



Cobra 148GTL-DX



VOL - EQ

MID GAIN - RF GAIN

SWR CAL

LOW MID HI

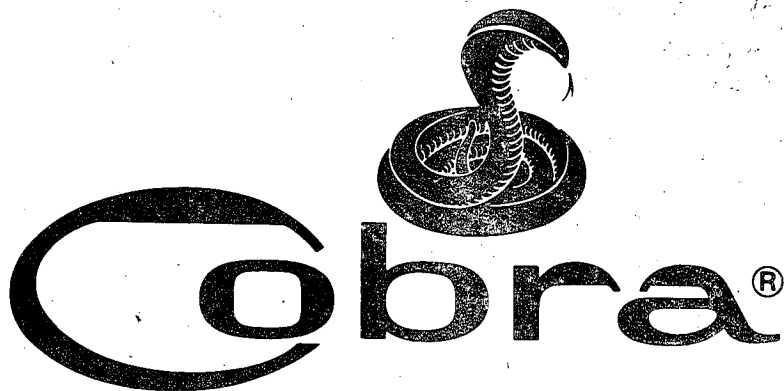
FM AM

USB LSB

FINE - COARSE



BAND



**Cobra 148GTL-DX
120-Channel
Solid State, Citizens Band
SSB/CW/AM/FM 2-Way
Mobile Radio**



Cobra Communications Product Group
DYNASCAN CORPORATION
6460 W. Cortland Street
Chicago, Illinois 60635

**Instruction Manual
for
Cobra 148GTL-DX
120-Channel
Solid State, Citizens Band
SSB/CW/AM/FM 2-Way
Mobile Radio**



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THE CB STORY

The Citizens Band lies between the shortwave broadcast and 10-meter amateur radio bands, and was established by law in 1949. Two-way communications service was opened in 1959.

**HAVE
A GOOD DAY
TODAY
AND
A BETTER DAY
TOMORROW!**

Section I

Introduction

FREQUENCY RANGE

The COBRA 148GTL-DX transceiver represents one of the most advanced SSB/CW/AM/FM two-way radios ever designed for use as the Citizens Radio Service. This unit features advanced Phase Lock Loop (PLL) circuitry, which is used in the AM/FM mode, in the upper and lower single sideband modes and in the CW mode providing complete coverage of all 120 channels shown below.

CORRECTION

CHANNEL	LOW BAND	MID BAND	HI BAND
1	26.515	26.965	27.415
2	.525	.975	.425
3	.535	.985	.435
4	.555	27.005	.455
5	.565	.015	.465
6	.575	.025	.475
7	.585	.035	.485
8	.605	.055	.505
9	.615	.065	.515
10	.625	.075	.525
11	.635	.085	.535
12	.655	.105	.555
13	.665	.115	.565
14	.675	.125	.575
15	.685	.135	.585
16	.705	.155	.605
17	.715	.165	.615
18	.725	.175	.625
19	.735	.185	.635
20	.755	.205	.655
21	.765	.215	.665
22	.775	.225	.675
23	.805	.255	.705
24	.785	.235	.685
25	.795	.245	.695

CHANNEL	LOW BAND	MID BAND	HI BAND
26	26.815	27.265	27.715
27	.825	.275	.725
28	.835	.285	.735
29	.845	.295	.745
30	.855	.305	.755
31	.865	.315	.765
32	.875	.325	.775
33	.885	.335	.785
34	.895	.345	.795
35	.905	.355	.805
36	.915	.365	.815
37	.925	.375	.825
38	.935	.385	.835
39	.945	.395	.845
40	.955	.405	.855

The COBRA 148GTL-DX has a vastly superior receiver which includes an RF gain control and noise blanker circuitry effective in both AM/FM and SSB/CW modes, and an automatic noise limiter effective in the AM mode. The receiver also features increased protection against cross modulation and strong adjacent channel signals.

To obtain maximum performance from your transceiver, please read carefully the following descriptions and operating instructions.

Section II

Specifications

GENERAL

Channels	120 FM, 120 AM, 120 LSB, 120 USB, 120 CW.
Frequency Range	Low Band, 26.515 to 26.955 MHz. Mid Band, 26.965 to 27.405 MHz. Hi Band, 27.415 to 27.855 MHz.
Frequency Control	Phase Lock Loop (PLL) synthesizer.
Frequency Tolerance	0.005%.
Frequency Stability	0.001%.
Operating Temperature Range	-30°C to +50°C.
Microphone	Plug-in dynamic; with push-to-talk switch and coiled cord.
Input Voltage	13.8V DC nominal, 15.9V max., 11.7V min. (positive or negative ground). <i>Transmit:</i> AM full mod., 2.2A. SSB 12 watts PEP output, 2A. <i>Receiver:</i> Squelched, 0.3 A. Maximum audio output, 0.7A.
Size	2-3/8"(H) x 7-7/8"(W) x 9-1/4"(D).
Weight	5 lbs.
Antenna Connector	UHF, SO239.
Meter (3-in-1)	Illuminated; indicates relative output power, received signal strength, and SWR.

TRANSMITTER

Power Output	AM/FM/CW, 5 watts. SSB, 12 watts, PEP.
Modulation	High-and low-level Class B, Amplitude Modulation: AM. Variable capacitance Frequency Modulation: FM.
Intermodulation Distortion	SSB: 3rd order, more than -25 dB. 5th order, more than -35 dB.
SSB Carrier Suppression	55 dB
Unwanted Sideband	50 dB

Frequency Response
Output Impedance
Output Indicators

AM and FM: 450 to 2500 Hz.
50 ohms, unbalanced.

Meter shows relative RF output power and SWR. Transmit LED glows red when transmitter is in operation.

RECEIVER

Sensitivity

SSB/CW: 0.25 μ V for 10 dB (S+N)/N at greater than $\frac{1}{2}$ -watt of audio output.
AM: 0.5 μ V for 10 dB (S+N)/N at greater than $\frac{1}{2}$ -watt of audio output.
FM: 1.0 μ V for 20 dB (S+N)/N at greater than $\frac{1}{2}$ -watt of audio output.

Selectivity

AM/FM: 6 dB @3 KHz, 50 dB @9 KHz.
SSB/CW: 6 dB @2.1 KHz, 60 dB @3.3 KHz.

Image Rejection

More than 65 dB.

IF Frequency

AM/FM: 10.695 MHz 1st IF, 455 KHz 2nd IF
SSB/CW: 10.695 MHz.

Adjacent-Channel Rejection

60 dB AM/FM & 70 dB SSB/CW.

AM/FM and SSB/CW/RF
Gain Control

45 dB adjustable for optimum signal reception.

Automatic Gain Control
(AGC)

Less than 10 dB change in audio output for inputs from 10 to 100,000 microvolts.

Squelch

Adjustable; threshold less than 0.5 μ V.

ANL

Switchable.

Noise Blanker

RF type, effective on AM/FM and SSB/CW.

Voice Lock Range

Coarse (TX/RX) $\pm$ 7 KHz.
Fine (RX) $\pm$ 1 KHz.

Audio Output Power

4 watts into 8 ohms.

Frequency Response

300 to 2800 Hz.

Built-in Speaker

8 ohms, round.

External Speaker
(Not Supplied)

8 ohms; disables internal speaker when connected.

Section III

Installation

LOCATION

Plan the location of the transceiver and microphone bracket before starting the installation. Select a location that is convenient for operation and does not interfere with the driver or passengers in the vehicle. In automobiles, the transceiver is usually mounted below the dash panel, with the microphone bracket beside it.

MOUNTING THE CONNECTION

The COBRA 148GTL-DX is supplied with a universal mounting bracket. When mounting the bracket and radio to your car, make sure it is mechanically strong. Also provide a good electrical connection to the chassis of the vehicle. Proceed as follows to mount the transceiver:

1. After you have determined the most convenient location in your vehicle, hold the COBRA 148GTL-DX with mounting bracket in the exact location desired. If nothing will interfere with mounting it in the desired position, remove the mounting bolts. Before drilling the holes, make sure nothing will interfere with the installation of the mounting bolts.
2. Connect the antenna cable plug to the standard receptacle on the rear panel. Most CB antennas are terminated with a type PL-259 plug and mate with the receptacle.
3. Connect the red DC power input wire (with the fuse) to +13.8V DC. This wire extends from the rear panel. In automobile installation, +13.8V DC is usually obtained from the accessory contact on the ignition switch. This prevents the set being left on accidentally when the driver leaves the car and also permits operating the unit without the engine running. Locate the accessory contact on most ignition switches by tracing the power wire from the AM broadcast receiver in the car.
4. Connect the black lead to -13.8V DC. This is usually the chassis of the car. Any convenient location with good electrical contact (remove paint) may be used.
5. Mount the microphone bracket on the right side of the transceiver or near the transceiver, using two screws supplied. When mounting in an automobile, place the bracket under the dash so the microphone is readily accessible.

IGNITION NOISE INTERFERENCE

Use of a mobile receiver at low signal levels is normally limited by the presence of electrical noise. The primary source of noise in automobile installations is from the generator and ignition system in the vehicle. Under most operating conditions, when signal level is adequate, the background noise does not present a serious problem. Also, when extremely low level signals are being received, the transceiver may be operated with vehicle engine turned off. The unit requires very little current and therefore will not significantly discharge the vehicle battery.

Even though the COBRA 148GTL-DX has ANL and NB controls, in some installations ignition interference may be high enough to make good communications impossible. The electrical noise may come from several sources. Many possibilities exist and variations between vehicles require different solutions to reduce the noise. Consult your COBRA dealer or a 2-way radio technician for help in locating and correcting the source of severe noise.

ANTENNA

Since the maximum allowable power output of the transmitter is limited by the FCC, the antenna is one important factor affecting transmission distance. Only a properly matched antenna system will allow maximum power transfer from the 50 ohm transmission line to the radiating element. In mobile installations (cars, trucks, boats, etc.), an antenna system that is non-directional should be used.

A vertically polarized, quarter-wavelength whip antenna provides the most reliable operation and greatest range. Shorter, loaded-type whip antennas are more attractive, compact and adequate for applications where the maximum possible distance is not required. Also, the loaded whips do not present the problems of height imposed by a full quarter-wavelength whip.

Mobile whip antennas utilize the metal body of the vehicle as a ground plane. When mounted at a corner of the vehicle they are slightly directional, in the direction of the body of the vehicle. For all practical purpose, however, the radiation pattern is nondirectional. The slight directional characteristic will be observed only at extreme distances. A standard antenna connector (type SO 239) is provided on the transceiver for easy connection to a standard PL 259 cable termination.

If the transceiver is not mounted on a metal surface, it is necessary to run a separate ground wire from the unit to a good metal electrical ground in the vehicle. When installed in a boat, the transceiver will not operate at maximum efficiency without a ground plate, unless the vessel has a steel hull.

Before installing the transceiver in a boat, consult your dealer for information regarding an adequate grounding system and prevention of electrolysis between fittings in the hull and water.

TUNING THE ANTENNA FOR OPTIMUM SWR

Since there is such a wide variety of base and mobile antennas, this section will strictly concern itself to the various types of mobile adjustable antennas.

Because the antenna length is directly related to the channel frequency, it must be tuned to resonate optimally all 120 channels of the transceiver. Channel 1 requires a longer antenna than Channel 120 because it is lower in frequency.

Due to the various methods of adjusting antennas for proper SWR we have chosen what we think is the optimum method:

A. Antennas with adjustment screws (set screws).

1. Start with the antenna extended and tighten the set screw lightly enough so that the antenna can be lightly tapped with your finger for easy adjustment.
2. Set your COBRA 148GTL-DX to Channel 21 @ Mid band. Press the PTT (push-to-talk) switch, and tap the antenna (making it shorter). The SWR meter will show a lower reading each time the antenna is tapped. By continuing to shorten the antenna you will notice the SWR reading will reach a low point and then start rising again. This means that you have passed the optimum point for Channel 21. Extend the antenna a short distance and again follow the procedure above.

When the lowest point has been reached, switch to Channel @ Low band and then to Channel 40 @ Hi band and compare SWR readings. They should be almost equal.

B. Antennas which must be cut to proper length.

1. Follow the same procedure as above, but adjust the length by cutting in 1/8" increments until a good match is obtained.
2. *Be very careful not to cut too much at one time, as once it is cut, it can no longer be lengthened.*
3. The whip is easily cut by filing a notch all the way around and breaking the piece off with pliers.

NOTE

THE PROPER SETTING IS ACHIEVED WHEN THE SWR IS 1.5 OR BELOW, AND WHEN IT HAS THE SAME READING FOR CHANNELS LOW BAND 1 AND HI BAND 40.

If you are having difficulties in adjusting your antenna, check the following:

- A. All doors must be closed when adjusting the antenna.
- B. Make sure the antenna base is grounded.
- C. Check your coaxial cable routing (it may be pinched when routed into the car).

- D. Try a different location on your car (keeping in mind the radiation pattern you wish).
- E. Is the antenna perfectly vertical?
- F. Try a different location in your neighborhood. Stay away from large metal objects when adjusting (metal telephone or light posts, fences, etc.)

NOTE

The COBRA 148GTL-DX will operate into an SWR of 2 to 1 indefinitely and sustain an SWR of 20:1 for a maximum of 5 minutes at rated operating conditions.

BASE STATION OPERATION

(Operating from 120V AC House Current)

To operate your transceiver from your home or office, using the regular house current as the power source, you will require the DYNASCAN Model CA-20 Power-Pak which has been specially designed for the purpose. It is available as optional equipment from your dealer. It consists of a precision-built AC-DC power converter that delivers the required power for the operation of the transceiver. The CA-20 operates from any 120-volt, 60 Hz power source. Simply connect the red (+) and black (-) leads of the transceiver to the corresponding terminals of the CA-20.

NOTE

Do not attempt to operate this transceiver by connecting directly to 120 volts AC.

When the CA-20 Power-Pak is used with the transceiver for base station operation, any Citizens Band beam, dipole, ground plane or vertical antenna may be used. A ground plane vertical antenna will provide the most uniform horizontal coverage.

External Speaker

The external speaker jack (EXT. SPK.) on the rear panel is used for remote receiver monitoring. The external speaker should have 8 ohms impedance and be able to handle at least 4 watts. When the external speaker is plugged in, the internal speaker is disconnected.

CW KEY

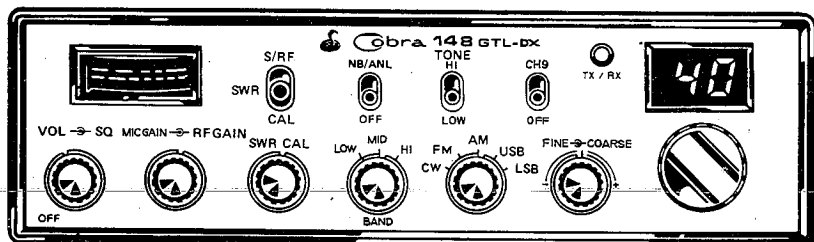
This jack is for Morse code operation; To operate, connect a CW Key to this jack and place the CW/FM/AM/USB/LSB switch in the CW position.

Section IV

Operation

CONTROLS AND INDICATORS

There are thirteen controls and three indicators on the front panel of your COBRA 148GTL-DX.



A. CONTROL FUNCTIONS

1. **MIKE GAIN.** (inner dual concentric) Adjusts the microphone gain in the transmit and PA modes. This controls the gain to the extent that full talk power is available several inches away from the microphone.
2. **OFF/ON/VOLUME** (inner dual concentric). Turn clockwise to apply power to the unit and to set the desired listening level. During normal CB operation, the VOLUME control is used to adjust the output level obtained either at the transceiver speaker or the external speaker, if used.
3. **SQUELCH** (outer dual concentric). This control is used to cut off or eliminate receiver background noise in the absence of an incoming signal. For maximum receiver sensitivity it is desired that the control be adjusted only to the point where the receiver background noise or ambient background noise is eliminated. Turn fully counterclockwise then slowly clockwise until the receiver noise disappears. Any signal to be received must now be slightly stronger than the average received noise. Further clockwise rotation will increase the threshold level which a signal must overcome in order to be heard. Only strong signals will be heard at a maximum clockwise setting.
4. **RF GAIN CONTROL** (outer dual concentric). Used to reduce the gain of the RF amplifier under strong signal conditions.

5. **SWR CAL CONTROL** In order for you to achieve maximum radiated power and the longest range, it is important that your antenna be in good condition, properly adjusted and matched to your transceiver. The built-in SWR (standing wave ratio) meter lets you easily measure your antenna condition. To operate this function, connect your antenna to the transceiver antenna output connector. Select a channel near the middle of the band such as 21 or the channel you plan to use most frequently. Turn the power on and set the meter function switch to the CAL position. Press and hold the microphone push-to-talk button and using the SWR CAL control, adjust the meter to read the CAL position indicated on the meter face. Then, without releasing the microphone button, switch the meter function switch to the SWR position and read the SWR indicated. The lower the figure, the better, with 1 being ideal. Generally speaking, readings up to 3 are acceptable, but over 3 indicates that you are losing radiated power and antenna adjustment may be advisable.
6. **S-RF/SWR/CAL SWITCH.** When in the S-RF position, the meter swings proportionally to the strength of the received signal. When transmitting, the meter indicates relative RF output power.
When in the "CAL" position, the SWR meter can be calibrated by adjusting the "SWR CAL" control to the "CAL" mark on the meter face.
When in the "SWR" position, the standing wave ratio is measured.
7. **MODE (CW/FM/AM/USB/LSB) SWITCH.** This switch is used to select CW, FM, AM, LSB or USB mode of operation. Unless the station with which communication is desired is equipped with SSB, the AM or FM mode is normally used. The mode selector switch changes the mode of operation of both transmitter and receiver simultaneously. Turn to "Receiving SSB signals" for a further explanation of single sideband.
8. **VOICE LOCK.** Allows variation of the receiver operating frequencies above and below the assigned frequency. Although this control is intended primarily to tune in SSB/CW signals, it may be used to optimize AM/FM signals as described in the Operating Procedure paragraphs. Coarse operates both TX/RX but Fine only in RX.
9. **CHANNEL SELECTOR.** This switch selects any one of the forty Citizens Band channels desired. The selected channel appears on the LED readout directly above the Channel Selector knob.
10. **CHANNEL 9 SWITCH.** Channel 9 has been reserved emergency communications involving the immediate safety of life of individuals or immediate protection of property. Channel 9 may also be used to render assistance to a motorist.
11. **OFF-NB/ANL SWITCH.** In the NB/ANL position, the RF noise blanker is activated and automatic noise limiter in the audio circuits is also activated. The RF noise blanker is very effective for repetitive impulse noise such as ignition interference.

12. **TONE SWITCH-HI/LOW.** This switch is used to shape the audio response to the operator's preference. Bass is increased in the LOW position and treble is increased in the HI position.
13. **BAND SELECTOR.** This switch selects HI, MID or LOW band of operation.

B. INDICATOR FUNCTIONS

1. **S-METER.** Swings proportionally to the strength of the incoming signal.
2. **RF METER.** Swings proportionally to the RF output power.
3. **SWR METER.** Swings proportionally to the ratio of standing wave voltage and RF output. Used to properly adjust the length of the antenna, and to monitor the quality of the coaxial cable and all RF electrical connections. If there is any degradation whatsoever in any of the above, due to humidity, salt spray, vibration or corrosion, the SWR meter reading will rise, thereby indicating that a problem exists.
To calibrate, switch to the "CAL" position transmit by pressing the mike switch, and adjust the SWR control to the "CAL" mark on the meter then switch to "SWR" position for the SWR measurement.
4. **CHANNEL INDICATOR.** Numbered LED indicates the selected channel you wish to operate on. LED indicates "9" when CH-9 is switched on.
5. **RECEIVER/TRANSMIT INDICATOR.** The receiver/transmit LED indicator is located next to the channel indicator. When in receive, the LED will be green. When in transmit the LED will be red.
6. **PRESS-TO-TALK MICROPHONE.** The receiver and transmitter are controlled by the press-to-talk switch on the microphone. Press the switch and the transmitter is activated, release switch to receive. When transmitting, hold the microphone two inches from the mouth and speak clearly in a normal "voice". The radios come complete with low-impedance (500 ohm) dynamic microphone. For installation instructions on other microphones, see next section, "ALTERNATE MICROPHONES AND INSTALLATION."

OPERATING PROCEDURE TO RECEIVE

1. Be sure that power source, microphone and antenna are connected to the proper connectors before going to the next step.
2. Turn unit on by tuning VOL control clockwise on COBRA 148GTL-DX.
3. Set the VOLUME for a comfortable listening level.
4. Set the MODE switch to the desire mode.

5. Listen to the background noise from the speaker. Turn the SQUELCH control slowly clockwise until the noise JUST disappears (no signal should be present). Leave the control at this setting. The SQUELCH is now properly adjusted. The receiver will remain quiet until a signal is actually received. Do not advance the control too far, or some of the weaker signals will not be heard.
6. Set the CHANNEL selector switch to the desired channel.
7. Set the RF gain control fully clockwise for maximum RF gain.
8. Adjust the VOICE LOCK control to clarify the SSB/CW signals or to optimize AM/FM signals.

OPERATING PROCEDURE TO TRANSMIT

1. Select the desired channel of transmission.
2. Set the MIKE GAIN control fully clockwise.
3. If the channel is clear, depress the push-to-talk switch on the microphone and speak in a normal voice.

RECEIVING SSB SIGNALS

There are four types of signals presently used for communications in the Citizens Band: FM, AM, USB, and LSB. When the MODE switch on your unit is placed in the AM position, only standard double-sideband and in FM position, only frequency deviation, full carrier signals will be detected. An SSB signal may be recognized while in the AM or FM mode by its characteristic "Donald Duck" sound and the inability of the AM or FM detector to produce an intelligible output. The USB and LSB modes will detect upper sideband and lower sideband respectively, and standard AM signals.

SSB reception differs from standard AM reception in that SSB receiver does not require a carrier or opposite sideband to produce an intelligible signal. A single-sideband transmitted signal consists only of the upper or the lower sideband and no carrier is transmitted. The elimination of the carrier from the AM signal helps to eliminate the biggest cause of whistles and tones heard on channels which make even moderately strong AM signals unreadable. Also, SSB takes only half of an AM channel, therefore two SSB conversations will fit into each channel, expanding the 120 AM channels to 240 SSB channels. The reduction in channel space required also helps in the receiver because only *half* of the noise and interference can be received with 100% of the SSB signal.

An SSB signal may be received only when the listening receiver is functioning in the same mode. In other words, an upper sideband signal (USB) may be made intelligible *only* if the receiver is functioning in the USB position.

If a lower sideband (LSB) signal is heard when the receiver is in the USB mode, no amount of tuning will make the signal intelligible. The reason for this

may be understood if you consider that when modulation is applied to the transmitter's microphone in the USB mode, the transmitter's output frequency is increased whereas in the LSB mode the transmitter's output frequency is decreased. The result in listening to the receiver is that when the MODE switch is in the proper position (either USB or LSB), a true reproduction of single tone of modulation will result, and if the tone is increased in frequency (such as a low-pitched whistle a high-pitched whistle) you will hear the increase in the output tone of the receiver. If the incorrect mode is selected, an increase in tone of a whistle applied to the transmitter will cause a decrease in the resultant tone from the receiver.

Thus when a voice is used in place of a whistle or tone, in the proper listening mode the voice will be received correctly whereas in the incorrect mode, the voice will be translated backwards and cannot be made intelligible by the voice lock control. When listening to an AM transmission, a correct sideband is heard in either mode since both upper and lower sideband are received.

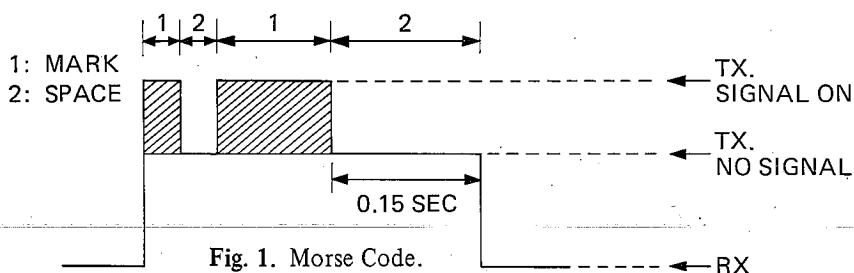
Once the desired SSB mode has been selected, frequency adjustment may be necessary in order to make the incoming signal intelligible, the VOICE LOCK control allows the operator to vary frequency above and below the exact-center frequency of the received signal. If the sound of the incoming signal is high or low pitched, adjust the operation of the VOICE LOCK. Consider it as performing the same function as a phonograph speed control. When the speed is set to high, voices will be high-pitched and if set too low, voices will be low-pitched. Also, there is only *one* correct speed that will make a particular record produce the same sound that was recorded. If the record is played on a turntable that rotates in the wrong direction (opposite sideband) no amount of speed control (VOICE LOCK) will produce an intelligible sound.

An AM signal received while listening in one of the SSB modes will produce a steady tone (carrier) in addition to the intelligence, unless the SSB receiver is tuned to exactly the same frequency by the VOICE LOCK control. For simplicity it is recommended that the AM modes be used to listen to AM signals.

OPERATING PROCEDURE TO CW(CARRIER WAVE) MODE

This is communicated by MORSE-CODE. This can be advantageously used especially while channels in busy or communication in long distance.

- 1. TRANSMIT.** Press CW KEY by MORSE-CODE switching Selector to CW MODE and connecting CW KEY to CW KEY JACK. Your COBRA 148GTL-DX transceiver is automatically changed from RX to TX when CW KEY is in (MARK) and keeping the transmitting condition without being transmitted MORSE-CODE during 0.15-second even if CW KEY is in (SPACE). And, thereafter the unit is set in RX condition automatically. Be sure that the CODE transmitted from your station is heard as monitor sound from internal speaker (see Fig. 1).

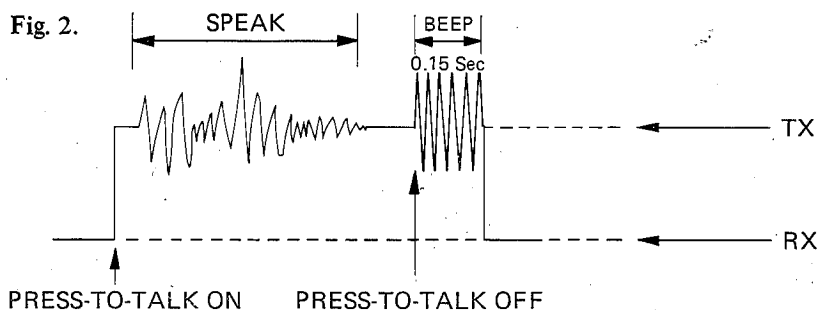


*CAUTION: 1. MARK when CW KEY is closed.
2. SPACE when CW KEY is opened.

- 2. RECEIVE.** Adjust FINE CONTROL of VOICE LOCK for your desired sound when your transceiver is received MORSE-CODE Signal.

ROGER BEEP

When this switch is placed in the ROGER BEEP position, your radio automatically transmits the audio sign at the end of your transmission. The listener can note easily that your transmission is over through the sign. Please note that this ROGER BEEP transmits 0.15-second at the moment PRESS-TO-TALK SWITCH KNOB is off.



ALTERNATE MICROPHONES AND INSTALLATION

For best results, the user should select a low-impedance dynamic type microphone or a transistorized microphone. Transistorized type microphones have a low output impedance characteristic. The microphones must be provided with a five-lead cable. The audio conductor and its shielded lead comprise two of the leads. The third lead is for receive control, the fourth is for grounding and fifth is for transmit control.

The microphone should provide the functions shown in schematic below.

4 WIRE MIC CABLE

Pin Number	Mic Cable Lead
1	Audio Shield
2	Audio Lead
3	Transmit Control
4	Receive Control

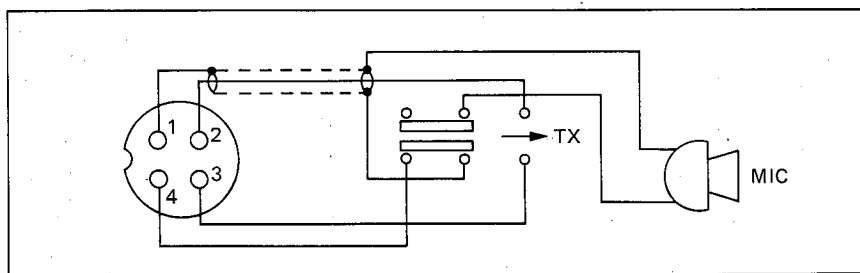


Fig. 3. Cobra 148GTL-DX microphone schematic.

If the microphone to be used is provided with pre-cut leads, they must be revised as follows.

1. Cut leads so that they extend $7/16''$ beyond the plastic insulating jacket of the microphone cable.
2. All leads should be cut to the same length. Strip the ends of each wire $1/8''$ and tin the exposed wire.

Before beginning the actual wiring read carefully, the circuit and wiring information provided with the microphone you select. Use the minimum heat required in soldering the connections. Keep the exposed wire lengths to a minimum to avoid shorting when the microphone plug is reassembled.

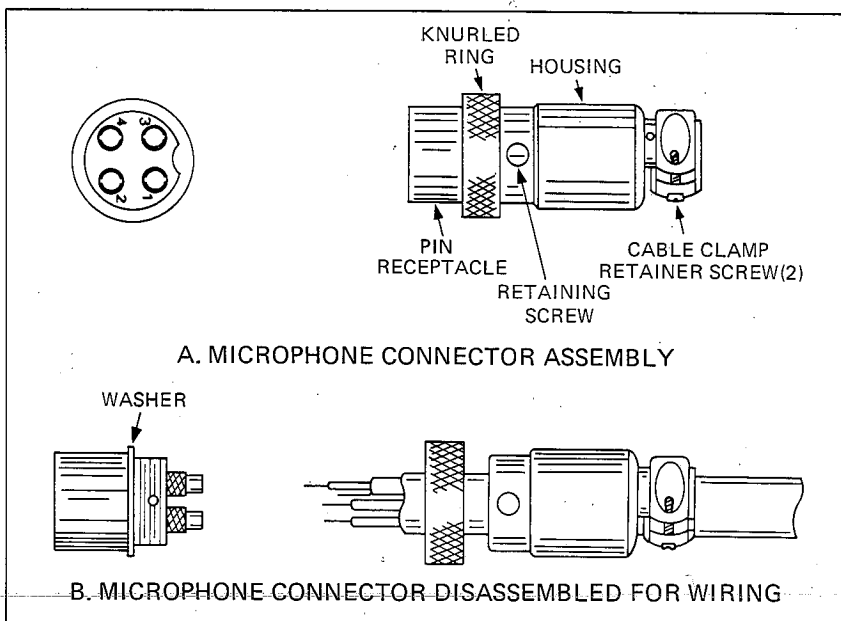


Fig. 4. Microphone plug wiring.

1. Remove the retaining screw.
2. Unscrew the housing from the pin receptacle body.
3. Loosen the two cable clamp retainer screws.
4. Feed the microphone cable through the housing, knurled ring and washer as shown Fig. 4.
5. The wires must now be soldered to the pins as indicated in the above wiring tables. If a vise or clamping tool is available it should be used to hold the pin receptacle body during the soldering operation, so that both hands are free to perform the soldering. If a vise or clamping tool is not available, the pin receptacle body can be held in a stationary position by inserting it into the microphone jack of the front panel. The numbers of the pins of the microphone plug are shown in Fig. 5, as viewed from the back of the plug. Before soldering the wire to the pins, pre-tin the wire receptacle of each pin of the plug.

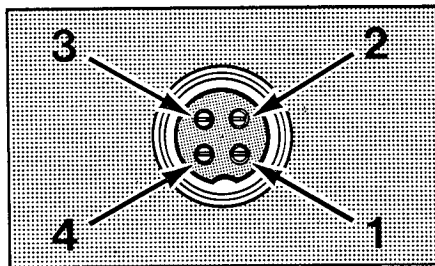


Fig. 5. Microphone plug pin numbers viewed from rear of pin receptacle.

Be sure that the housing and the knurled ring of Fig. 3 are pushed back onto the microphone cable before starting to solder. If the washer is not captive to the pin receptacle body, make sure that it is placed on the threaded portion of the pin receptacle body before soldering.

If the microphone jack is used to hold the pin receptacle during the soldering operation, best results are obtained when the connections to pins 1 and 3 are made first and then the connections to pins 2, 4 and 5. Use a minimum amount of solder and be careful to prevent excessive solder accumulation on pins, which could cause a short between the pin and the microphone plug housing.

6. When all soldering connections to the pins of the microphone plug are complete, push the knurled ring and the housing forward and screw the housing onto the threaded portion of the pin receptacle body. Note the location of the screw clearance hole in the plug housing with respect to the threaded hole in the pin receptacle body. When the housing is completely threaded into the pin receptacle body, a final fraction of a turn either clockwise or counter-clockwise may be required to align the screw hole with the threaded hole in the pin receptacle body. When these are aligned, the retaining screw is then screwed into the place to secure the housing to the pin receptacle body.
7. The two cable clamp retainer screws should now be tightened to secure the housing to the microphone cord. If the cutting directions have been carefully followed, the cable clamp should secure to the insulating jacket of the microphone cable.
8. Upon completion of the microphone plug wiring, connect and secure the microphone plug in the transceiver.

Section V

Maintenance and Adjustment

The COBRA 148GTL-DX transceiver is specifically designed for the environment encountered in mobile installations. The use of all solid state circuitry and its light weight result in high reliability. Should a failure occur, however, replace parts only with identical parts. Do not substitute. Refer to the schematic diagram and parts list.

NOTE

If the performance described in the OPERATION and MAINTENANCE AND ADJUSTMENT sections is not obtained, review the operating instructions to insure that proper procedures were followed. If a problem still exists, refer to WARRANTY SERVICE INSTRUCTIONS elsewhere in this manual.

Section VI

Appendix

Citizens Band radio operators have largely adopted the "10-code" for standard questions and answers. Its use permits faster communications and better understanding in noisy areas. The following table lists some of the more common codes and their meanings.

10 CODE

Code	Meaning	Code	Meaning
10-1	Receiving poorly	10-29	Time is up for contact
10-2	Receiving well		
10-3	Stop transmitting.	10-30	Does not conform to FCC rules
10-4	OK, message received	10-32	I will give you a radio check
10-5	Relay message	10-33	EMERGENCY TRAFFIC
10-6	Busy, stand by	10-34	Trouble at this station
10-7	Out of service, leaving air	10-35	Confidential information
10-8	In service, subject to call	10-36	Correct time is
10-9	Repeat message	10-37	Wrecker needed at
		10-38	Ambulance needed at
10-10	Transmission completed, standing by	10-39	Your message delivered
10-11	Taking too rapidly		
10-12	Visitors present	10-41	Please turn to channel
10-13	Advise Weather/Road conditions	10-42	Traffic accident at
		10-43	Traffic Tie up at
10-16	Make pick up at	10-44	I have a message for you
10-17	Urgent business	10-45	All units within range please report
10-18	Anything for us?		
10-19	Nothing for you, return to base	10-50	Break channel
10-20	My location is	10-60	What is next message number?
10-21	Call by telephone	10-62	Unable to copy, use phone
10-22	Report in person to	10-63	Net directed to
10-23	Stand by	10-64	Net clear
10-24	Completed last assignment	10-65	Awaiting your next Message/assignment
10-25	Can you contact	10-67	All units comply
10-26	Disregard last information		
10-27	I am moving to channel	10-70	Fire at
10-28	Identify your station		

10 CODE (Continued)

Code	Meaning	Code	Meaning
10-71	Proceed with transmission in sequence	10-91	Talk closer to mike
10-77	Negative contact	10-93	Check my frequency on this channel
10-81	Reserve hotel room for	10-94	Please give me a long count
10-82	Reserve room for	10-99	Mission completed, all units secure
10-84	My telephone number is		
10-85	My address is	10-200	Police needed at

A FEW RULES THAT SHOULD BE OBEYED

1. You must identify your official licensed call sign at the beginning and end of every conversation.
2. You are not allowed to carry on a conversation with another station for more than five minutes at a time without taking a one-minute break, to give others a chance to use the channel.
3. You are not allowed to blast others off the air by over-powering them with illegally amplified transmitter power, or illegally high antennas.
4. You can't use CB to promote illegal activities.
5. You are not allowed to use profanity.
6. You may not play music in your CB.
7. You may not use your CB to sell merchandise or professional services.

HOW YOUR CB CAN SERVICE YOU

- Warn of traffic tie ups ahead.
 - Provide weather and road information.
 - Provide help fast in event of emergency or breakdown.
 - Suggest good spots to eat and sleep.
 - Make long trips more interesting and help keep you awake.
 - Provide direct contact with your office or home.
 - Make friends for you as you travel.
 - Provide "local information" to find your destination.
 - Help law enforcement officers by reporting drunk and reckless drivers.
-

Colonel Samuel S. Smith of the Missouri Highway Patrol called the numbers of drunken drivers, wrong-way drivers and speeders reported by CBers as "amazing." He said, that even the "Smokey Bear" warnings don't shake their beliefs that "the potential benefits of CB radio to law enforcement are so great that they far outweigh the disadvantages." In regards to CB radar warnings to other CBers, Colonel Smith said cheerfully that "We've overheard warnings being relayed to truckers long after our operations have been discontinued...so we actually receive a residual benefit from these warnings."

USE CHANNEL 9 FOR EMERGENCY MESSAGES ONLY

FCC gives the following examples of permitted and prohibited types of communications for use on Channel 9. These are guidelines and are not intended to be all-inclusive.

Permitted	Example Message
Yes	"A tornado sighted six miles north of town."
No	"This is observation post number 10. No tornado sighted."
Yes	"I am out of gas on Interstate 95."
No	"I am out of gas in my driveway."
Yes	"There is a four-car collision at Exit 10 on the Beltway, send police and ambulance."
No	"Traffic is moving smoothly on the Beltway."
Yes	"Base to Unit 1, the Weather Bureau has just issued a thunderstorm warning. Bring the sailboat into port."
No	"Attention all motorists. The Weather Bureau advises that the snow tomorrow will accumulate 4 to 6 inches."
Yes	"There is a fire in the building on the corner of 6th and Main Streets."
No	"This is Halloween patrol unit number 3. Everything is quiet here."

WARRANTY SERVICE INSTRUCTIONS

1. Refer to the MAINTENANCE section of your Cobra instruction manual for adjustments that may be applicable.
2. If the above-mentioned procedures do not correct the problem you are experiencing with your unit, pack it securely (preferably in the original carton or double-packed). Enclose a letter describing the problem and include your name and address. Deliver to, or ship PREPAID (UPS preferred) to the nearest Cobra authorized service agency (see list enclosed with unit).

If your list of authorized Cobra service agencies has been misplaced, contact your local dealer for the name of your nearest service agency, or write to:

Service Department

Cobra Product Group
DYNASCAN CORPORATION
6460 W. Cortland Street
Chicago, Illinois 60635

90 DAY LIMITED WARRANTY WITH 1 YEAR FREE PARTS

DYNASCAN CORPORATION warrants to the original purchaser that its COBRA GTL Citizens Band Radios, and the component parts thereof, will be free from defects in workmanship and materials for a period of 90 days from the date of purchase. Component parts are warranted for one (1) year from the date of purchase.

DYNASCAN will, without charge, repair or replace, at its option, defective radios or component parts upon delivery to an authorized COBRA service station or the factory service department, accompanied by proof of the date of purchase in the form of a sales receipt. After 90 days parts will be supplied at no charge up to one year from date of purchase, the original purchaser being responsible for all labor and other charges.

Exclusions: This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. It is void if the serial number is altered, defaced or removed.

As indicated in your product instruction booklet, certain COBRA models are suitable for dashboard installation without modification of the dash. In other cases professional installation is recommended. In either event, DYNASCAN is not responsible for damages to the product or the automobile resulting from improper installation.

DYNASCAN shall not be liable for any consequential damages, including without limitation damages resulting from loss of use or cost of installation. Some states do not allow limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

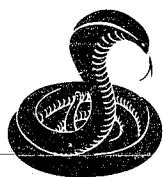
This warranty gives you specific rights and you may also have other rights which vary from state to state.

For your convenience we suggest you contact your dealer, who may be authorized to make repairs or can refer you to the nearest service station. If warranty service cannot be obtained locally, please send the unit to Cobra Communications Service, 6460 West Cortland Avenue, Chicago, Illinois 60635, properly packaged to avoid damage in shipment.

NOTE

For future reference, jot down the serial number (shown on the FCC identification plate of your COBRA 148GTL-DX) below:

SERIAL NO. _____



Cobra®

Cobra Communications Product Group

DYNASCAN CORPORATION

6460 W. Cortland Street

Chicago, Illinois 60635

SERVICE MANUAL

SERVICE MANUAL 148 GTLDX

(EARLY & LATE VERSIONS)

COBRA COMMUNICATIONS
PRODUCTION GROUP
DYNASCAN CORPORATION
6460 W. CORTLAND ST.
CHICAGO, ILLINOIS 60635

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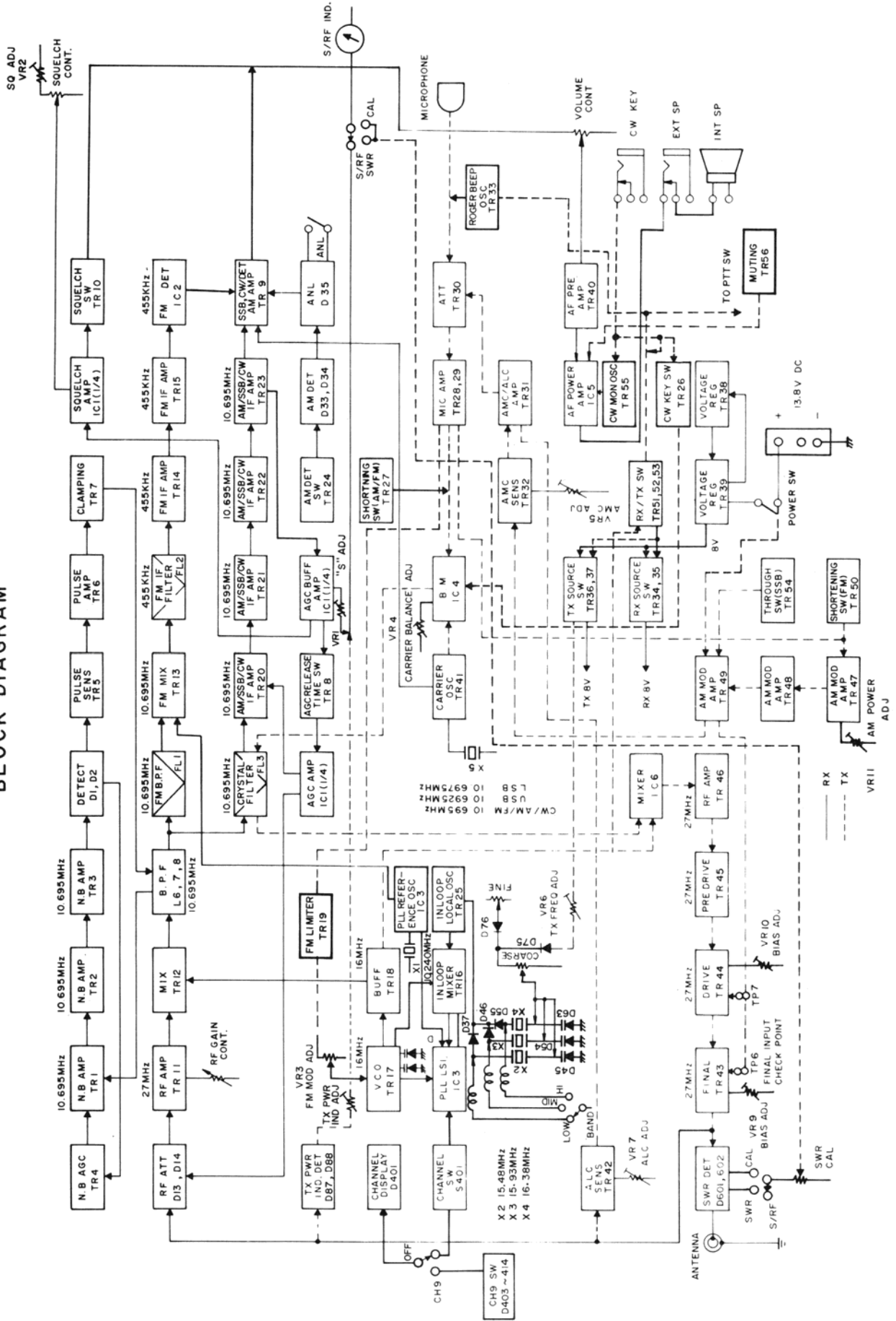
Early Version

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19	Copper Pattern SWR PCB CH SW PCB LED PCB
20	Parts Layout Sub. Assy PCB's Top View
21	Semi Conductor Pin Configuration
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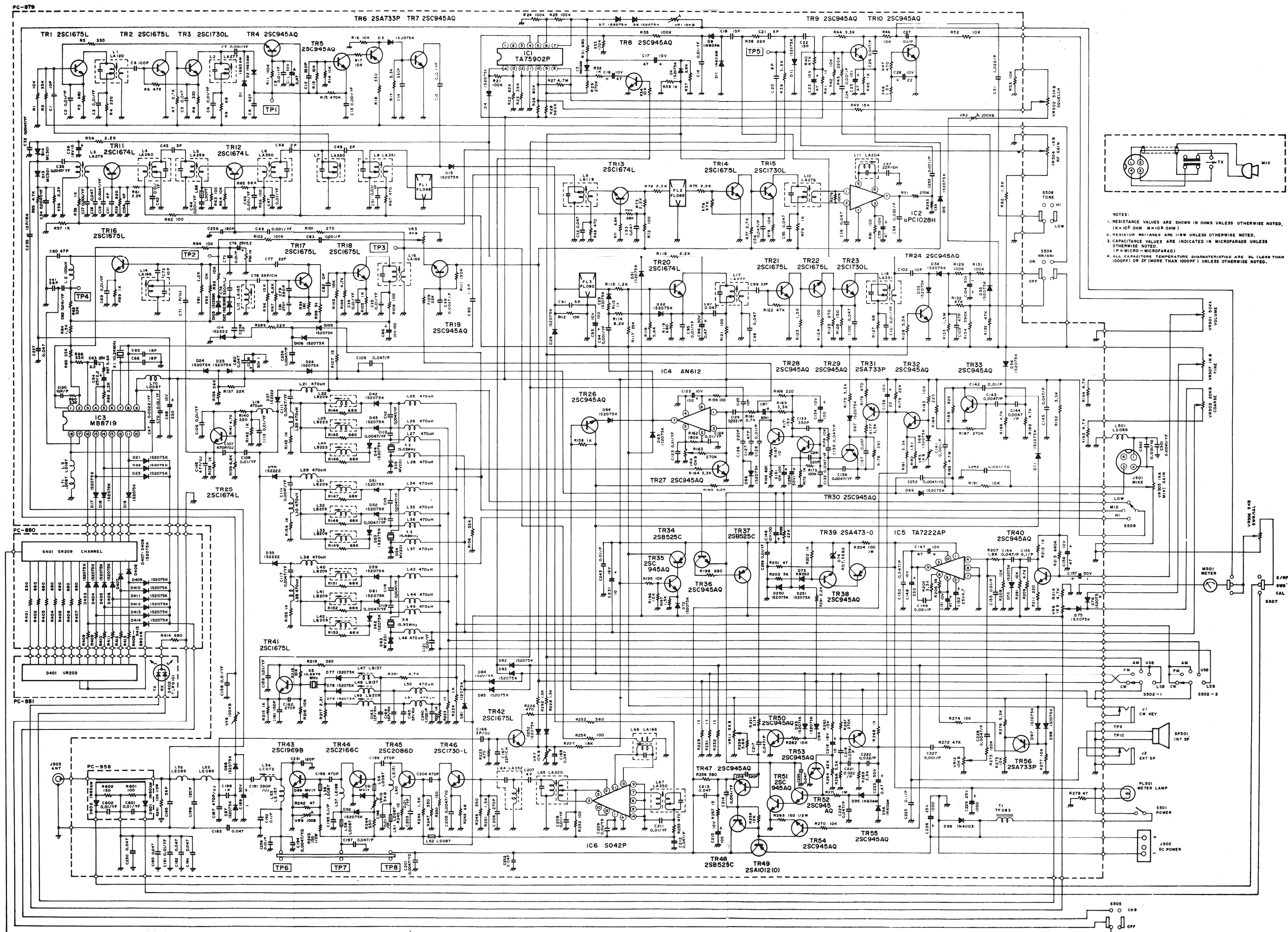
Late Version

32	Block Diagram
33-34	Schematic Diagram
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37-41	Alignment Procedure
42-43	Copper Pattern Main PCB
44-45	Parts Layout Main PCB Top View
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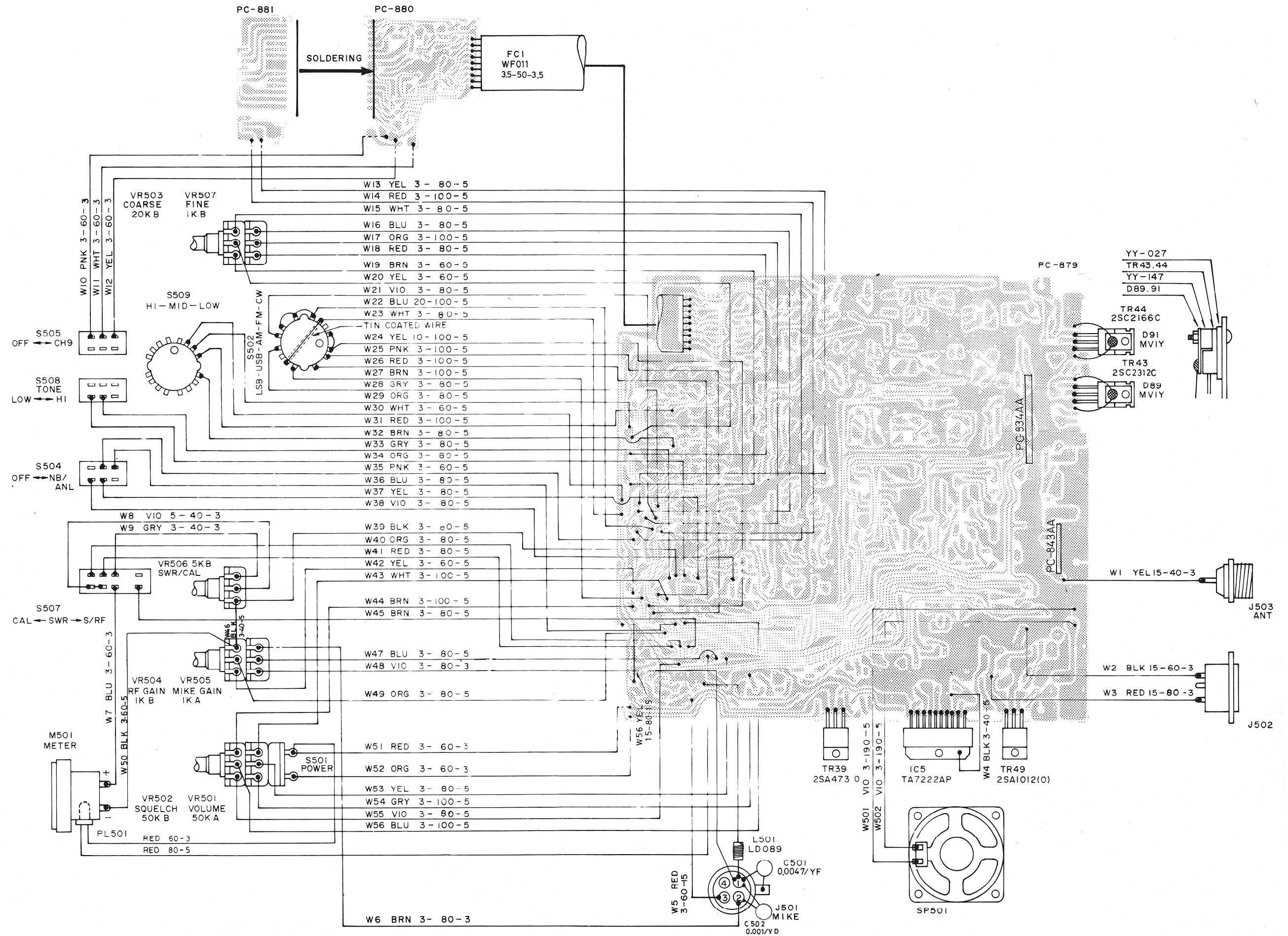
BLOCK DIAGRAM



SCHEMATIC DIAGRAM



WIRING DIAGRAM



CL48GTL DX ALIGNMENT PROCEDURE

ALIGNMENT OF PLL AND CARRIER OSCILLATOR SECTION.

1. Test Equipment Required:

- a) Oscilloscope
- b) DC Voltmeter
- c) Frequency Counter

Effectivity: S/N 03000001-4498
S/N 13000001-1504

EARLY
VERSION

2. Alignment Procedure.

STEP	PRESET TO	ADJUSTMENT	REMARKS
1	CH :19 RX Mode Mode AM Voice Lock: Center Band: MID	L14	Connect Oscilloscope to TP4 (lead of R83). Adjust for maximum indication on Oscilloscope.
2	Same as above, except: CH : 40	L15	Connect DC Voltmeter to TP2 (lead of R93). Adjust for 5.4V reading on DC Voltmeter.
3	Same as Step 1	L16	Connect Oscilloscope to TP3 (lead of R101). Adjust for maximum indication on Oscilloscope.
4	Same as Step 1	L31	Connect Frequency Counter to TP3 (lead of R101). Adjust for 16.490MHz + or - 20Hz.
5	Same as Step 1 CH : 40 Mode : USB	L32	Adjust for 16.4925MHz + or - 20Hz.
6	Same as Step 1 CH : 40 Mode : LSB	L33	Adjust for 16.4875MHz + or - 20Hz.
7	Same as Step 6, CH : 40 TX Mode	VR6	Adjust for 16.4875MHz + or - 20Hz.
8	Same as Step 1 CH : 40 Band : Low	L22	Adjust for 16.040MHz + or - 20Hz.

Note: Two TP4 are noted on procedure. One is R83 and the other one is R114.

C148GTL DX ALIGNMENT PROCEDURE

STEP	PRESET TO	ADJUSTMENT	REMARKS
9	Same as Step 8, CH : 40 Mode : USB	L23	Adjust for 16.0425MHz + or - 20Hz.
10	Same as Step 9, CH : 40 Mode : LSB	L24	Adjust for 16.0375MHz + or - 20Hz.
11	Same as Step 1 CH : 40 Band : HI	L40	Adjust for 16.940MHz + or - 20Hz.
12	Same as Step 11 CH : 40 Mode : USB	L41	Adjust for 16.9425MHz + or - 20Hz.
13	Same as Step 12 CH : 40 Mode : LSB	L42	Adjust for 16.9375MHz + or - 20Hz.
14	Same as Step 1 CH : 40 TX Mode	L47	Connect Frequency Counter to TP4 (R114). Adjust for 10.695MHz + or - 5Hz.
15	Same as Step 1 CH : 40 Mode : USB	L48	Connect Frequency Counter to TP5 (lead of R39). Adjust for 10.6925MHz +5Hz - 0Hz.
16	Same as Step 15 CH : 40 Mode : LSB	L49	Adjust for 10.6975MHz +0Hz -5Hz.

Note: Two TP4 are noted on Precedure. One is R83 and the other one is R114.

C148GLT DX ALIGNMENT PROCEDURE

ALIGNMENT OF RECEIVER PORTION

1. Test Equipment Required

- a) SG, 27MHz Band.
- b) Oscilloscope.
- c) AF VTVM (Across 8oz. speaker).
- d) Deviation Meter.

2. Alignment Procedure

STEP	PRESET TO	ADJUSTMENT	REMARKS
1	CH : 19 Band : Mid AM Mode Tone : HI NB/ANL : OFF AF VR : CW RF Gain: CW Coarse : Center SQ VR : CCW CH 9 SW: OFF		Set the VR settings as noted in left.
2	Same as Step 1	L4	Turn the Core of L4 to the bottom.
3	Same as Step 1	L3, L5, L6 L7, L8, L17, L18 and L4.	Adjust for maximum reading and readjust L4 for maximum reading.
4	Same as Step 1 except: NB/ANL : ON	L1 and L2	Set the SG on Mid, CH18, 27.175MHz (unit is CH19) with no modulation. Connect Oscilloscope to lead of D2 and adjust coils for maximum reading. Then set the level of SG to 5uV, then readjust this step (D2 is TP1).
5	Same as Step 1 except: SQ VR: CW	VR2	Set the SG to Mid, CH19, 27.185MHz, 30% AM modulation with 1000uV. Then turn the VR2, so that the AF signal will appear on Oscilloscope (Tight squelch Adj.).

C148GTL DX ALIGNMENT PROCEDURE

STEP	PRESET TO	ADJUSTMENT	REMARKS
6	Same as Step 1	VR11	Set the SG output level to 100uV with No-modulation. Then adjust VR1 for S-9 reading on radio's meter.
7	Same as step 1 except: Mode: FM	L9 and L10	Set the SG to 10uV with No-Modulation. Connect Oscilloscope to lead of R279, and adjust coils for maximum reading (Pin 1&2 of IC 2).
8	Same as Step 7	L11	Set the SG to 1mV with 1.5kHz deviation of 1kHz. Adjust L11 for maximum sign-wave output on Oscilloscope.

ALIGNMENT OF TRANSMITTER PORTION.

1. Test Equipment Required

- a) DC Ammeter.
- b) Power meter.
- c) RF VTVM
- d) Oscilloscope.
- e) Deviation Meter.
- f) 50 ohm Dummy Load.
- g) Frequency counter.

2. Alignment Procedure

STEP	PRESET TO	ADJUSTMENT	REMARKS
1	CH : 19 TX Mode Mode : USB Mic Gain: Min.	VR10	Remove PC-843 (PCB) and connect Ammeter to TP8 (+) and TP7 (-). Adjust for 8mA reading.
2	Same as Step 1	VR9	Connect DC Ammeter to TP8 (+) and TP6 (-) and adjust for 100mA reading.

C148GTL DX ALIGNMENT PROCEDURE

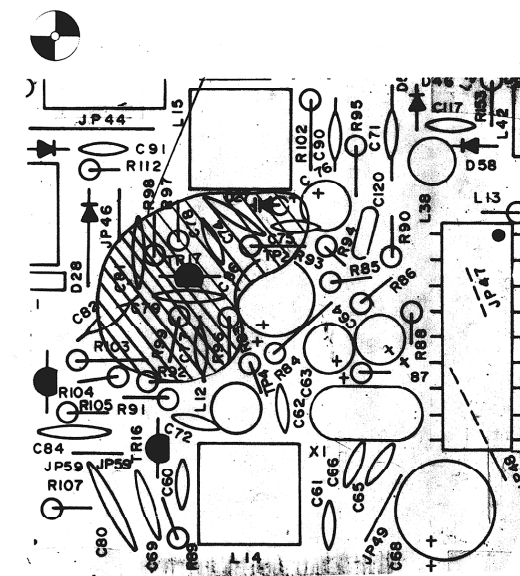
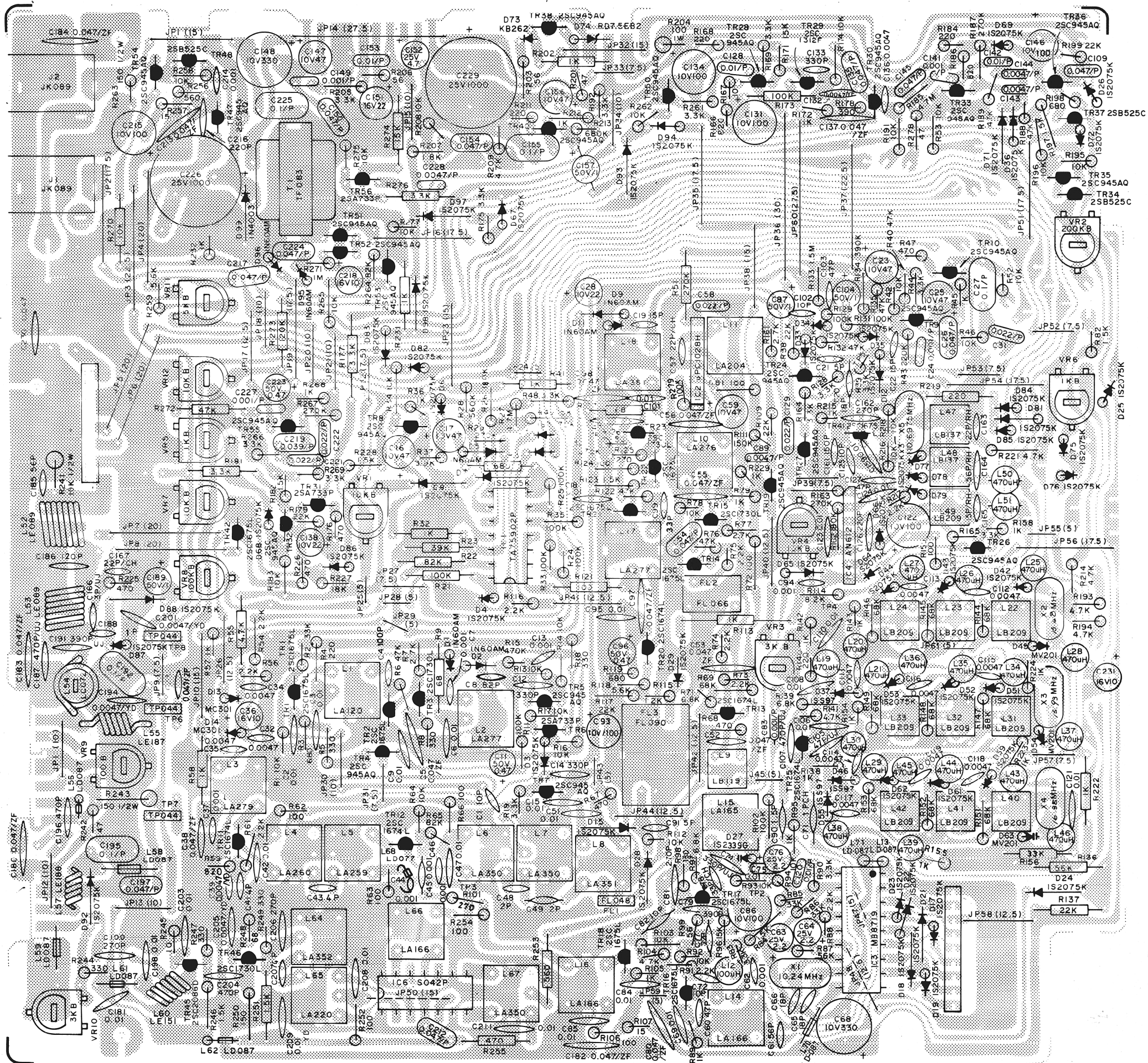
STEP	PRESET TO	ADJUSTMENT	REMARKS
3	Same as Step 1, except: Mic Input: 30mV 1KHz	L65	Restore PC-834. Turn the core to the bottom.
4	Same as Step 3	L64, L66, and L67.	Adjust for maximum reading on RF VTVM (across 50ohm Dummy Load).
5	Same as Step 3	L65	Set the Band: HI, CH 40. And adjust for maximum reading on RF VTVM. Then turn the Band: Low, CH 1. Readjust for equalized output power.
6	Same as Step 1, except: Mode : AM Mic Input 90%	L54	Adjust for maximum reading on RF VTVM (Final Output Adj.).
7	Same as Step 3	VR7	Adjust ALC for 24.5V reading on RF VTVM (12w/50ohm Single tone).
8	Same as Step 1	VR4	Adjust for minimum reading on Oscilloscope for both USB and LSB (minimum carrier Adj.).
9	Same as Step 1, except: Mode : AM	VR11	Adjust for 5.0W reading on RF Power Meter (AM carrier output adj.).
10	Mic Input: 30mV 1KHz	VR8	Set the meter SW to S/RF position. Adjust the VR8 so that the radio's meter reads 5W (between Green zone and Red zone), "S" meter adj.
11	Same as Step 1, except: AM Mode Mic Input: 30mV 1KHz	VR5	Adjust for 90% modulation on Oscilloscope (AM modulation adj.).

CI48GTL DX ALIGNMENT PROCEDURE

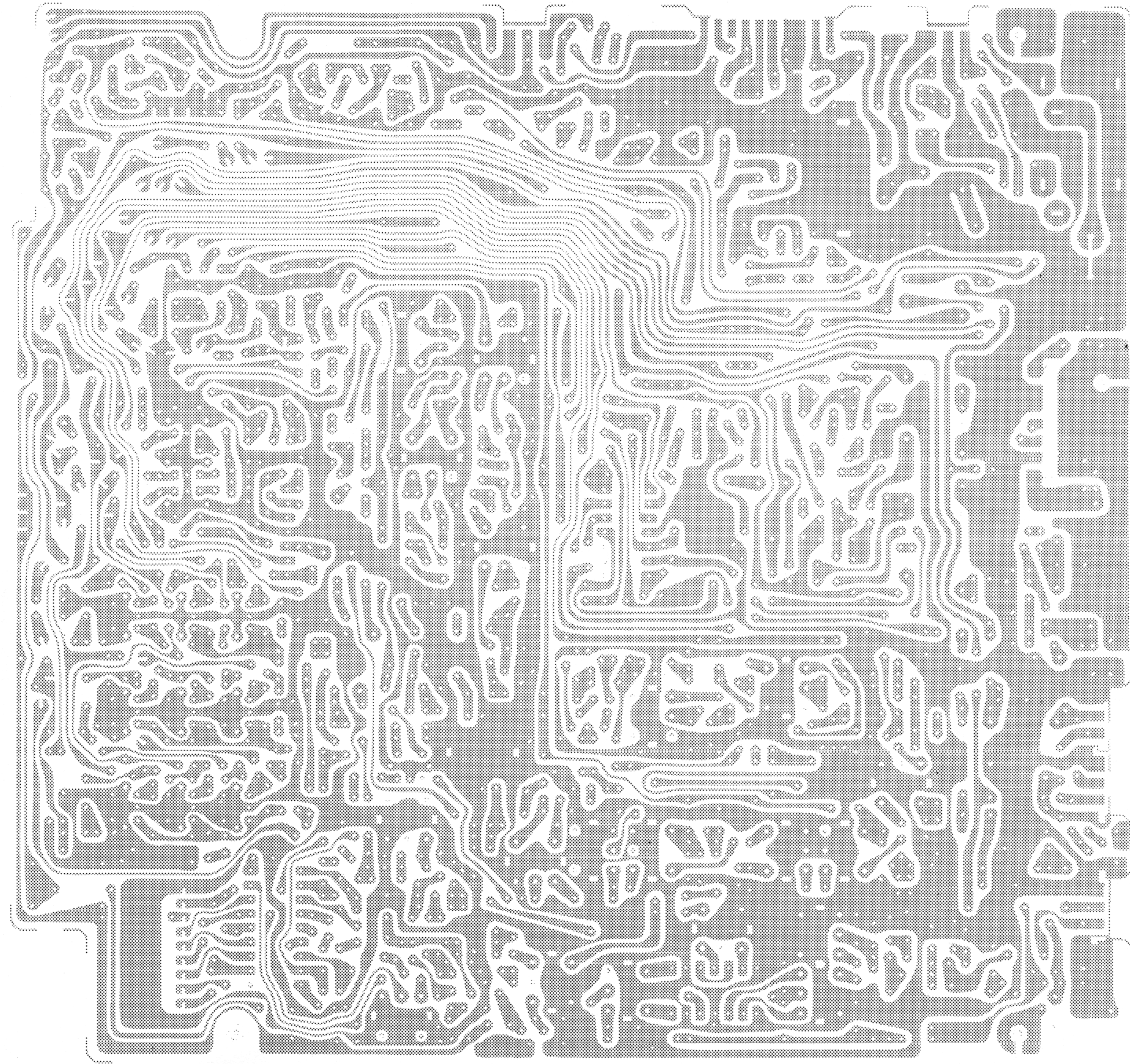
STEP	PRESET TO	ADJUSTMENT	REMARKS
12	Same as Step 1, except: Mode : FM Band : Low 40 Mic Input: 30mV 1kHz	VR3	Adjust for 4.5kHz deviation (FM Deviation Adj.).
13	Same as Step 12 except: Mode : CW	VR12	Adjust 0.2V reading on AF VTVM when CW key is keyed. Side tone adj.
14	Same as Step 1, except: CH 9 CW: CH 9		Check that the output frequency is 27.065 MHz on Frequency Counter.

Parts Layout Top View

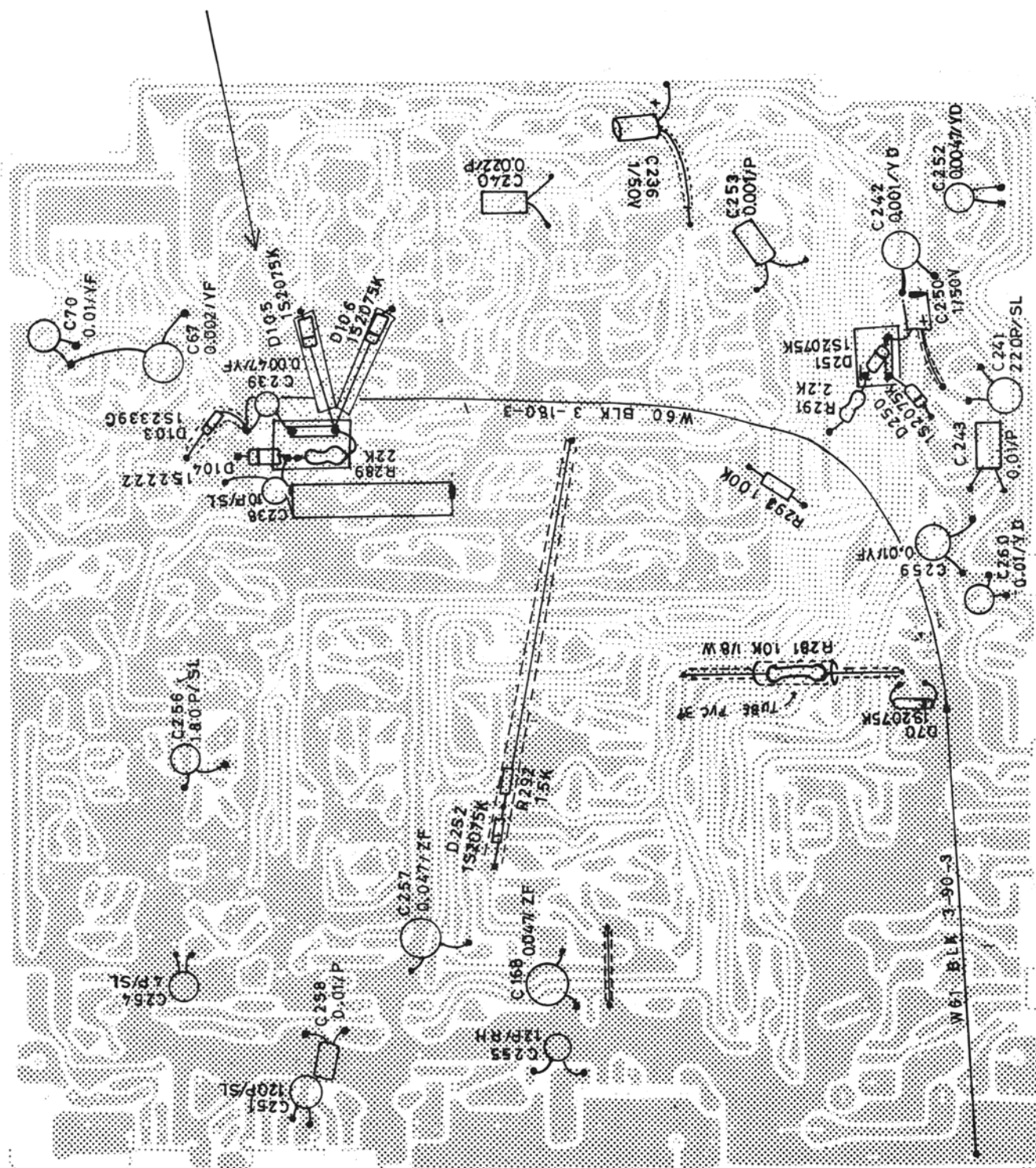
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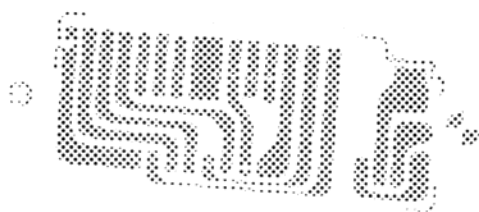
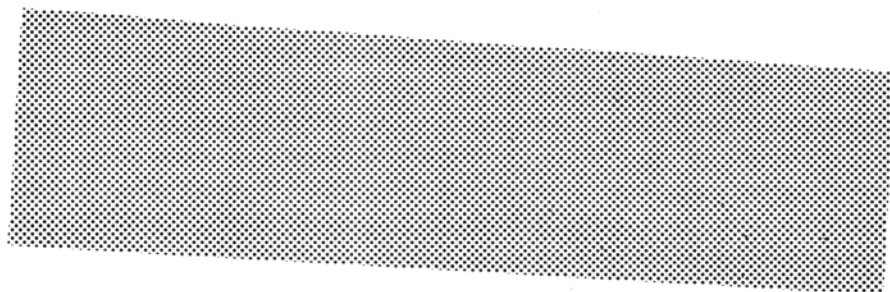
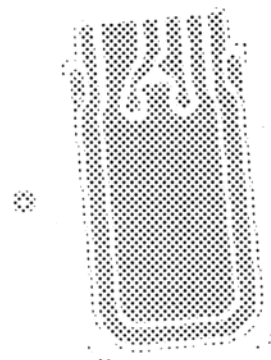
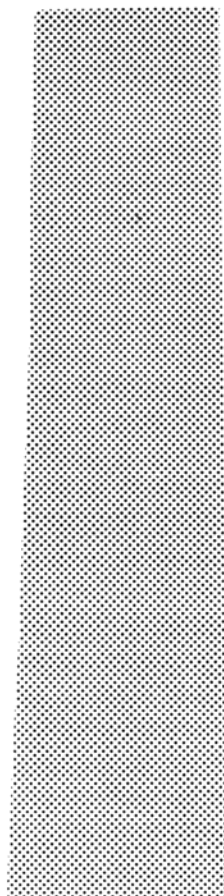
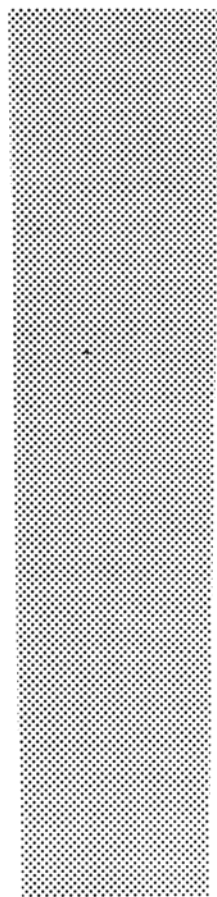


PARTS LAYOUT (Top View)



PC-879AB

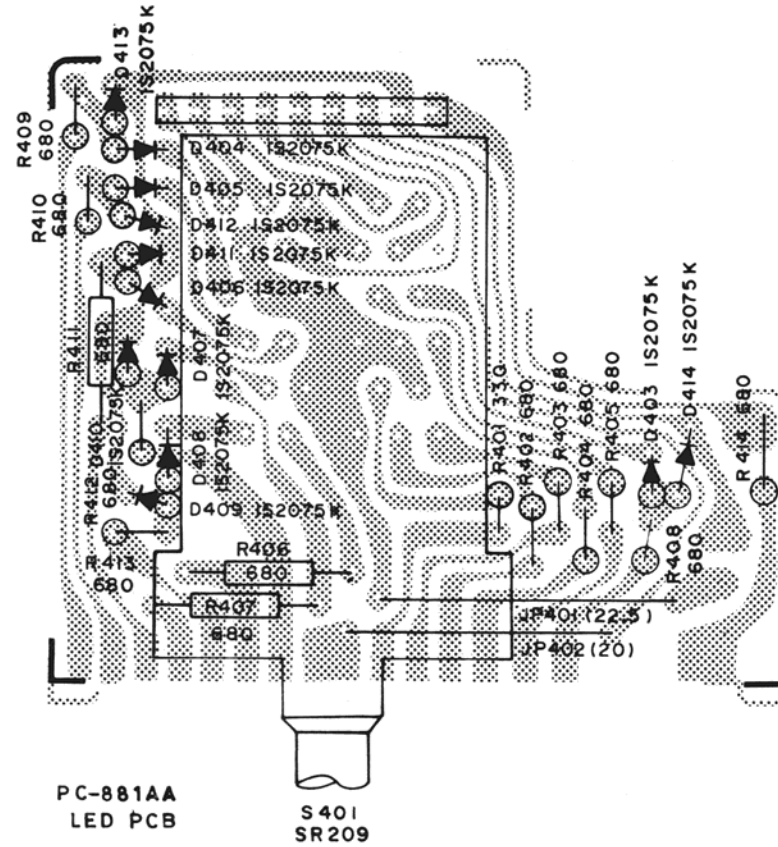




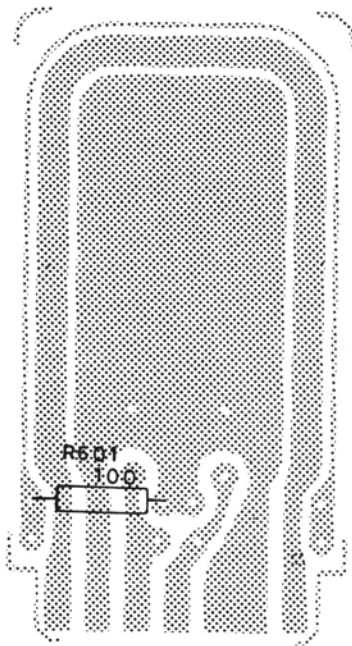
PARTS LAYOUT SUB. ASSY. PCB's (Top View)

E24-3326

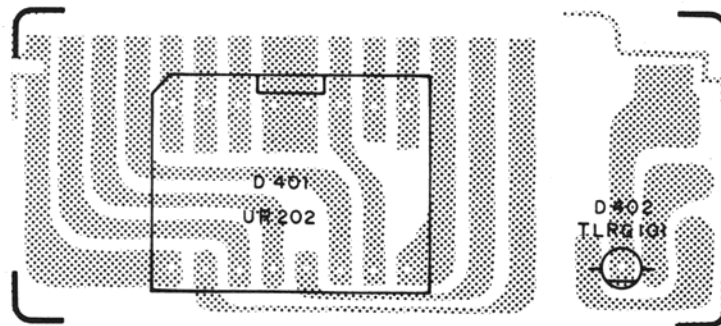
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CH SW PCB



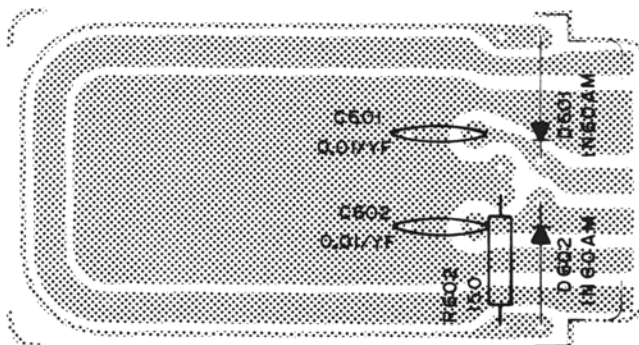
PC 958AA



PC-881AA
LED PCB



PC-958AA SWR PCB

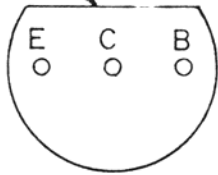


SEMI CONDUCTOR PIN CONFIGURATION

TRANSISTOR

NOTE: B: BASE
E: EMITTER
C: COLLECTOR

MARKING
SIDE



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2SC1674L
2SC1675L
2SC1730L
2SA733P



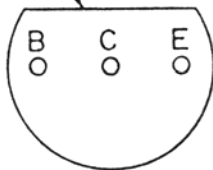
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1S2075K
MC-301

1S2688EB
MV-201

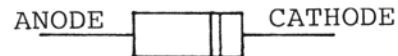
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KB262

MARKING
SIDE

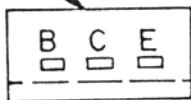


2SC1312F
2SC2086D
2SB525C



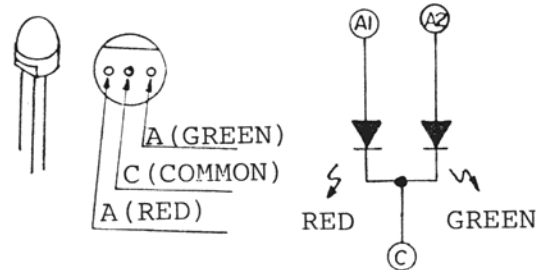
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MARKING
SIDE



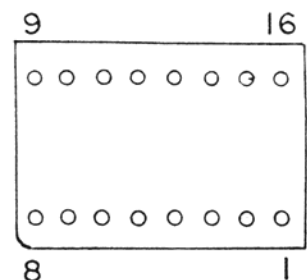
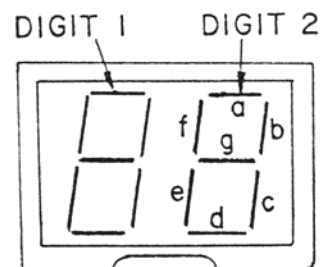
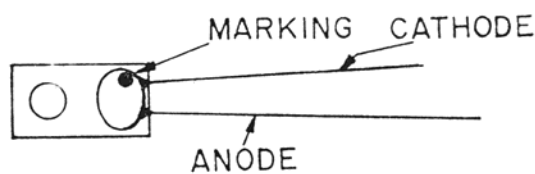
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2SA4730
2SA10120

TLRG-101



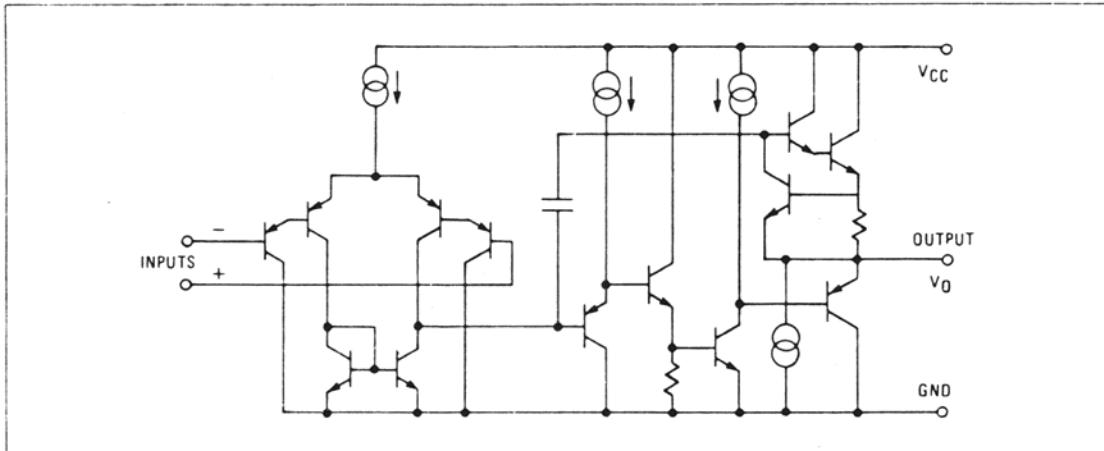
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MV1Y

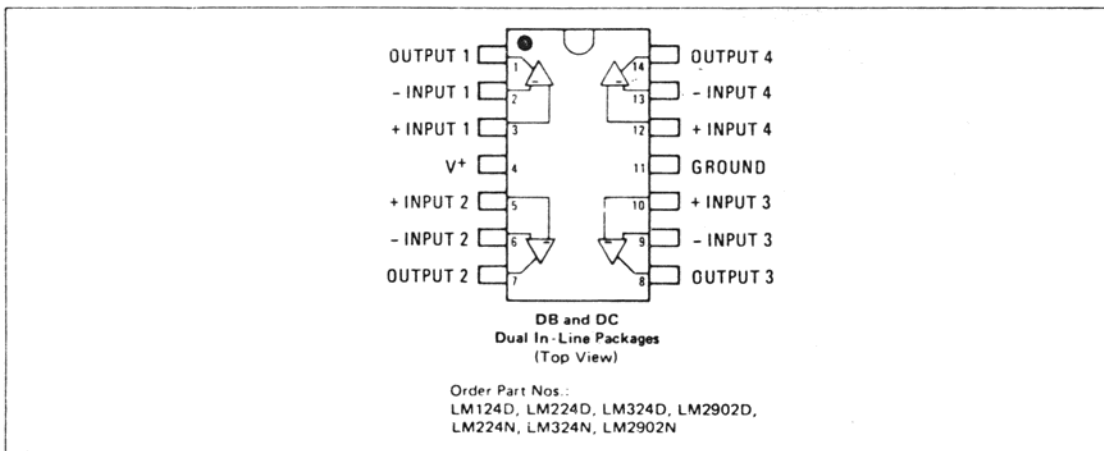


INTERNAL DIAGRAM - IC's

SCHEMATIC DIAGRAM

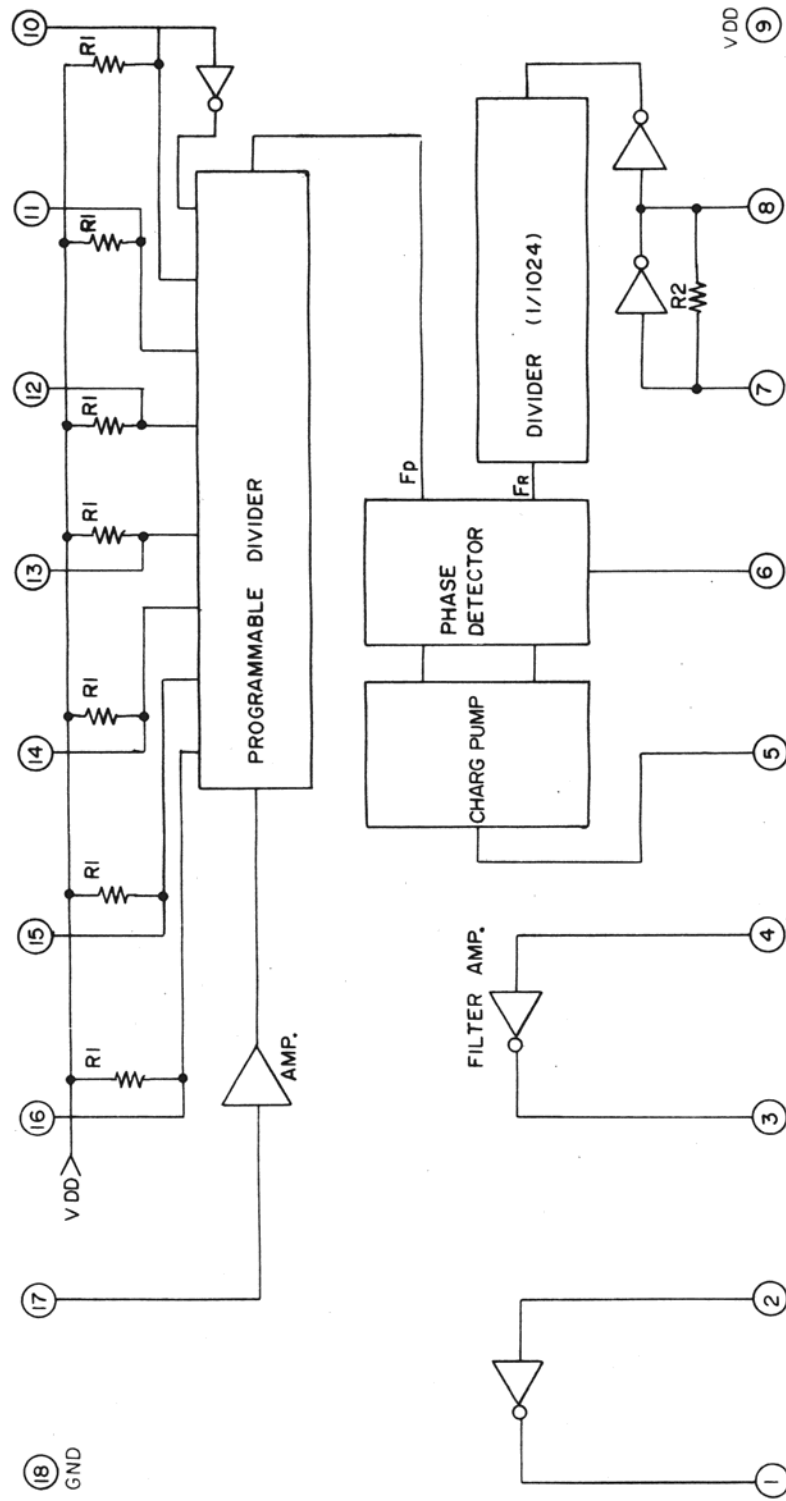


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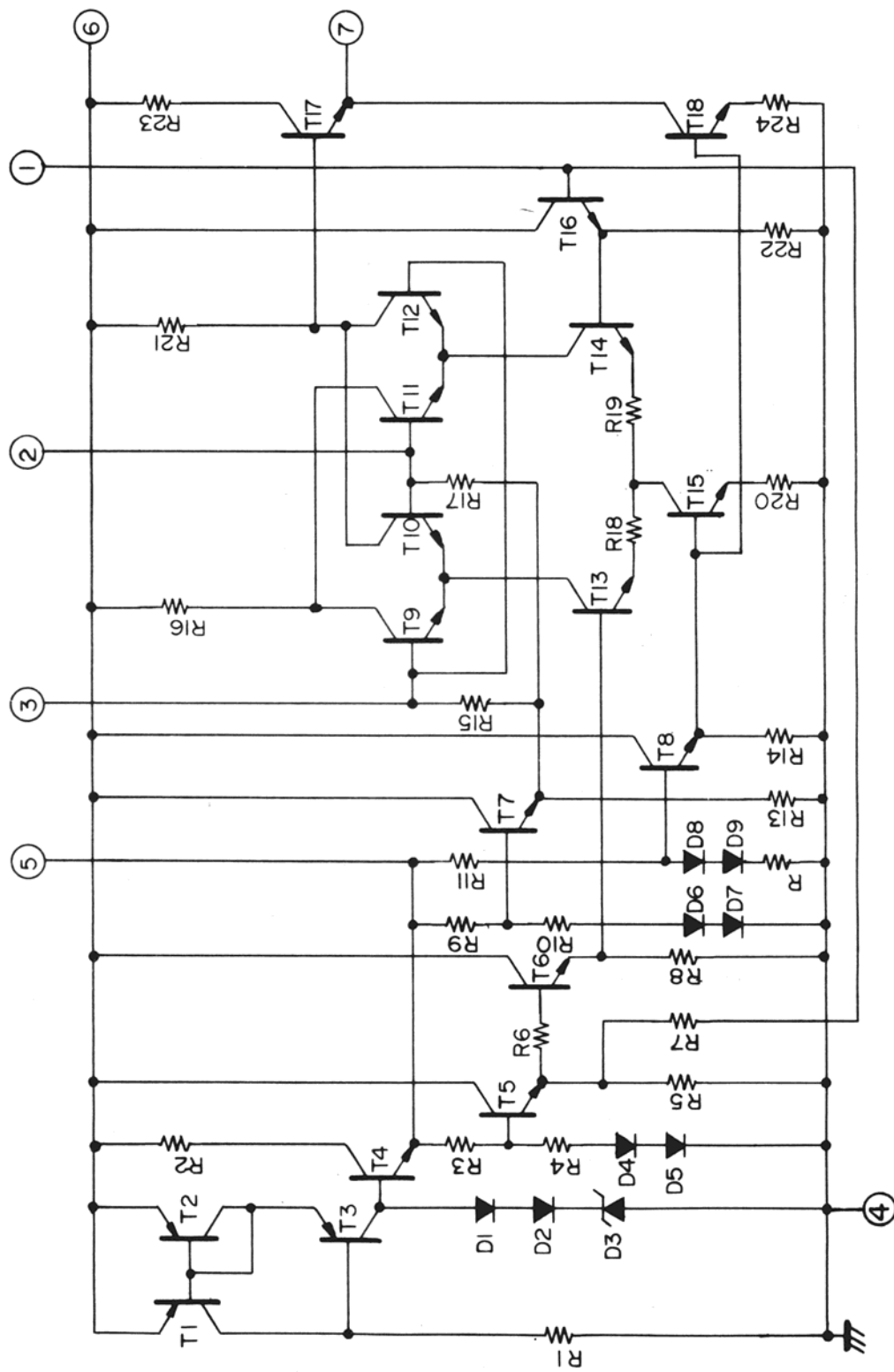


INTERNAL DIAGRAM - IC's

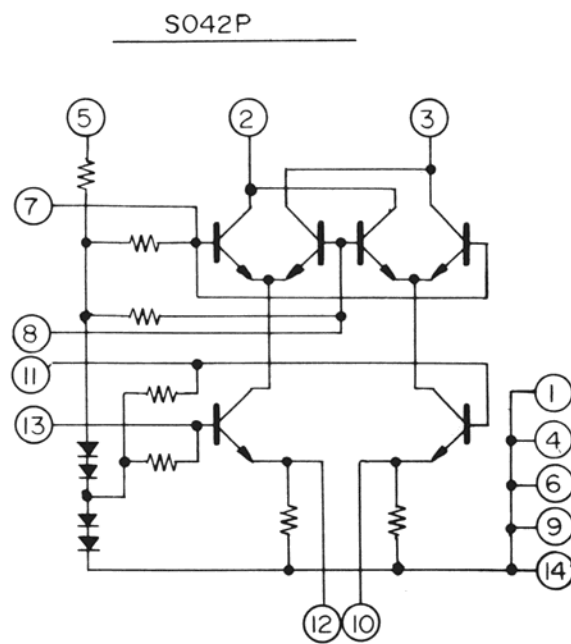
MB8719



INTERNAL DIAGRAM - IC's



INTERNAL DIAGRAM - IC's



VOLTAGE CHART

148GTL-DX Early Version

Mode	Base	Collector	Emitter
TR 1	CW 0 FM 0 AM 0 USB 0 LSB 0 NB/ON 1.8	0 0 0 0 0 7.8	0 0 0 0 0 1.1
TX	CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
TR 2	CW 0 FM 0 AM 0 USB 0 LSB 0 NB/ON 0.7	0 0 0 0 0 2.5	0 0 0 0 0 0
TX	CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
TR 3	CW 0 FM 0 AM 0 USB 0 LSB 0 NB/ON 2.6	0 0 0 0 0 7.8	0 0 0 0 0 1.8
TX	CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
TR 4	CW 0 FM 0 AM 0 USB 0 LSB 0 NB/ON 0	0 0 0 0 0 8.2	0 0 0 0 0 1.1
TX	CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
TR 5	CW 0 FM 0 AM 0 USB 0 LSB 0 NB/ON 0	0 0 0 0 0 7.6	0 0 0 0 0 0
TX	CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
TR 6	CW 0 FM 0 AM 0 USB 0 LSB 0 NB/ON 7.6	0 0 0 0 0 11	0 0 0 0 0 8.3
TX	CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
TR 7	CW 0 FM 0 AM 0 USB 0 LSB 0 NB/ON 0	0 0 0 0 0 0	0 0 0 0 0 0
TX	CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
TR 8	CW 0 FM 0 AM 0 USB 0 LSB 0 NB/ON 0.7	0 0 0 0 0 0	0 0 0 0 0 0
TX	CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
TR 9	CW 1.3 FM 1.3 AM 1.3 USB 1.3 LSB 1.3 NB/ON 1.3	5.0 5.0 5.0 5.0 5.0 5.0	0.7 0.7 0.7 0.7 0.7 0.7
TX	CW 1.3 FM 1.3 AM 1.3 USB 1.3 LSB 1.3	5.0 5.0 5.0 5.0 5.0	0.7 0.7 0.7 0.7 0.7
TR 10	CW 0 FM 0 AM 0 USB 0 LSB 0 SQ(CW) 0.7	0 0 0 0 0 0	0 0 0 0 0 0
TX	CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
TR 11	CW 2.1 FM 2.1 AM 2.1 USB 2.1 LSB 2.1 NB/ON 0	7.8 7.8 7.8 7.8 7.8 0	1.4 1.4 1.4 1.4 1.4 0
TX	CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
TR 12	CW 1.0 FM 1.0 AM 1.0 USB 1.0 LSB 1.0 NB/ON 0	7.9 7.9 7.9 7.9 7.9 0	0.3 0.3 0.3 0.3 0.3 0
TX	CW 0 FM 0 AM 0 USB 0 LSB 0	0 0 0 0 0	0 0 0 0 0
TR 13	CW 0 FM 0.7 AM 0 USB 0 LSB 0 NB/ON 0.6	0 7.7 0 0 0 7.6	0 0.1 0 0 0 0.1
TX	CW 0 FM 0.6 AM 0 USB 0 LSB 0	0 7.6 0 0 0 0	0 0.1 0 0 0 0
TR 14	CW 0 FM 0.7 AM 0 USB 0 LSB 0 NB/ON 0.7	0 2.4 0 0 0 2.1	0 0 0 0 0 0
TX	CW 0 FM 0.7 AM 0 USB 0 LSB 0	0 2.1 0 0 0 0	0 0 0 0 0 0
TR 15	CW 0 FM 2.4 AM 0 USB 0 LSB 0 NB/ON 2.1	0 8.1 0 0 0 7.9	0 1.7 0 0 0 1.8
TX	CW 0 FM 2.1 AM 0 USB 0 LSB 0	0 7.9 0 0 0 0	0 1.8 0 0 0 0
TR 16	CW 1.4 FM 1.4 AM 1.4 USB 1.4 LSB 1.4 NB/ON 1.4	4.5 4.5 4.5 4.5 4.5 4.5	1.2 1.2 1.2 1.2 1.2 1.1
TX	CW 1.4 FM 1.4 AM 1.4 USB 1.4 LSB 1.4	4.5 4.5 4.5 4.5 4.5	1.1 1.1 1.1 1.1 1.1
TR 17	CW 1.4 FM 1.4 AM 1.4 USB 1.4 LSB 1.4 NB/ON 1.4	4.6 4.6 4.6 4.6 4.6 4.6	1.1 1.1 1.1 1.1 1.1 1.1
TX	CW 1.4 FM 1.4 AM 1.4 USB 1.4 LSB 1.4	4.6 4.6 4.6 4.6 4.6	1.1 1.1 1.1 1.1 1.1

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Mode	Base	Collector	Emitter
TR 16	TX CW L FM O AM W USB LSB	1.4 4.5 4.5 4.5 4.5 4.5	1.2 1.2 1.2 1.2 1.2 1.2
	CW M FM I AM D USB LSB	1.4 4.5 4.5 4.5 4.5	1.1 1.1 1.1 1.1 1.1
	CW H FM I AM USB LSB	1.4 4.6 4.6 4.6 4.6	1.1 1.1 1.1 1.1 1.1
TR 17	RX CW L FM O AM W USB LSB	2.1 7.3 7.3 7.3 7.3 7.3	1.5 1.5 1.5 1.5 1.5 1.5
	CW M FM I AM D USB LSB	2.1 7.3 7.3 7.3 7.3	1.5 1.5 1.5 1.5 1.5
	CW H FM I AM USB LSB	2.1 7.4 7.4 7.4 7.4	1.5 1.5 1.5 1.5 1.5
TR 18	RX CW L FM O AM W USB LSB	2.3 7.8 7.8 7.8 7.8 7.8	1.9 1.9 1.9 1.9 1.9 1.9
	CW M FM I AM D USB LSB	2.3 7.8 7.8 7.8 7.8	1.9 1.9 1.9 1.9 1.9
	CW H FM I AM USB LSB	2.5 7.8 7.8 7.8 7.8	1.9 1.9 1.9 1.9 1.9
TR 19	RX CW L FM O AM W USB LSB	0 6.5 0 0 0 0	0 5.9 0 0 0 0
	CW M FM I AM D USB LSB	0 6.4 0 0 0 0	0 6.0 0 0 0 0
	CW H FM I AM USB LSB	0 0 0 0 0	0 0 0 0 0
TR 20	RX CW L FM O AM W USB LSB	1.6 8.1 8.1 8.1 8.1 8.1	0.9 0.9 0.9 0.9 0.9 0.9
	CW M FM I AM D USB LSB	2.3 8.2 8.2 8.2 8.2	7.4 7.4 7.4 7.4 7.4
TR 21	RX CW L FM O AM W USB LSB	0.7 3.6 3.6 3.6 3.6 3.6	0 0 0 0 0 0
	CW M FM I AM D USB LSB	0 0.1 0.1 0.1 0.1	0 0 0 0 0
TR 22	RX CW L FM O AM W USB LSB	3.6 7.1 7.1 7.1 7.1 7.1	3.0 3.0 3.0 3.0 3.0 3.0
	CW M FM I AM D USB LSB	0.1 0.1 0.1 0.1 0.1	0 0 0 0 0
TR 23	RX CW L FM O AM W USB LSB	3.0 7.2 7.2 7.2 7.2 7.2	2.3 2.3 2.3 2.3 2.3 2.3
	CW M FM I AM D USB LSB	0 0.1 0.1 0.1 0.1	0 0 0 0 0
TR 24	RX CW L FM O AM W USB LSB	0 1.0 1.0 1.0 1.0 1.0	0 0 0 0 0 0
	CW M FM I AM D USB LSB	0 0 0 0 0	0 0 0 0 0
TR 25	RX CW L FM O AM W USB LSB	3.8 6.5 6.5 6.5 6.5 6.5	3.1 3.1 3.1 3.1 3.1 3.1
	CW M FM I AM D USB LSB	3.8 6.5 6.5 6.5 6.5	3.1 3.1 3.1 3.1 3.1
TR 26	RX CW L FM O AM W USB LSB	8.2 0 0 0 0 0	7.8 0.2 0.2 0.2 0.2 0.2
	CW M FM I AM D USB LSB	8.2 0 0 0 0	7.6 0.2 0.2 0.1 0.1
TR 27	RX CW L FM O AM W USB LSB	0.7 0 0 0 0 0	0 0 0 0 0 0
	CW M FM I AM D USB LSB	0.7 0 0 0 0	0 0 0 0 0

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	Mode	Base	Collector	Emitter
TR 28	RX	1.7	3.6	1.1
	CW	1.7	3.6	1.1
	FM	1.7	3.6	1.1
	AM	1.7	3.6	1.1
	USB	1.7	3.6	1.1
	LSB	1.7	3.6	1.1
TR 29	RX	1.7	3.6	1.1
	CW	1.7	3.6	1.1
	FM	1.7	3.6	1.1
	AM	1.7	3.6	1.1
	USB	1.7	3.6	1.1
	LSB	1.7	3.6	1.1
TR 30	RX	1.0	1.7	0.4
	CW	1.0	1.7	0.4
	FM	1.0	1.7	0.4
	AM	1.0	1.7	0.4
	USB	1.0	1.7	0.4
	LSB	1.0	1.7	0.4
TR 31	RX	8.3	0.7	8.3
	CW	8.3	0.7	8.3
	FM	8.3	0.7	8.3
	AM	8.3	0.7	8.3
	USB	8.3	0.7	8.3
	LSB	8.3	0.7	8.3
TR 32	RX	1.1	8.3	4.1
	CW	1.1	8.3	4.1
	FM	1.1	8.3	4.1
	AM	1.1	8.3	4.1
	USB	1.1	8.3	4.1
	LSB	1.1	8.3	4.1
TR 33	RX	0.7	1.5	0
	CW	0.7	1.5	0
	FM	0.7	1.5	0
	AM	0.7	1.5	0
	USB	0.7	1.5	0
	LSB	0.7	1.5	0
TR 34	RX	7.6	8.2	8.3
	CW	7.6	8.2	8.3
	FM	7.6	8.2	8.3
	AM	7.6	8.2	8.3
	USB	7.6	8.2	8.3
	LSB	7.6	8.2	8.3
TR 35	RX	4.1	7.6	3.5
	CW	4.1	7.6	3.5
	FM	4.1	7.6	3.5
	AM	4.1	7.6	3.5
	USB	4.1	7.6	3.5
	LSB	4.1	7.6	3.5
TR 36	RX	5.5	7.8	7.5
	CW	5.5	7.8	7.5
	FM	5.5	7.8	7.5
	AM	5.5	7.8	7.5
	USB	5.5	7.8	7.5
	LSB	5.5	7.8	7.5
TR 37	RX	7.8	0	8.2
	CW	7.8	0	8.2
	FM	7.8	0	8.2
	AM	7.8	0	8.2
	USB	7.8	0	8.2
	LSB	7.8	0	8.2
TR 38	RX	1.6	13.0	1.0
	CW	1.6	13.0	1.0
	FM	1.6	13.0	1.0
	AM	1.6	13.0	1.0
	USB	1.6	13.0	1.0
	LSB	1.6	13.0	1.0
TR 39	RX	13.0	8.3	13.8
	CW	13.0	8.3	13.8
	FM	13.0	8.3	13.8
	AM	13.0	8.3	13.8
	USB	13.0	8.3	13.8
	LSB	13.0	8.3	13.8
TR 40	RX	0.9	3.2	0.3
	CW	0.9	3.2	0.3
	FM	0.9	3.2	0.3
	AM	0.9	3.2	0.3
	USB	0.9	3.2	0.3
	LSB	0.9	3.2	0.3
TR 41	RX	3.1	6.9	2.6
	CW	3.1	6.9	2.6
	FM	3.1	6.9	2.6
	AM	3.1	6.9	2.6
	USB	3.1	6.9	2.6
	LSB	3.1	6.9	2.6
TR 42	RX	0	0.8	7.0
	CW	0	0.8	7.0
	FM	0	0.8	7.0
	AM	0	0.8	7.0
	USB	0	0.8	7.0
	LSB	0	0.8	7.0
TR 43	RX	0	13.2	0
	CW	0	13.2	0
	FM	0	13.2	0
	AM	0	13.2	0
	USB	0	13.2	0
	LSB	0	13.2	0

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	Mode	Base	Collector	Emitter
TR 44	RX			
	CW	0	13.2	0
	FM	0	13.2	0
	AM	0	13.2	0
	USB	0	13.8	0
TR 45	TX			
	CW	0.6	12.4	0
	FM	0.5	10.2	0
	AM	0.5	10.2	0
	USB	0.6	13.7	0
TR 46	RX			
	CW	0	0	0
	FM	0	0	0
	AM	0	0	0
	USB	0	0	0
TR 47	TX			
	CW	1.4	8.1	0.8
	FM	1.3	7.8	0.8
	AM	1.3	7.8	0.8
	USB	1.4	8.1	0.8

	Mode	Base	Collector	Emitter
TR 48	RX			
	CW	13.2	13.2	13.3
	FM	13.2	13.2	13.3
	AM	13.2	13.2	13.3
	USB	13.8	13.8	13.1
TR 49	TX			
	CW	12.4	12.4	13.1
	FM	11.3	11.3	11.8
	AM	11.3	11.3	11.8
	USB	13.7	13.7	13.0
TR 50	RX			
	CW	0.7	0	0
	FM	0.7	0	0
	AM	0	0	0
	USB	0.6	0	0
TR 51	TX			
	CW	0	0.7	0
	FM	0	0.7	0
	AM	0	0.7	0
	USB	0	0.7	0

	Mode	Base	Collector	Emitter
TR 52	RX			
	CW	0	7.5	0
	FM	0	7.5	0
	AM	0	7.5	0
	USB	0	7.5	0
TR 53	TX			
	CW	0	0.7	0
	FM	0	0.7	0
	AM	0	0.7	0
	USB	0	0.7	0
TR 54	RX			
	CW	0	13.3	0
	FM	0	13.3	0
	AM	0	13.3	0
	USB	6.5	13.1	5.8
TR 55	TX			
	CW	0	13.1	0
	FM	0	11.8	0
	AM	0	11.8	0
	USB	6.5	13.0	5.8

	Mode	Base	Collector	Emitter
TR 56	RX			
	CW	7.7	1.1	6.2
	FM	7.6	1.1	6.2
	AM	7.6	1.1	6.2
	USB	7.6	1.1	6.2
TR 57	TX			
	CW	7.7	1.1	6.2
	FM	4.0	4.6	4.6
	AM	4.0	4.6	4.6
	USB	4.0	4.6	4.6

VOLTAGE CHART

	Mode	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
IC 1	RX	CW	-	-	-	8.3	0	0	0	2.8	1.4	0	0.3	0.3	0.6						
			FM	-	-	8.3	0.1	0.1	0.2	0	2.8	1.4	0	0.3	0.3	0.6					
			AM	-	-	8.3	0	0	0	0	2.8	1.4	0	0.3	0.3	0.6					
			USB	-	-	8.3	0	0	0	0	2.8	1.4	0	0.3	0.3	0.6					
			LSB	-	-	8.3	0	0	0	0	2.8	1.4	0	0.3	0.3	0.6					
SQ (CW)	-	-	-	-	-	-	-	6.9	-	4.0	-	-	-	-	-	-	-	-			
	CW	-	-	-	8.3	0	0	0	0	2.8	1.0	0	0.3	0.3	0.6						
	FM	-	-	-	8.0	0	0	0	0	2.8	1.0	0	0.3	0.3	0.6						
	AM	-	-	-	8.0	0	0	0	0	2.8	1.0	0	0.3	0.3	0.6						
	USB	-	-	-	8.3	0	0	0	0	2.8	1.0	0	0.3	0.3	0.6						
LSB	-	-	-	8.0	0	0	0	0	0	2.8	1.0	0	0.3	0.3	0.6						
	IC 2	RX	CW	0	0	1.9	0	0.6	0.6	0											
	FM	1.3	1.3	7.1	0	3.2	3.3	0													
	AM	0	0	0	0	0	0	0													
	USB	0	0	1.9	0	0.6	0.6	0													
LSB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	CW	0	0	1.9	0	0.6	0.6	0													
	FM	1.3	1.4	6.8	0	3.3	3.3	4.3													
	AM	0	0	0	0	0	0	0													
	USB	0	0	1.9	0	0.6	0.6	0													
LSB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	CW	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
	FM	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
	AM	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
	USB	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
TX	CW	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
		FM	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		AM	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		I USB	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		D USB	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
LSB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	CW	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
	FM	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
	AM	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
	USB	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
IC 3 (con't)	RX	CW	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
			FM	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0
			AM	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0
			USB	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0
			LSB	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0
TX	CW	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
		FM	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		AM	3.0	4.5	5.9	3.3	3.3	8.0	4.5	4.9	7.8	-	8.0	0	0	7.9	0.5	7.9	3.8	0	
		I USB	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
		D USB	3.0	4.6	6.1	3.4	3.4	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
IC 4	RX	CW	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0	
			FM	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0
			AM	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0
			I USB	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0
			D USB	4.2	4.3	4.4	3.8	3.8	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0
LSB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	CW	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
	FM	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
	AM	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
	USB	3.4	4.5	5.5	3.6	3.6	8.2	4.5	4.9	8.2	-	8.2	0	0	8.2	0.5	8.2	3.8	0		
TX	CW	3.0	3.3	3.3	0	5.9	7.4	7.0													
		FM	0	3.3	3.3	0	5.8	7.0	3.7												
		AM	0	3.3	3.3	0	5.8	7.0	3.7												
		I USB	2.9	3.3	3.3	0	5.9	7.4	4.0												
		D USB	2.9	3.3	3.3	0	5.9	7.4	4.0												

VOLTAGE CHART

	Mode	1	2	3	4	5	6	7	8	9	10	11	12	13	14
IC 5	RX	13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1				
		13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1				
		13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1				
		13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1				
		13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1				
	TX	13.7	6.6	0	0	1.1	1.1	0	0	6.9	13.0				
		13.4	6.0	0	0.4	1.8	1.8	0	0	0	10.9				
		13.4	6.0	0	0.4	1.8	1.8	0	0	0	10.9				
		13.7	6.6	0	0.3	1.8	1.8	0	0	0	11.4				
		13.7	6.6	0	0.3	1.8	1.8	0	0	0	11.4				
IC 6	RX	0	0	0	0	0	0	0	0	0	0	-0.5	0	-0.5	0
		0	0	0	0	0	0	0	0	0	0	-0.5	0	-0.5	0
		0	0	0	0	0	0	0	0	0	0	-0.5	0	-0.5	0
		0	0	0	0	0	0	0	0	0	0	-0.5	0	-0.5	0
		0	0	0	0	0	0	0	0	0	0	-0.5	0	-0.5	0
	TX	0	7.8	7.8	0	7.9	0	2.8	2.8	0	1.3	1.3	1.3	1.3	0
		0	7.8	7.8	0	7.8	0	2.7	2.7	0	1.3	1.3	1.3	1.3	0
		0	7.8	7.8	0	7.8	0	2.7	2.7	0	1.3	1.3	1.3	1.3	0
		0	7.8	7.8	0	7.9	0	2.8	2.8	0	1.3	1.3	1.3	1.3	0
		0	7.8	7.8	0	7.9	0	2.8	2.8	0	1.3	1.3	1.3	1.3	0

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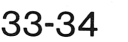
Early Version

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6-7	Wiring Diagram
8-13	Alignment Procedure
14-15	Parts Layout Top View
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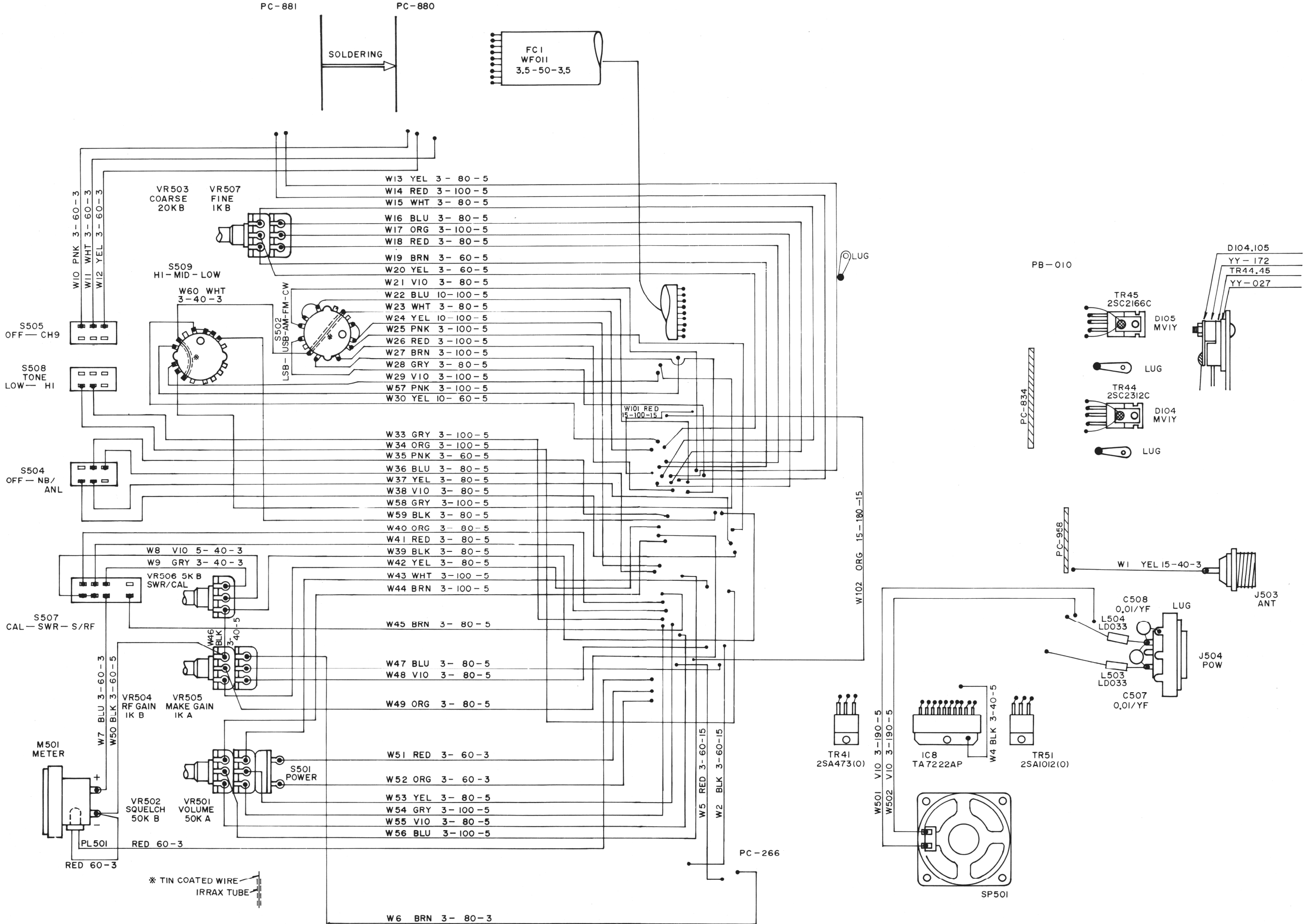
Late Version

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PB-010



WIRING DIAGRAM



C148GTL DX ALIGNMENT PROCEDURELATE
VERSION

Alignment of PLL Portion.

1. Test Equipment Required

- a) Oscilloscope (0-5MHz).
- b) DC Voltmeter (10 Volts Max., 100k ohm/Volt).
- c) Frequency Counter.

2. Alignment Procedure.

STEP	PRESET TO	CONNECTIONS	ADJUSTMENT	PROCEDURE
1	RX. Mode. Band SW: Mid CH :19 Mode :AM	Connect Oscilloscope to TP-4 (lead of R124).	L17	Adjust for Max. reading.
2	Same as Step 1, except CH: 40	Connect DC Voltmeter to TP-2 (Lead of R126).	L18	Adjust for 5.4 Volts re- ading.
3	Same as Step 1.	Connect Oscilloscope to TP-3 (Lead of R84).	L19	Adjust for Max. reading.
4	Same as Step 1.	Same as Step 3	L21	Adjust for 16.490MHz.
5	Same as Step 1, except Mode SW:USB	Same as Step 3	L22	Adjust for 16.4925MHz.
6	Same as Step 1, except Mode SW:USB	Same as Step 3.	L23	Adjust for 16.4875MHz.
7	Same as Step 6, except Band SW:Mid	Same as Step 3.	VR6	Adjust for 16.4875MHz.
8	Same as Step 1, except Mode SW:CW	Connect Oscilloscope to TP-6 (Lead of R60)	L37	Adjust for 10.695MHz.
9	Same as Step 8, except Mode SW:USB	Same as Step 8	L38	Adjust for 10.6925MHz.
10	Same as Step 8, except Mode SW:LSB	Same as Step 8	L39	Adjust for 10.6975MHz.

CL48GTL DX ALIGNMENT PROCEDURE

Alignment of Transmitter Section

1. Test Equipment Required

- a) VTVM (Full scale; IV DC with RF Probe).
- b) RF Output Power Meter.
- c) Spectrum Analyzer.
- d) Frequency Counter (0-30MHz).
- e) DC Power Supply (13.8V, 2Amp.).
- f) 50 ohm load and Attenuator.
- g) Oscilloscope (0-30MHz).
- h) AF Oscillator.
- i) DC Ammeter.

2. Alignment Procedure

STEP	PRESET TO	ADJUSTMENT	PROCEDURE
1	TX. Mode. Band SW: Mid CH : 19 Mode : USB Mic. VR: CW CH9 : OFF Coarse : Center	VR11	Remove PC-834 (PCB) and connect DC Ammeter to TP9(+) and TP8(-). Adjust for 50mA reading.
2	Same as Step 1.	VR10	Connect DC Ammeter to TP9(+) and TP7(-) and adjust for 50mA reading.
3	Same as Step 1, except Mic input 30mV.	VR12 L53	Restore PC-834. Turn VR12 to Mac. CW. and turn the core of L53 to the obttom.
4	Same as Step 3.	L52, 54, 55	Adjust for Max. reading on RF VTVM.
5	Same as Step 3.	L53	Set the Band: HI, CH40. And adjust for Max. reading on RF VTVM, then turn the Band: LOW, CH 1, readjust for minimum difference in output power.
6	Same as Step 1, except; Mode : AM Mic input 90% mod	L44	Adjust for Max. reading on RF VTVM.

C148GTL DX ALIGNMENT PROCEDURE

STEP	PRESET TO	ADJUSTMENT	REMARKS
7	Same as Step 3.	VR12	Adjust for 24.5V reading on RF VTVM.
8	Same as Step 1.	VR 7	Adjust for Min. reading on Spectrum Analyzer for both USB and LSB.
9	Same as Step 1, except: Mode :AM	VR13	Adjust for 5.0W reading on RF Power Meter.
10	Same as Step 9.	VR 8	Set the meter SW to S.RF position. Adjust the VR 8, so that the radio's meter reads 5W (Between Green zone and Red zone).
11	Same as Step 9, except Mic input 30mV.	VR14	Adjust 90% modulation on Oscilloscope
12	Same as Step 1, except: Mode SW: FM Band : 40 Mic input 30mV	VR 5	Adjust for 5kHz deviation.
13	Same as Step 12, except: Mode : CW	VR15	Adjust 0.2V reading on AF VTVM when CW key is keyed.
14	Same as Step 1, except: CH9 SW : CH9		Check that the output frequency is 27.065MHz.

CL48GTL DX ALIGNMENT PROCEDURE

Alignment of Transmitter Section

1. Test Equipment Required

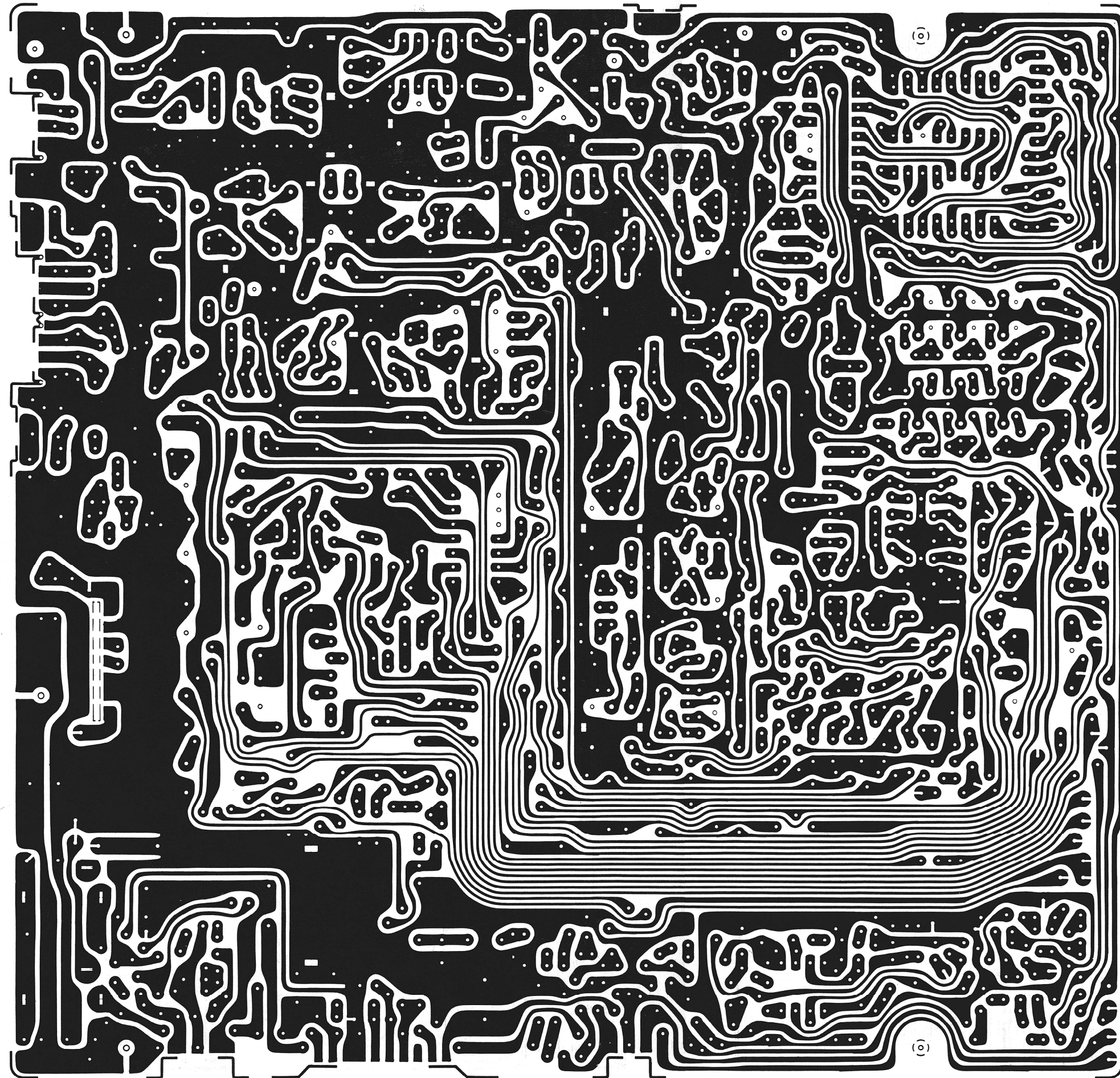
- a) VTVM (Full scale; IV DC with RF Probe).
- b) RF Output Power Meter.
- c) Spectrum Analyzer.
- d) Frequency Counter (0-30MHz).
- e) DC Power Supply (13.8V, 2Amp.).
- f) 50 ohm load and Attenuator.
- g) Oscilloscope (0-30MHz).
- h) AF Oscillator.
- i) DC Ammeter.

2. Alignment Procedure

STEP	PRESET TO	ADJUSTMENT	PROCEDURE
1	TX. Mode. Band SW: Mid CH : 19 Mode : USB Mic. VR: CW CH9 : OFF Coarse : Center	VR11	Remove PC-834 (PCB) and connect DC Ammeter to TP9(+) and TP8(-). Adjust for 50mA reading.
2	Same as Step 1.	VR10	Connect DC Ammeter to TP9(+) and TP7(-) and adjust for 50mA reading.
3	Same as Step 1, except Mic input 30mV.	VR12 L53	Restore PC-834. Turn VR12 to Mac. CW. and turn the core of L53 to the bottom.
4	Same as Step 3.	L52, 54, 55	Adjust for Max. reading on RF VTVM.
5	Same as Step 3.	L53	Set the Band: HI, CH40. And adjust for Max. reading on RF VTVM, then turn the Band: LOW, CH 1, readjust for minimum difference in output power.
6	Same as Step 1, except; Mode : AM Mic input 90% mod	L44	Adjust for Max. reading on RF VTVM.

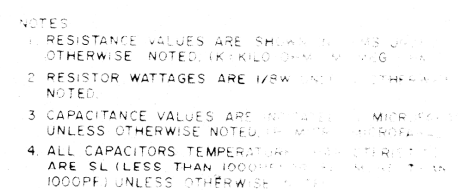
CL48GTL DX ALIGNMENT PROCEDURE

STEP	PRESET TO	ADJUSTMENT	REMARKS
6	Same as Step 1.	VR4 for AM/FM VR3 for SSB/CW	Set the SG to 40CH, 27.405MHz, 30% AM modulation with 1000uV. Then turn the VR4, so that the AF signal will appear on Oscilloscope. Repeat it for SSB/CW Mode with VR3.
7	Same as Step 1.	VR1 for AM/FM VR2 for SSB/CW	Set the SG to 40CH, 27.405MHz with No-modulation. Level of SG is 100uV. Then adjust VR1 for S-9 reading on radio's meter for AM mode. Repeat it for SSB/CW mode with VR2.
8	Same as Step 1, Mode : FM	L6	Set the SG to 1mV with 1.5kHz deviation of 1kHz. Adjust L6 for Max. signwave output on Oscilloscope.

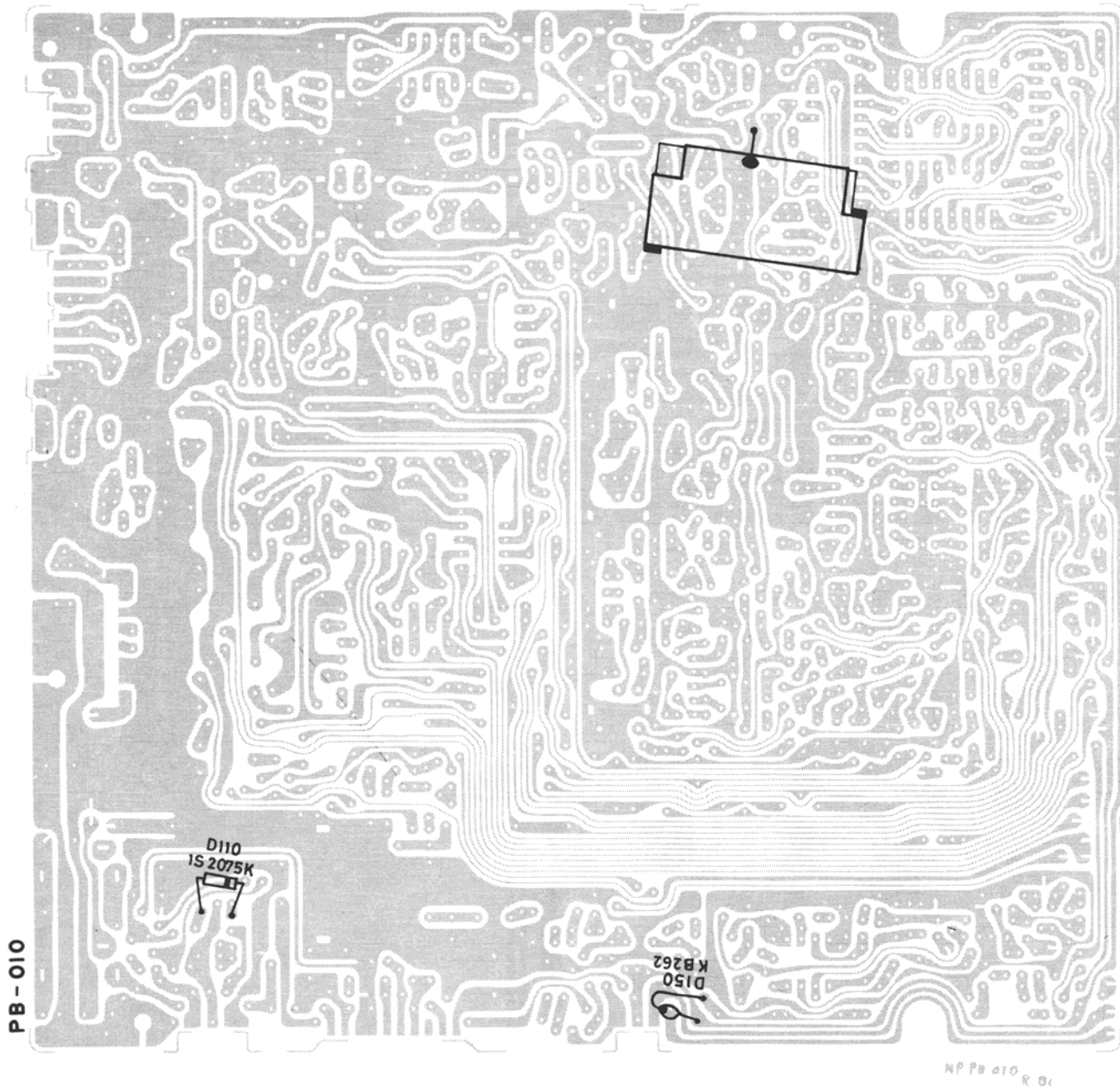


This is a detailed electronic circuit board layout for a radio receiver. The board is populated with numerous components, including resistors, capacitors, integrated circuits (ICs), transistors, and transformers. Key components and their values are labeled throughout the layout:

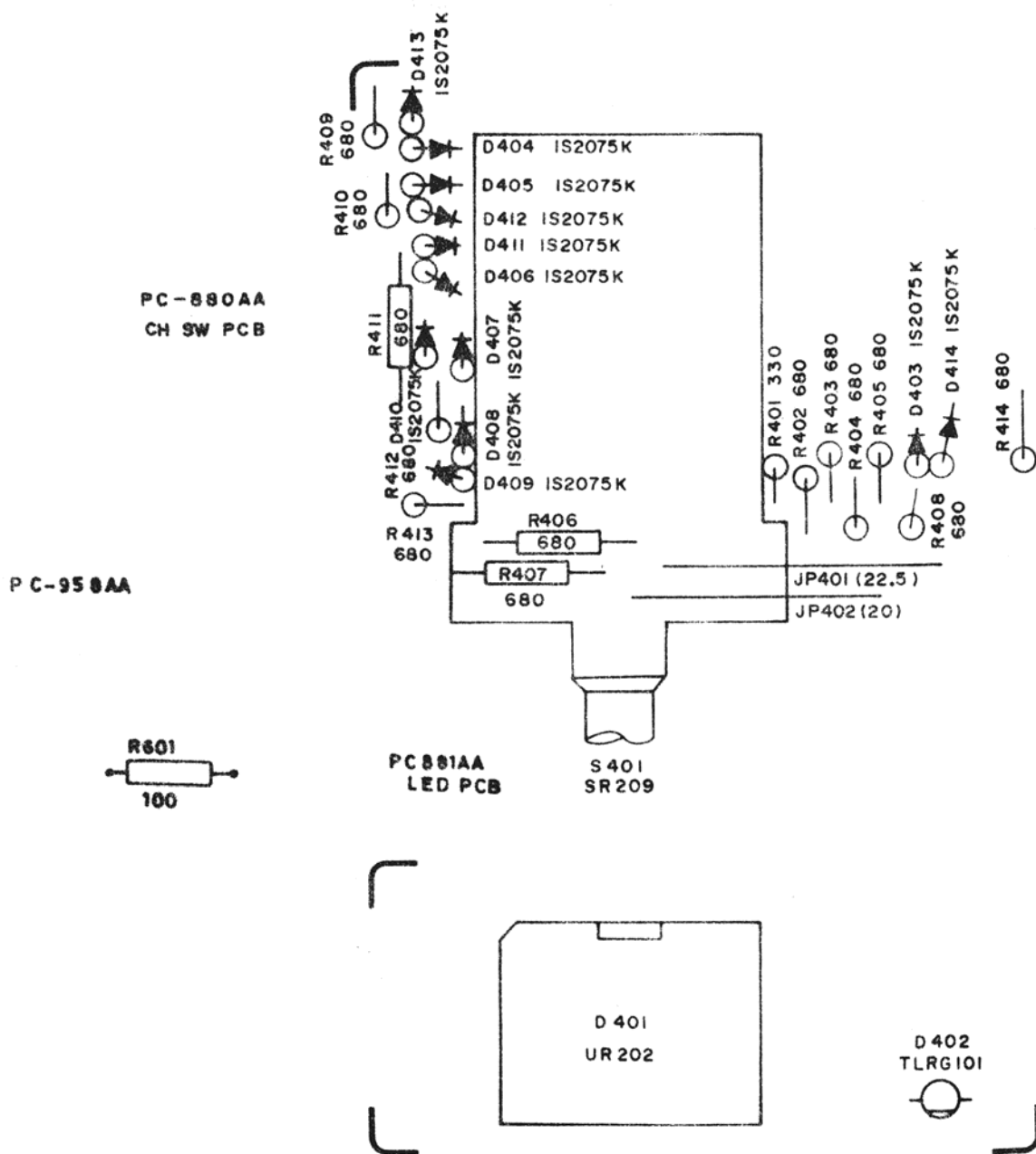
- Resistors:** Various values are specified, such as 10V 330, 10V 47, 10V 100, 10V 150, 10V 220, 10V 330, 10V 470, 10V 1K, 10V 1.5K, 10V 2.2K, 10V 3.3K, 10V 4.7K, 10V 10K, 10V 15K, 10V 20K, 10V 25K, 10V 30K, 10V 35K, 10V 40K, 10V 45K, 10V 50K, 10V 55K, 10V 60K, 10V 65K, 10V 70K, 10V 75K, 10V 80K, 10V 85K, 10V 90K, 10V 95K, 10V 100K, 10V 110K, 10V 120K, 10V 130K, 10V 140K, 10V 150K, 10V 160K, 10V 170K, 10V 180K, 10V 190K, 10V 200K, 10V 220K, 10V 240K, 10V 260K, 10V 280K, 10V 300K, 10V 330K, 10V 360K, 10V 390K, 10V 420K, 10V 450K, 10V 480K, 10V 510K, 10V 540K, 10V 570K, 10V 600K, 10V 630K, 10V 660K, 10V 690K, 10V 720K, 10V 750K, 10V 780K, 10V 810K, 10V 840K, 10V 870K, 10V 900K, 10V 930K, 10V 960K, 10V 990K, 10V 1.0K, 10V 1.1K, 10V 1.2K, 10V 1.3K, 10V 1.4K, 10V 1.5K, 10V 1.6K, 10V 1.7K, 10V 1.8K, 10V 1.9K, 10V 2.0K, 10V 2.2K, 10V 2.4K, 10V 2.6K, 10V 2.8K, 10V 3.0K, 10V 3.3K, 10V 3.6K, 10V 3.9K, 10V 4.2K, 10V 4.5K, 10V 4.8K, 10V 5.1K, 10V 5.4K, 10V 5.7K, 10V 6.0K, 10V 6.3K, 10V 6.6K, 10V 6.9K, 10V 7.2K, 10V 7.5K, 10V 7.8K, 10V 8.1K, 10V 8.4K, 10V 8.7K, 10V 9.0K, 10V 9.3K, 10V 9.6K, 10V 9.9K, 10V 10K, 10V 11K, 10V 12K, 10V 13K, 10V 14K, 10V 15K, 10V 16K, 10V 17K, 10V 18K, 10V 19K, 10V 20K, 10V 22K, 10V 24K, 10V 26K, 10V 28K, 10V 30K, 10V 33K, 10V 36K, 10V 39K, 10V 42K, 10V 45K, 10V 48K, 10V 51K, 10V 54K, 10V 57K, 10V 60K, 10V 63K, 10V 66K, 10V 69K, 10V 72K, 10V 75K, 10V 78K, 10V 81K, 10V 84K, 10V 87K, 10V 90K, 10V 93K, 10V 96K, 10V 99K, 10V 100K, 10V 110K, 10V 120K, 10V 130K, 10V 140K, 10V 150K, 10V 160K, 10V 170K, 10V 180K, 10V 190K, 10V 200K, 10V 220K, 10V 240K, 10V 260K, 10V 280K, 10V 300K, 10V 330K, 10V 360K, 10V 390K, 10V 420K, 10V 450K, 10V 480K, 10V 510K, 10V 540K, 10V 570K, 10V 600K, 10V 630K, 10V 660K, 10V 690K, 10V 720K, 10V 750K, 10V 780K, 10V 810K, 10V 840K, 10V 870K, 10V 900K, 10V 930K, 10V 960K, 10V 990K, 10V 1.0K, 10V 1.1K, 10V 1.2K, 10V 1.3K, 10V 1.4K, 10V 1.5K, 10V 1.6K, 10V 1.7K, 10V 1.8K, 10V 1.9K, 10V 2.0K, 10V 2.2K, 10V 2.4K, 10V 2.6K, 10V 2.8K, 10V 3.0K, 10V 3.3K, 10V 3.6K, 10V 3.9K, 10V 4.2K, 10V 4.5K, 10V 4.8K, 10V 5.1K, 10V 5.4K, 10V 5.7K, 10V 6.0K, 10V 6.3K, 10V 6.6K, 10V 6.9K, 10V 7.2K, 10V 7.5K, 10V 7.8K, 10V 8.1K, 10V 8.4K, 10V 8.7K, 10V 9.0K, 10V 9.3K, 10V 9.6K, 10V 9.9K, 10V 10K, 10V 11K, 10V 12K, 10V 13K, 10V 14K, 10V 15K, 10V 16K, 10V 17K, 10V 18K, 10V 19K, 10V 20K, 10V 22K, 10V 24K, 10V 26K, 10V 28K, 10V 30K, 10V 33K, 10V 36K, 10V 39K, 10V 42K, 10V 45K, 10V 48K, 10V 51K, 10V 54K, 10V 57K, 10V 60K, 10V 63K, 10V 66K, 10V 69K, 10V 72K, 10V 75K, 10V 78K, 10V 81K, 10V 84K, 10V 87K, 10V 90K, 10V 93K, 10V 96K, 10V 99K, 10V 100K, 10V 110K, 10V 120K, 10V 130K, 10V 140K, 10V 150K, 10V 160K, 10V 170K, 10V 180K, 10V 190K, 10V 200K, 10V 220K, 10V 240K, 10V 260K, 10V 280K, 10V 300K, 10V 330K, 10V 360K, 10V 390K, 10V 420K, 10V 450K, 10V 480K, 10V 510K, 10V 540K, 10V 570K, 10V 600K, 10V 630K, 10V 660K, 10V 690K, 10V 720K, 10V 750K, 10V 780K, 10V 810K, 10V 840K, 10V 870K, 10V 900K, 10V 930K, 10V 960K, 10V 990K, 10V 1.0K, 10V 1.1K, 10V 1.2K, 10V 1.3K, 10V 1.4K, 10V 1.5K, 10V 1.6K, 10V 1.7K, 10V 1.8K, 10V 1.9K, 10V 2.0K, 10V 2.2K, 10V 2.4K, 10V 2.6K, 10V 2.8K, 10V 3.0K, 10V 3.3K, 10V 3.6K, 10V 3.9K, 10V 4.2K, 10V 4.5K, 10V 4.8K, 10V 5.1K, 10V 5.4K, 10V 5.7K, 10V 6.0K, 10V 6.3K, 10V 6.6K, 10V 6.9K, 10V 7.2K, 10V 7.5K, 10V 7.8K, 10V 8.1K, 10V 8.4K, 10V 8.7K, 10V 9.0K, 10V 9.3K, 10V 9.6K, 10V 9.9K, 10V 10K, 10V 11K, 10V 12K, 10V 13K, 10V 14K, 10V 15K, 10V 16K, 10V 17K, 10V 18K, 10V 19K, 10V 20K, 10V 22K, 10V 24K, 10V 26K, 10V 28K, 10V 30K, 10V 33K, 10V 36K, 10V 39K, 10V 42K, 10V 45K, 10V 48K, 10V 51K, 10V 54K, 10V 57K, 10V 60K, 10V 63K, 10V 66K, 10V 69K, 10V 72K, 10V 75K, 10V 78K, 10V 81K, 10V 84K, 10V 87K, 10V 90K, 10V 93K, 10V 96K, 10V 99K, 10V 100K, 10V 110K, 10V 120K, 10V 130K, 10V 140K, 10V 150K, 10V 160K, 10V 170K, 10V 180K, 10V 190K, 10V 200K, 10V 220K, 10V 240K, 10V 260K, 10V 280K, 10V 300K, 10V 330K, 10V 360K, 10V 390K, 10V 420K, 10V 450K, 10V 480K, 10V 510K, 10V 540K, 10V 570K, 10V 600K, 10V 630K, 10V 660K, 10V 690K, 10V 720K, 10V 750K, 10V



ADDED PARTS - MAIN PCB

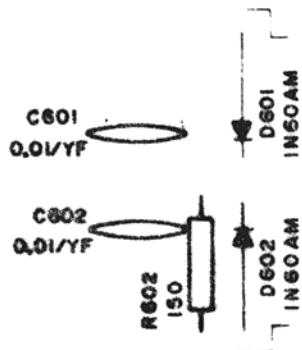


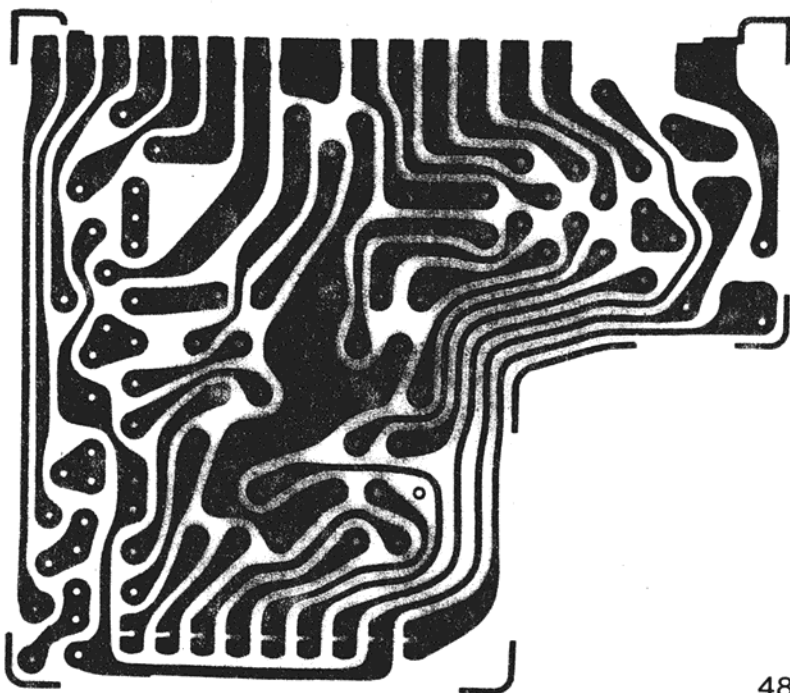
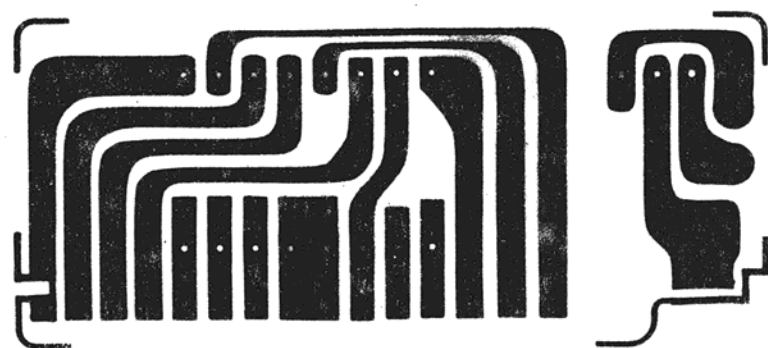
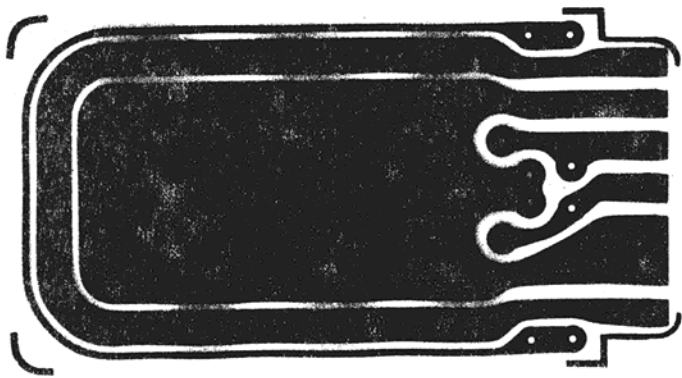
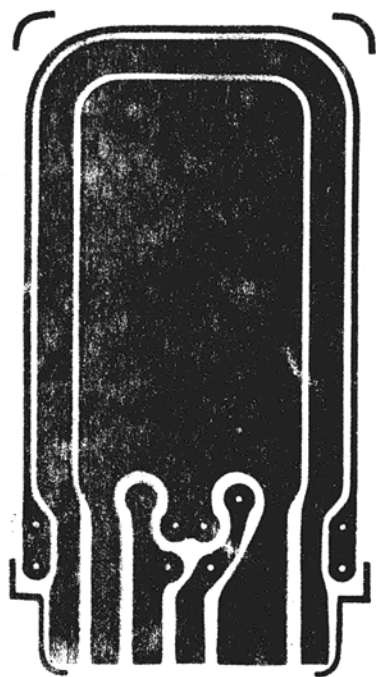
PARTS LAYOUT SUB. ASSY. PCB's



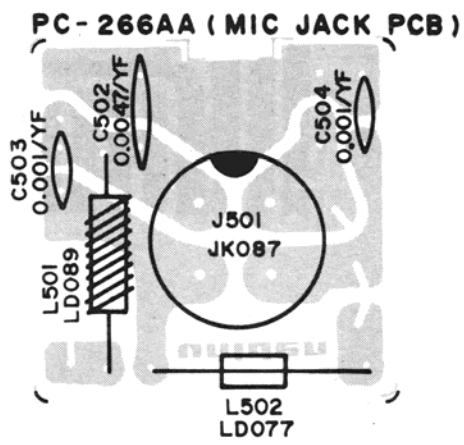
E24-3724

PC-958AA SWR PCB





PARTS LAYOUT - MIC JACK



SEMI CONDUCTOR PIN CONFIGURATION



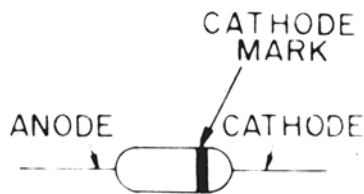
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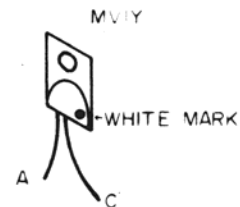
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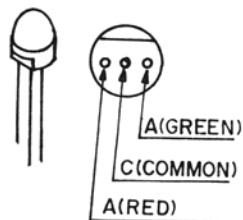
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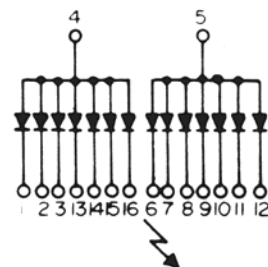
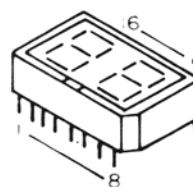
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1N4003
MV-201
1S2339G
RD5.1EB2
RD7.5EB2
KB262
1S2075K



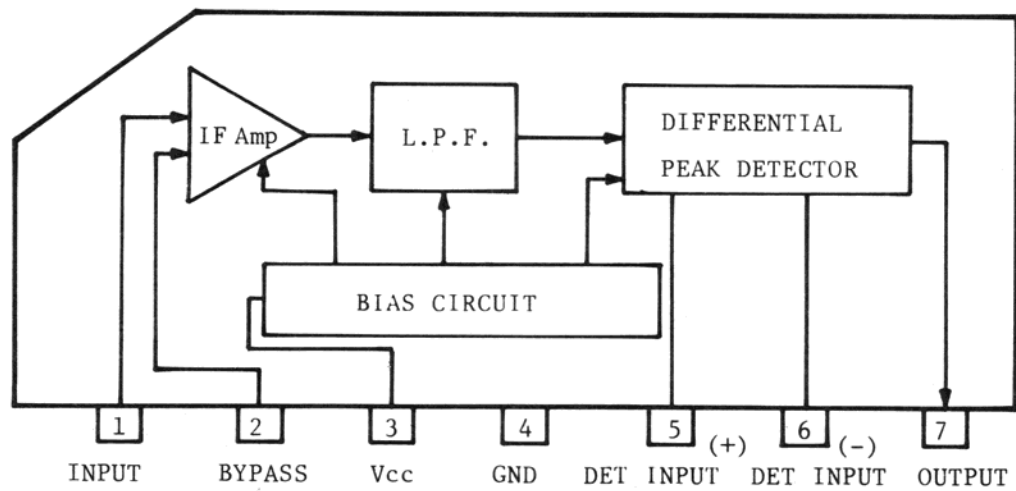
TLRG 101



UR202



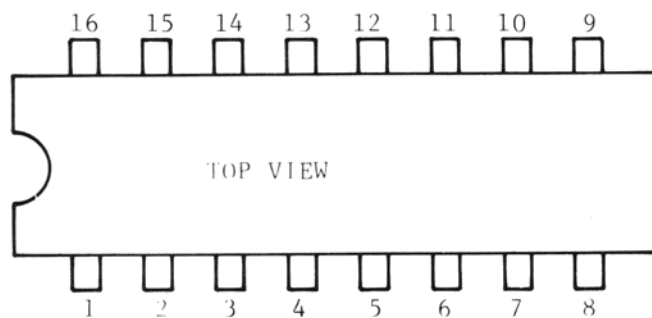
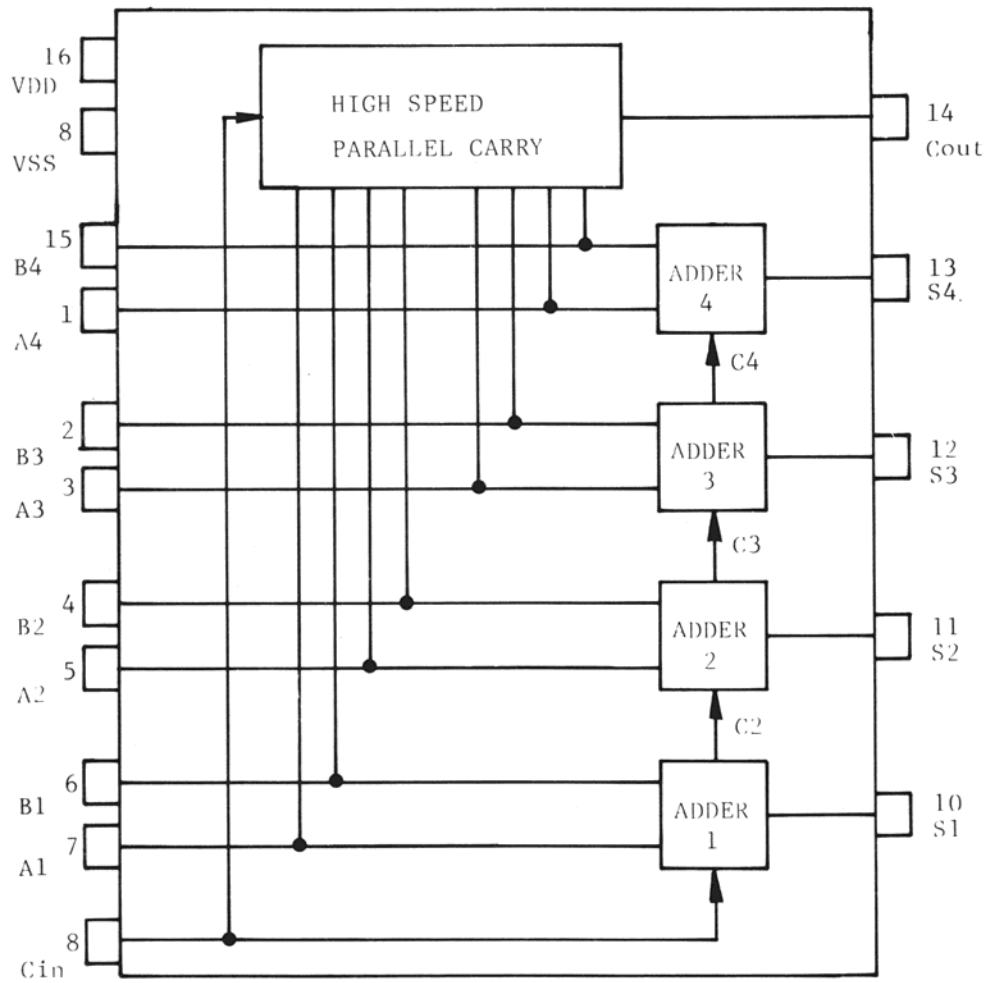
INTERNAL DIAGRAM - IC's



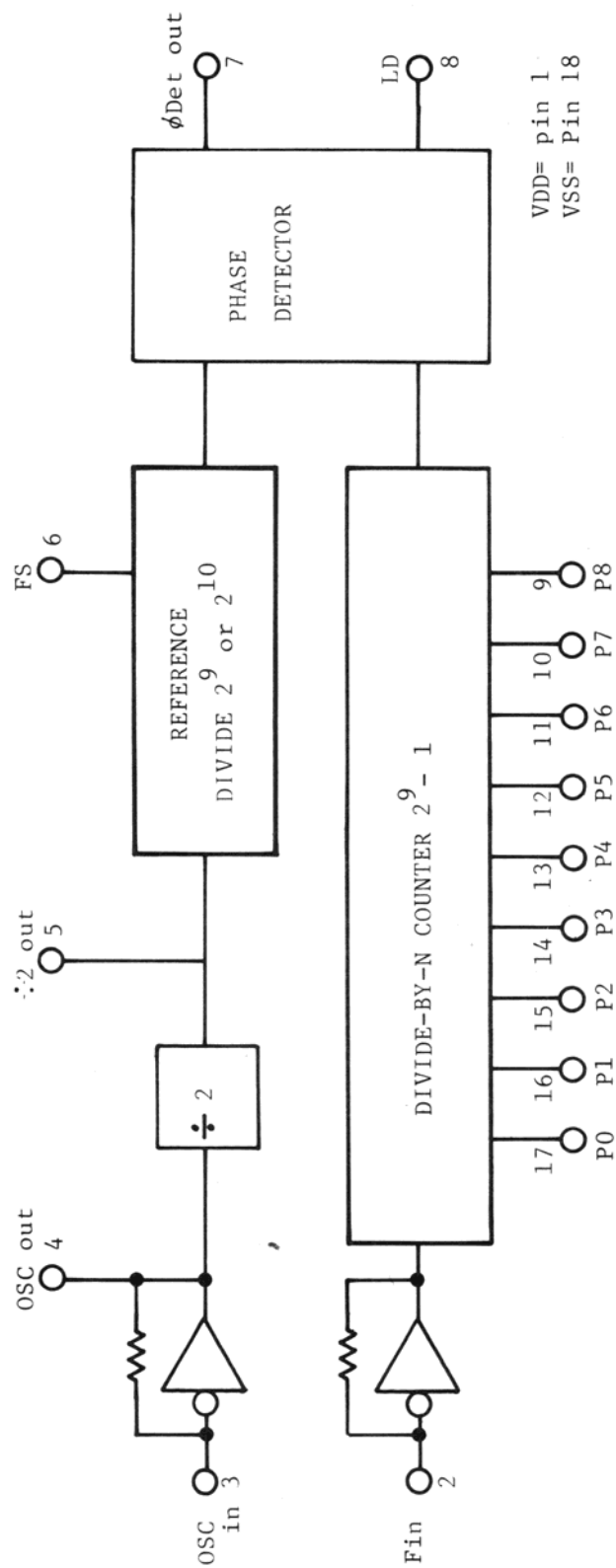
uPC1028H

INTERNAL DIAGRAM IC's

MC14008B

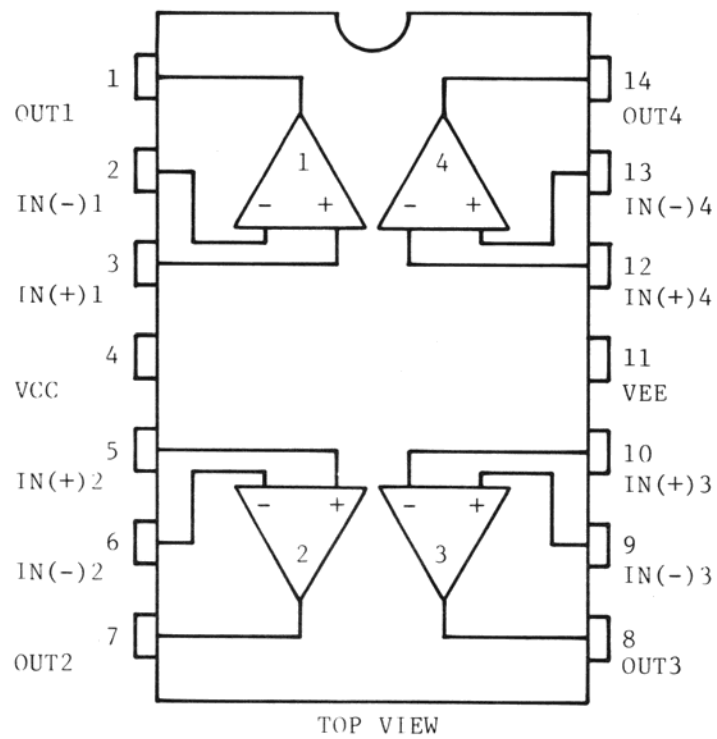


INTERNAL DIAGRAM IC's



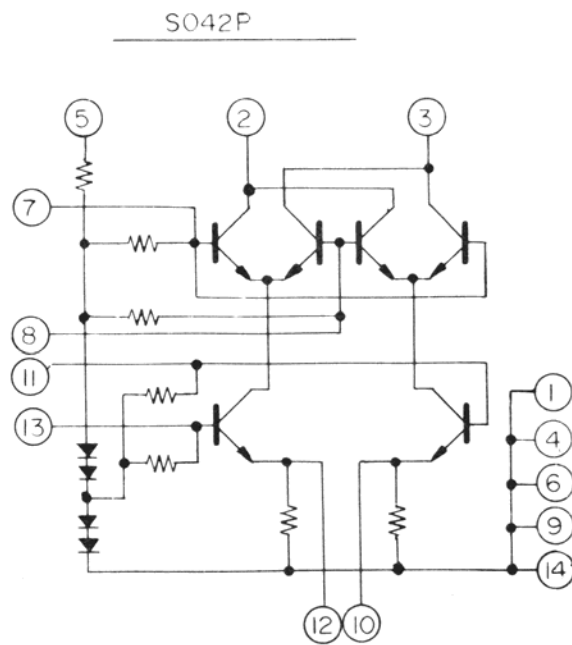
MC145106

INTERNAL DIAGRAM IC's



TA75902P

INTERNAL DIAGRAM IC's



VOLTAGE CHART

148CTL-DX Late Version

TR	Mode		Base	Collector		Emitter
	RX	CW		0	0	0
TR 1	FM	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 2	CW	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 3	CW	0	0	0	0	0
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		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 4	CW	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 5	CW	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 6	CW	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 7	CW	0	0	0	0	0
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		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 8	CW	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 9	CW	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 10	CW	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 11	CW	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 12	CW	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 13	CW	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 14	CW	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 15	CW	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0
TR 16	CW	0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
		0	0	0	0	0
	LSB	0	0	0	0	0

VOLTAGE CHART

	Mode	Base	Collector	Emitter		Mode	Base	Collector	Emitter		Mode	Base	Collector	Emitter			
TR 17	RX	CW	2.2	8.0	1.5	TR 21	RX	CW	3.6	6.1	2.9	TR 25	RX	CW	1.4	4.8	0.9
	FM	2.2	8.0	1.5	FM		1.9	1.2	1.2	FM	1.4		4.8	0.9			
	AM	2.2	8.0	1.5	AM		1.9	1.2	1.2	AM	1.4		4.8	0.9			
	USB	2.2	8.0	1.5	USB		3.6	6.1	2.9	USB	1.4		4.8	0.9			
	LSB	2.2	8.0	1.5	LSB		3.6	6.1	2.9	LSB	1.4		4.8	0.9			
	TX	CW	0	0	0	TR 22	TX	CW	0	6.8	0	TR 26	TX	CW	1.4	4.8	0.9
	FM	0	0	0	FM		0	2.1	0	FM	1.4		4.8	0.9			
	AM	0	0	0	AM		0	2.1	0	AM	1.4		4.8	0.9			
	USB	0	0	0	USB		0	6.8	0	USB	1.4		4.8	0.9			
	LSB	0	0	0	LSB		0	6.8	0	LSB	1.4		4.8	0.9			
TR 18	RX	CW	0.8	8.3	0.1	TR 23	RX	CW	0	0.5	0	TR 27	RX	CW	0.6	3.8	0
	FM	0.8	8.3	0.1	FM		0	0.5	0	FM	0.6		3.8	0			
	AM	0.8	8.3	0.1	AM		0.7	0	0	AM	0.6		3.8	0			
	USB	0.8	8.3	0.1	USB		0	0.5	0	USB	0.6		3.8	0			
	LSB	0.8	8.3	0.1	LSB		0	0.5	0	LSB	0.6		3.8	0			
	TX	CW	0	0	0	TR 24	TX	CW	0	0	0	TR 28	TX	CW	0.6	3.8	0
	FM	0	0	0	FM		0	0.2	0	FM	0.6		3.8	0			
	AM	0	0	0	AM		0.7	0	0	AM	0.6		3.8	0			
	USB	0	0	0	USB		0	0	0	USB	0.6		3.8	0			
	LSB	0	0	0	LSB		0	0	0	LSB	0.6		3.8	0			
TR 19	RX	CW	1.6	6.6	0.8	TR 29	RX	CW	0	0	0	TR 31	RX	CW	0	3.0	0
	FM	0.8	0.1	0	FM		0	0	0	FM	0.7		0	0			
	AM	0.8	0.1	0	AM		0.7	0	0	AM	0.7		0	0			
	USB	1.6	6.6	0.8	USB		0	0	0	USB	0		3.0	0			
	LSB	1.6	6.6	0.8	LSB		0	0	0	LSB	0		3.0	0			
	TX	CW	2.3	6.8	7.5	TR 30	TX	CW	0	0	0	TR 32	TX	CW	0	3.0	0
	FM	2.9	2.0	7.4	FM		0	0	0	FM	0.7		0	0			
	AM	2.9	2.0	7.4	AM		0.7	0	0	AM	0.7		0	0			
	USB	2.3	6.8	7.5	USB		0	0	0	USB	0		3.0	0			
	LSB	2.3	6.8	7.5	LSB		0	0	0	LSB	0		3.0	0			
TR 20	RX	CW	0.7	3.6	0	TR 32	RX	CW	0.7	0	0	TR 32	RX	CW	0.7	0	0
	FM	0.4	1.9	0	FM		0.7	0	0	FM	0.7		0	0			
	AM	0.4	1.9	0	AM		0.7	0	0	AM	0.7		0	0			
	USB	0.7	3.6	0	USB		0.7	0	0	USB	0.7		0	0			
	LSB	0.7	3.6	0	LSB		0.7	0	0	LSB	0.7		0	0			
	TX	CW	0	0	0	TR 33	TX	CW	0.7	0	0	TR 33	TX	CW	0.7	0	0
	FM	0	0	0	FM		0	0	0	FM	0		0	0			
	AM	0	0	0	AM		0	0	0	AM	0		0	0			
	USB	0	0	0	USB		0	0	0	USB	0		0	0			
	LSB	0	0	0	LSB		0	0	0	LSB	0		0	0			

VOLTAGE CHART

	Mode	Base	Collector	Emitter
TR 33	RX	0	0	0
	CW	0	0	0
	FM	0	0	0
	AM	0	0	0
	USB	0	0	0
TR 34	RX	7.8	8.2	8.3
	CW	7.8	8.2	8.3
	FM	7.8	8.2	8.3
	AM	7.8	8.2	8.3
	USB	7.8	8.2	8.3
TR 35	RX	8.2	8.3	7.7
	CW	8.2	8.3	7.7
	FM	8.2	8.3	7.7
	AM	8.2	8.3	7.7
	USB	8.2	8.3	7.7
TR 36	RX	7.7	8.4	8.4
	CW	7.7	8.4	8.4
	FM	7.7	8.4	8.4
	AM	7.7	8.4	8.4
	USB	7.7	8.4	8.4
TR 37	RX	0.66	0.1	0
	CW	0.66	0.1	0
	FM	0.66	0.1	0
	AM	0.66	0.1	0
	USB	0.66	0.1	0
TR 38	RX	7.9	0	8.4
	CW	7.9	0	8.4
	FM	7.9	0	8.4
	AM	7.9	0	8.4
	USB	7.9	0	8.4
TR 39	RX	0.69	0	0
	CW	0.69	0	0
	FM	0	0	0
	AM	0	0	0
	USB	0	0	0
TR 40	RX	1.6	12.9	1.0
	CW	1.6	12.9	1.0
	FM	1.6	12.9	1.0
	AM	1.6	12.9	1.0
	USB	1.6	12.9	1.0
TR 41	RX	13.1	8.5	13.8
	CW	13.1	8.5	13.8
	FM	13.1	8.5	13.8
	AM	13.1	8.5	13.8
	USB	13.1	8.5	13.8
TR 42	RX	1.2	3.2	0.6
	CW	1.2	3.2	0.6
	FM	1.2	3.2	0.6
	AM	1.2	3.2	0.6
	USB	1.2	3.2	0.6
TR 43	RX	-	-	-
	CW	-	-	-
	FM	-	-	-
	AM	-	-	-
	USB	-	-	-
TR 44	RX	0	5.7	0
	CW	0	5.7	0
	FM	0	5.7	0
	AM	0	5.7	0
	USB	0	5.7	0
TR 45	RX	0	5.7	0
	CW	0	5.7	0
	FM	0	5.7	0
	AM	0	5.7	0
	USB	0	5.7	0
TR 46	RX	0	0	0
	CW	0	0	0
	FM	0	0	0
	AM	0	0	0
	USB	0	0	0
TR 47	RX	0	0	0
	CW	0	0	0
	FM	0	0	0
	AM	0	0	0
	USB	0	0	0
TR 48	RX	0	7.8	0.5
	CW	0	7.8	0.5
	FM	0	7.8	0.5
	AM	0	7.8	0.5
	USB	0	7.8	0.5

VOLTAGE CHART

	Mode	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IC 1	RX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	FM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	USB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IC 2	LSB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	FM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IC 3	USB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	LSB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	FM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	Mode	Base	Collector	Emitter
TR 49	RX	6.2	13.2	5.7
	CW	6.2	13.2	5.7
	FM	6.2	13.2	5.7
	AM	6.2	13.2	5.7
	USB	12.9	13.2	13.5
TR 50	LSB	12.9	13.2	13.5
	TX	6.1	12.6	5.6
	CW	6.1	12.1	5.6
	FM	6.1	12.1	5.6
	AM	12.8	13.2	13.4
TR 51	USB	12.8	13.2	13.4
	LSB	13.2	13.2	13.4
	TX	13.2	13.2	13.4
	CW	13.2	13.2	13.4
	FM	13.2	13.2	13.4
TR 52	AM	13.2	13.2	13.4
	USB	13.2	13.2	13.4
	LSB	13.2	13.2	13.4
	TX	13.2	13.2	13.4
	CW	13.2	13.2	13.4

	Mode	Base	Collector	Emitter
TR 53	RX	0.9	7.7	1.7
	CW	0.9	7.7	1.7
	FM	0.9	7.7	1.7
	AM	0.9	7.7	1.7
	USB	0.9	7.7	4.2
TR 54	LSB	0.9	7.7	4.2
	TX	0.9	7.7	1.7
	CW	0.9	7.7	1.7
	FM	0.9	7.7	1.7
	AM	0.9	7.7	4.2
TR 55	USB	0.9	7.7	4.2
	LSB	0.9	7.7	4.2
	TX	0.9	7.7	1.7
	CW	0.9	7.7	1.7
	FM	0.9	7.7	4.2

VOLTAGE CHART

	Mode	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IC 4	RX	CW	4.4	4.4	4.4	0	4.4	3.2	7.5	8.1									
		FM	4.4	4.4	4.4	0	4.4	3.2	7.5	8.1									
		AM	4.4	4.4	4.4	0	4.4	3.2	7.5	8.1									
		USB	4.4	4.4	4.4	0	4.4	3.2	7.5	8.1									
	TX	LSB	4.4	4.4	4.4	0	4.4	3.2	7.5	8.1									
		CW	4.4	4.4	4.4	0	2.2	3.2	2.3	8.1									
		FM	4.4	4.4	4.4	0	2.1	3.2	2.3	8.1									
		AM	4.4	4.4	4.4	0	2.1	3.2	2.3	8.1									
		USB	4.4	4.4	4.4	0	2.2	3.2	2.3	8.1									
		LSB	4.4	4.4	4.4	0	2.2	3.2	2.3	8.1									
IC 5	RX	CW	8.4	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	8.3	0
		FM	8.4	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	8.3	0
		AM	8.4	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	8.3	0
		W USB	8.4	4.3	4.3	4.3	-	-	3.2	8.2	0	0	0	0	8.3	0	8.3	8.3	0
	TX	LSB	8.4	4.3	4.3	4.3	-	-	3.2	8.2	0	0	0	0	8.3	0	8.3	8.3	0
		CW	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	8.3	0
		FM	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	8.3	0
		AM	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	8.3	0
		D USB	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	8.3	0
		LSB	8.4	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	8.3	0
IC 5	RX	CW	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		FM	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		AM	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		I USB	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
	TX	LSB	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		CW	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		FM	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		AM	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		D USB	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		LSB	8.4	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3

	Mode	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IC 5 (cont.)	TX	CW	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	8.3	0
		L FM	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	8.3	0
		O AM	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	8.3	0
		W USB	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	8.3	0
	TX	LSB	8.3	4.3	4.3	4.3	-	-	3.2	8.3	0	0	0	0	8.3	0	8.3	8.3	0
		CW	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	8.3	0
		FM	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	8.3	0
		I AM	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	8.3	0
		D USB	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	8.3	0
		LSB	8.3	4.3	4.3	4.3	-	-	4.7	8.2	0	0	8.3	0	8.3	0	8.3	8.3	0
IC 6	RX	CW	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		FM	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		AM	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		I USB	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
	TX	LSB	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		CW	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		FM	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		AM	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		D USB	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3
		LSB	8.3	4.3	4.3	4.3	-	-	4.0	8.2	0	0	0	8.3	0	0	0	8.3	8.3

VOLTAGE CHART

	Mode	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IC 6 (con't)	TX	CW	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3	
			0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3	
			0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3	
			0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3	
	M	FM	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3	
			0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3	
			0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3	
			0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3	
	H	FM	0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3	
			0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3	
			0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3	
			0	0	8.3	7.9	0.5	7.9	8.3	0	0	0	0	0	8.3	0	0	8.3	
IC 7	RX	CW	0	7.9	0	0	8.3	0	0	0	0	8.3	8.3	0	0	0	8.3		
			0	7.9	0	0	8.3	0	0	0	0	8.3	8.3	0	0	0	8.3		
			0	7.9	0	0	8.3	0	0	0	0	8.3	8.3	0	0	0	8.3		
			0	7.9	0	0	8.3	0	0	0	0	8.3	8.3	0	0	0	8.3		
	M	FM	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
			0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
			0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
			0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
	H	FM	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
			0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
			0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
			0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	

	Mode	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IC 7 (con't)	TX	CW	0	7.9	0	0	8.3	0	0	0	0	8.3	8.3	0	0	0	8.3		
			0	7.9	0	0	8.3	0	0	0	0	8.3	8.3	0	0	0	8.3		
			0	7.9	0	0	8.3	0	0	0	0	8.3	8.3	0	0	0	8.3		
			0	7.9	0	0	8.3	0	0	0	0	8.3	8.3	0	0	0	8.3		
	M	FM	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
			0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
			0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
			0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
	H	FM	0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
			0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
			0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
			0	7.9	0	7.9	8.3	7.9	0	0	0	8.3	0	0	8.3	0	0	8.3	
IC 8	RX	CW	13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1							
			13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1							
			13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1							
			13.8	6.6	0	0	1.1	1.1	0	0	7.0	13.1							
	TX	CW	13.7	6.6	0	0	1.1	1.1	0	0	6.9	13.0							
			13.7	6.6	0	0	1.1	1.1	0	0	6.9	13.0							
			13.7	6.6	0	0	1.1	1.1	0	0	6.9	13.0							
			13.7	6.6	0	0	1.1	1.1	0	0	6.9	13.0							
	M	FM	13.0	6.3	0	0.5	2.2	2.2	0	0	10.9								
			13.0	6.3	0	0.5	2.2	2.2	0	0	10.9								
			13.0	6.3	0	0.5	2.2	2.2	0	0	10.9								
			13.0	6.3	0	0.5	2.2	2.2	0	0	10.9								
IC 9	RX	CW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	M	FM	0	8.0	8.0	0	8.0	0	0	0	2.7	2.7	0	1.0	1.4	0	0	0	0
			0	8.0	8.0	0	8.0	0	0	0	2.7	2.7	0	1.0	1.4	0	0	0	0
			0	8.0	8.0	0	8.0	0	0	0	2.7	2.7	0	1.0	1.4	0	0	0	0
			0	8.0	8.0	0	8.0	0	0	0	2.7	2.7	0	1.0	1.4	0	0	0	0
	H	FM	0	8.0	8.0	0	8.0	0	0	0	2.7	2.7	0	1.0	1.4	0	0	0	0
			0	8.0	8.0	0	8.0	0	0	0	2.7	2.7	0	1.0	1.4	0	0	0	0
			0	8.0	8.0	0	8.0	0	0	0	2.7	2.7	0	1.0	1.4	0	0	0	0
			0	8.0	8.0	0	8.0	0	0	0	2.7	2.7	0	1.0	1.4	0	0	0	0

C148GTL DX

SPECIFICATIONS

GENERAL

Channels	120FM, 120AM, 120 LSB, 120 USB, 120CW.
Frequency Range	Low Band, 26.515 to 26.955 MHz. Mid Band, 26.965 to 27.405 MHz. Hi Band, 27.415 to 27,855 MHz.
Frequency Control	Phase Lock Loop (PLL) synthesizer.
Frequency Tolerance	0.005%
Frequency Stability	0.001%
Operating Temperature Range	-30 C to +50 C.
Microphone	Plug-in dynamic: with push-to-talk switch and coiled cord.
Input Voltage	13.8 DC nominal 15.9 max., 11.7V min. (positive or negative ground). Transmit: AM full mod., 2.2A. SSB 12 watts PEP output, 2A. Receiver: Squelched, 0.3 A. Maximum audio output, 0.7 A.
Size	2-3/8" (H) x 7-7/8" (W) x 9-1/4" (D).
Weight	5 lbs.
Antenna Connector	UHF, SO239
Meter (3-in-1)	Illuminated; indicates relative output power, received signal strenght, and SWR.

TRANSMITTER

Power Output	AM/FM/CW, 5 watts. SSB, 12 watts, PEP
Modulation	High-and low-level Class B, Amplitude Modulation: AM, Variable capacitance Frequency Modulation: FM.
Intermodulation Distortion	SSB: 3rd order, more than -25 dB. 5th order, more than -35 dB.
SSB Carrier Suppression	55 dB
Unwanted Sideband	50 dB
Frequency Response	AM and FM: 450 to 2500 Hz.
Output Impedance	50 ohms, unbalanced
Output Indicators	Meter shows relative RF output power and SWR. Transmit LED glows red when transmitter is in operation.

RECEIVER

Sensitivity	SSB/CW: 0.25 uV for 10 dB (S-N)/N at greater than 1/2-watt of audio output. AM: 0.5 uV for 10 dB (S+N)/N at greater than 1/2-watt of audio output. FM: 1.0 uV for 20 dB (S+N)/N at greater than 1/2-watt of audio output.
Selectivity	AM/FM: 6 dB @3 KHz, 50 dB @9 KHz. SSB/CW: 6 dB @2.1 KHz, 60 dB @3.3 KHz.
Image Rejection	More than 65 dB.

IF Frequency	AM/FM: 10.695 MHz 1st IL, 455 KHz 2nd IF
Adjacent-Channel Rejection	SSB/CW: 10.695 MHz.
AM/FM and SSB/CW/RF	60 dB AM/FM & 70 dB SSB/CW.
Gain Control	45 dB adjustable for optimum signal reception.
Automatic Gain Control (AGC)	Less than 10 dB change in audio output for inputs from 10 to 100,000 microvolts.
Squelch	Adjustable; threshold less than 0.5 uV.
ANL	Switchable.
Noise Blanker	RF type, effective on AM/FM and SSB/CW.
Voice Lock Range	Coarse (TX/RX) + or - 7KHz.
	Fine (RX) + or - 1 KHz.
Audio Output Power	4 watts into 8 ohms.
Frequency Response	300 to 2800 Hz.
Built-in Speaker	8 ohms, round.
External Speaker	8 ohms; disables internal speaker when connected.
(Not Supplied)	

FREQUENCY

CHANNEL	LOW BAND	MID BAND	HI BAND	CHANNEL	LOW BAND	MID BAND	HI BAND
1	26.515	26.965	27.415	21	26.765	27.215	27.665
2	.525	.975	.425	22	.775	.225	.675
3	.535	.985	.435	23	.805	.255	.705
4	.555	27.005	.455	24	.785	.235	.685
5	.565	.015	.465	25	.795	.245	.695
6	.575	.025	.475	26	.815	.265	.715
7	.585	.035	.485	27	.825	.275	.725
8	.605	.055	.505	28	.835	.285	.735
9	.615	.065	.515	29	.845	.295	.745
10	.625	.075	.525	30	.855	.305	.755
11	.635	.085	.535	31	.865	.315	.765
12	.655	.105	.555	32	.875	.325	.775
13	.665	.115	.565	33	.885	.335	.785
14	.675	.125	.575	34	.895	.345	.795
51	.685	.135	.585	35	.905	.355	.805
16	.705	.155	.605	36	.915	.365	.815
17	.715	.165	.615	37	.925	.375	.825
18	.725	.175	.625	38	.935	.385	.835
19	.735	.185	.635	39	.945	.395	.845
20	.755	.205	.655	40	.955	.405	.855