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## Model 19 Plus

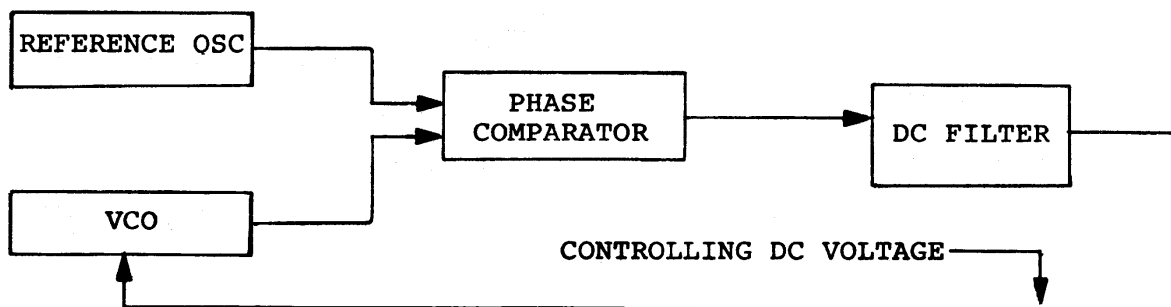
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# OPERATING THEORY OF PLL FREQUENCY SYNTHESIZER FOR MODEL 19 PLUS

## 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.

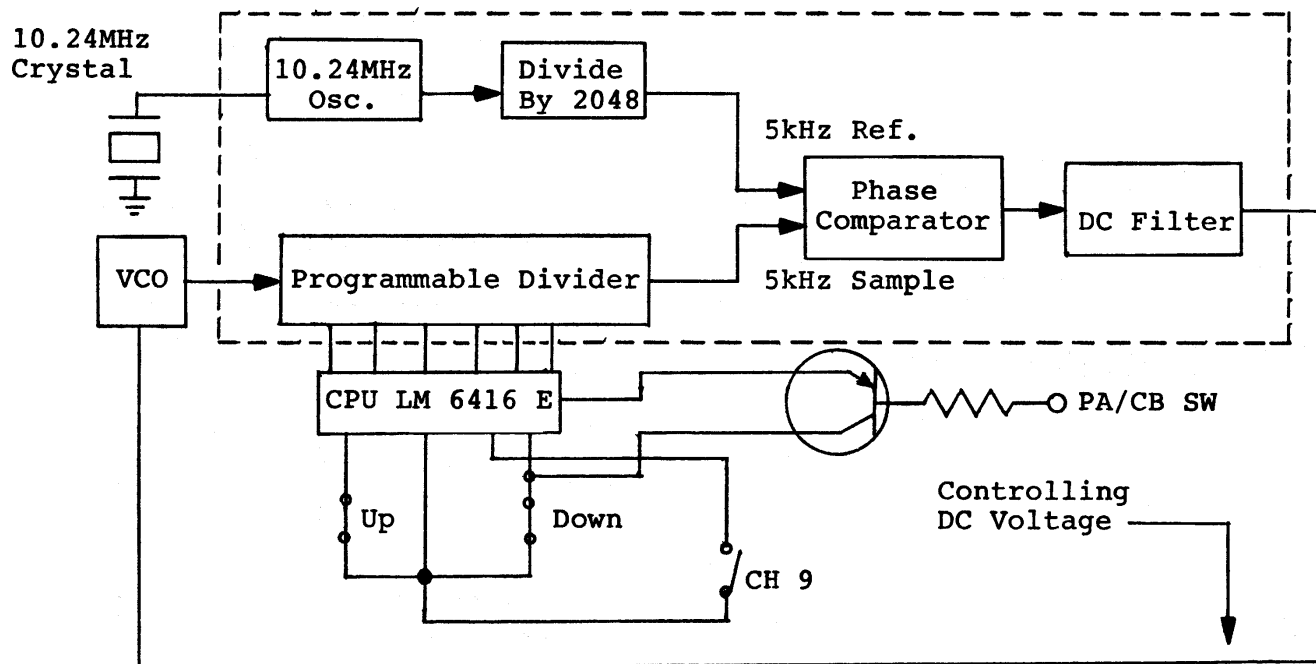
A basic PLL circuit consists of reference oscillator, VCO, phase comparator and DC filter (low pass filter).



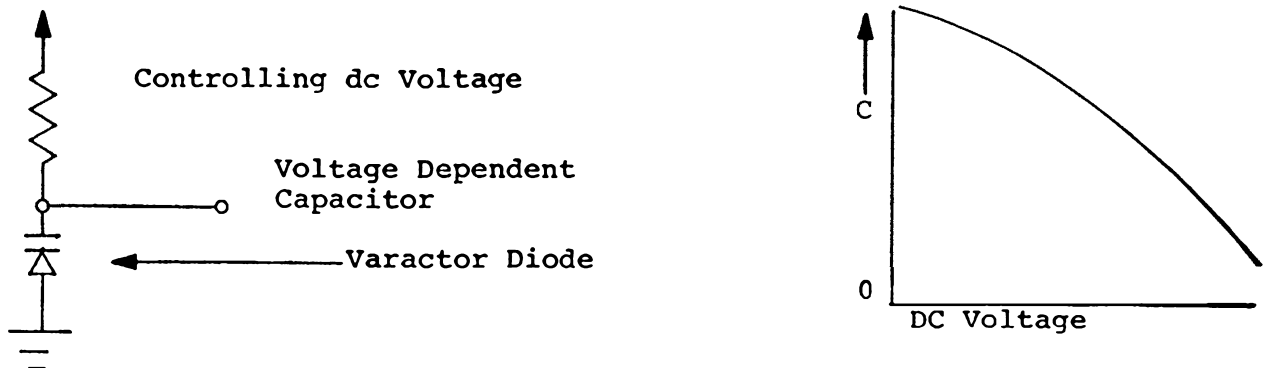
With the above circuit the VCO (Voltage Controlled Oscillator) frequency is effectively locked to the reference oscillator, and its accuracy is as good as the reference oscillator.

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:  
 $10.24 + 16.725 = 26.965\text{MHz}$

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

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

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 (programmable). When transmit logic signal is applied to the IC-202 through pin 19, the programmable divider will divide incoming VCO frequency by 3345 to produce 5kHz sampling signal.  $16,725 \div 3345 = 5\text{kHz}$

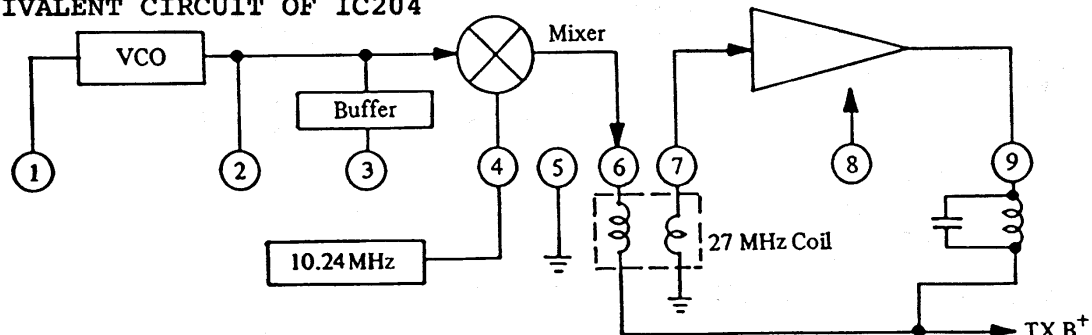
For the receiver mode the programmable divider will automatically change to divide the VCO frequency by 3254.  
 $16270 \div 3254 = 5\text{kHz}$

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

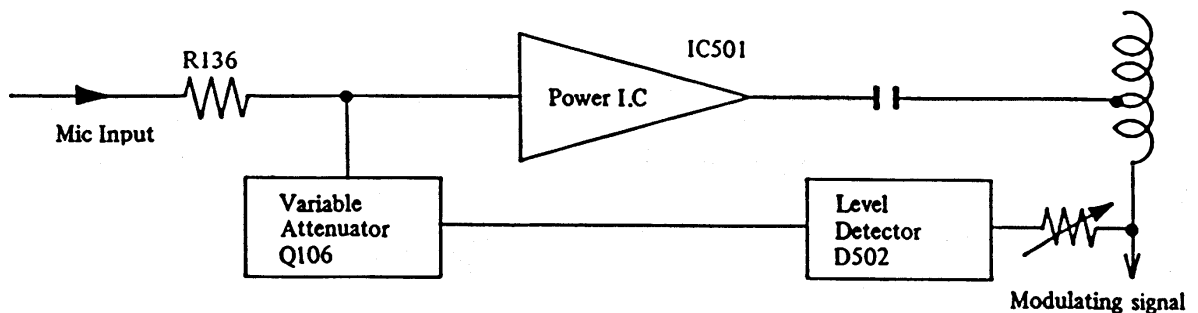
IC202 (PLL-LSI), VCO section of IC204 (pins 1,2, and 3) are operational regardless of the receive or transmit mode. When the radio is set to the transmit mode, mixer/amplifier section of IC204 (pins 4,6,7 and 9), Q203, Q301, Q302 and Q303 are activated. The VCO frequency selected by the channel selector 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  $26.965 - 16.27 = 10.695\text{MHz}$ . 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.  $10.695 - 10.24 = 0.455\text{MHz}$ . 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.

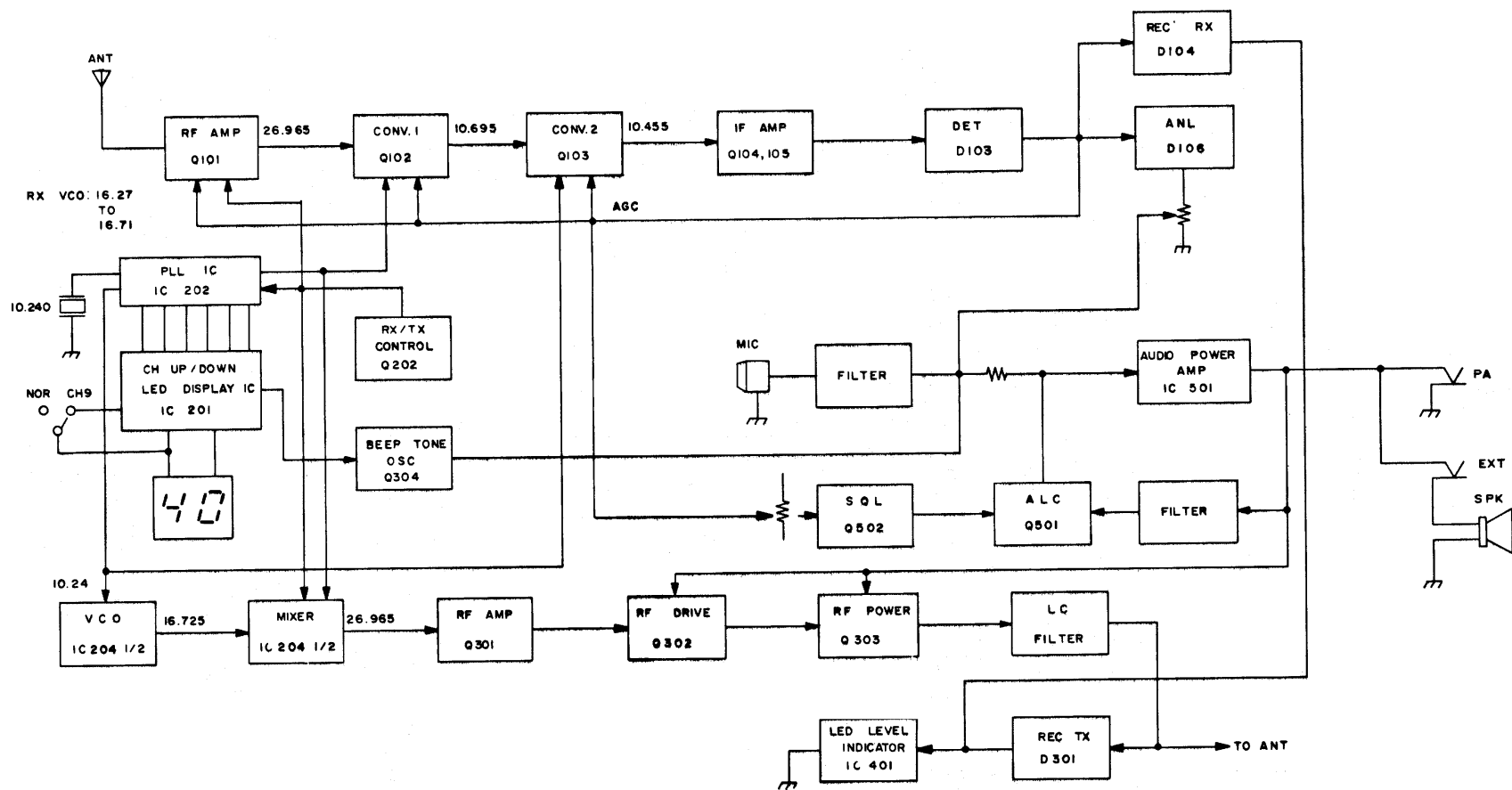
During channel selection or scan function, the microprocessor inhibits the transmitter section of the unit, to prevent undesired signals from being radiated.

FREQUENCY CHART

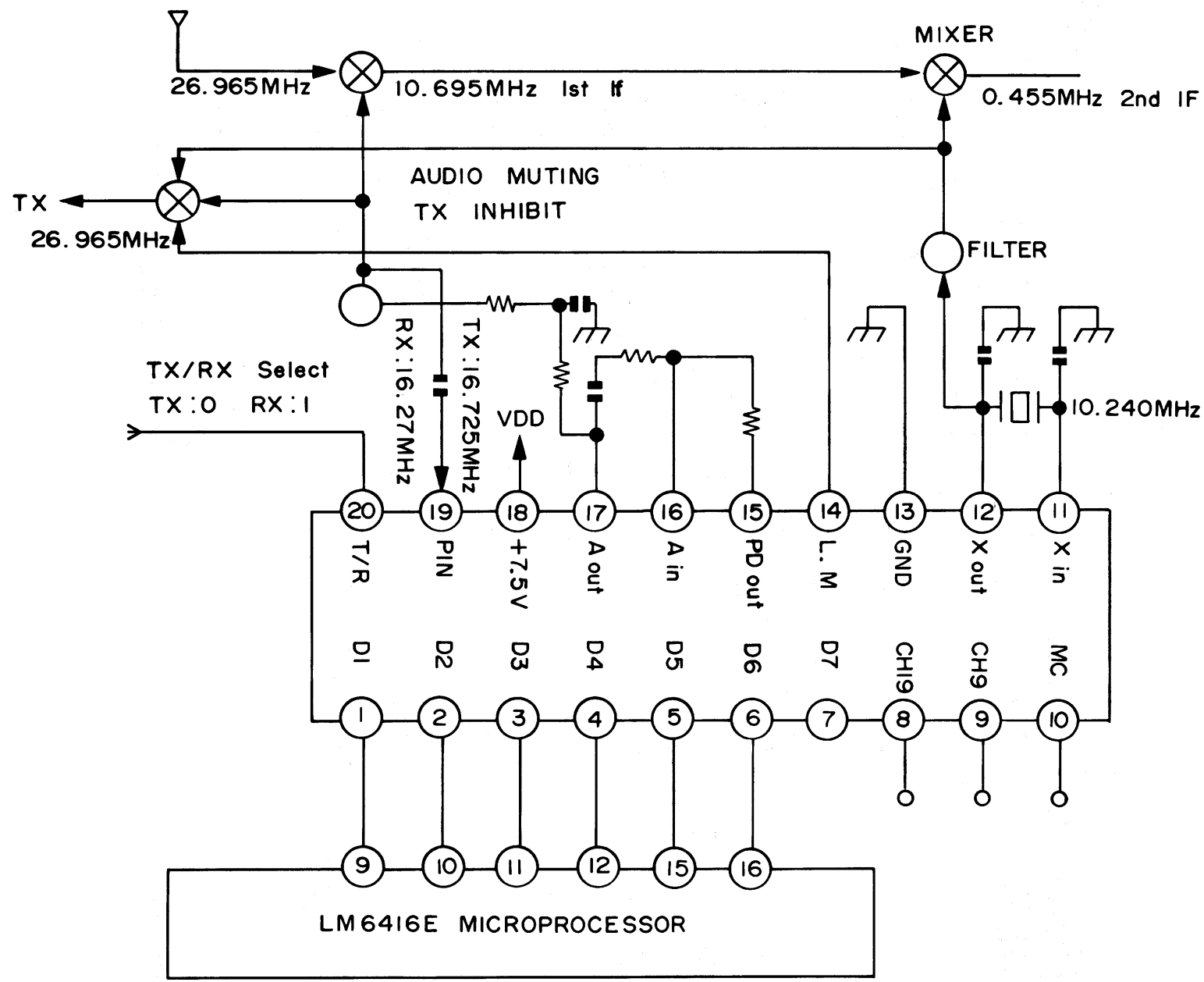
(Table 1)

| CH<br>NO | CHANNEL<br>FREQ(MHz) | CRYSTAL<br>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.

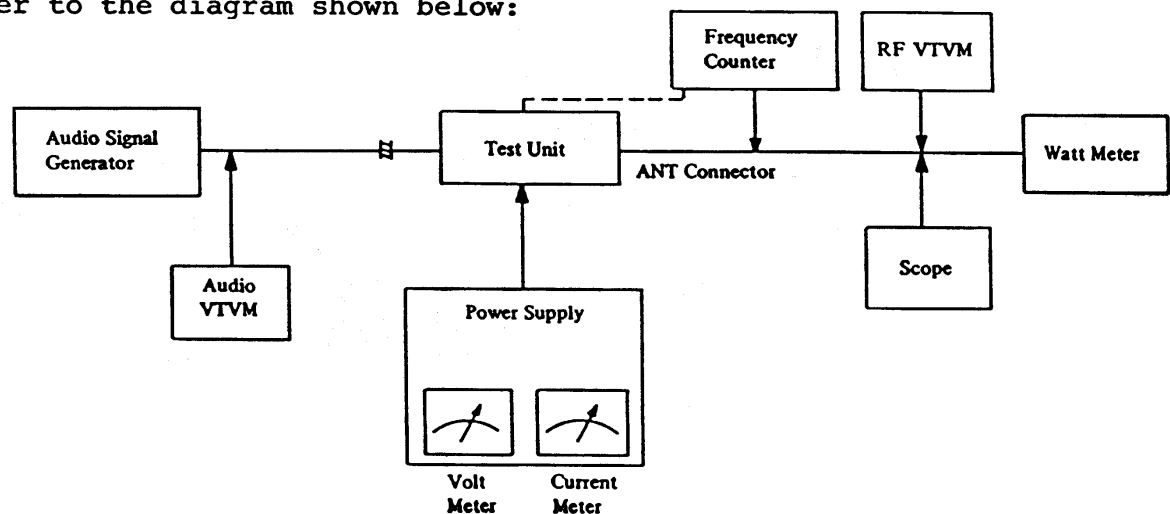
5. Check to see that the TP1 dc voltage drops to a level between 0.6 and 1.0 volts. As long as the dc level stays between 4.5Vdc for transmit on channel 40 and 0.6 to 1.0Vdc for receive on channel 1, the VCO is set properly.

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.

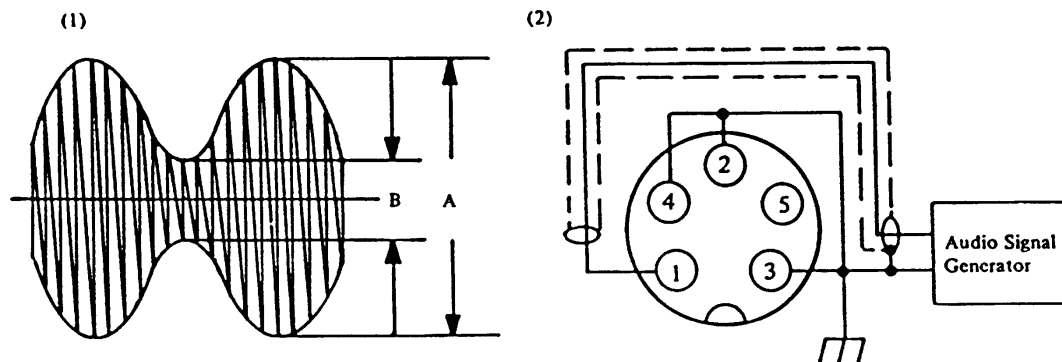
c. Transmit Frequency Check

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.



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

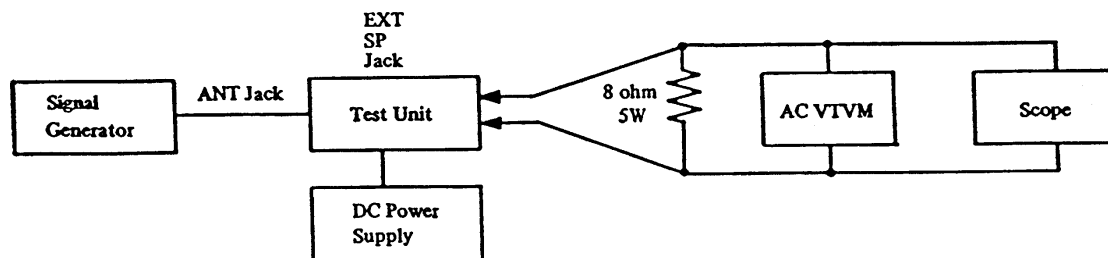
Mic Plug wiring for modulation

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

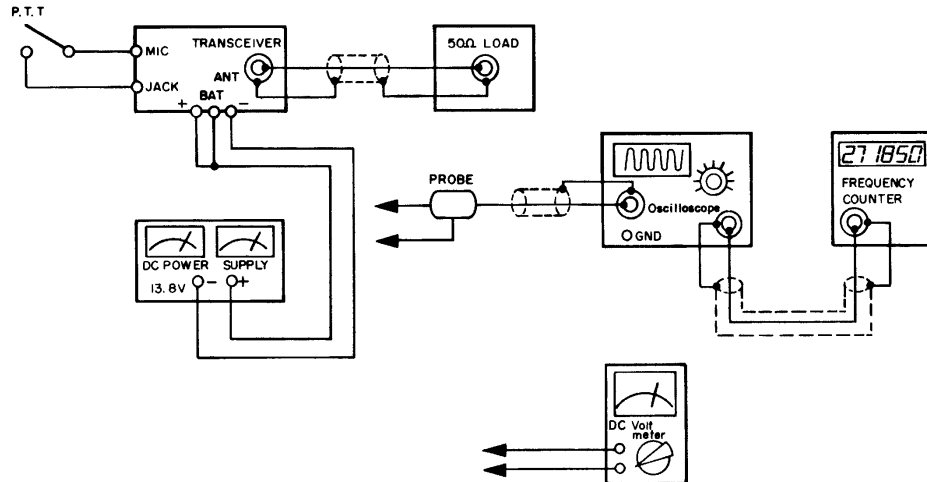
1. Set the signal generator to provide 27.185MHz, 1kHz, 30% modulation. Set the channel selector to 19.
2. Adjust L101, L102, L103, L104 and L105 for maximum audio output across the 8 ohm dummy load resistor. This alignment should be performed by gradually decreasing the generator output signal to the minimum level required for tuning to avoid inaccurate alignment due to AGC action.

### c. Squelch Circuit Alignment

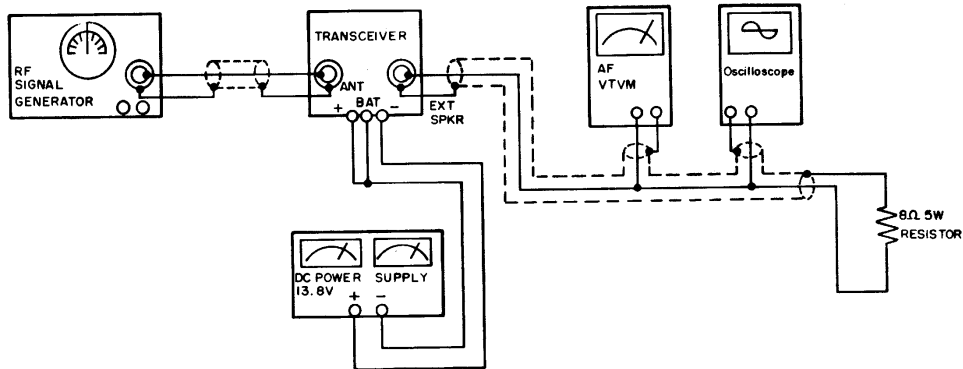
1. Set a 50 ohm signal generator to generate a signal on channel 19 with an output level of 1000 microvolts, modulated 30% with a 1kHz tone.
2. Rotate the squelch control in full clockwise direction.
3. Temporarily adjust RV101 for maximum audio output, and note the audio output level. Then adjust RV101 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

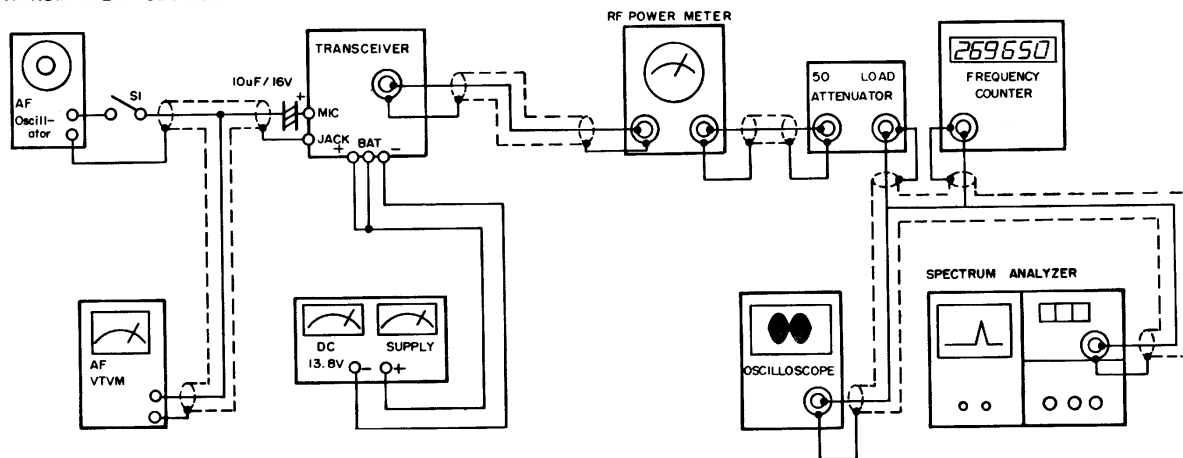
## PLL AND CARRIER SECTION



## RECEIVER SECTION



## TRANSMITTER SECTION



# Voltage Chart

CONDITIONS MEASURED ON 19CH  
NO SIGNAL  
NO MODULATION

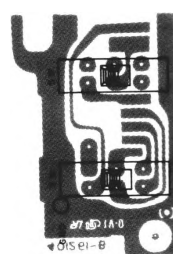
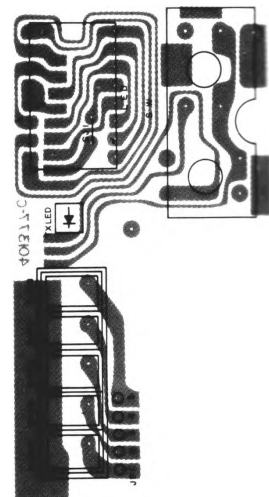
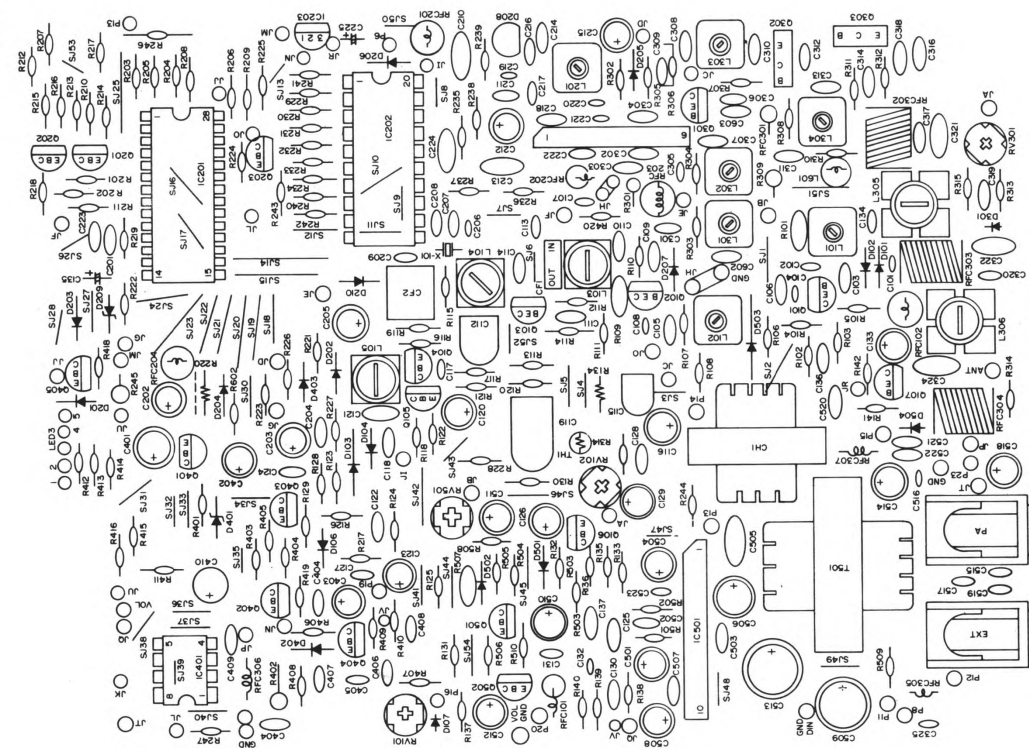
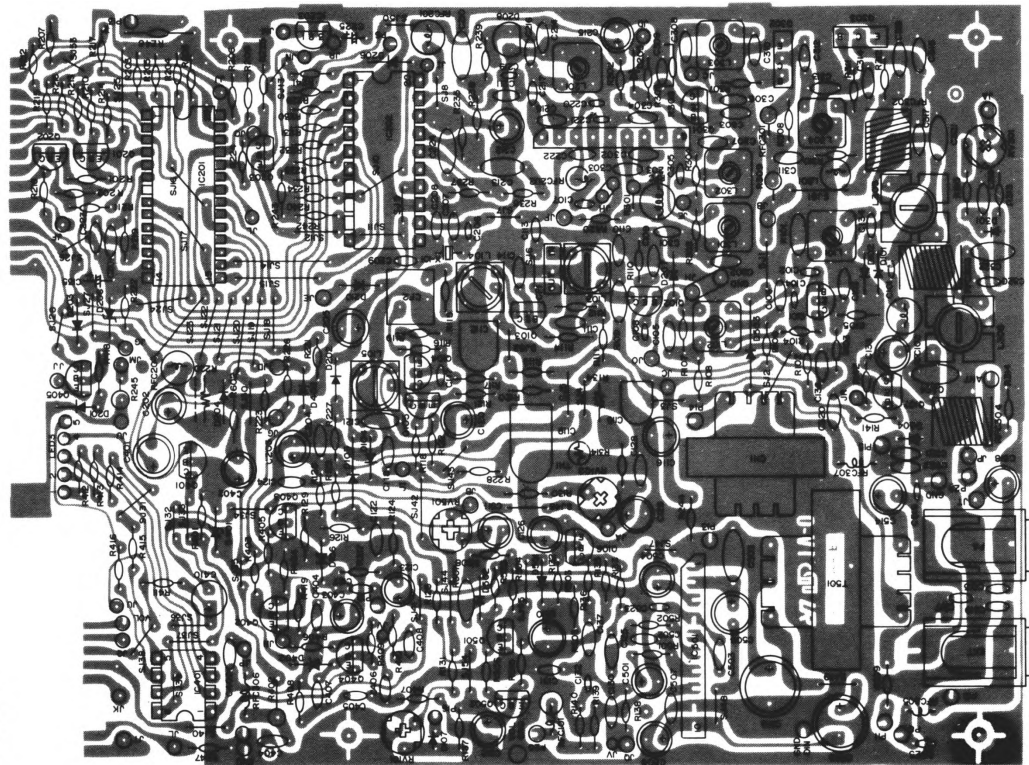
## 1) TRANSISTOR

| TR NO |      | B    | E    | C     | TR NO |      | B    | E    | C     | TR NO |    | B    | E    | C     | TR NO |      | B    | E    | C    |
|-------|------|------|------|-------|-------|------|------|------|-------|-------|----|------|------|-------|-------|------|------|------|------|
| Q101  | RX   | 1.65 | 0.96 | 12.80 | Q106  | SQ L | 0    |      |       | Q302  | TX | 0    | 0    | 10.61 | Q405  | RX   | 6.43 | 3.07 | 0    |
|       | TX   | 0.34 | 3.94 | 12.72 |       | TX   | 0    | 0    | 0.06  |       | RX | 0    | 0    | 13.10 |       | PA   | 4.81 | 5.46 | 5.45 |
| Q102  | RX   | 1.63 | 0.90 | 11.85 | Q201  | RX   | 7.82 | 8.05 | 2.51  | Q303  | TX | 0    | 0    | 11.74 | Q401  | TX   | 6.46 | 3.08 | 0.04 |
|       | TX   | 0.24 | 0    | 12.70 |       | TX   | 7.81 | 8.20 | 2.48  |       | RX | 5.78 | 5.16 | 13.18 |       | SQ H | 0.37 | 0    | 2.51 |
| Q103  | RX   | 1.60 | 1.01 | 11.0  | Q202  | RX   | 7.78 | 8.05 | 2.53  | Q402  | TX | 5.78 | 5.14 | 13.03 | Q501  | SQ L | 0.68 | 0    | 0.05 |
|       | TX   | 0.34 | 0.01 | 12.67 |       | TX   | 7.84 | 8.10 | 2.56  |       | RX | 7.94 | 7.95 | 0     |       | TX   | 0.68 | 0    | 0.05 |
| Q104  | RX   | 1.07 | 0.38 | 3.29  | Q203  | RX   | 7.95 | 7.95 | 0.91  | Q403  | TX | 7.93 | 7.94 | 0     | Q502  | SQ H | 0.65 | 0    | 0    |
|       | TX   | 0.09 | 0    | 0.81  |       | TX   | 7.16 | 7.94 | 7.81  |       | RX | 0    | 0    | 0     |       | SQ L | 0.19 | 0    | 0.68 |
| Q105  | RX   | 3.29 | 2.59 | 12.90 | Q301  | RX   | 0.33 | 0    | 13.18 | Q404  | TX | 0    | 0    | 0     |       | TX   | 0.1  | 0    | 0.68 |
|       | TX   | 0.81 | 0.17 | 12.67 |       | TX   | 1.39 | 0.81 | 12.87 |       | RX | 0.42 | 0    | 7.80  |       |      |      |      |      |
| Q106  | SQ H | 0.7  | 0    | 0     | Q302  | RX   | 0    | 0    | 13.5  |       | TX | 0.40 | 0    | 7.79  |       |      |      |      |      |

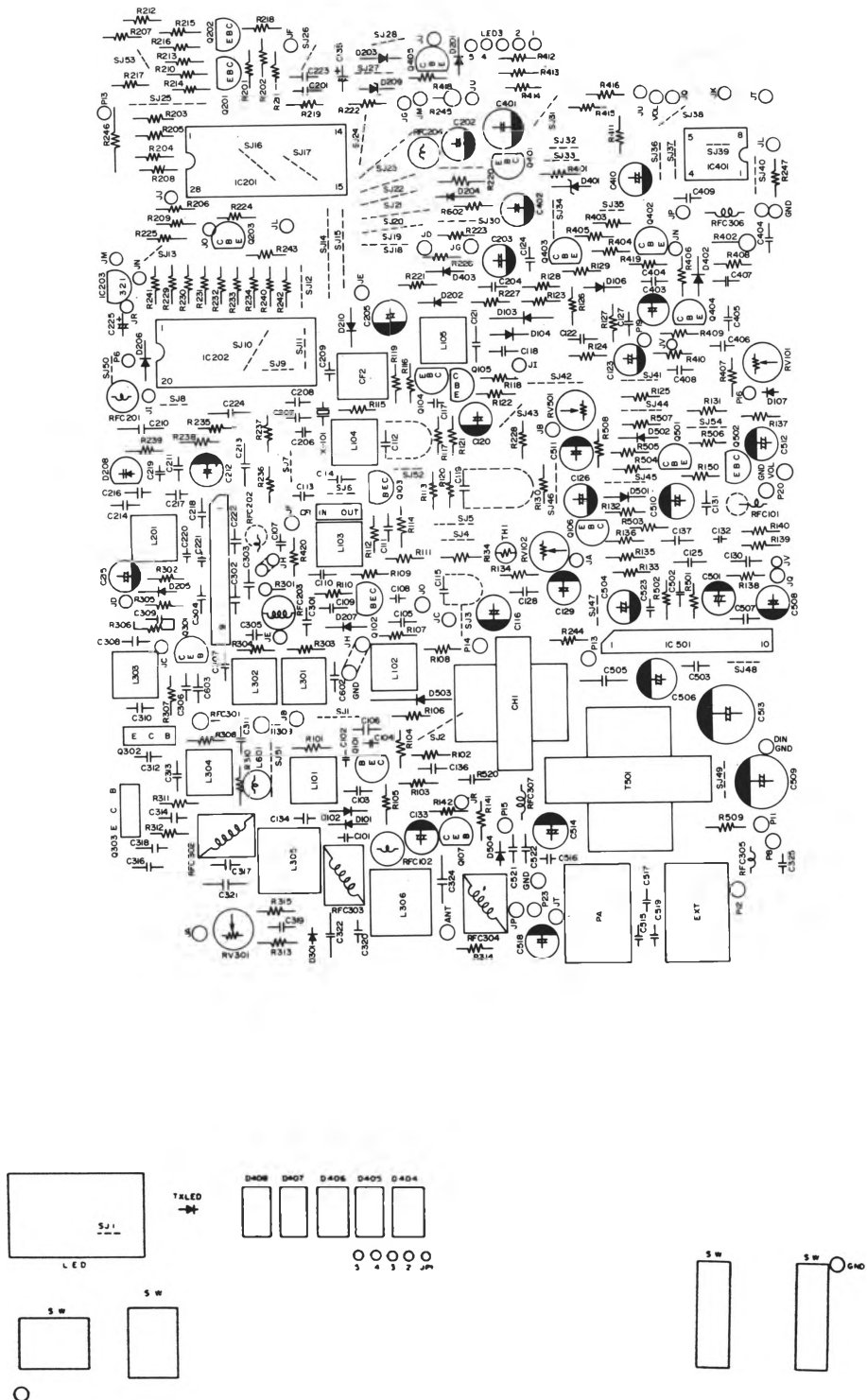
## 2) INTEGRATED CIRCUIT

| IC NO  | PIN | RX   | TX   | IC NO  | PIN | RX   | TX   | IC NO  | PIN | RX    | TX    | IC NO  | PIN | RX    | TX    |
|--------|-----|------|------|--------|-----|------|------|--------|-----|-------|-------|--------|-----|-------|-------|
| IC 201 | 1   | 0.21 | 0.21 |        | 21  | 0    | 0    |        | 13  | 0     | 0     | IC 401 | 1   | 0     | 0     |
|        | 2   | 0.21 | 0.22 |        | 22  | 0    | 0    |        | 14  | 1.45  | 4.10  |        | 2   | 10.81 | 0.06  |
|        | 3   | 2.38 | 0.41 |        | 23  | 0    | 0    |        | 15  | 1.74  | 1.60  |        | 3   | 11.45 | 0.06  |
|        | 4   | 6.0  | 5.93 |        | 24  | 0.67 | 7.81 |        | 16  | 1.74  | 1.61  |        | 4   | 10.75 | 0.07  |
|        | 5   | 2.0  | 2.05 |        | 25  | 3.08 | 3.11 |        | 17  | 1.37  | 3.06  |        | 5   | 10.88 | 0.08  |
|        | 6   | 2.0  | 2.0  |        | 26  | 3.08 | 3.10 |        | 18  | 7.57  | 7.59  |        | 6   | 11.15 | 0.08  |
|        | 7   | NC   | NC   |        | 27  | 5.23 | 5.28 |        | 19  | 3.85  | 3.31  |        | 7   | 12.80 | 11.55 |
|        | 8   | 5.13 | 5.15 |        | 28  | 3.08 | 3.08 |        | 20  | 7.19  | 0.81  |        | 8   | 0     | 1.31  |
|        | 9   | 6.44 | 6.49 | IC 202 | 1   | 6.44 | 6.48 | IC 203 | 1   | 12.71 | 11.83 | IC 501 | 1   | 13.80 | 13.50 |
|        | 10  | 0.07 | 0.07 |        | 2   | 0.07 | 0.07 |        | 2   | 0     | 0     |        | 2   | 12.60 | 12.28 |
|        | 11  | 0.07 | 0.07 |        | 3   | 0.07 | 0.07 |        | 3   | 7.95  | 7.94  |        | 3   | 3.90  | 3.90  |
|        | 12  | 6.46 | 6.50 |        | 4   | 6.46 | 6.50 | IC 204 | 1   | 2.64  | 2.56  |        | 4   | 8.15  | 8.02  |
|        | 13  | 0    | 0    |        | 5   | 6.45 | 6.49 |        | 2   | 1.96  | 1.90  |        | 5   | 1.51  | 1.51  |
|        | 14  | 0    | 0    |        | 6   | 0.07 | 0.07 |        | 3   | 1.37  | 1.37  |        | 6   | 3.38  | 3.30  |
|        | 15  | 6.45 | 6.49 |        | 7   | NC   | NC   |        | 4   | 1.78  | 2.56  |        | 7   | 3.40  | 3.33  |
|        | 16  | 0.07 | 0.07 |        | 8   | NC   | NC   |        | 5   | 0     | 0     |        | 8   | 1.28  | 1.27  |
|        | 17  | 8.11 | 8.1  |        | 9   | NC   | NC   |        | 6   | 1.27  | 7.08  |        | 9   | 0     | 0     |
|        | 18  | 0.03 | 0.03 |        | 10  | 1.45 | 4.10 |        | 7   | 2.12  | 2.02  |        | 10  | 6.86  | 6.72  |
|        | 19  | 5.92 | 5.88 |        | 11  | 2.83 | 3.23 |        | 8   | 5.10  | 5.50  |        |     |       |       |
|        | 20  | 5.14 | 5.16 |        | 12  | 3.83 | 3.83 |        | 9   | 1.27  | 7.08  |        |     |       |       |

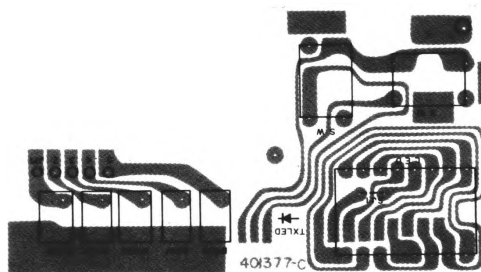
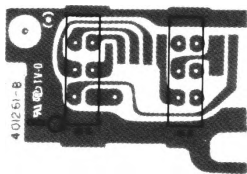
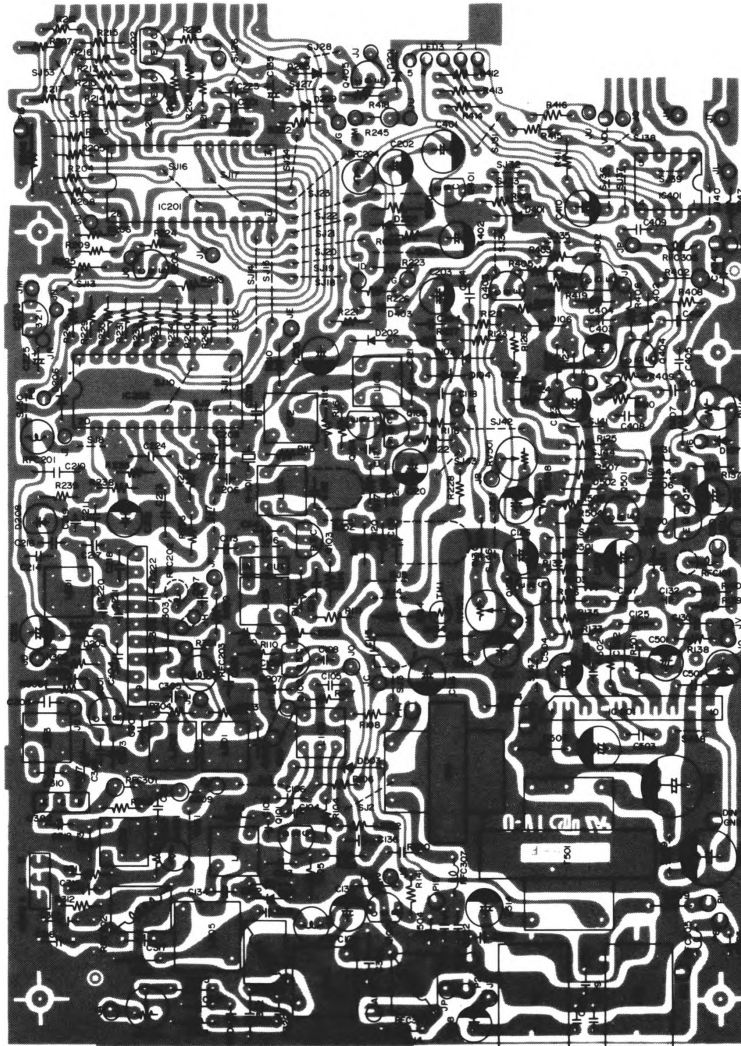
# P.C.B Top View

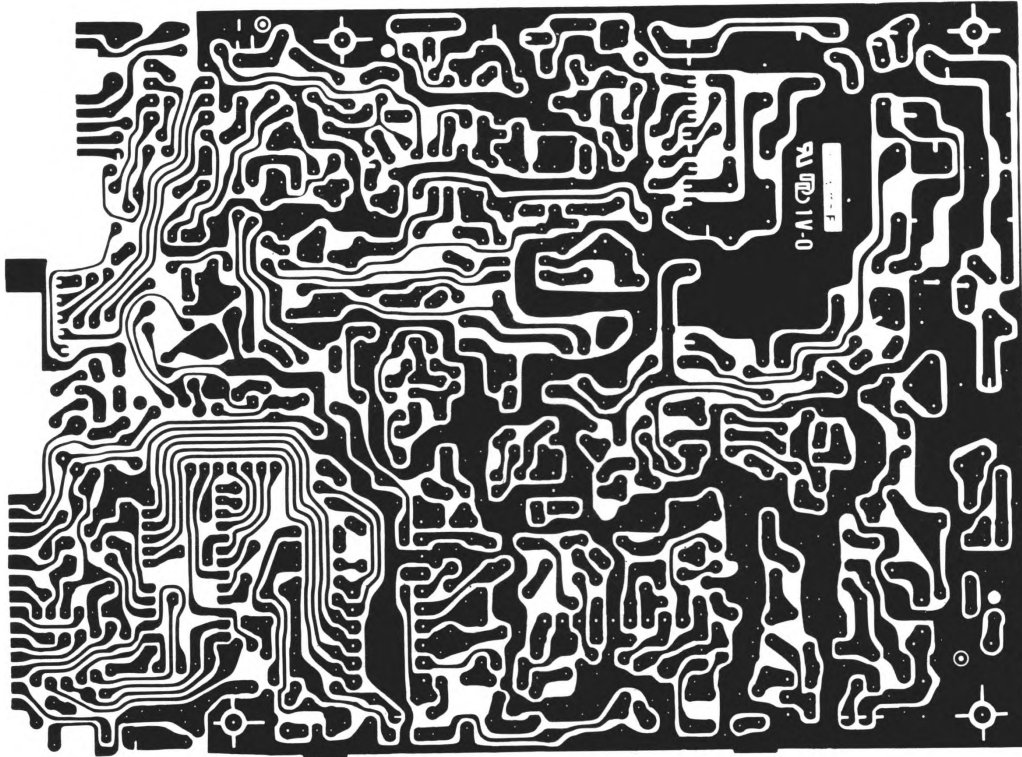


# P.C.B Bottom View

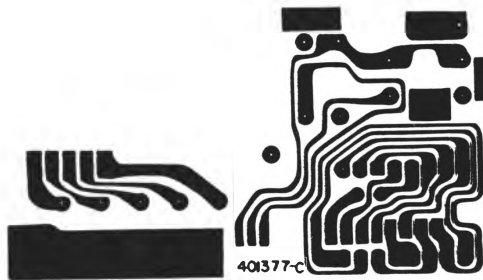
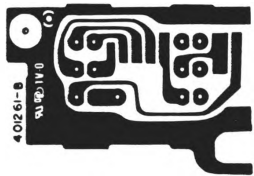


## P.C.B Bottom View

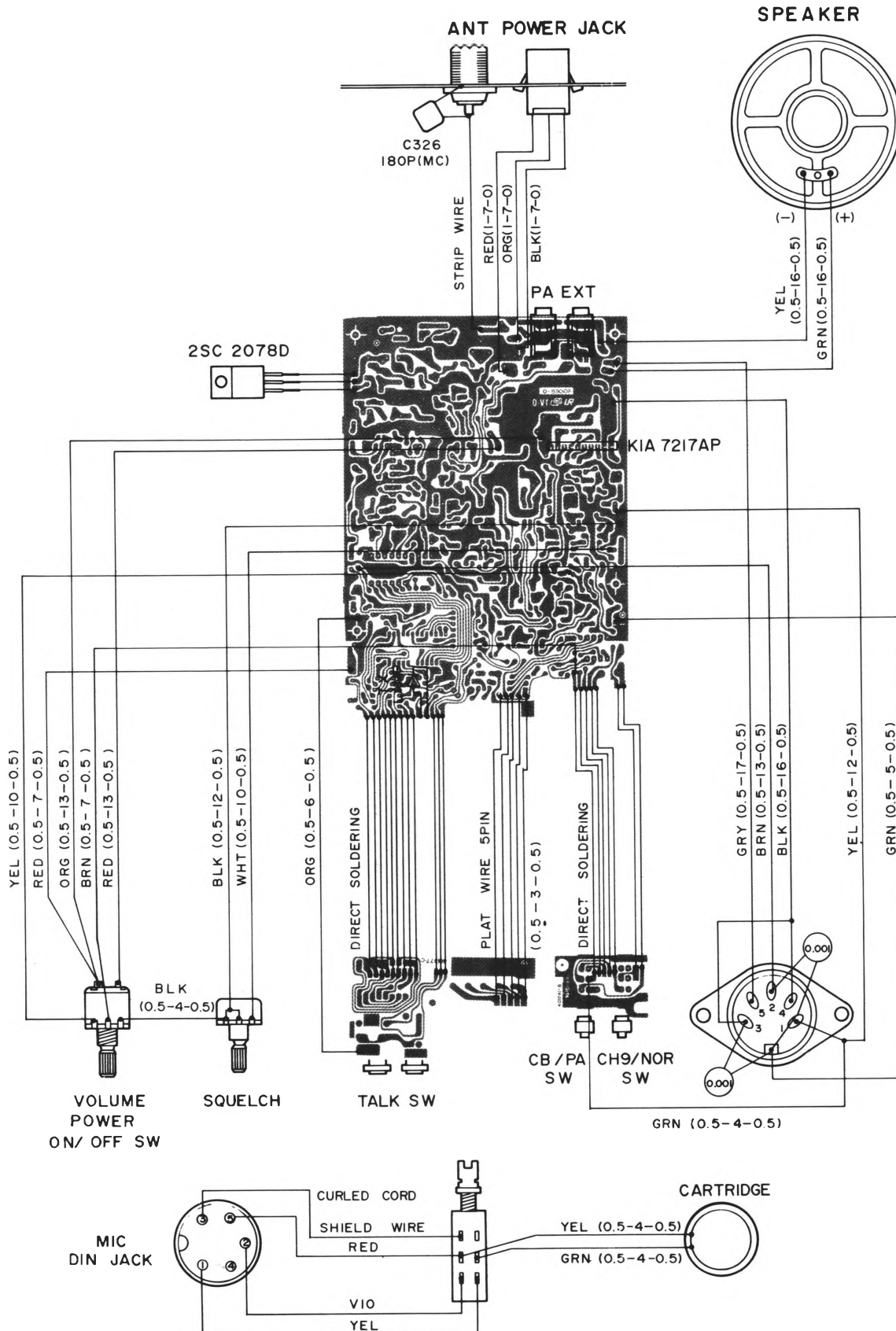




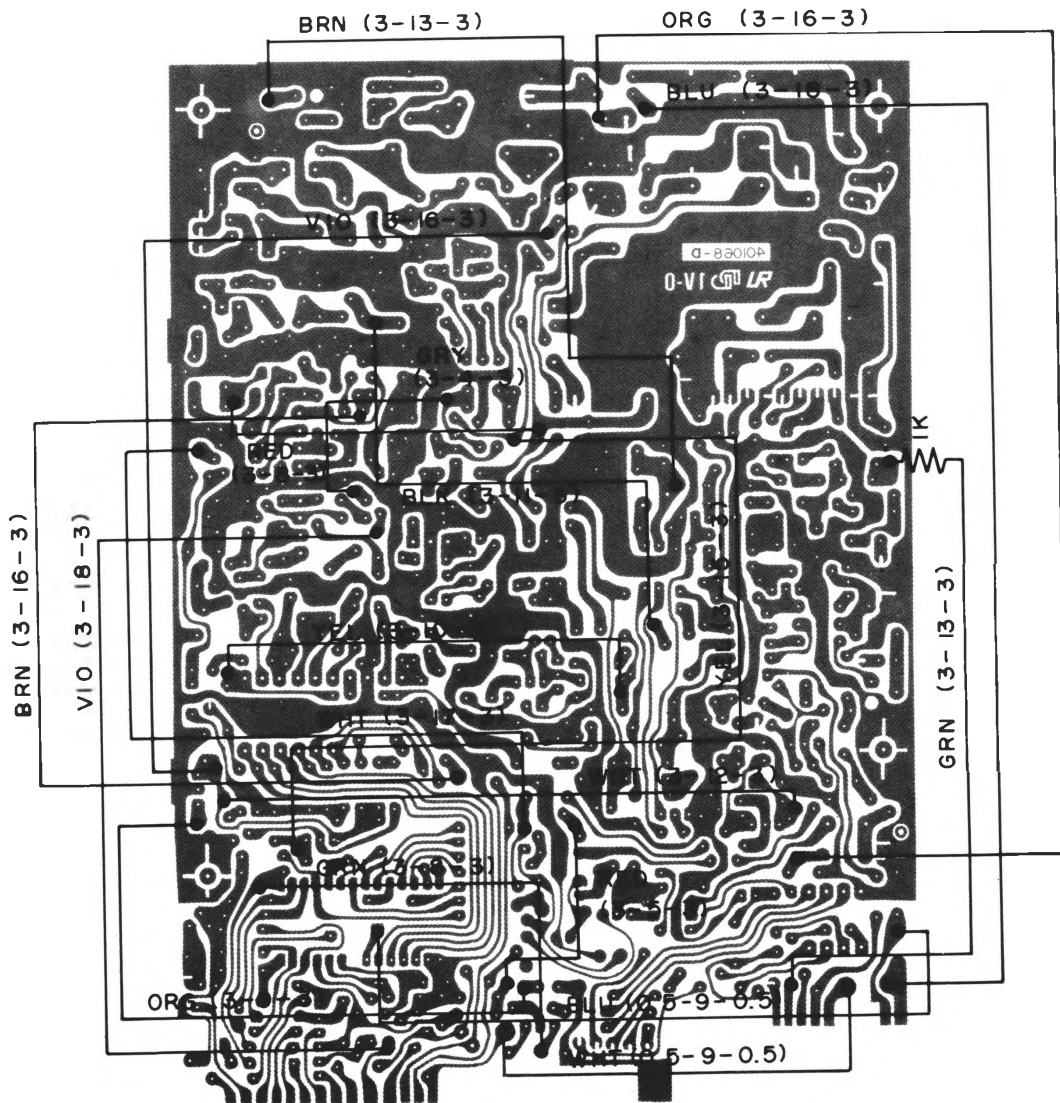
401068-F



# Wiring Diagram (Chassis and Microphone Pins)

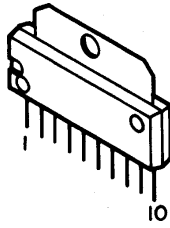


## P.C.B Wiring Diagram

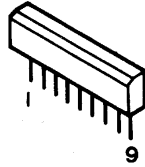


## INTEGRATED CIRCUIT

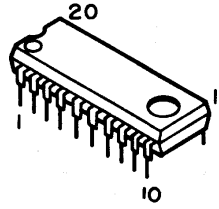
KIA 7217AP



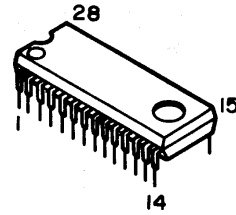
TA 7310P



LC7131



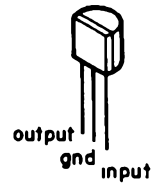
LM6416E



TL 489CP



MC78L08CT



## TRANSISTORS

MPS 9418  
MPS 9623  
MPS 9631  
MPS 9681  
MPS 9634



MPS 9426



2SC 2314



2SC 2078

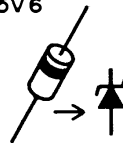


## DIODES

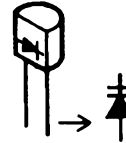
IN 4002  
IS 2473  
OA 90



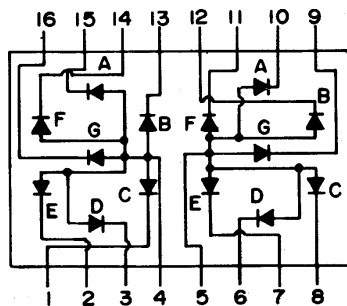
UZP-8.2B  
BZX83-C5V6



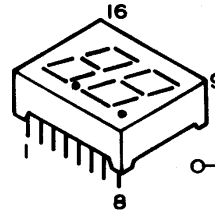
MV2209



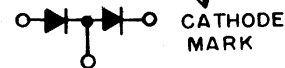
SLB55VR3



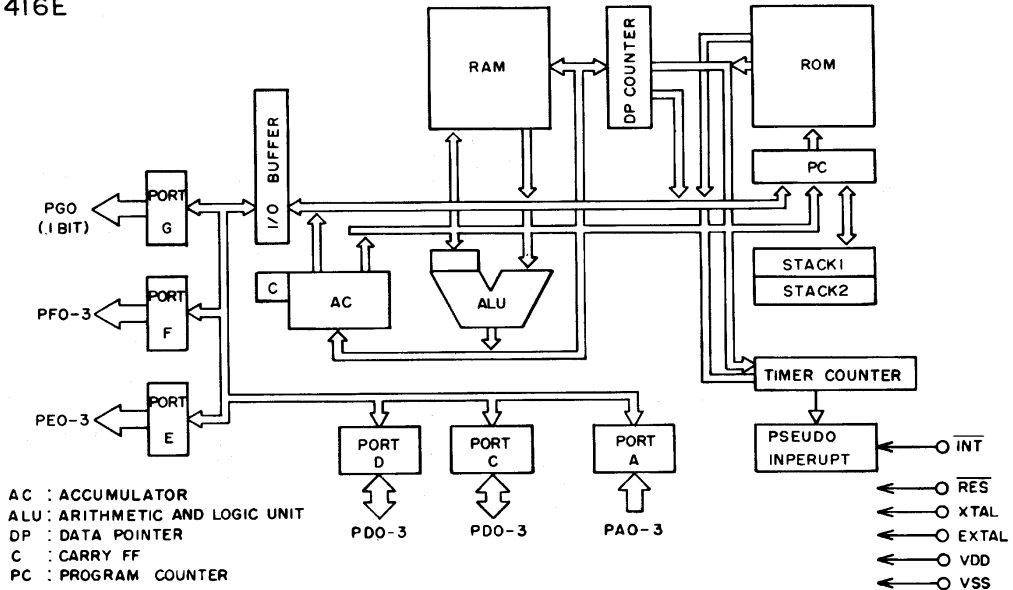
LTD-482G-Y



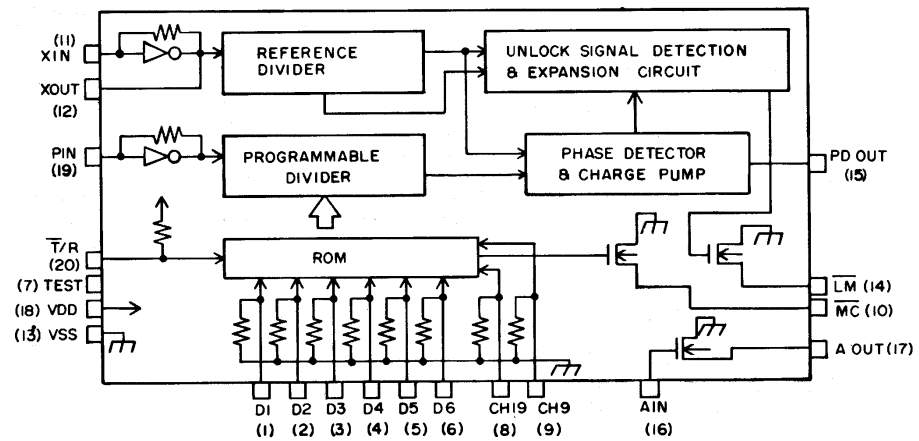
LD-001VR



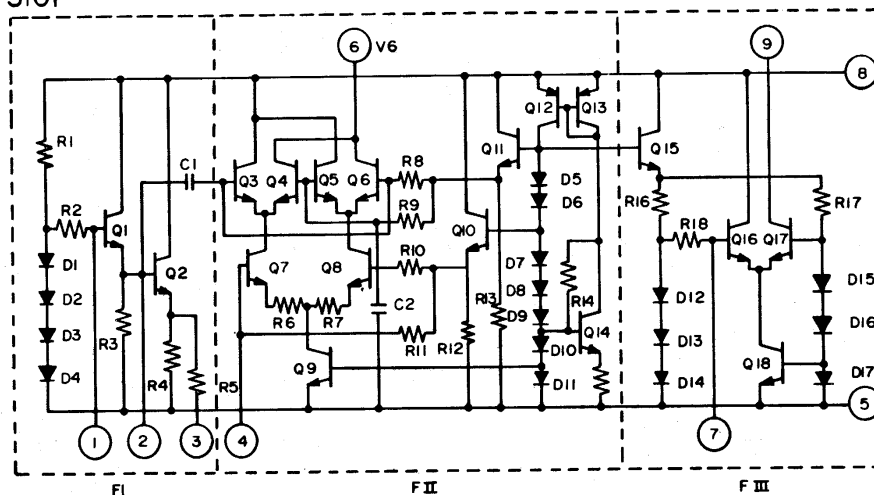
## LM6416E



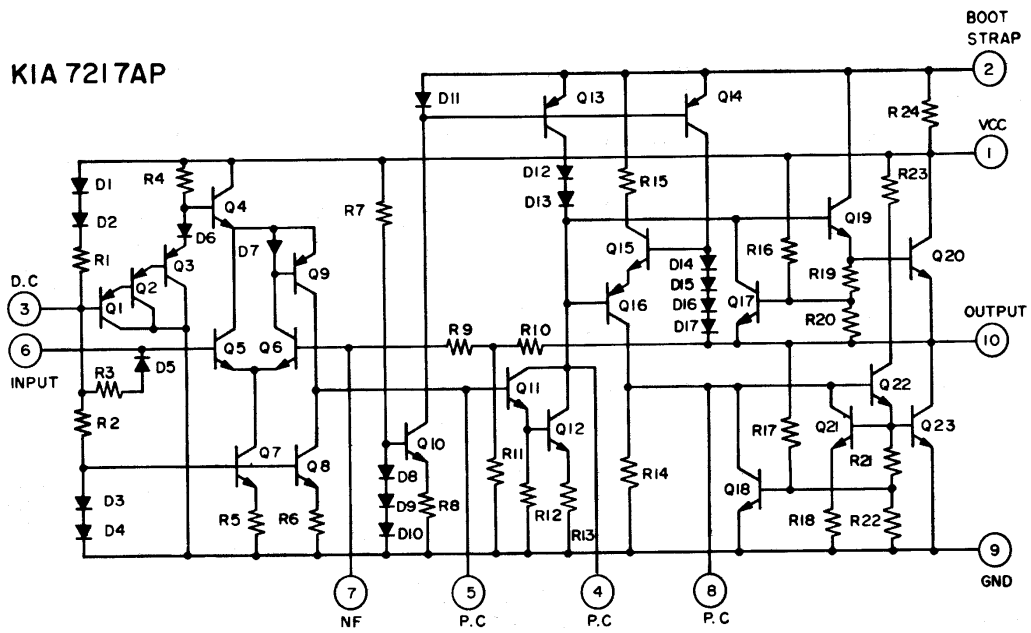
## LC 7131



## TA7310P

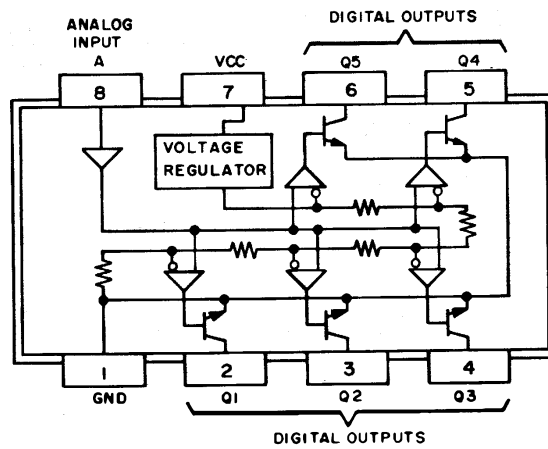


# KIA 7217AP

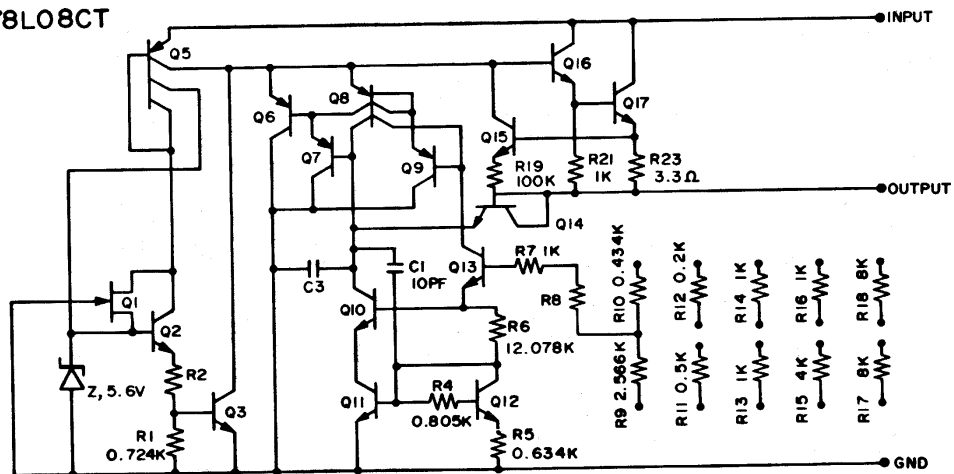


D.C : DECOUPLING  
P.C : PHASE COMPENSATION

# TL 489 CP



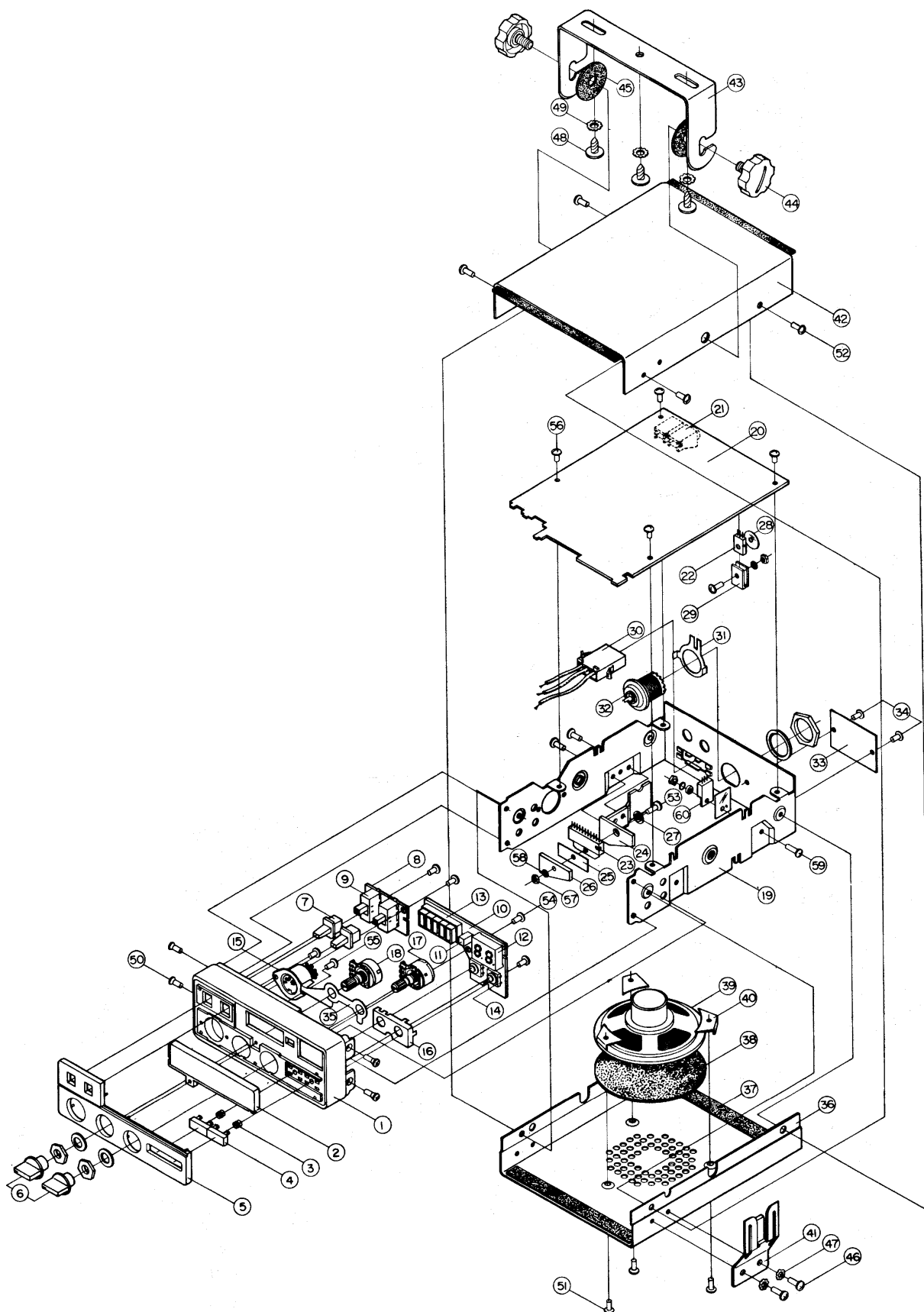
# MC 78L08CT



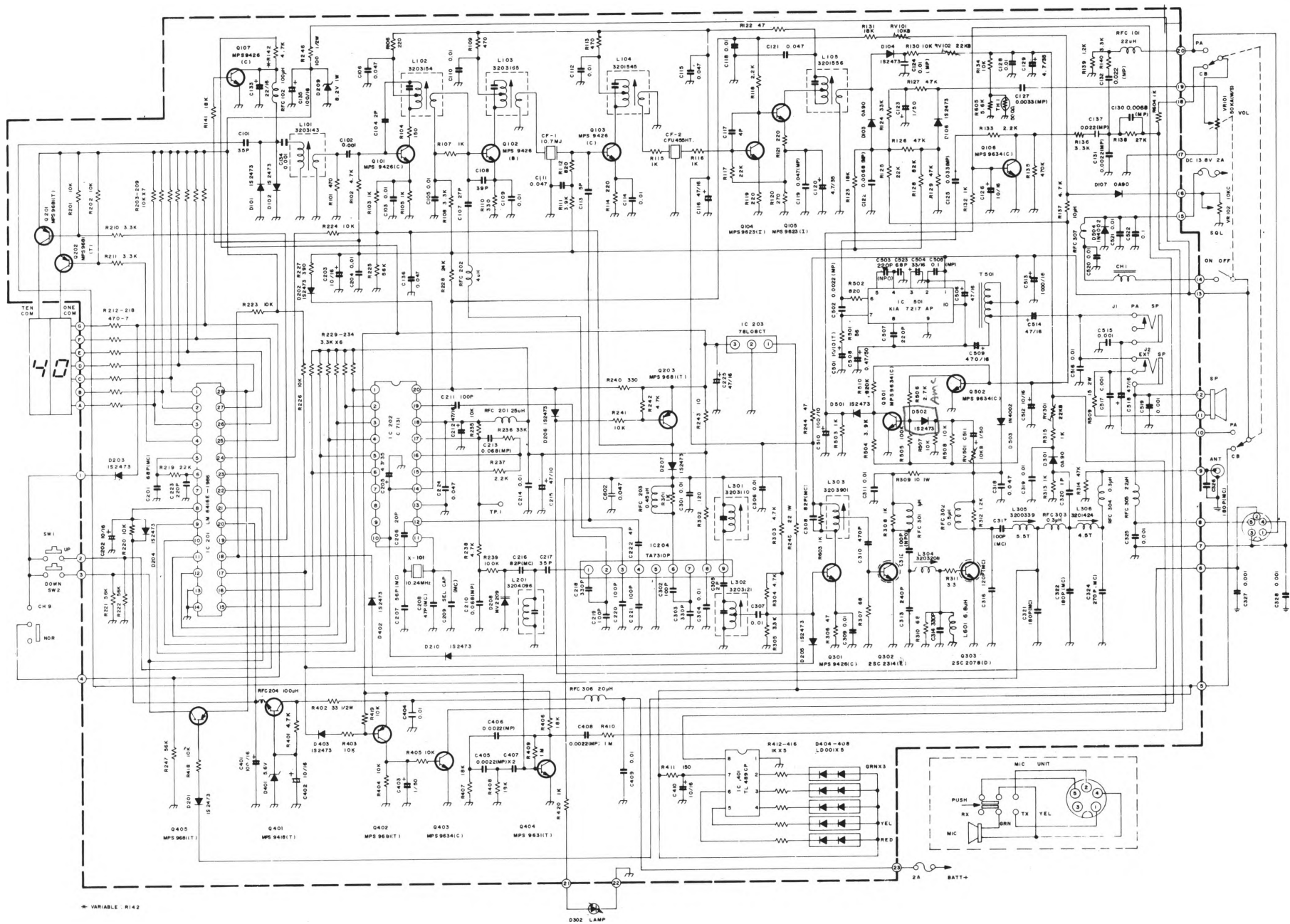
## Exploded View Part List

| No. | Part-No. | Description                      | No. | Part No. | Description                        |
|-----|----------|----------------------------------|-----|----------|------------------------------------|
| 1   | 800950   | Escutcheon                       | 54  | 621159   | (+) Tapping Screw (B.H) 2.6 x 8-1S |
| 2   | 813010   | Lens (Front)                     | 55  | 623256   | (+) Tapping Screw (B.H) 3 x 6-1S   |
| 3   | 880880   | Spring                           | 56  | 623265   | (+) Tapping Screw (B.H) 3 x 6-2S   |
| 4   | 823830   | Knob (Slide SW)                  | 57  | 651024   | Nut                                |
| 5   | 830520   | Front Pannel                     | 58  | 662305   | Washer (Spring)                    |
| 6   | 823850   | Knob (Control)                   | 59  | 613305   | (+) Machine Screw (B.H) M3 x 8     |
| 7   | 823860   | Knob (Push)                      | 60  | 2040167  | Transistor 2SC 2314 (E)            |
| 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  |     |          |                                    |

## Exploded View



## Schematic Diagram



**PARTS LIST 19 PLUS**

| SYMBOL           | DESCRIPTION                                                       | PART NO.      | SYMBOL                                                           | DESCRIPTION                              | PART NO.      |
|------------------|-------------------------------------------------------------------|---------------|------------------------------------------------------------------|------------------------------------------|---------------|
|                  | COVER ASSEMBLY                                                    | 521 124 9 001 | IC204                                                            | I.C. TA7310P                             | 307 133 9 004 |
|                  | SPEAKER 2½" 8 OHM 0.25W                                           | 580 076 9 001 | IC203                                                            | I.C. MC78L08CT                           | 307 426 9 001 |
|                  | NAME PLATE (COBRA 19PLUS)<br>ALP3 32X25X0.51                      | 600 171 9 001 | IC202                                                            | I.C. LC7131                              | 307 272 9 002 |
|                  | ESCUTCHEON (COBRA 19PLUS)<br>ABS BLK                              | 380 548 9 001 | IC201                                                            | I.C. LM6416E                             | 307 426 9 002 |
|                  | LENS (FRONT) ACRYL<br>SMOKE SILK                                  | 380 548 9 002 | IC401                                                            | I.C. TL489CH                             | 307 426 9 003 |
|                  | KNOB (SLIDE SW) ABS<br>SETTING CR-PLATE                           | 384 084 9 001 | D401                                                             | DIODE BZX83-C5V6                         | 152 160 9 001 |
|                  | KNOB (CONTROL) ABS<br>CR-PLATING                                  | 384 084 9 002 | D209                                                             | DIODE UZP-8.2B 1W                        | 152 160 9 002 |
|                  | KNOB (PUSH) (UP,DOWN)<br>ABS CR-PLATING                           | 384 084 9 003 | D208                                                             | DIODE VARICAP MV2209                     | 151 028 9 007 |
|                  | FRONT PANEL ABS<br>LUCK8017-107 HOT STAMPING                      | 260 437 9 001 | D101,102,104,<br>106,201-207,210,<br>402,403,501,502,<br>601,602 | DIODE SI 1S2473                          | 151 035 9 001 |
|                  | FRONT BODY ASSEMBLY                                               | 521 125 9 001 | D103,107,301                                                     | DIODE GE OA90                            | 150 020 9 001 |
| Q303             | XSTOR 2SC 2078 (D)                                                | 172 075 9 001 | D503,504                                                         | DIODE SI 1N4002                          | 151 082 9 001 |
| IC501            | I.C. KIA 7217AP                                                   | 307 331 9 001 | X101                                                             | CRYSTAL 10.240MHz HC-18/U                | 132 036 9 001 |
| D302             | LED LAMP SLB55VR3 RED                                             | 158 079 9 001 | CF2                                                              | CRYSTAL FILTER CFU 455HT                 | 143 014 9 001 |
| D404,405,406     | LED DISPLAY LD-001MG GRN                                          | 158 079 9 002 | CF1                                                              | CERAMIC FILTER 10.7MJ                    | 140 006 9 002 |
| D408             | LED DISPLAY LD-001VR RED                                          | 158 079 9 003 | CH1                                                              | TRANSFORMER, CHOKE                       | 042 041 9 001 |
| D407             | LED DISPLAY LD001YY YEL                                           | 158 079 9 004 | T501                                                             | TRANSFORMER, OPT                         | 042 051 9 001 |
| LED              | LED DISPLAY LTD-482G-Y                                            | 158 079 9 005 | RFC307                                                           | COIL, RF CHOKE 10µH CORE                 | 047 012 9 003 |
| J1 2             | JACK EARPHONE HSJ0615-01-010                                      | 773 126 9 001 | RFC301                                                           | COIL, CHOKE 1µH BOBBIN                   | 041 134 9 007 |
| J11-15           | FLAT WIRE 5 PIN 40MM                                              | 428 130 9 001 | RFC306                                                           | COIL, RF CHOKE 20µH CORE                 | 047 039 9 002 |
|                  | SLIDE SW KSA-2251T 2P-2C                                          | 084 160 9 001 | RFC101, 305                                                      | COIL, RF CHOKE 22µH BOBBIN               | 041 134 9 001 |
| SW1,2            | TACK SWITCH KHG10905                                              | 088 155 9 001 | RFC302                                                           | COIL, RF CHOKE 0.5µH SPRING              | 041 134 9 008 |
| VR102            | RES., VARIABLE (VR)<br>K161100-10KC(WO/SW)<br>15MM SHAFT          | 008 848 9 001 | RFC201                                                           | INDUCTOR 25µH MOLD TYPE                  | 047 049 9 001 |
| VR101            | RES., VARIABLE (VR)W/OFF<br>ON SW VM11A-5M1411-50KA<br>15MM SHAFT | 008 848 9 002 | RFC203                                                           | INDUCTOR 0.45µH MOLD TYPE                | 047 049 9 002 |
|                  | 36 PLUG ASSEMBLY                                                  | 777 056 9 001 | RFC102,204                                                       | COIL, CHOKE 100µH MO TYPE                | 047 027 9 001 |
|                  | MAIN BODY SPC 48X405XX1T                                          | 257 165 9 001 | RFC202                                                           | COIL, CHOKE 4µH BOBBIN TYPE              | 047 012 9 004 |
| R309             | RES., METALOXIDE<br>10 OHM 1W "S"                                 | 011 001 5 100 | L601                                                             | INDUCTOR, 6.8µH MOLDED TYPE              | 047 050 9 001 |
| R245             | RES., METALOXIDE<br>22 OHM 1W "S"                                 | 011 001 5 220 | RFC303,304                                                       | COIL, AM TX ANT 27MHz A                  | 046 039 9 012 |
| R509             | RES., METALOXIDE<br>15 OHM 2W "S"                                 | 011 002 5 150 | L305                                                             | COIL, AM TX ANT 27MHz B                  | 046 039 9 013 |
| RV101,501        | RES., SEMIFIXED H0651A-10K<br>6DIA "H"                            | 008 512 9 003 | L306                                                             | COIL, IFT 27MHz TXANT<br>TUNING-C (4.5T) | 047 049 9 003 |
| RV102,301        | RES., SEMIFIXED H0651A-22KB<br>6DIA "H"                           | 008 512 9 004 | L104                                                             | COIL, IFT 455kHz-A                       | 047 049 9 004 |
| Q106 403,501,502 | XSTOR MPS9634 (C)                                                 | 176 128 9 001 | L105                                                             | COIL, IFT 455kHz-B                       | 047 049 9 005 |
| Q101-103,107,301 | XSTOR MPS9426 (C)                                                 | 176 115 9 001 | L301                                                             | IFT 27MHz RF AMP-A                       | 047 039 9 006 |
| Q201-203,402,405 | XSTOR MPS9681 (T)                                                 | 177 049 9 001 | L302                                                             | IFT AM AMP 27MHz-C                       | 047 039 9 007 |
| Q401             | XSTOR MPS9418 (T)                                                 | 176 115 9 004 | L101                                                             | 27MHz RX ANT                             | 047 039 9 009 |
| Q014,105         | XSTOR MPS9623 (T)                                                 | 176 115 9 002 | L102                                                             | 27MHz RF AMP (RX)                        | 047 039 9 010 |
| Q404             | XSTOR MPS9631 (T)                                                 | 176 132 9 001 | L103                                                             | 10.6MHz RF 1ST MIXER (RX)                | 047 039 9 011 |
| Q302             | XSTOR 2SC2314 (E)                                                 | 176 120 9 001 | 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)                        | 250 213 9 001 |
|                  |                                                                   |               |                                                                  | SPC 60X35XT1                             |               |
|                  |                                                                   |               |                                                                  | BRACKET (SET MTG)                        | 250 214 9 001 |
|                  |                                                                   |               |                                                                  | 30X235X1.5T BLK-PNTG                     |               |