Humidity Range ..... **-30**°C to **+50**°C and **10%** to **90%**

STANDARD TEST CONDITIONS:

Ambient conditions Humidity .... **45%** to **85%**

3. BLOCK DIAGRAM

Page 6

Refer to the attached revision.

4. CIRCUIT DESCRIPTIONS

Page 7

Refer to the revised PLL circuit diagram attached.

The frequencies in the WAVE FORM IC4, pin No.22 should be **Rx = 960 kHz ~ 1170 kHz, Tx = 1415 kHz ~ 1625 kHz.**

Page 8

The 4th paragraph should be as follows:

For example, the divide ratio, N is programmed to **283** for channel No.1 Transmit, therefore Fvco is calculated like this;

$$\mathbf{Fvco = 15.360 + 5 \times 283 = 15.360 + 1415 = 16.775\ (kHz)}$$

In the same manner, Fvco for channel No.2 through No.**18** is determined as shown in Table A.

Page 9

The 2nd and 3rd paragraphs should be as follows:

When the PLL circuit is not locked or the program data input is not for channel 1 — **18**, pin 15 in IC4 produces a low level digital control signal. This signal is fed to the base of RF signal Disable Transistor, TR-16 (INSTANT STOP).

When the Channel Selector is switched from one channel to another, it may produce a non-valid input (other than data required for channels 1 — **18**). However, between channels, the Channel Selector produces a control signal at ground potential, and this signal is fed to the base of RF signal Disable Transistor, TR16.

Refer to the attached revision of **TABLE A: FREQUENCY CHART OF Fvco AND DIVIDE RATIO N.**

5. ALIGNMENT INSTRUCTIONS

Page 12

2. ALIGNMENT PROCEDURE

Step 1, Preset to: Receive mode, channel **18.**
Step 4, Remarks: Adjust L18 to obtain approx. **2.50V** reading.
Step 5, Adjustment: L17, Remarks: Adjust **L17** for **16.530000 MHz.**

Page 13

2. ALIGNMENT PROCEDURE

The channel number in step 1 and 6 should be Channel **10.**

Page 14

2. **ALIGNMENT PROCEDURE**

Step 1, SG Connection Frequency: 27.125 MHz, Preset to: Channel **10.**

6. TROUBLESHOOTING HINTS

Page 15

S METER DOES NOT DEFLECTS: The channel No.40 in item 2 should read as channel **18.**

Page 16

The first and third clauses from top-right hand side should be as follows:

Check whether there is approx. 1.8 volts at CH 1 and **2.5 volts** at **CH18.**

Check whether voltage is **2.5 volts** on TP2 at **CH18.**

7. IC, TRANSISTOR, DIODE & LED LEAD IDENTIFICATION:

Page 17

The type number of IC-4 should be **KM5626** Lead designation is same as **KM5624.**

8. IC & COMPOUND PARTS INTERNAL DIAGRAMS

Page 18

The type number of IC-4 should be **KM5626** and refer to the revised block diagram attached.

The resistor compound parts **RR-1, HA-014** and **RR-2, HA-013** should be deleted.

Pages 19 through 23

Refer to the revised parts layout attached.

15. ELECTRICAL PARTS LIST

Page 26

Delete **C-102,** Ceramic Capacitor

Page 27

Add C-202 Ceramic Capacitor, 0.01μF 25V K SL.... CKGZ511030
Add C-203 Ceramic Capacitor, 0.01μF 25V K SL.... CKGZ511030
Read type number of IC-4 as IC, KM5626 .... DDEY139001

Page 30

Add R-201 Carbon Film Resistor, 1K-ohm 1/8W J ... RFPZ181024
Add R-202 Carbon Film Resistor, 1K-ohm 1/8W J ... RFPZ181024
Read type number of S-201 Rotary Switch as SR-198 ... SSRY198001

16. MECHANICAL PARTS LIST

Page 33

Add Pan Head Screw 3 x 8 for TR11 .... MZSS123008

Page 34

Delete Bracket for Meter, F.C.C. Plate and Binding Screw M3 x 6 for speaker.

Add:

Spring Washer 2.6 diameter MZSN510026
Hexagonal Nut M2.6 .... MZSN430026
Name Plate(rear of the chassis) MDNP405640
Binding Screw M2.6 x 6 .... MZSN192606

Page 9

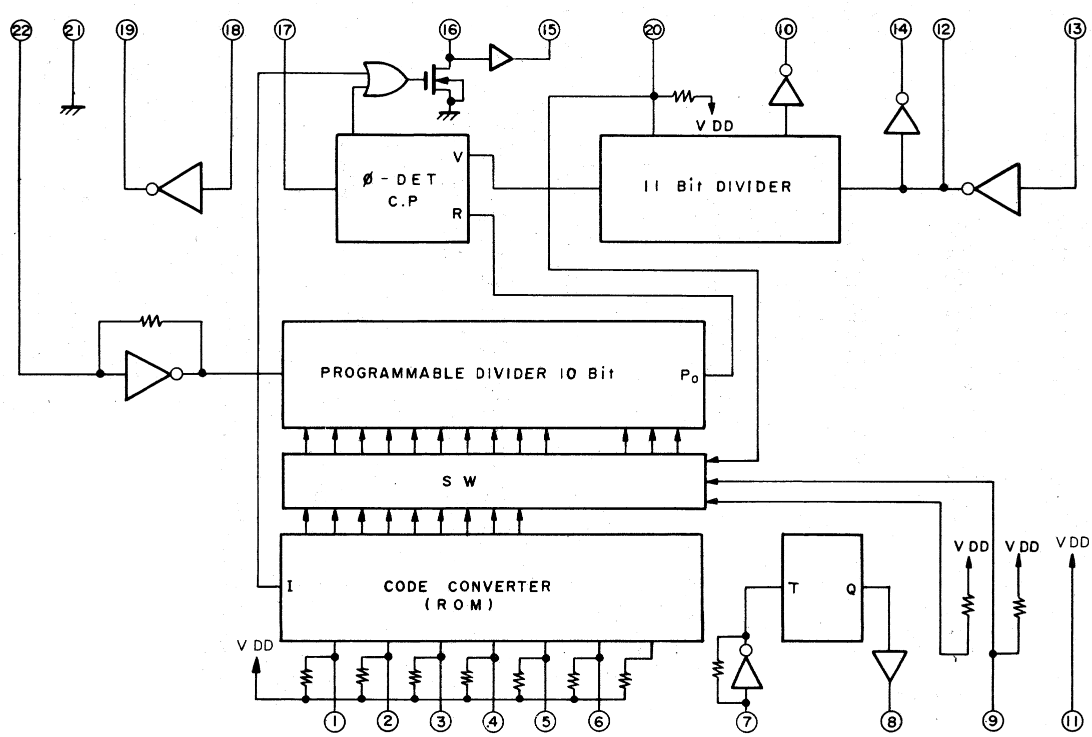
TABLE A: FREQUENCY CHART OF Fvco AND DIVIDE RATIO N

H: High Level (More than 3.5V DC) L: Low Level (Less than 1.0V DC)

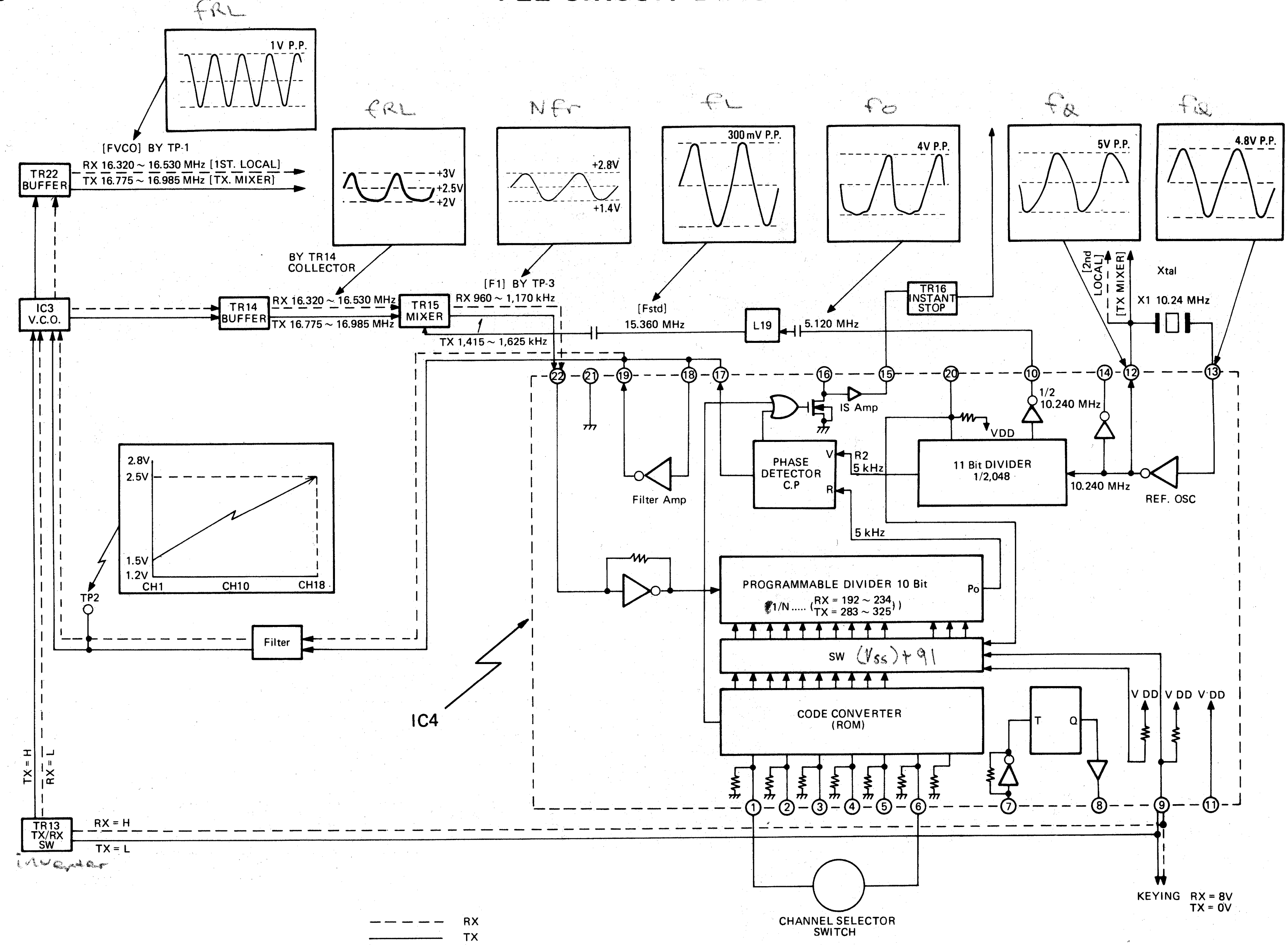
Antenna Frequency (MHz)	Channel Number	For Transmit			For Receive			Program input data					
		Divide Ratio (N)	F1 (kHz)	VCO Frequency (MHz)	Divide Ratio (N)	F1 (kHz)	VCO Frequency (MHz)	1A	1B	1C	1D	2A	2B
27.015	1	283	1.415	16.775	192	960	16.320	H	L	L	L	L	L
27.025	2	285	1.425	16.785	194	970	16.330	L	H	L	L	L	L
27.035	3	287	1.435	16.795	196	980	16.340	H	H	L	L	L	L
27.055	4	291	1.455	16.815	200	1.000	16.360	L	L	H	L	L	L
27.065	5	293	1.465	16.825	202	1.010	16.370	H	L	H	L	L	L
27.085	6	297	1.485	16.845	206	1.030	16.390	L	H	H	L	L	L
27.095	7	299	1.495	16.855	208	1.040	16.400	H	H	H	L	L	L
27.105	8	301	1.505	16.865	210	1.050	16.410	L	L	L	H	L	L
27.115	9	303	1.515	16.875	212	1,060	16.420	H	L	L	H	L	L
27.125	10	305	1.525	16.885	214	1.070	16.430	L	L	L	L	H	L
27.135	11	307	1.535	16.895	216	1.080	16.440	H	L	L	L	H	L
27.155	12	311	1.555	16.915	220	1.100	16.460	L	H	L	L	H	L
27.165	13	313	1.565	16.925	222	1.110	16.470	H	H	L	L	H	L
27.175	14	315	1.575	16.935	224	1.120	16.480	L	L	H	L	H	L
27.185	15	317	1.585	16.945	226	1.130	16.490	H	L	H	L	H	L
27.195	16	319	1.595	16.955	228	1.140	16.500	L	H	H	L	H	L
27.205	17	321	1.605	16.965	230	1.150	16.510	H	H	H	L	H	L
27.225	18	325	1.625	16.985	234	1.170	16.530	L	L	L	H	H	L

Page 18

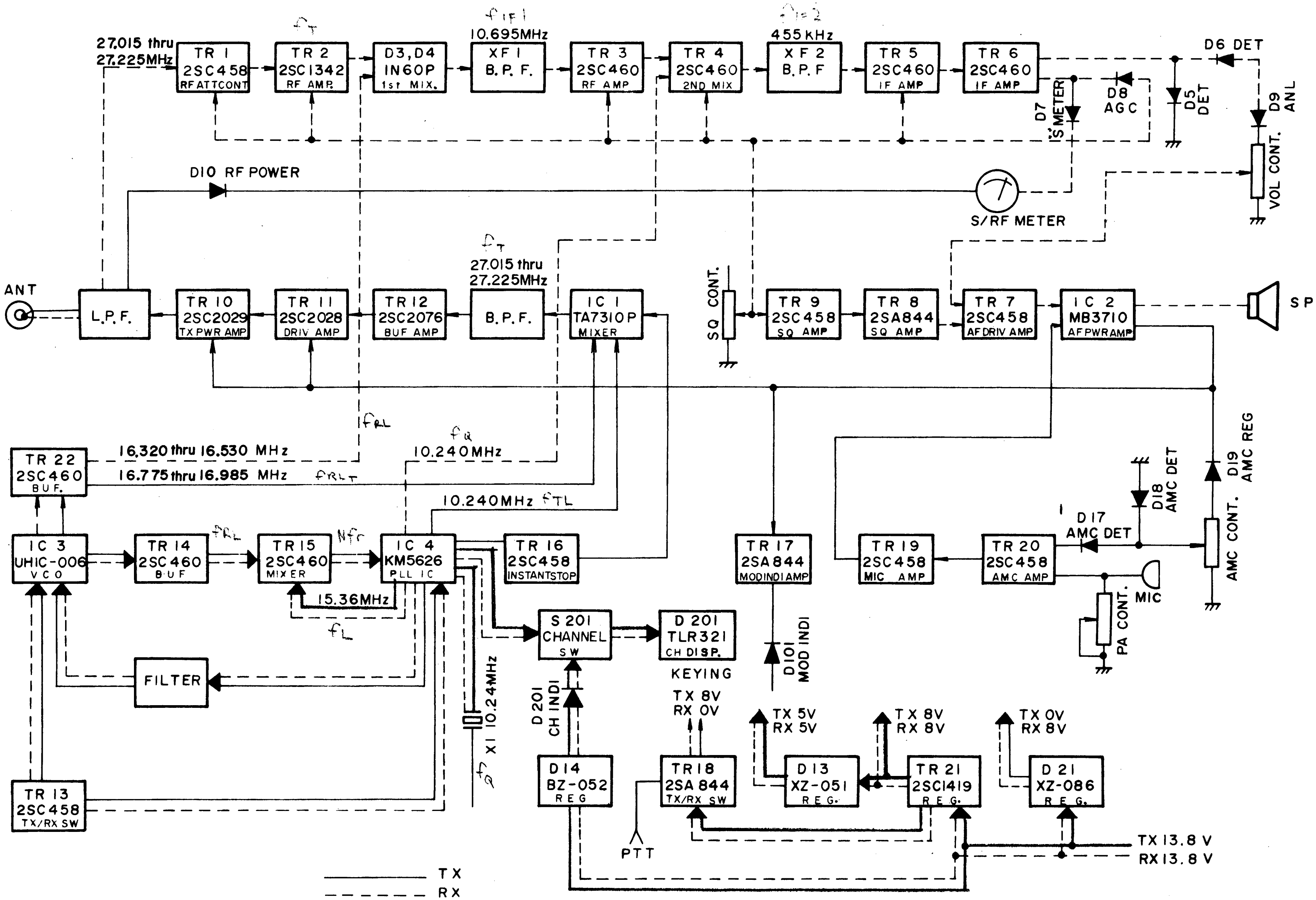
IC4, KM5626



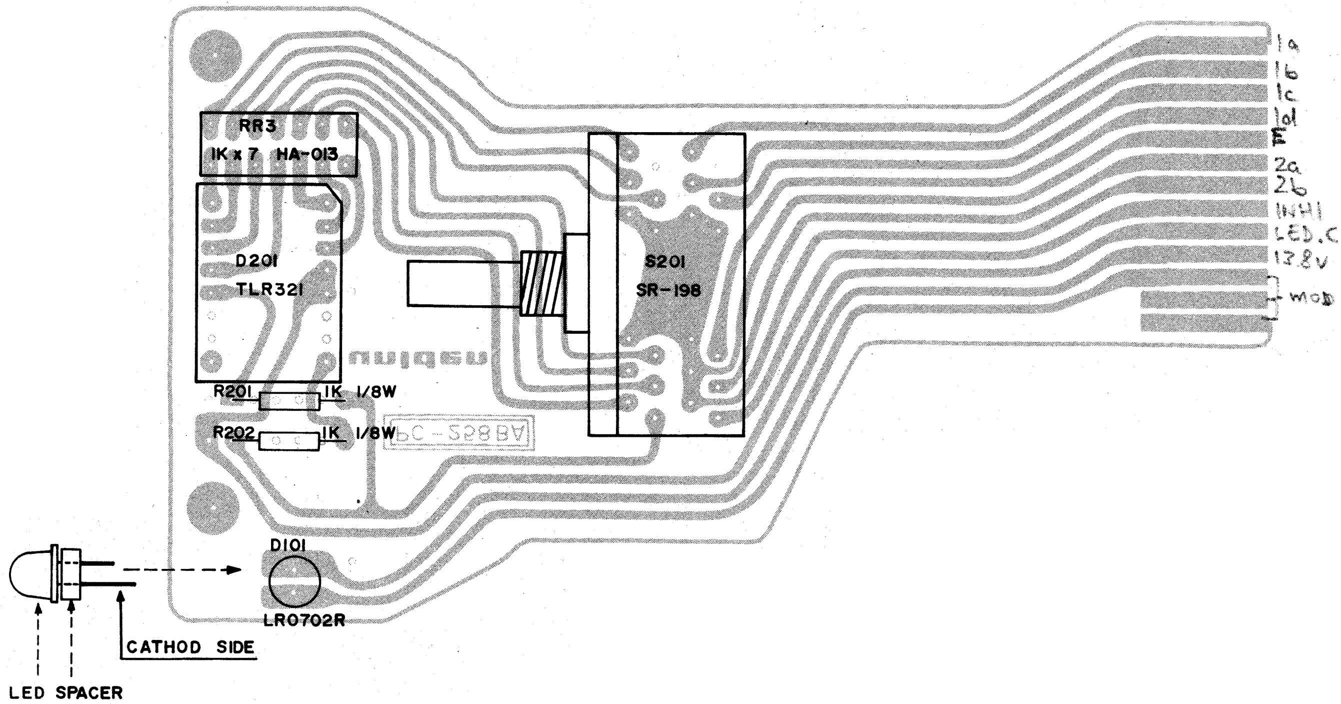
PLL CIRCUIT DIAGRAM



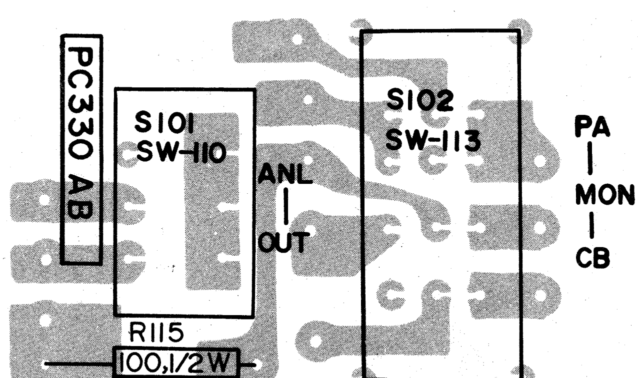
3. BLOCK DIAGRAM



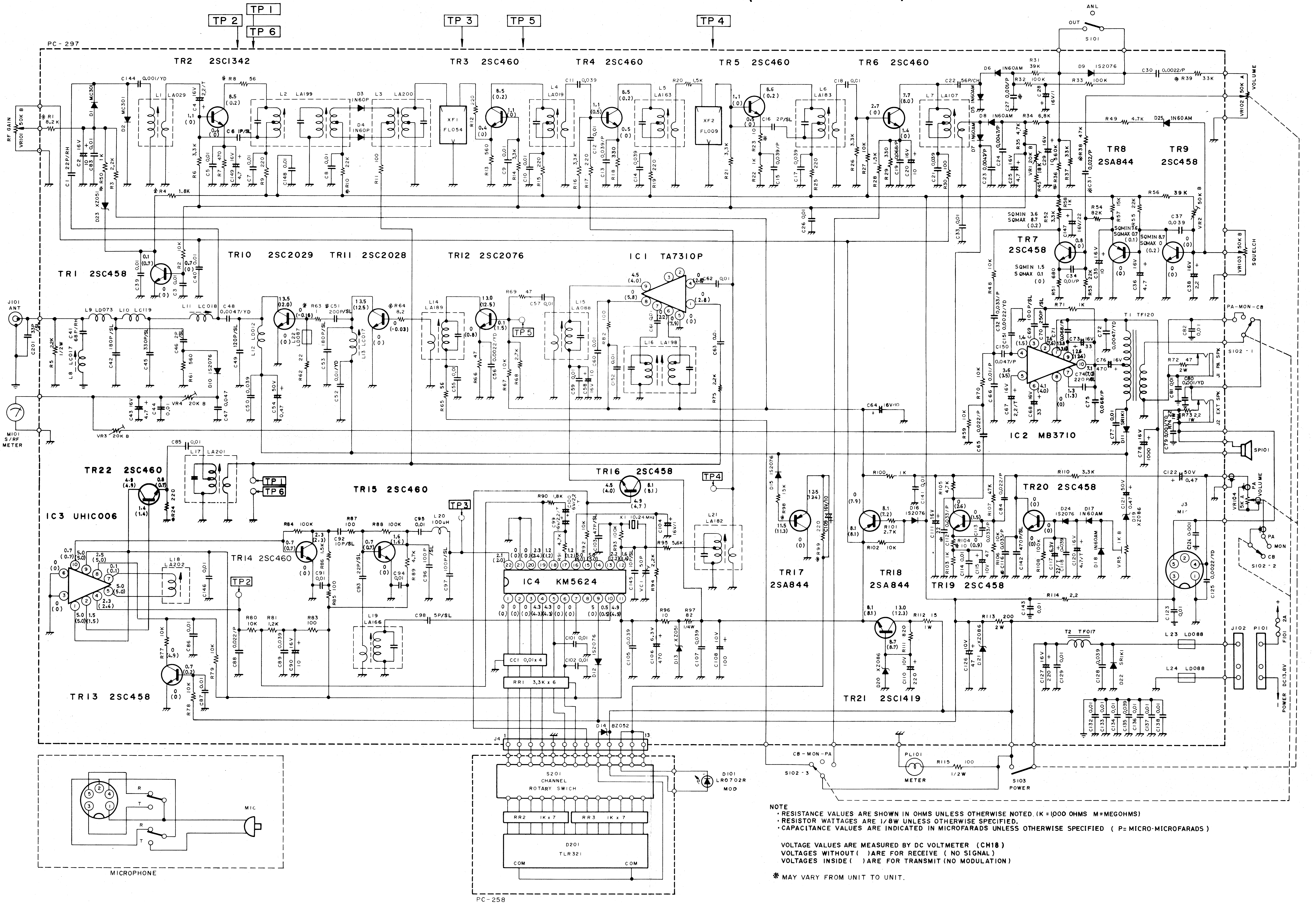
9. FLEXIBLE P.C. BOARD (TOP VIEW)



10. SWITCH P.C. BOARD (ANL, PA-MON-CB)



17. SCHEMATIC DIAGRAM FOR TRC-469 (CAT. NO. 21-1527)



NOTE
- RESISTANCE VALUES ARE SHOWN IN OHMS UNLESS OTHERWISE NOTED. (K = 1000 OHMS M = MEGOHMS)
- RESISTOR WATTAGES ARE 1/8W UNLESS OTHERWISE SPECIFIED.
- CAPACITANCE VALUES ARE INDICATED IN MICROFARADS UNLESS OTHERWISE SPECIFIED (P= MICRO-MICROFARADS)

VOLTAGE VALUES ARE MEASURED BY DC VOLTMETER (CH18)
VOLTAGES WITHOUT ( ) ARE FOR RECEIVE (NO SIGNAL)
VOLTAGES INSIDE ( ) ARE FOR TRANSMIT (NO MODULATION)

* MAY VARY FROM UNIT TO UNIT.

RADIO SHACK A DIVISION OF TANDY CORPORATION

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CANADA: BARRIE, ONTARIO L4M 4W5

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