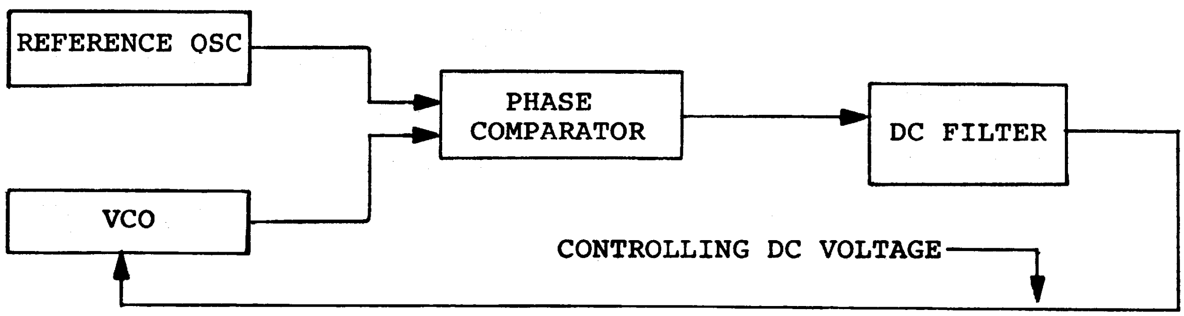
TABLE OF CONTENTS
Model 19 Plus

OPERATING THEORY OF PLL FREQUENCY SYNTHESIZER
FOR MODEL 19 PLUS

1. Fundamental Theory Of PLL Circuitry

The purpose of PLL (Phase Locked Loop) circuit is to generate multiple number programable frequencies from a signal reference frequency with quartz crystal accuracy.

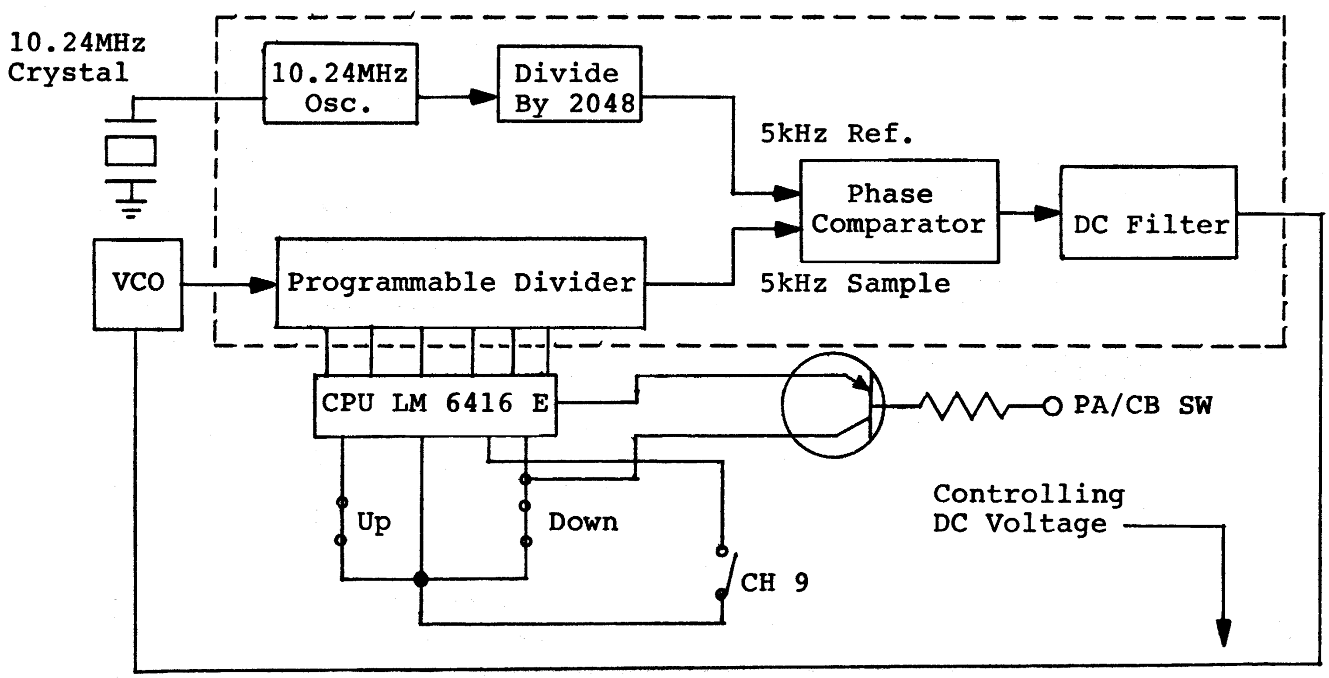
A basic PLL circuit consists of reference oscillator, VCO, phase comparator and DC filter (low pass filter).



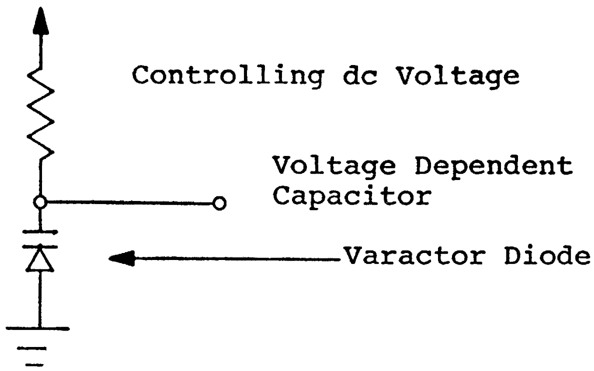
With the above circuit the VCO (Voltage Controlled Oscillator) frequency is effectively locked to the reference oscillator, and its accuracy is as good as the reference oscillator.

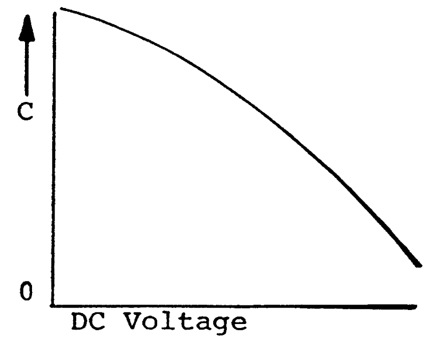
Since the CB radio's adjacent channel spacing is 10 kHz (or multiple of 5 kHz), our purpose should be to produce multiples of programable frequencies that are spaced apart by 10 kHz.

Therefore the basic PLL circuitry is expanded as follow:



The most important part of VCO circuitry is a voltage controlled variable capacitor called varicap or varactor diode whose capacitance depends on DC voltage applied to its cathode.





The varactor diode is responsible for setting VCO frequency, and once set it regulates the VCO frequency against the reference. The VCO frequencies are chosen in 16 to 17 MHz range as shown on table 1. To obtain transmit signal the VCO is mixed with 10.24MHz. As an example for channel 1:
10.24 + 16.725 = 26.965MHz

For receiver mode the VCO is used as a first local oscillator. Example, channel 1:
26.965 - 16.27 = 10.695MHz

The above first IF of 10.695MHz is mixed again with 10.24MHz crystal oscillator frequency which serves as the second local oscillator.
10.695 - 10.24 = 0.455MHz

As can be seen above the VCO frequency shifts from 16.725 to 16.27MHz when changed from transmit to receive for the same channel 1. The shift is accomplished by "read only memory" incorporated inside the PLL IC-202 between the selector switch and the VCO divider (programable). When transmit logic signal is applied to the IC-202 through pin 19, the programable divider will divide incoming VCO frequency by 3345 to produce 5kHz sampling signal. 16,725 ÷ 3345 = 5kHz

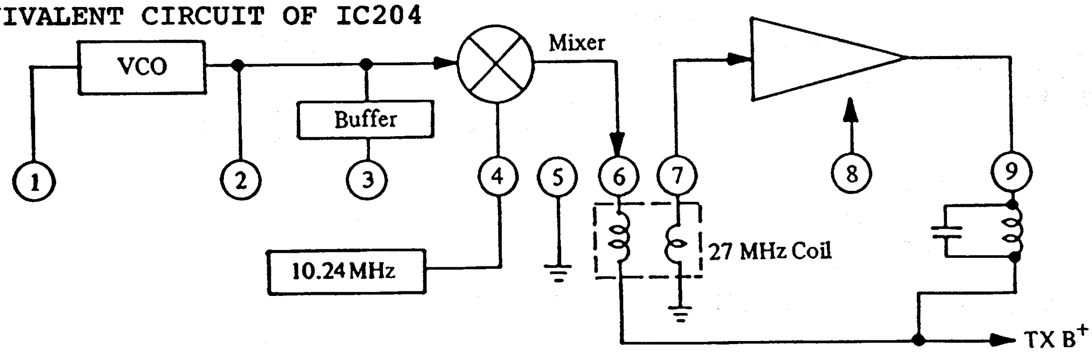
For the receiver mode the programable divider will automatically change to divide the VCO frequency by 3254.
16270 ÷ 3254 = 5kHz

Note that the reference frequency of 5kHz is obtained by dividing the 10.24MHz by 2048 times. (5kHz reference is used instead of 10kHz for division convenience). See table 1 for transmit/receive mode VCO frequencies.

2. Transmitter Circuit

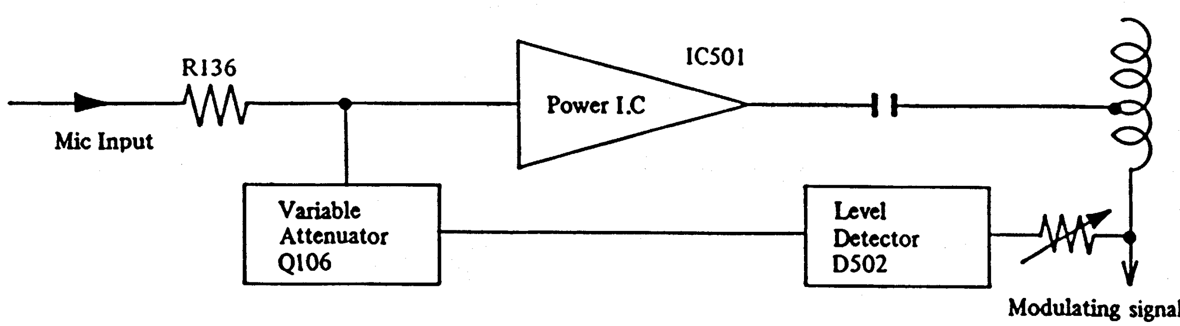
IC202 (PLL-LSI), VCO section of IC204 (pins 1,2, and 3) are operational regardless of the receive or transmit mode. When the radio is set to the transmit mode, mixer/amplifier section of IC204 (pins 4,6,7 and 9), Q203, Q301, Q302 and Q303 are activated. The VCO frequency selected by the channel selector switch is mixed with 10.24MHz to generate desired transmit frequency. The mixing is done by a mixer circuit located inside the IC204.

EQUIVALENT CIRCUIT OF IC204



The resulting transmit frequency from pin 9 of IC204 is filtered by L301 and L302. Q301 is an amplifier/switch circuit. When VCO frequency is out of "LOCK" condition pin 14 of IC202 pulls down bias voltage of Q301 to ground disabling Q301 from passing possible illegal frequencies. Q302 is a RF power driver circuit and Q303 is the final RF power amplifier.

A modulation audio signal is applied to the collectors of Q302 and Q303 through an audio power transformer T501. The audio signal (mic input) is amplified by a single power IC501. The modulation limiting is accomplished by an automatic level control circuit which is as follows:



L305 and C317 are series resonant , and RFC303, L306, RFC304, C321, 322, 324 and C326 make up PI-LOW pass filter. C312 is factory selected and limits the RF output level to within the FCC limit of 4 watts.

3. Receiver Circuit

In the receiver mode of operation, Q203 transistor is turned off. Also bias voltage is applied to Q103 and a proper bias and AGC voltage is established to Q101, Q102, and Q103. Q101 is a 27MHz RF input amplifier and any excessive input signal is limited by diodes D101 and D102. The amplified 27MHz is mixed with VCO frequency selected by channel switch. For channel 1 VCO is set at 16.27MHz. The resulting first IF is 26.965 - 16.27 = 10.695MHz. Q102, is the first converter, and the 10.695MHz is sharply filtered by L103 and a ceramic filter CF1. The first IF is again mixed with a second local oscillator of 10.24MHz. 10.695 - 10.24 = 0.455MHz. Q103 is the second converter. Second IF is filtered by a razor sharp ceramic filter of CF2 coupled with L104. Q104 is a first 455kHz amplifier, with Q105 being the last amplifier. D103 is a detector diode which produces audio signal as well as a negative DC voltage for AGC action. The negative voltage also provides forward biasing to the cathode of ANL clipping diode of D106. The biasing voltage has a time constance determined by R124 and C123. Therefore, any sharp negative going pulse from D103 will back bias D106 and be clipped.

4. Channel Up/Down Operation

The PLL (TX/RX) frequency, channel number display, channel 9 select, and PA/CB mode select functions are controlled by a 4 bit microprocessor. The controls for channel selection are the Up and Down push buttons located on the front panel. Depending upon which button is pressed, instructions are given to the microprocessor to change the PLL frequency to the next channel. If the button is kept in the depressed position for approximately 1.2 seconds the microprocessor will then scan through the channels at a rate of approximately 5 channels per second.

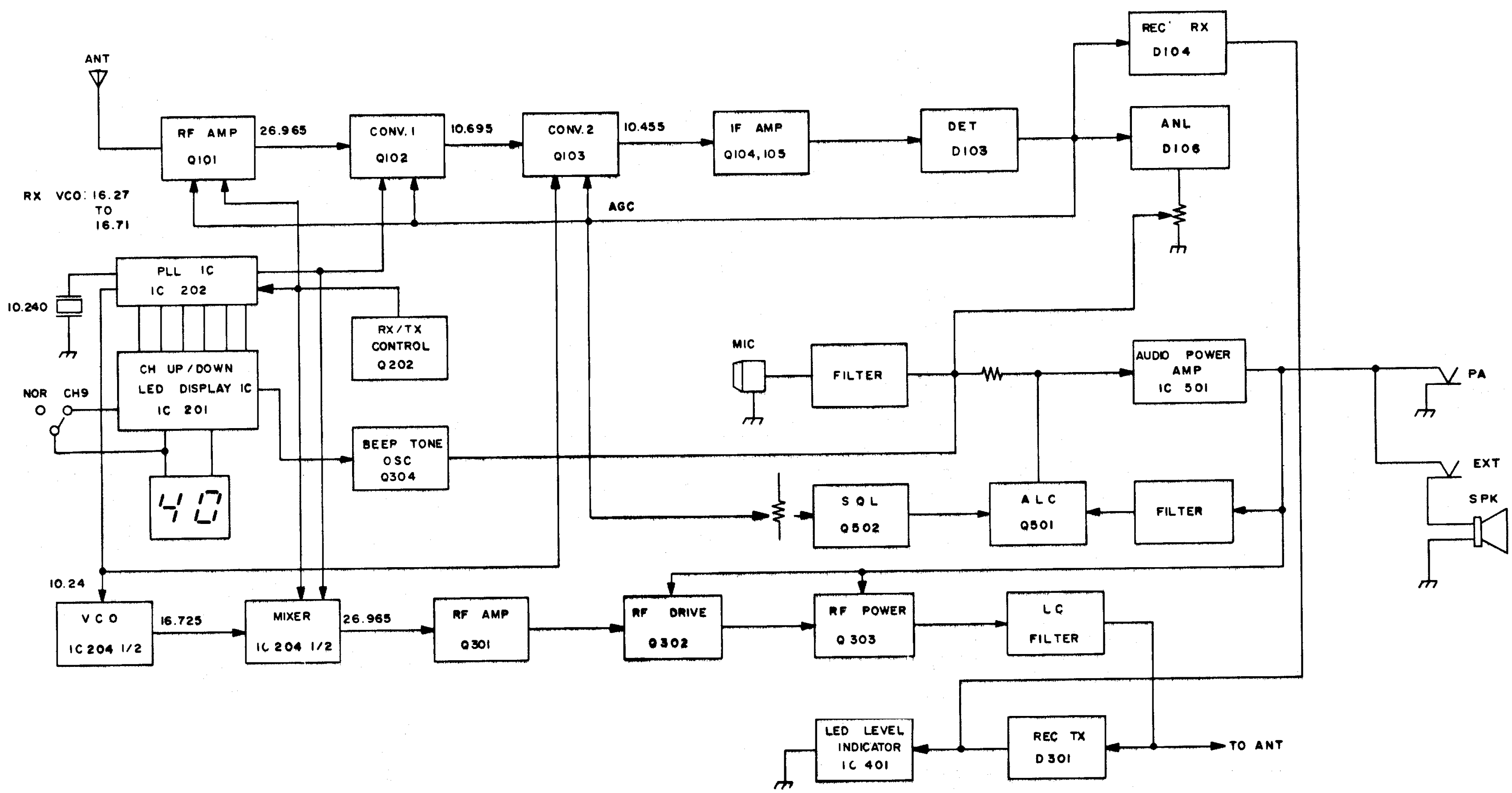
During channel selection or scan function, the microprocessor inhibits the transmitter section of the unit, to prevent undesired signals from being radiated.

FREQUENCY CHART

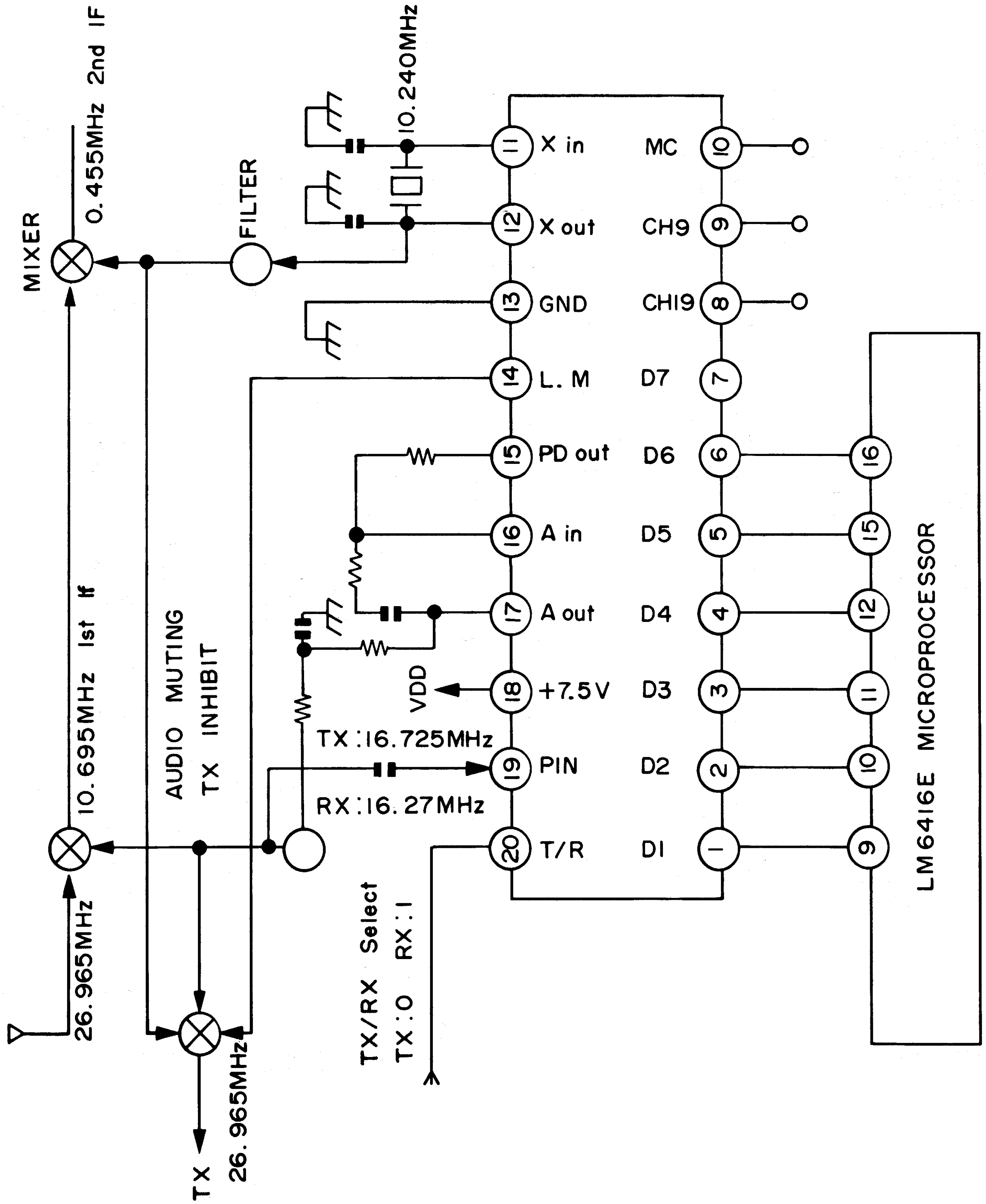
(Table 1)

CH NO	CHANNEL FREQ(MHz)	CRYSTAL OSC	VCO FREQUENCY (MHz)	
			TX	RX
1	26.965	10.24	16.725	16.27
2	26.975	”	16.735	16.28
3	26.985	”	16.745	16.29
4	27.005	”	16.765	16.31
5	27.015	”	16.775	16.32
6	27.025	”	16.785	16.33
7	27.035	”	16.795	16.34
8	27.055	”	16.815	16.36
9	27.065	”	16.825	16.37
10	27.075	”	16.835	16.38
11	27.085	”	16.845	16.39
12	27.105	”	16.865	16.41
13	27.115	”	16.875	16.42
14	27.125	”	16.885	16.43
15	27.135	”	16.895	16.44
16	27.155	”	16.915	16.46
17	26.165	”	16.925	16.47
18	27.175	”	16.935	16.48
19	27.185	”	16.945	16.49
20	27.205	”	16.965	16.51
21	27.215	”	16.975	16.52
22	27.225	”	16.985	16.53
23	27.255	”	17.015	16.56
24	27.235	”	16.995	16.54
25	27.245	”	17.005	16.55
26	27.265	”	17.025	16.57
27	27.275	”	17.035	16.58
28	27.285	”	17.045	16.59
29	27.295	”	17.055	16.60
30	27.305	”	17.065	16.61
31	27.315	”	17.075	16.62
32	27.325	”	17.085	16.63
33	27.335	”	17.095	16.64
34	27.345	”	17.105	16.65
35	27.355	”	17.115	16.66
36	27.365	”	17.125	16.67
37	27.375	”	17.135	16.68
38	27.385	”	17.145	16.69
39	27.395	”	17.155	16.70
40	27.405	”	17.165	16.71

Block Diagram



PLL Circuit Block Diagram



ALIGNMENT PROCEDURE FOR CB TRANSCEIVER
MODEL 19 PLUS

TEST EQUIPMENT REQUIRED

All Test equipment should be properly calibrated.

1. Audio Signal Generator, 10Hz - 20kHz
2. VTVM 1mV measurable.
3. DC Ammeter, 2A
4. Regulated Power Supply, dc 0-20V, 2A or higher.
5. Frequency Counter, 0-40MHz, high input impedance type.
6. RF VTVM probe type.
7. Oscilloscope, 30MHz, high input impedance.
8. RF watt meter, thermo-couple type, 50 ohm, 5W.
9. Standard Signal Generator, 100kHz-50MHz, 50 ohm unbalanced.
10. Speaker dummy resistor, 8 ohm, 5W.
11. Circuit Tester, dc, 20kV ohm/V.

TEST CONDITIONS

Test voltage = 13.8Vdc +/-5%, unless otherwise specified.

PLL CIRCUIT ALIGNMENT

a. 10.24MHz Oscillator Check

Connect a frequency counter to IC202, pin 12 and check to see 10.240000MHz +/-100Hz.

When a defective crystal is replaced and if the frequency is higher than by 100Hz, C208 should be increased. If the frequency is lower, C208 should be reduced in capacitance.

With a factory supplied crystal a C208 value of 47 pFd should be sufficient, but on some sets minor value selection may be necessary.

b. VCO Alignment

1. Set the Radio to channel 40 and into the transmit mode (make certain 50 ohm dummy load or wattmeter is connected to the antenna terminal).
2. Connect a circuit tester between TP1 and ground.
3. Adjust L201 to obtain 4.5Vdc.
4. Set the Radio to channel 1 and into the receive mode.

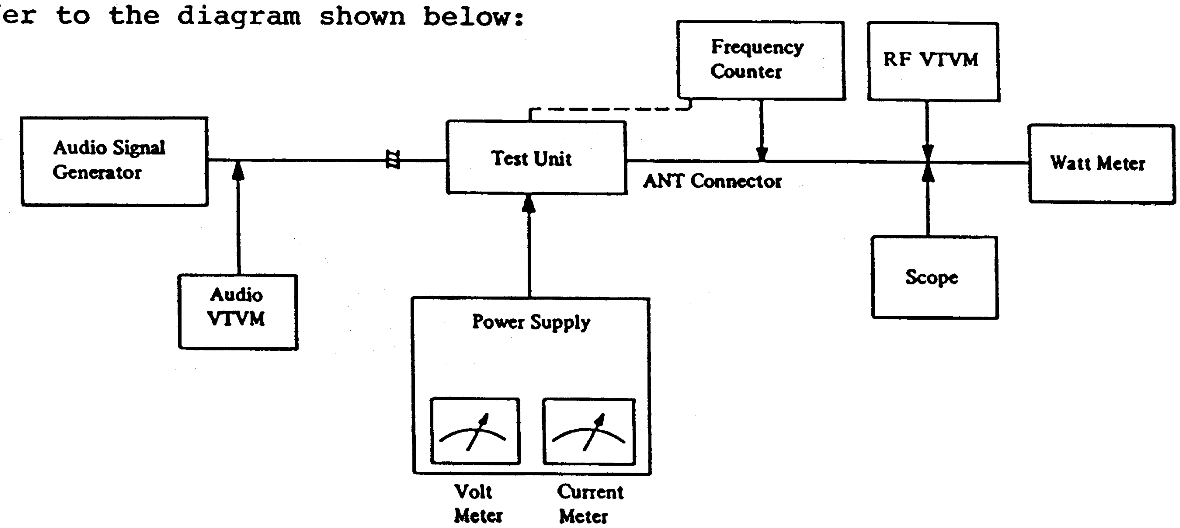
5. Check to see that the TP1 dc voltage drops to a level between 0.6 and 1.0 volts. As long as the dc level stays between 4.5Vdc for transmit on channel 40 and 0.6 to 1.0Vdc for receive on channel 1, the VCO is set properly.

   The magnitude of the TP1 voltage swing is determined by C216 at the factory. The optimum value of C216 was found to be around 82 pFd. C216 with a value larger than 82 pFd will reduce the voltage swing magnitude and vice versa for a smaller value. If the lower value drops only to 1.5Vdc, then a C216 of 82 pFd should be reduced to increase the range. This should not be necessary when factory supplied parts are used for D208 (Varactor Diode) and L201 (VCO Tuning Coil).

TRANSMITTER ALIGNMENT

a. Test Set-up

   Refer to the diagram shown below:



Transmitter Alignment Set Up

Note:

1. When connecting audio cable to the microphone input circuit, always use shielded cable.

2. When making alignment for RF power output, always use the supplied dc cable.

b. RF Amplifier State Alignment

1. Reduce power supply voltage to 9.0V.

2. Set channel selector to 19 and connect the oscilloscope to the antenna connector through a suitable connection pad.

3. Adjust L301, L302, L303 and L304 for maximum amplitude of the scope display.

4. Increase the power supply voltage to 13.8V, and then adjust L305 and L306 until the watt meter indicates 3.8W.

5. Measure the transmit power output at all channels, and make sure that the power output difference between any channels is less than 0.3W.

6. Measure the transmit frequency at all channels, and make sure that the frequency is within +/-800Hz from the assigned channel center frequencies.

c. Transmit Frequency Check

1. Set the radio into transmit mode with no modulation.

2. Connect the frequency counter to the antenna load or to the tab provided at the watt meter.

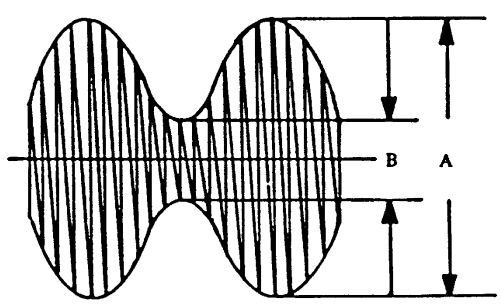
   The frequency should be within +/-800Hz from each channel center frequency as tabulated in Table 1.

d. Modulation Sensitivity Alignment

1. Set the unit to transmit mode of operation. Feed 1kHz, 30mV signal to the microphone input circuit, and adjust RV501 so that 100% modulation is obtained.

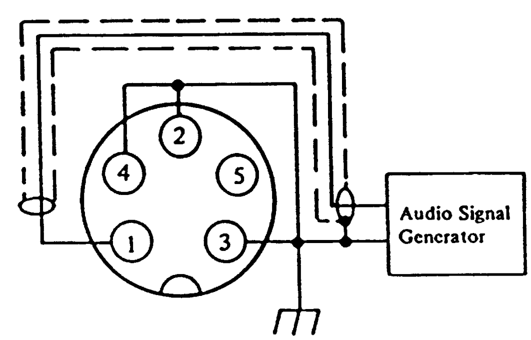
2. To set the transceiver into transmit mode without a microphone, insert the plug, wired as shown below, into the MIC jack on the transceiver. When applying the audio modulation signal to the microphone input circuit, use the same plug.

(1)



Modulation ratio = $\frac{A-B}{A+B} \times 100$ (%)

(2)



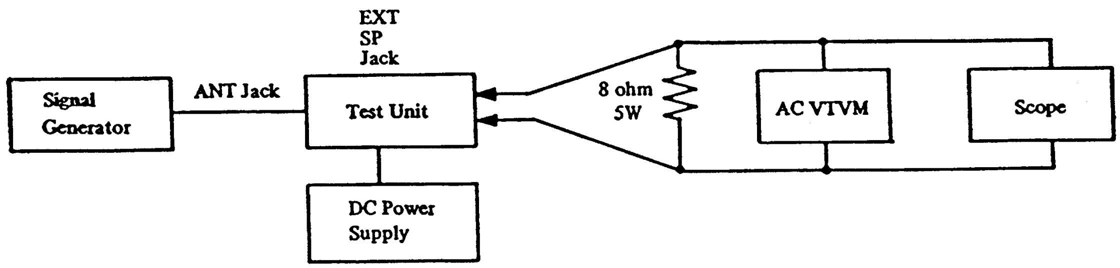
Mic Plug wiring for modulation

3. Next, reduce the signal input level to 4.5mV, and make sure that the modulation is higher than 60%.

RECEIVER CIRCUIT ALIGNMENT

a. Test Set-up

Refer to the diagram shown below:



RECEIVER ALIGNMENT SETUP

b. Sensitivity Alignment

1. Set the signal generator to provide 27.185MHz, 1kHz, 30% modulation. Set the channel selector to 19.

2. Adjust L101, L102, L103, L104 and L105 for maximum audio output across the 8 ohm dummy load resistor. This alignment should be performed by gradually decreasing the generator output signal to the minimum level required for tuning to avoid inaccurate alignment due to AGC action.

c. Squelch Circuit Alignment

1. Set a 50 ohm signal generator to generate a signal on channel 19 with an output level of 1000 microvolts, modulated 30% with a 1kHz tone.

2. Rotate the squelch control in full clockwise direction.

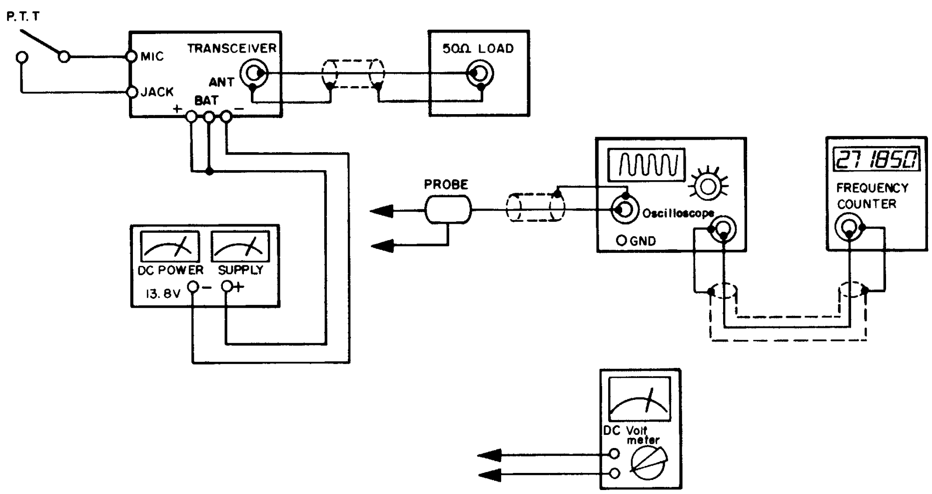
3. Temporarily adjust RV101 for maximum audio output, and note the audio output level. Then adjust RV101 so that the audio output level decreases by 6db.

4. Next, reduce the antenna input signal level to between 794 and 447 microvolts. The receiver should squelch. (The audio output level should drop to zero.)

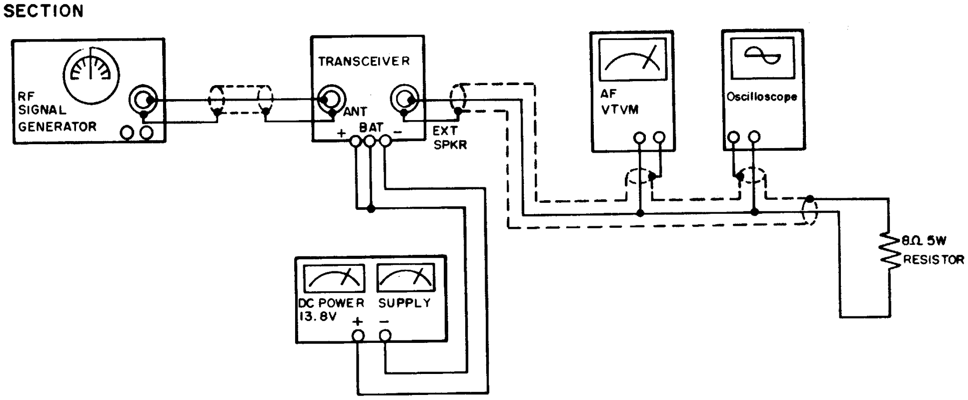
5. Reduce the antenna signal input level to zero, and adjust the SQ control until the noise output just disappears.

Test Equipment Setup

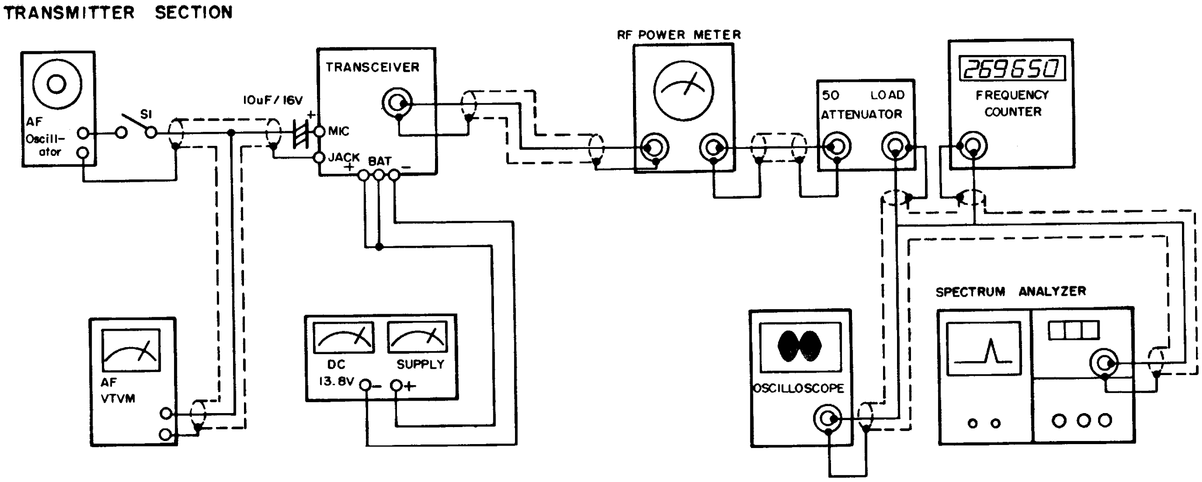
PLL AND CARRIER SECTION



RECEIVER SECTION



TRANSMITTER SECTION



Voltage Chart

CONDITIONS MEASURED ON 19CH
NO SIGNAL
NO MODULATION

1) TRANSISTOR

TR NO		B	E	C
Q101	RX	1.65	0.96	12.80
	TX	0.34	3.94	12.72
Q102	RX	1.63	0.90	11.85
	TX	0.24	0	12.70
Q103	RX	1.60	1.01	11.0
	TX	0.34	0.01	12.67
Q104	RX	1.07	0.38	3.29
	TX	0.09	0	0.81
Q105	RX	3.29	2.59	12.90
	TX	0.81	0.17	12.67
Q106	SQ H	0.7	0	0

TR NO		B	E	C
Q106	SQ L	0		
	TX	0	0	0.06
Q201	RX	7.82	8.05	2.51
	TX	7.81	8.20	2.48
Q202	RX	7.78	8.05	2.53
	TX	7.84	8.10	2.56
Q203	RX	7.95	7.95	0.91
	TX	7.16	7.94	7.81
Q301	RX	0.33	0	13.18
	TX	1.39	0.81	12.87
Q302	RX	0	0	13.5

TR NO		B	E	C
Q302	TX	0	0	10.61
Q303	RX	0	0	13.10
	TX	0	0	11.74
Q401	RX	5.78	5.16	13.18
	TX	5.78	5.14	13.03
Q402	RX	7.94	7.95	0
	TX	7.93	7.94	0
Q403	RX	0	0	0
	TX	0	0	0
Q404	RX	0.42	0	7.80
	TX	0.40	0	7.79

TR NO		B	E	C
Q405	RX	6.43	3.07	0
	PA	4.81	5.46	5.45
	TX	6.46	3.08	0.04
Q501	SQ H	0.37	0	2.51
	SQ L	0.68	0	0.05
	TX	0.68	0	0.05
Q502	SQ H	0.65	0	0
	SQ L	0.19	0	0.68
	TX	0.1	0	0.68

2) INTEGRATED CIRCUIT

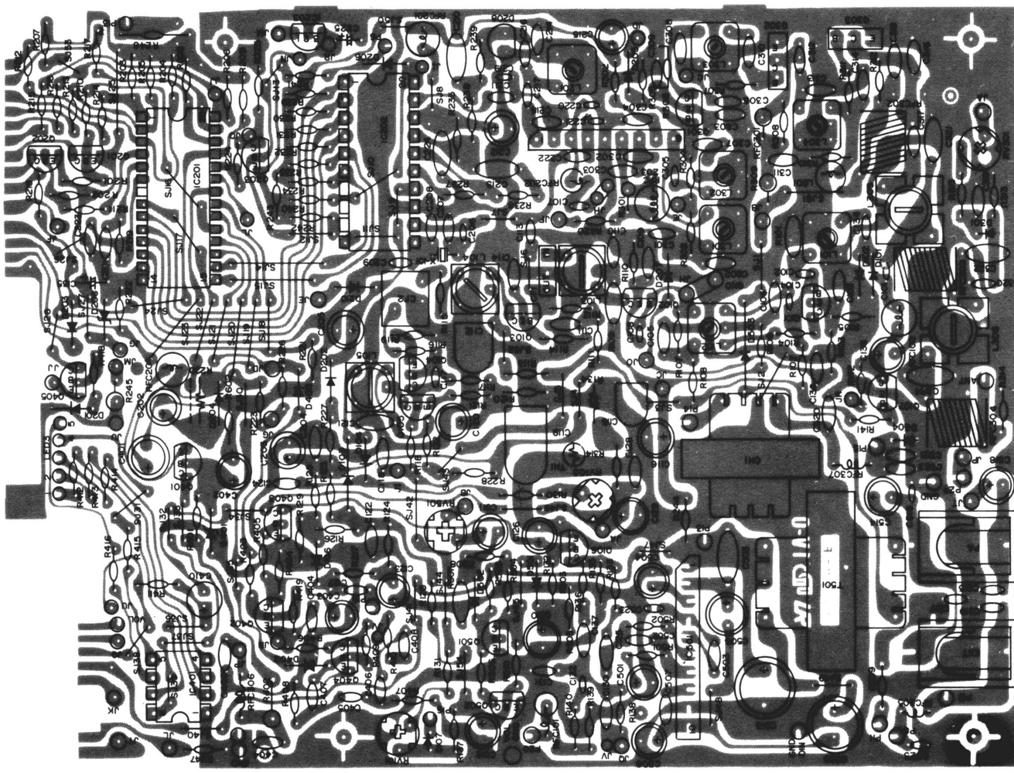
IC NO	PIN	RX	TX
IC 201	1	0.21	0.21
	2	0.21	0.22
	3	2.38	0.41
	4	6.0	5.93
	5	2.0	2.05
	6	2.0	2.0
	7	NC	NC
	8	5.13	5.15
	9	6.44	6.49
	10	0.07	0.07
	11	0.07	0.07
	12	6.46	6.50
	13	0	0
	14	0	0
	15	6.45	6.49
	16	0.07	0.07
	17	8.11	8.1
	18	0.03	0.03
	19	5.92	5.88
	20	5.14	5.16

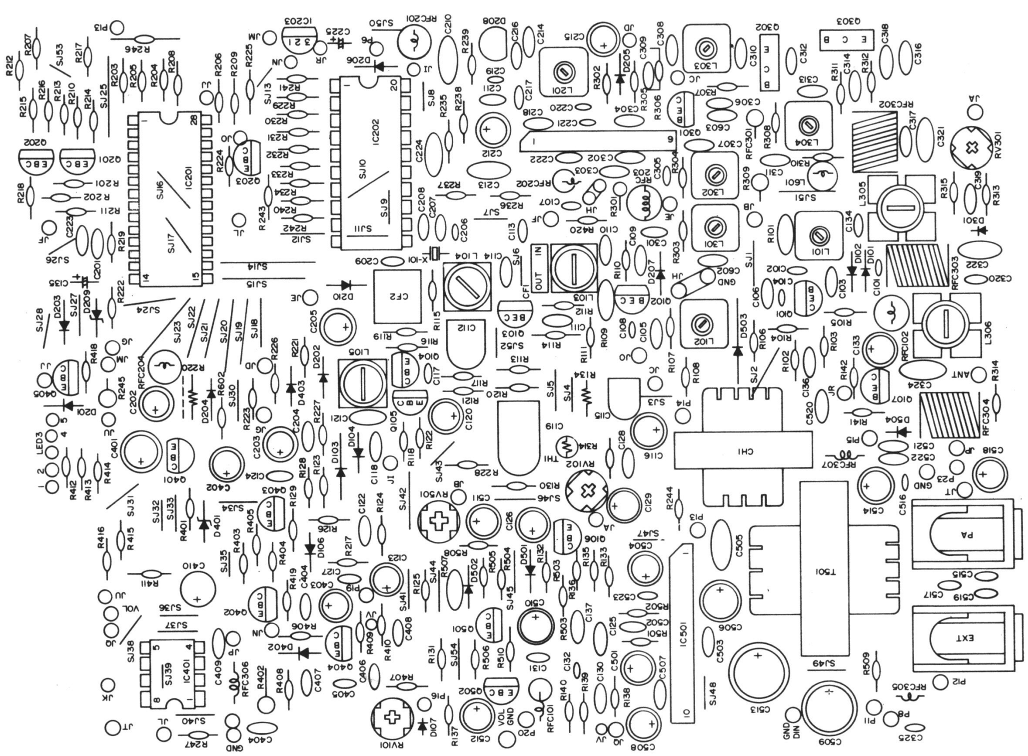
IC NO	PIN	RX	TX
	21	0	0
	22	0	0
	23	0	0
	24	0.67	7.81
	25	3.08	3.11
	26	3.08	3.10
	27	5.23	5.28
	28	3.08	3.08
IC 202	1	6.44	6.48
	2	0.07	0.07
	3	0.07	0.07
	4	6.46	6.50
	5	6.45	6.49
	6	0.07	0.07
	7	NC	NC
	8	NC	NC
	9	NC	NC
	10	1.45	4.10
	11	2.83	3.23
	12	3.83	3.83

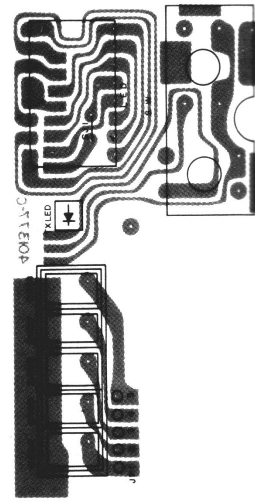
IC NO	PIN	RX	TX
	13	0	0
	14	1.45	4.10
	15	1.74	1.60
	16	1.74	1.61
	17	1.37	3.06
	18	7.57	7.59
	19	3.85	3.31
	20	7.19	0.81
IC 203	1	12.71	11.83
	2	0	0
	3	7.95	7.94
IC 204	1	2.64	2.56
	2	1.96	1.90
	3	1.37	1.37
	4	1.78	2.56
	5	0	0
	6	1.27	7.08
	7	2.12	2.02
	8	5.10	5.50
	9	1.27	7.08

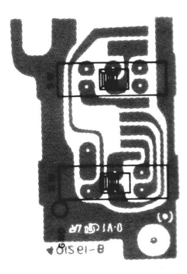
IC NO	PIN	RX	TX
IC 401	1	0	0
	2	10.81	0.06
	3	11.45	0.06
	4	10.75	0.07
	5	10.88	0.08
	6	11.15	0.08
	7	12.80	11.55
	8	0	1.31
IC 501	1	13.80	13.50
	2	12.60	12.28
	3	3.90	3.90
	4	8.15	8.02
	5	1.51	1.51
	6	3.38	3.30
	7	3.40	3.33
	8	1.28	1.27
	9	0	0
	10	6.86	6.72

P.C.B Top View

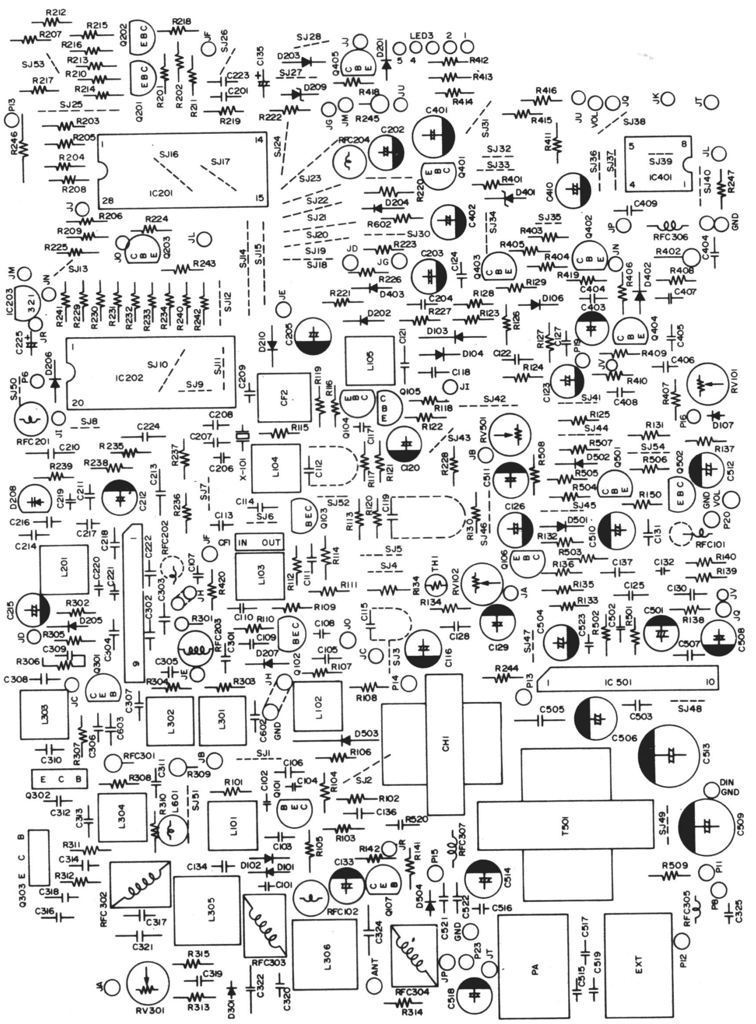


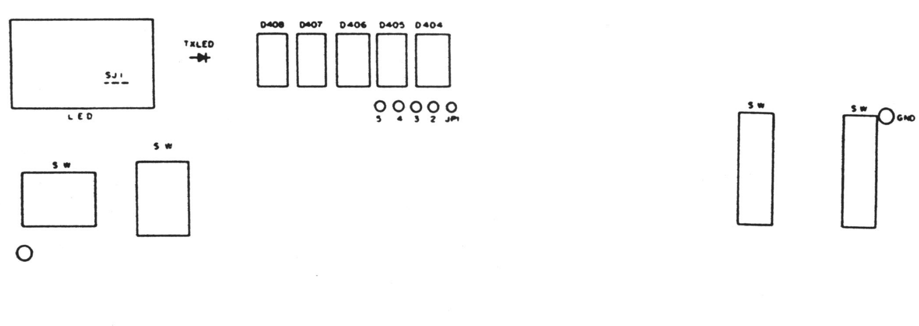




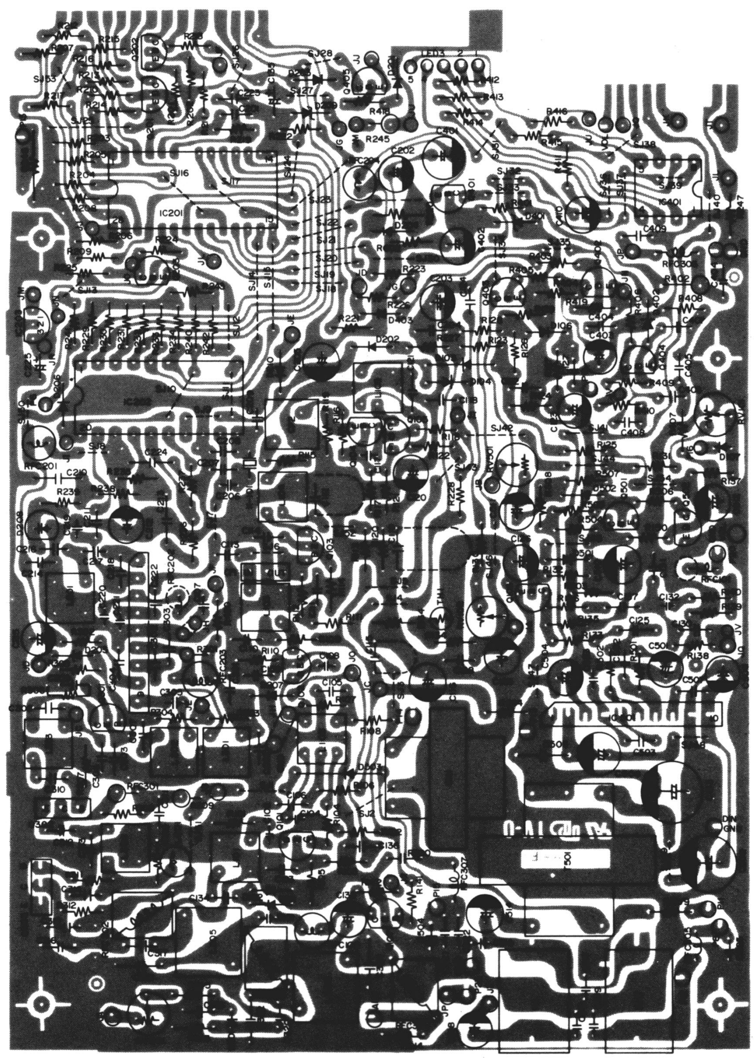


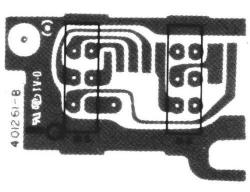
P.C.B Bottom View

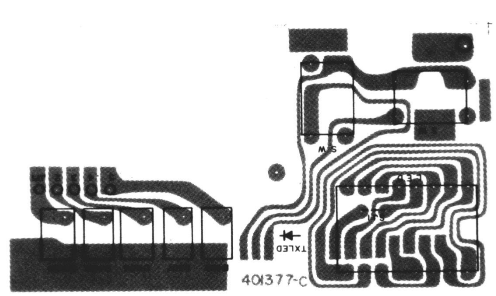


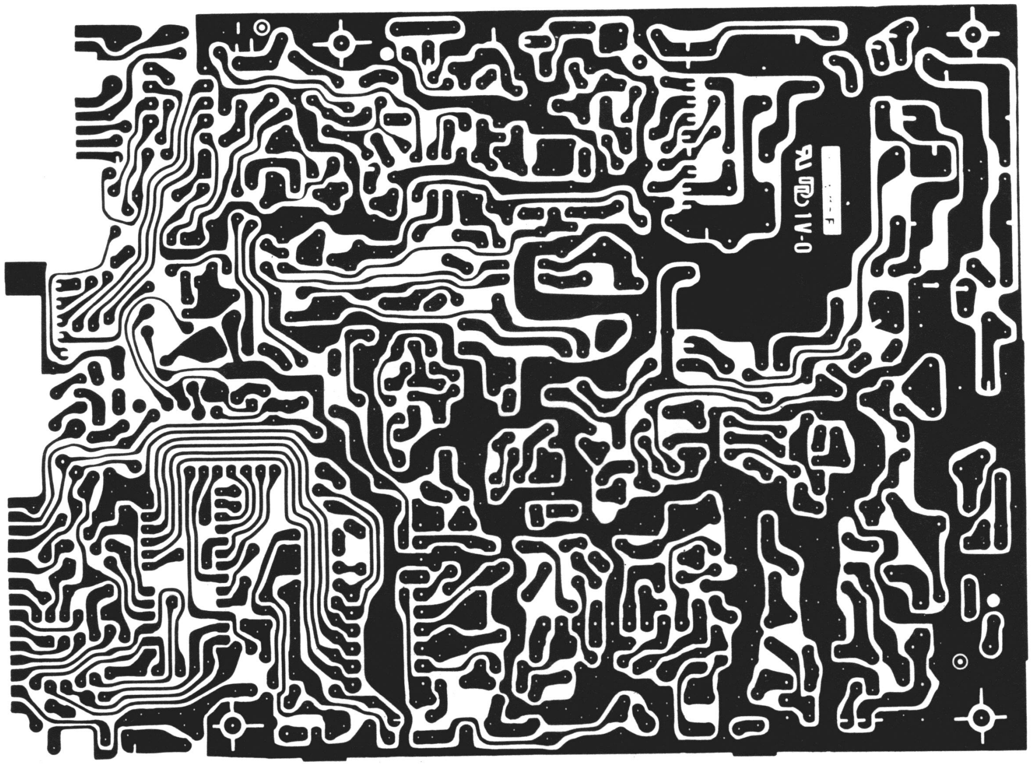


P.C.B Bottom View

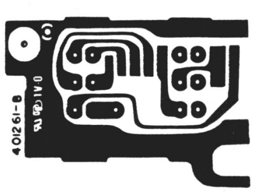


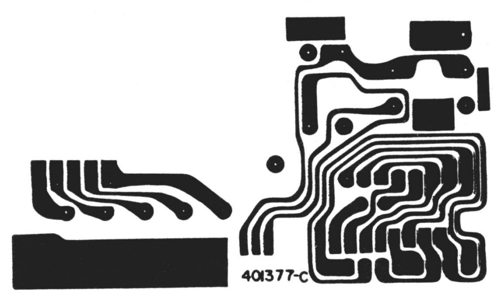




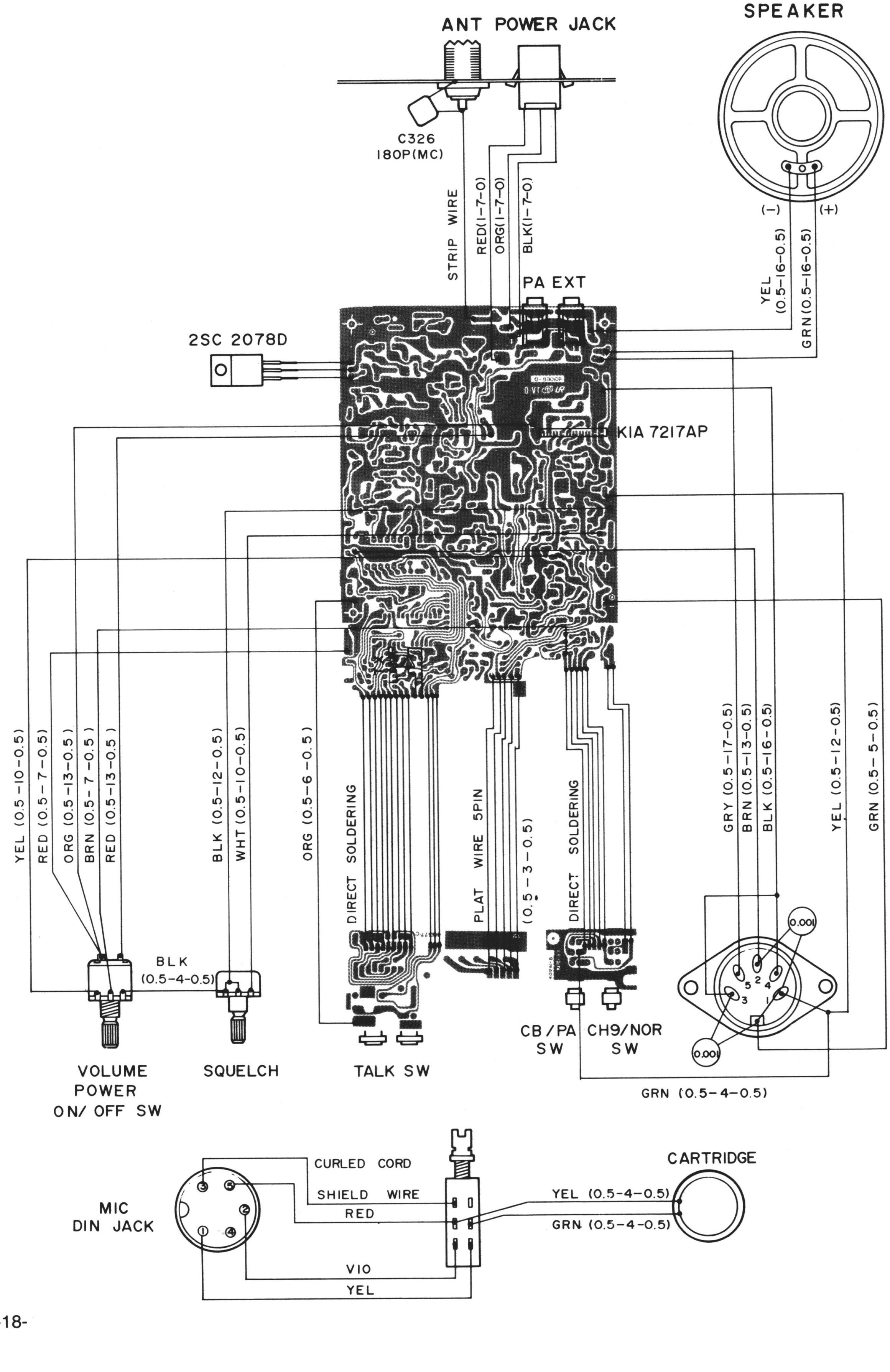


401068—F

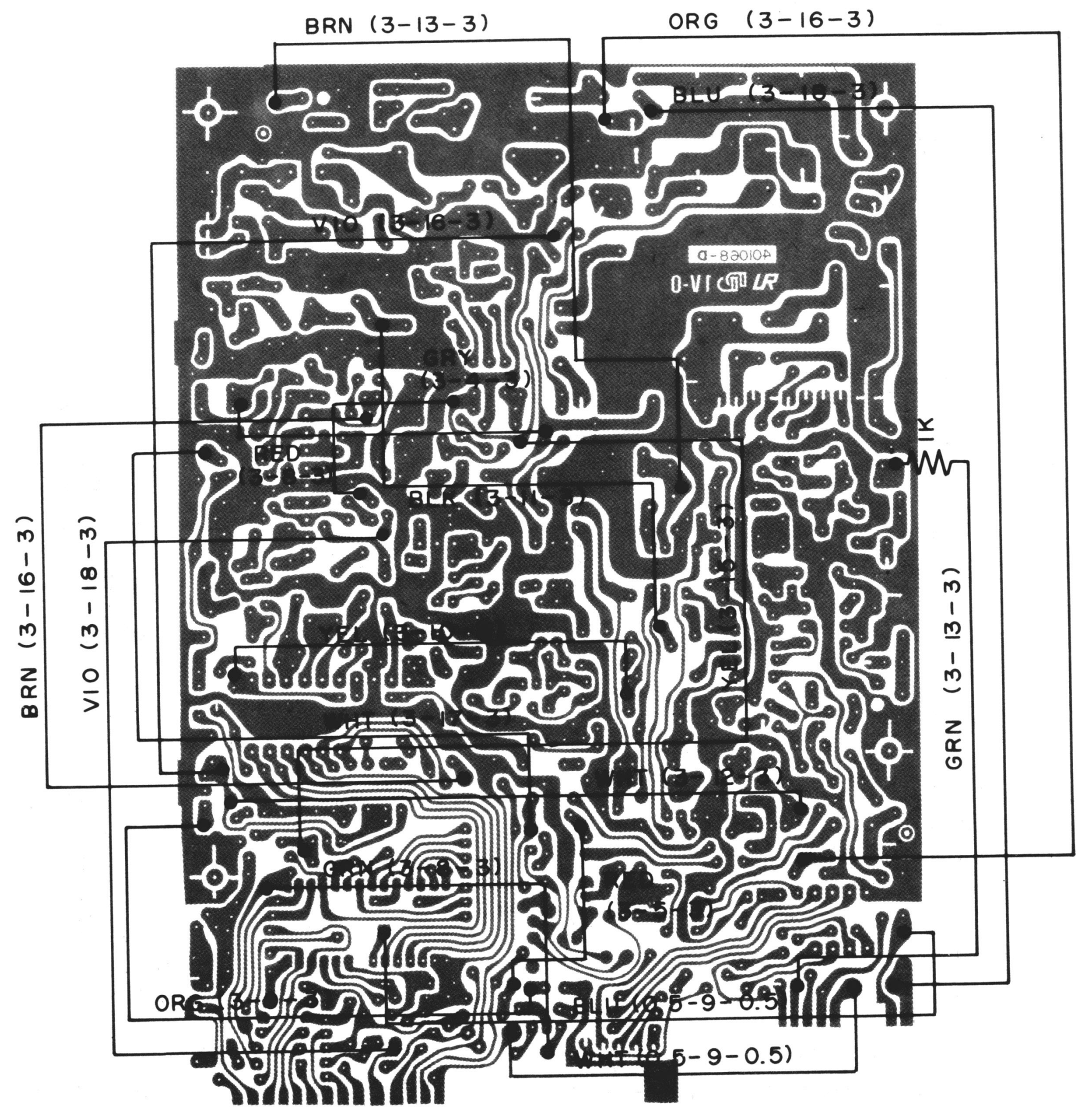




Wiring Diagram (Chassis and Microphone Pins)

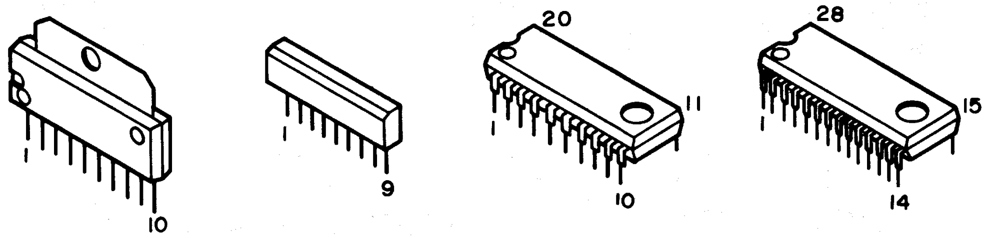


P.C.B Wiring Diagram

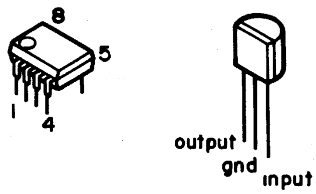


INTEGRATED CIRCUIT

KIA7217AP TA7310P LC7131 LM6416E



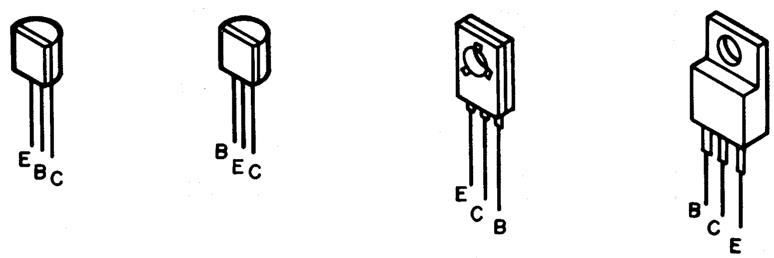
TL489CP MC78L08CT



TRANSISTORS

MPS9418
MPS9623
MPS9631
MPS9681
MPS9634

MPS9426 2SC2314 2SC2078

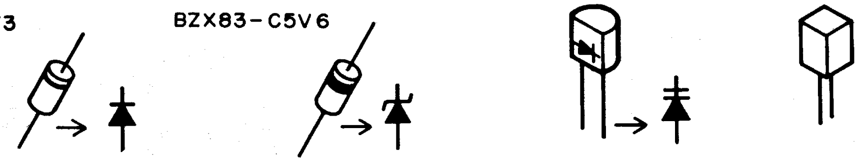


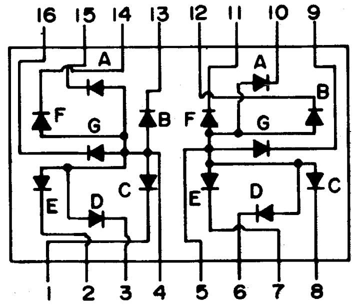
DIODES

IN4002
IS2473
OA90

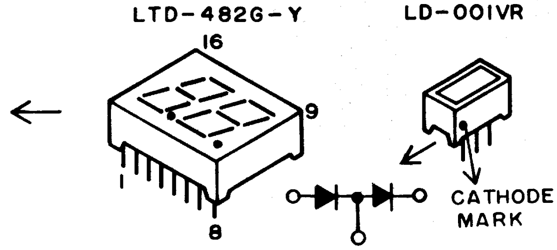
UZP-8.2B
BZX83-C5V6

MV2209 SLB55VR3

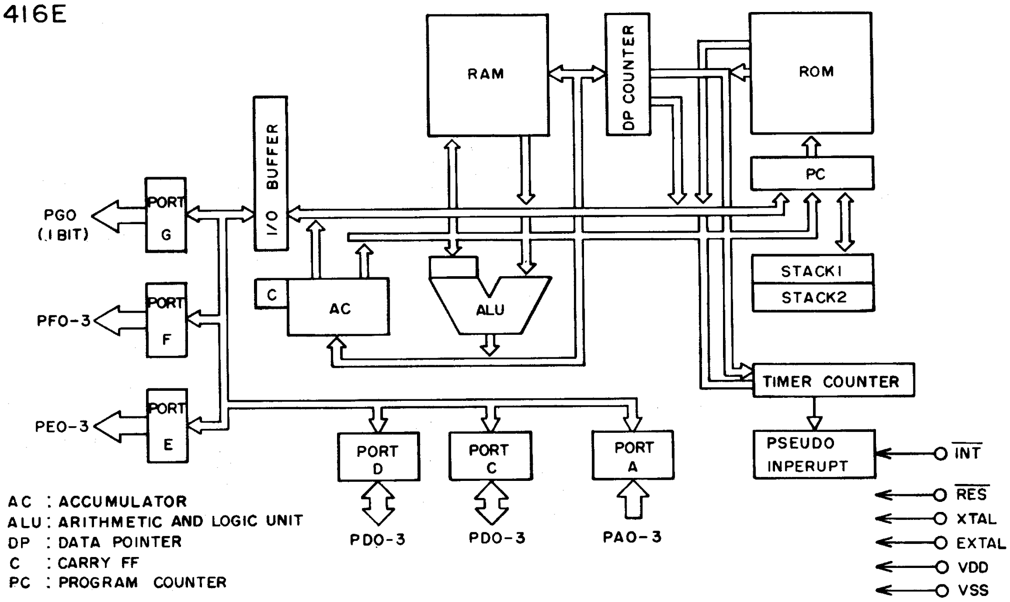




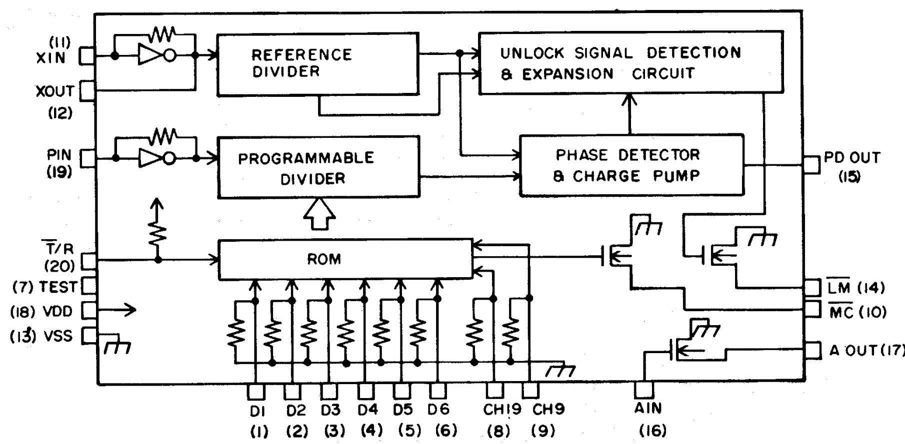
LTD-482G-Y LD-001VR



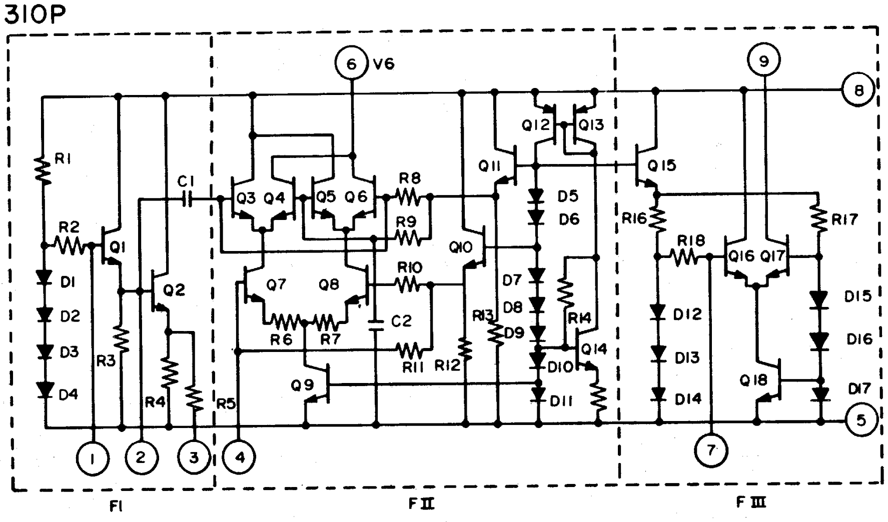
LM6416E



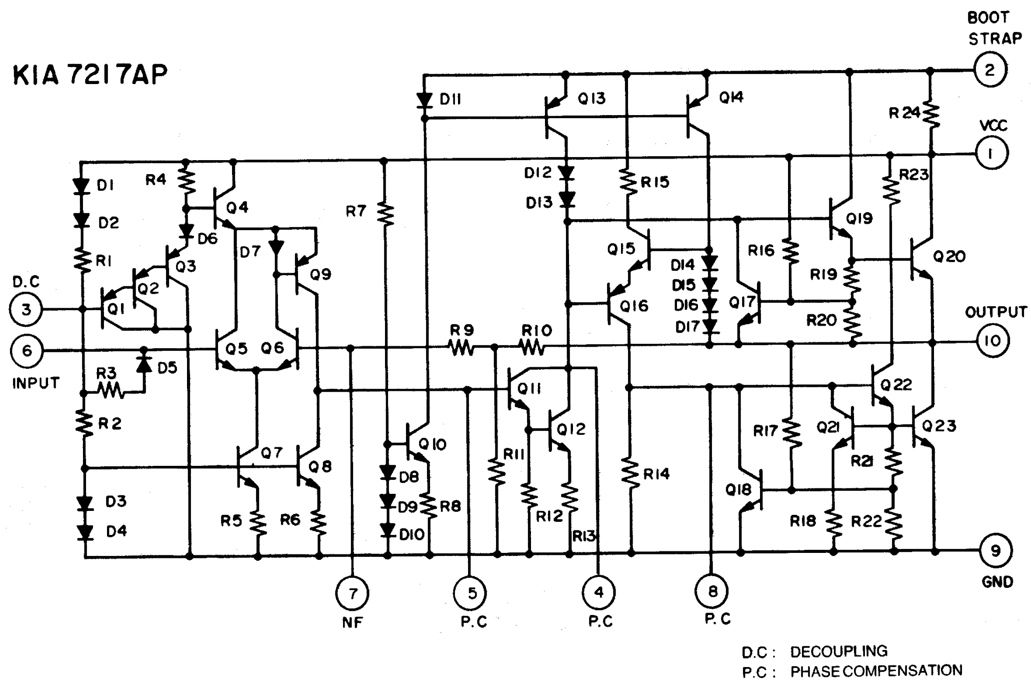
LC 7131



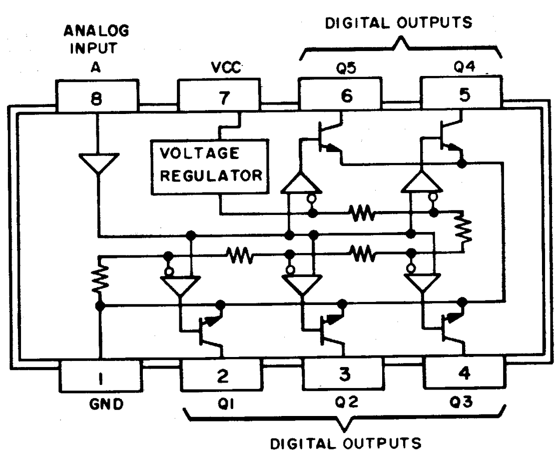
TA7310P



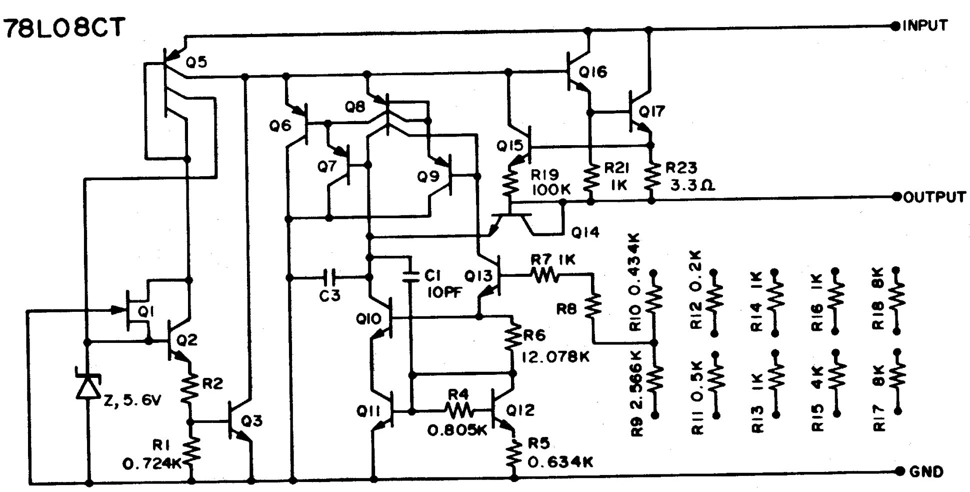
KIA 7217AP



TL489CP



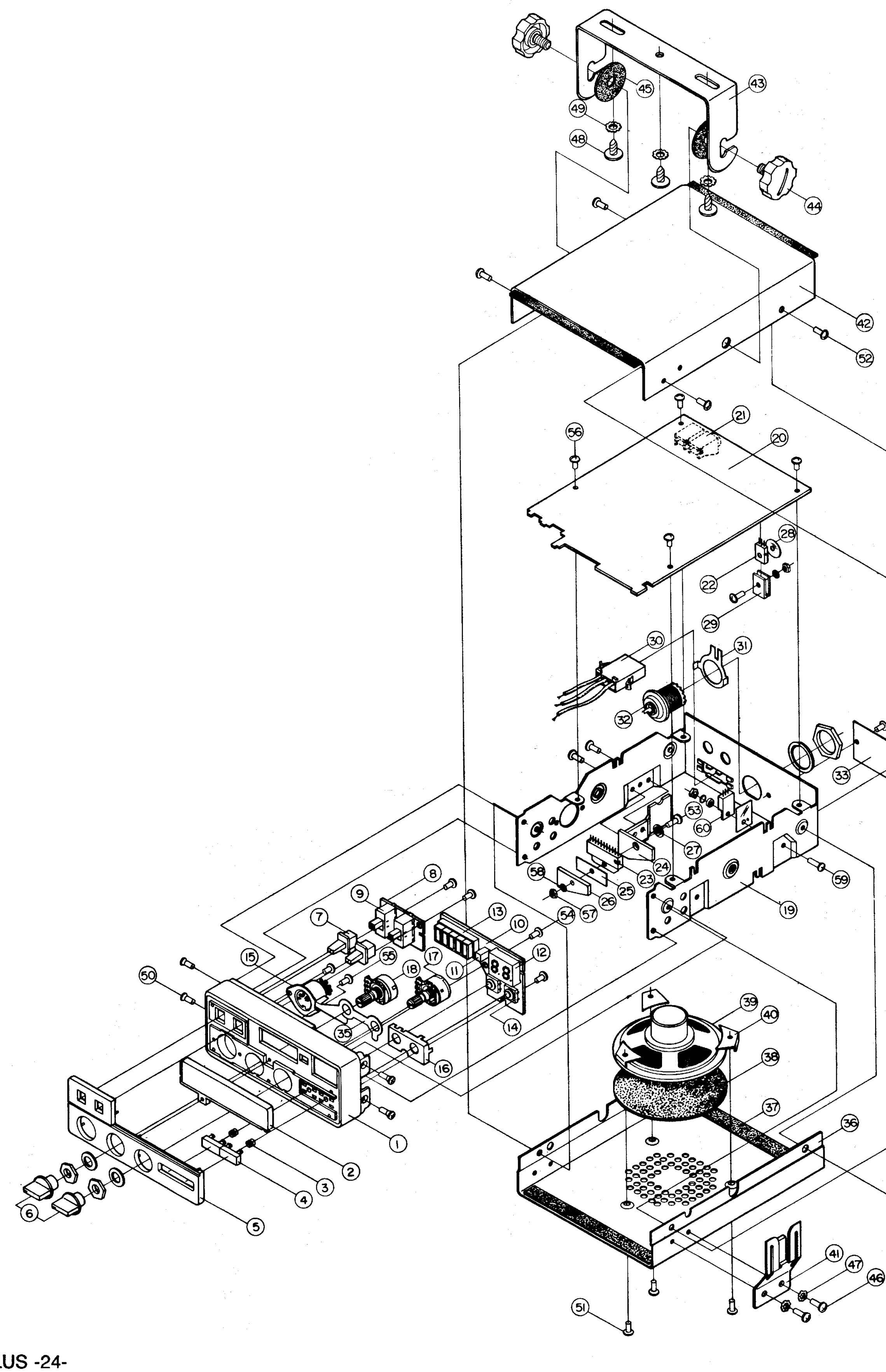
MC78L08CT



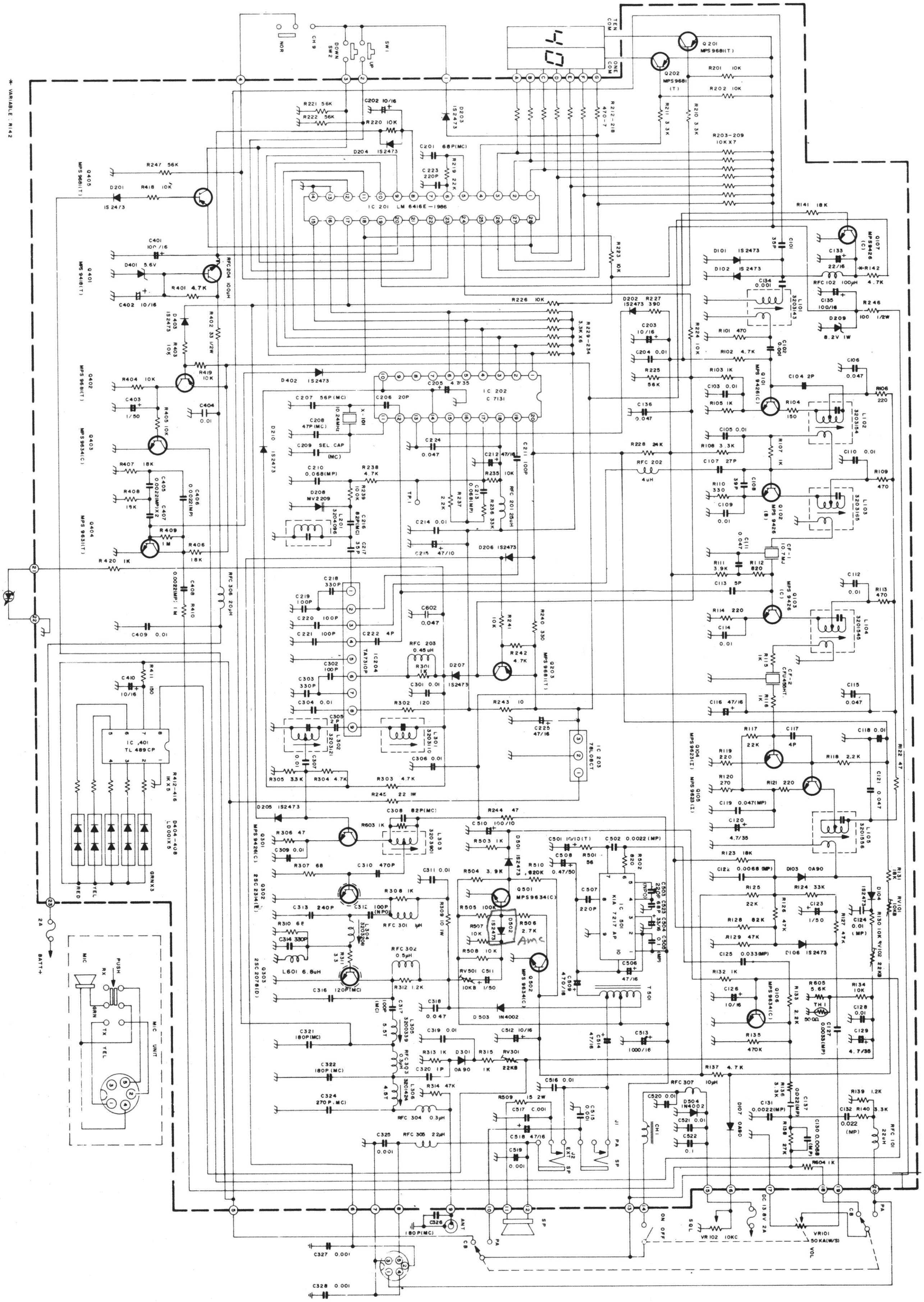
Exploded View Part List

No.	Part-No.	Description
1	800950	Escutcheon
2	813010	Lens (Front)
3	880880	Spring
4	823830	Knob (Slide SW)
5	830520	Front Pannel
6	823850	Knob (Control)
7	823860	Knob (Push)
8	401261B	P.C.B. SW
9	4310921	Slide SW
10	401377C	P.C.B. LED
11	2510640	LED Lamp
12	2520261	LED Display
13	892550	Rubber Holder (Bar LED Lamp)
14	4360069	Tack Switch
15	4215297	Socket
16	770800	Shield Plate
17	4506045	Resistor Variable (VR) W/Off On
18	4504173	Resistor Variable (VR)
19	701430	Main Body
20	51028MP	Main PCB Ass'y
21	4207076	Jack Earphone
22	2040091	Transistor 2SC 2078 (D)
23	2220064	I.C
24	761260	Heat Sink (IC MTG)
25	4400105	Mica (For I.C KIA 7217 AP)
26	760704	Heat Sink (IC MTG)
27	4410100	Bushing
28	4400040	Mica (For T.R 2SC 2078)
29	760430	Heat Sink (TR MTG)
30	504203	3P Plug Ass'y
31	730477	Holder (ANT MTG)
32	992440	Ant Receptacle (W/Nut Washer)
33	793100	Name Plate
34	670025	Rivet Blind
35	770830	Shield Plate
36	715540	Bottom Cover
37	900133	Felt
38	901767	Felt Strip BLK
39	4201030	Speaker
40	730015	Holder (Speaker)
41	720050	Bracket (Mic MTG)
42	715550	Upper Cover
43	720916	Bracket (Set MTG)
44	600051	Securing Screw
45	660138	Washer Rubber
46	624066	(+) Tapping Screw (R.H)
47	664411	Washer (Lock "B" Type) M4
48	625007	(+) Tapping Screw (T.H)
49	664518	Washer (Lock "B" Type) M5
50	611086	(+) Machine Screw (F.H) M2.6 x 4
51	623344	(+) Tapping Screw (B.H) 3 x 8-2S
52	633082	(+) Tap Tite Screw (B.H)
53	613332	(+) Machine Screw (B.H) M3 x 10
54	621159	(+) Tapping Screw (B.H) 2.6 x 8-1S
55	623256	(+) Tapping Screw (B.H) 3 x 6-1S
56	623265	(+) Tapping Screw (B.H) 3 x 6-2S
57	651024	Nut
58	662305	Washer (Spring)
59	613305	(+) Machine Screw (B.H) M3 x 8
60	2040167	Transistor 2SC 2314 (E)

Exploded View



Schematic Diagram



PARTS LIST 19 PLUS

SYMBOL	DESCRIPTION	PART NO.
	COVER ASSEMBLY	521 124 9 001
	SPEAKER 2½" 8 OHM 0.25W	580 076 9 001
	NAME PLATE (COBRA 19PLUS) ALP3 32X25X0.51	600 171 9 001
	ESCUTCHEON (COBRA 19PLUS) ABS BLK	380 548 9 001
	LENS (FRONT) ACRYL SMOKE SILK	380 548 9 002
	KNOB (SLIDE SW) ABS SETTING CR-PLATE	384 084 9 001
	KNOB (CONTROL) ABS CR-PLATING	384 084 9 002
	KNOB (PUSH) (UP,DOWN) ABS CR-PLATING	384 084 9 003
	FRONT PANEL ABS LUCK8017-107 HOT STAMPING	260 437 9 001
	FRONT BODY ASSEMBLY	521 125 9 001
Q303	XSTOR 2SC 2078 (D)	172 075 9 001
IC501	I.C. KIA 7217AP	307 331 9 001
D302	LED LAMP SLB55VR3 RED	158 079 9 001
D404,405,406	LED DISPLAY LD-001MG GRN	158 079 9 002
D408	LED DISPLAY LD-001VR RED	158 079 9 003
D407	LED DISPLAY LD001YY YEL	158 079 9 004
LED	LED DISPLAY LTD-482G-Y	158 079 9 005
J1 2	JACK EARPHONE HSJ 0615-01-010	773 126 9 001
J11-15	FLAT WIRE 5 PIN 40MM	428 130 9 001
	SLIDE SW KSA-2251T 2P-2C	084 160 9 001
SW1,2	TACK SWITCH KHG10905	088 155 9 001
VR102	RES., VARIABLE (VR) K161100-10KC(WO/SW) 15MM SHAFT	008 848 9 001
VR101	RES., VARIABLE (VR) W/OFF ON SW VM11A-5M1411-50KA 15MM SHAFT	008 848 9 002
	36 PLUG ASSEMBLY	777 056 9 001
	MAIN BODY SPC 48X405XX1T	257 165 9 001
R309	RES., METALOXIDE 10 OHM 1W "S"	011 001 5 100
R245	RES., METALOXIDE 22 OHM 1W "S"	011 001 5 220
R509	RES., METALOXIDE 15 OHM 2W "S"	011 002 5 150
RV101,501	RES., SEMIFIXED H0651A-10K 6DIA "H"	008 512 9 003
RV102,301	RES., SEMIFIXED H0651A-22KB 6DIA "H"	008 512 9 004
Q106 403,501,502	XSTOR MPS9634 (C)	176 128 9 001
Q101-103,107,301	XSTOR MPS9426 (C)	176 115 9 001
Q201-203,402,405	XSTOR MPS9681 (T)	177 049 9 001
Q401	XSTOR MPS9418 (T)	176 115 9 004
Q014,105	XSTOR MPS9623 (T)	176 115 9 002
Q404	XSTOR MPS9631 (T)	176 132 9 001
Q302	XSTOR 2SC2314 (E)	176 120 9 001

PARTS LIST 19 PLUS

SYMBOL	DESCRIPTION	PART NO.
IC204	I.C. TA7310P	307 133 9 004
IC203	I.C. MC78L08CT	307 426 9 001
IC202	I.C. LC7131	307 272 9 002
IC201	I.C. LM6416E	307 426 9 002
IC401	I.C. TL489CH	307 426 9 003
D401	DIODE BZX83-C5V6	152 160 9 001
D209	DIODE UZP-8.2B 1W	152 160 9 002
D208	DIODE VARICAP MV2209	151 028 9 007
D101,102,104, 106,201-207,210, 402,403,501,502, 601,602	DIODE SI 1S2473	151 035 9 001
D103,107,301	DIODE GE OA90	150 020 9 001
D503,504	DIODE SI 1N4002	151 082 9 001
X101	CRYSTAL 10.240MHz HC-18/U	132 036 9 001
CF2	CRYSTAL FILTER CFU 455HT	143 014 9 001
CF1	CERAMIC FILTER 10.7MJ	140 006 9 002
CH1	TRANSFORMER, CHOKE	042 041 9 001
T501	TRANSFORMER, OPT	042 051 9 001
RFC307	COIL, RF CHOKE 10μH CORE	047 012 9 003
RFC301	COIL, CHOKE 1μH BOBBIN	041 134 9 007
RFC306	COIL, RF CHOKE 20μH CORE	047 039 9 002
RFC101, 305	COIL, RF CHOKE 22μH BOBBIN	041 134 9 00[illegible]
RFC302	COIL, RF CHOKE 0.5μH SPRING	041 134 9 008
RFC201	INDUCTOR 25μH MOLD TYPE	047 049 9 001
RFC203	INDUCTOR 0.45μH MOLD TYPE	047 049 9 002
RFC102,204	COIL, CHOKE 100μH MO TYPE	047 027 9 001
RFC202	COIL, CHOKE 4μH BOBBIN TYPE	047 012 9 004
L601	INDUCTOR, 6.8μH MOLDED TYPE	047 050 9 001
RFC303,304	COIL, AM TX ANT 27MHz A	046 039 9 012
L305	COIL, AM TX ANT 27MHz B	046 039 9 013
L306	COIL, IFT 27MHz TXANT TUNING-C (4.5T)	047 049 9 003
L104	COIL, IFT 455kHz-A	047 049 9 004
L105	COIL, IFT 455kHz-B	047 049 9 005
L301	IFT 27MHz RF AMP-A	047 039 9 006
L302	IFT AM AMP 27MHz-C	047 039 9 007
L101	27MHz RX ANT	047 039 9 009
L102	27MHz RF AMP (RX)	047 039 9 010
L103	10.6MHz RF 1ST MIXER (RX)	047 039 9 011
L304	27MHz RF-C (TX)	046 039 9 012
L303	COIL,RF PRE AMP TX	047 049 9 006
L201	RX VCO 16.5MHz	047 049 9 007
	PACKING ASSEMBLY	523 861 9 001
	MIC ASSEMBLY	561 009 9 001
	PLUG 5PIN TCP-1356-01-2011	777 056 9 002
	PUSH SW HPW0208-01-010	088 155 9 002
	SECURING SCREW M6 (P=1) X 9	634 166 9 001
	BRACKET (MIC MTG) SPC 60X35XT1	250 213 9 001
	BRACKET (SET MTG) 30X235X1.5T BLK-PNTG	250 214 9 001