

# IC - M 25 D

**N. OMOLOGAZIONE NAUTICA:**

**PROTOCOLLO DC SR/021389 2/2/144-01/39699**

**DEL 4/7/79**

IC - M25DTHEORY OF OPERATION

## 1 Receiver:

The receiver is composed of the following sections:

- A. Antenna Switching Circuit
- B. RF Amplifier/Helical Resonator
- C. First Mixer/1st IF Mixer
- D. Second Oscillator and Mixer/Second IF Filter
- E. Second IF Amplifier and Limiter
- F. Discriminator/Pre-amplifier
- G. Power Amplifier
- H. Squelch Control Circuit.

The input signal coming from the antenna connector (J303) passes through the low pass filter and is fed to the antenna switching circuit. When received, Q101 becomes conductive thus a DC current flows into diodes D301, 302, and 303.

This makes these diodes conductive for RF frequencies and a signal is fed to the RF amplifier (Q102) and amplified. Q102 is a MOSFET in order to furnish excellent sensitivity, signal-to-noise ratio, and cross-modulation characteristics.

The helical resonator has a band width of 156 to 163 MHz and attenuates incoming out-of-band signals. When received current flows into D101, causing a backward bias across D102, thus applying only the signal passing through the helical resonator to the balanced mixer. The signal is combined with the output of the VCO, previously set to a channel frequency, to the balanced mixer (D103 through D106) which produces a signal of 21.4 MHz. This signal then passes through diode D107 which is conductive of RF signals, and is fed to the Second Mixer Q103, through the monolithic crystal filter FL101. Then, combined with the Second Oscillator's output signal of 20.945 MHz it produces the second IF signal of 455 KHz, which passes through Ceramic Filter FL102. The output is then amplified and limited in amplitude by IC101 and detected by Ceramic Discriminator DS101, as well as diodes D109 and D110, to obtain an audio signal. R125 and C141 act as an integrator to achieve the desired frequency characteristics. The signal, lightly amplified by Q105 is fed to AF Filter IC351, which compensate the frequency for low range (lower than 300 Hz) and high range (higher than 3 KHz) and is amplified by power amplifier IC102 to drive the speaker. The squelch signal is taken from immediately after the discriminator and fed to the Audio Amplifier IC103, whose gain can be varied by change of the DC bias applied to its No. 2 pin. The output of IC103 is amplified by Q107 and Q108 and detected by D112 and D113. Diode D111 functions to compensate the detection output voltage thermally. This output is applied, after DC amplification, to Q109, to vary the bias voltage of Q105 base thus switching the squelch circuit on and off.

## 2 Transmitter

The transmitter is composed of the following sections:

- A. Microphone Amplifier and Instantaneous Deviation Control (IDC)
- B. Splatter Filter
- C. Modulator and TX Oscillator
- D. Limiter Amplifier and Balanced Mixer
- E. Exciter
- F. Power Amplifier and Low Pass Filter
- G. TX Power Control and RF LTD Control.

The signal from the microphone or handset is amplified by the microphone amplifier Q115 and Q116, then differentiated by C202 and R190. The differentiated audio signal is fed to the IDC Circuit. In the IDC circuit the audio signal is limited in amplitude so that any parts above 3 KHz are attenuated by the splatter filter. Q110 in the TX Oscillator circuit emits a signal of 21.4 MHz which is directly frequency-modulated by the splatter filter. Since frequency-modulated signals contain some amplitude modulated components a limiter amplifier is provided in the next stage to remove them. During transmission a 9V current moves through R160 to D108 to turn it on for RF signals, D107 is biased in reverse to return it off, so that the output from the limiter amplifier is applied only to the balanced mixer, where it combines with the signal from the VCO output to produce the transmitting frequency. The signal passes through D102 and is amplified by the exciter (driver) unit. At the same time spurious signals generated at the balanced mixer are attenuated by the tuning circuits L117, 118, 119, 120, 121 and 122. The power output of the exciter is about 200 mW and is amplified to 25W by the power amplifier IC30. The power amplifier is a one piece module having a frequency range of 156 to 158 MHz. Antenna Switching diodes D301, 302 and 303 detect RF output voltage from the PA unit, and this DC causes a reverse bias for these diodes, turning them off to RF signals. Thus RF is cut off from the receiver during transmissions. The low pass filter attenuates harmonic waves generated in the power amplifier, etc, by about 50 dB. The transmit power control circuit performs two functions.

One: selecting low and high power, by controlling the detected front voltage of the SWR circuit, and two, the voltage at Pin 3 of PA unit K301, thus the power can be controlled. Switching of power is done by dividing the SWR voltage proportionally among R309, 310, 311 and 312.

Two: protection of IC301 when SWR falls and lowers the RF output. When SWR falls, the reverse detection voltage rises and is amplified by Q305, 306 and 307 which reduces the voltage at Pin 3 of IC301, and lowers the RF power output. The RF LTD amplifies the SWR front detected voltage by Q301, 302 and 303 to illuminate D5, the RF indicator.

ALIGNMENT PROCEDURES

## PLL and VCO Units

## Test equipment required:

1. Frequency Counter, with a frequency range of 5 MHz to 150 MHz. Sensitivity of 1V or better. Accuracy of  $\pm 1$  ppm or better.
2. RF Millivolt meter, with a full scale range of 1V to 100mV.
3. FM Deviation Meter, frequency 100 to 169 MHz, and deviation of 5 KHz.
4. Oscilloscope.
5. Dummy load, 25W, 500 Ohms.

## Setting coils and trimmer resistors:

1. Remove the PLL and matrix board cover. Turn the cores of L403, L404 and L405 to level with the top of the core holder, then one full turn clockwise. Turn R454 fully counterclockwise.
2. Remove the VCO cover. Turn the core of L504 to level with the top of the core holder, then one complete turn clockwise.

## Alignment of offset local oscillator:

1. Set the channel selector to Channel 16. Unplug P502 from J401.
2. Connect the RF millivolt meter to test point FCP401 and adjust L403, 404, and 405 for maximum deflection on the meter when set at the 100 mV range.
3. Set the channel selector to weather, WX, and adjust the coils L403 through L405 to obtain the same output as for channel 16. After adjustment the output voltage of both channel 16 and weather should be more than 20mV.
4. Turn the channel selector back to channel 16. Connect the frequency counter to test point FCP401 and adjust L407 for 133.525 MHz.
5. Set the channel selector to weather and adjust L408 for 138.125 MHz.
6. Plug P502 back into J401.

## Alignment of the VCO:

1. Connect the frequency counter to the feed-through terminal of P501, do not remove the plug. Place a jumper across pin 4 and 2 of P503.
2. Set the channel selector to weather and adjust C510 for about 138.4 MHz.

3. Set the channel selector to channel 16 and adjust C504 for about 138.4 MHz.
4. Alternate the previous two alignments until they are stable.
5. Remove the jumper wire from P503, and turn to channel 16.
6. Turn R454 clockwise until the power indicator LED stops flashing (VCO locked).
7. Connect the RF millivolt meter, set at the 1V range, to the center connector of P501 and adjust L504 to obtain approximately 8V on both channel 16 and weather.

## PLL (cont'd)

Kept at 25 KHz, the same as the reference frequency sent to Pin 7 of IC406.

Should the loop unlock the voltage at Pin 4 of IC416 drops causing Q411 and Q410 to go on. The the base of Q409 drops through D421 causing Q409 to turn off, these actions cause the Transmit Mute circuit to inhibit, through Pin 5 of J406, and the RF indicator turns off. At the same time lamp control IC401 is turned on by the output of the collector Q410 through R437. The signal is amplified by lamp amplifier Q401, and through Pin 7 of J403 causes the unlock and power LED, D1 to flash.

When selecting a channel, if no diode has been placed in that particular channel section of the matrix this is detected by D415, 416, 417, 418 and 419 and voltage is sent to Q410 through D422. Again the Transmit Mute functions and at the same time LED D1 flashes and the RF indicator goes off.

When on receive only, or weather channel has been programmed the voltage of Pin 1 of J405 drops, and Q409 turns off, this also causes the Transmit Mute circuit to function.

Q406, 407, and 408 are the 8V constant voltage supply for all PLL circuits, with the exception of the Offset Oscillator Switch circuit.

## VCO

The output signal of the phase comparator is sent to Pin 1 of P503 then to the base of Q502 to eliminate any 25 KHz spurious and then fed to variacap diode D501, which controls the frequency of Q501.

When in the receive duplex mode voltage from Pin 3 of P503 turns off C504 and the oscillation frequency is shifted up, thus it is possible to reach a frequency range of 134.6 MHz to 141.15 MHz, a difference of about 7 MHz.

Q503 and Q505 are the buffer amplifiers. Output voltages of about 800mV from P501, and 200mV from P502 are present. Q504 is a ripple filter to prevent ripples in the power source line to secure a stable oscillation frequency.

## MATRIX UNIT

J408 and J409 are connected to the channel selector switch, S6, and the wiper of that switch is connected to select switch, S1. When the select switch is closed the common of S6 is grounded, causing one of the A through W lines on the matrix board to go to ground. Pins 3 through 7 of J407 are the terminals of the binary code output. Pin 1 of J407 detects receive only and will inhibit transmit functions when a diode is inserted for that purpose. Pin 2 detects Simplex channels and will shift the operation to Simplex when a diode is inserted. Pin 10 of J407 detects weather channel operation - it is not necessary to have a diode in the receive position for this function.

### 3. Auto Dimmer Control

Photo sensor R8 in the auto dimmer control circuit varies its resistance and the voltage developed across it depending on outside brightness.

This voltage is applied to the Schmitt circuit composed of Q122 and Q120.

When brightness is high the resistance of the photo sensor reduces the flow of current to the base of Q122, which turns on. This reduces the base voltage of Q120 and increases the collector voltage. The collector voltage is drawn from the emitter of Q121, the emitter follower circuit of Q120, and that output voltage rises to illuminate the lamps brightly. When outside light is dim, the reverse occurs to dim the lamps.

### 4. Regulator

The regulator of the 9V supply is Q601 for the receive circuits and obtains its reference voltage from D603. During transmission the base of Q601 is grounded through D602 and no output voltage appears. The regulator for transmit circuits is Q602 and obtains its reference voltage from D605.

When transmitting the base of Q603 is grounded through D607 which turns it off, supplying Q602 with a base voltage of 9V, supplying the transmitter with the 9V. During receive the base of Q603 is supplied with voltage through R606, whereas no voltage is supplied to the base of Q602 so no voltage is supplied to the transmitter.

#### Alignment of the reference oscillator:

1. Set the channel selector to 16.
2. Connect the frequency counter to the bare lead of R458 and adjust C430 for  $1.875 \text{ MHz} \pm 10 \text{ Hz}$ .
3. Remove the counter. Connect the dummy load and deviation meter, connect the oscilloscope to the output of the deviation meter. While observing RF power output adjust R454 to obtain minimum carrier noise.

#### Alignment of 1st and 2nd IF

1. Connect the counter to test point FCP101 and adjust C131 for 20.945 MHz  $\pm$  20 Hz.
2. Tune the signal generator to 156.8 and connect to the antenna connector.
3. Modulate the signal generator with a 1 KHz signal and a modulation level of  $\pm$  6 KHz.
4. Connect the AF voltmeter between pin 6 of J1 and ground.
5. Apply the signal generator output to channel 16.
6. Adjust L108 and L109 to achieve the maximum sensitivity.

#### Miscellaneous Alignments

1. Dimmer position alignment:

Set R210 to its center position, when the sensitivity is low turn counterclockwise, to high, clockwise.

2. Squelch:

With no signal present set the knob to the desired position and adjust R136 to open and close the squelch.

## Alignment of the Receiver

### Test equipment required:

1. VHF Sweep Generator, with a sweep range of 145 to 170 MHz, and output voltage of 1 mV to 1V.
2. VHF Signal Generator, with a frequency of 150 to 165 MHz, and an output voltage of 1 microvolt to 1000 microvolts.
3. AF Voltmeter, full scale 1V.

Frequency counter, with up to 30 MHz, sensitivity of 1V, and accuracy of  $\pm 1$  ppm.

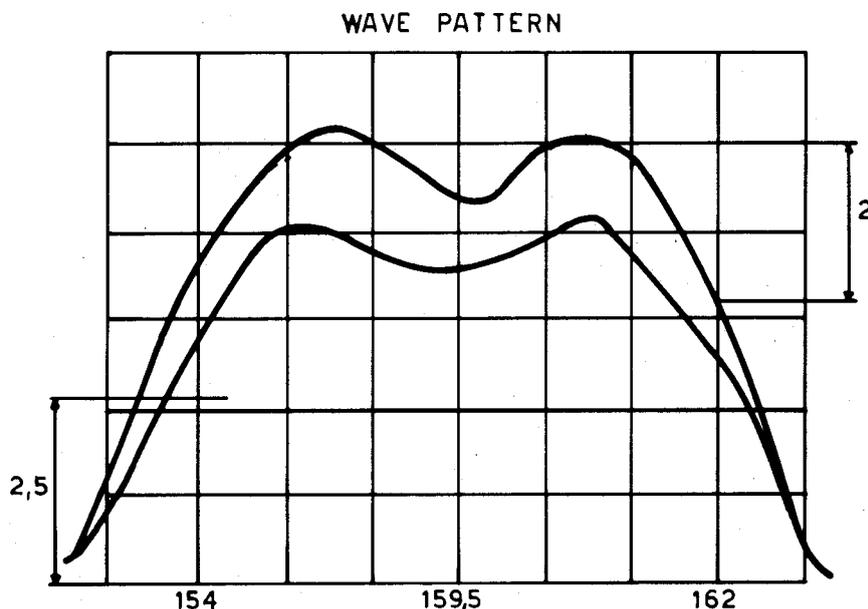
4. Oscilloscope with RF detector.

### Setting of coils:

1. Turn the core of L101 to the top then two complete turns clockwise. If the remote control head is installed, remove it.
2. Turn the cores of L102, 103, and 104 to level with the PC board, then one complete turn clockwise.
3. Turn the core of L105 four turns clockwise from the top.

Alignment of the helical resonator (the helical coil should be opened by L311 and 312 before this procedure).

1. Connect the oscilloscope detector lead between D107 and the bare lead of R112, on the L108 side (ground side).
2. Connect the sweep generator to the antenna connector, and adjust the sweep to a level that can be seen on the scope.
3. Adjust L101 through L105 to obtain the maximum output, 156.3 to 162.55 MHz, and ripple not to exceed 3 dB. (See below).



### Alignment of the Transmitter Section.

#### Test equipment required:

1. Multimeter, 50.000 ohms per volt.
2. RF Voltmeter, 50 ohms, 50 W, 5W.
3. Power source, 13.6V, 8A, DC.
4. AF Oscillator, 1 KHz, sine wave, 1V rms.
5. Frequency counter, 30 MHz, sensitivity 1V, accuracy  $\pm 1$  ppm.
6. FM Modulation Meter, 0 to  $\pm 5$  KHz peak to peak.
7. Oscilloscope, 1 KHz.

#### Setting coils and trimmer resistors.

1. Set L112 core two turns clockwise from the top.
2. Set the cores of L117, 118, and 121 flush with the top.
3. Set the cores of L119 and L210 three turns clockwise from the top.
4. Turn R317 fully counterclockwise.
5. Turn R310 and 312 fully clockwise.

#### Transmit Oscillator Alignment.

1. Connect the RF power meter to the antenna connector and set for 50W.
2. Connect the frequency counter to FCP104 and set the channel to 16.
3. Short pins 5 and 6 of the microphone connector and press the PTT switch.
4. Adjust L115 for 21.4 MHz  $\pm 1$  ppm on the counter.

#### Alignment of the Final Drive.

1. Set the multimeter to 3V range and connect to FCP106.
2. Adjust L112 through L119 for maximum reading while transmitting on channel 16.
3. Connect the multimeter to CP101 and adjust L117 through L119 for maximum reading. The reading should be above 2V.

#### PA Alignment.

1. Turn R301 and R311 fully clockwise to obtain full power.
2. Turn R317 fully counterclockwise.
3. Adjust C246 to obtain maximum deflection on the power meter.
4. Check the power output on channels 80, 60 and 16 for minimum power variation.

#### Power Setting.

1. Adjust R303 to attain the minimum voltage reading at H307 with the multimeter set at the 3V range.
2. Set the Hi-Low switch to the Hi setting. Hook up a Wattmeter to the dummy load.
3. Adjust R310 for 25W output.
4. Set the Hi-Low switch to Low, and adjust R311 to 1W output.

#### APC Alignment.

1. Turn R317 fully clockwise.
2. Adjust R317 to reduce input current to less than 3A when the antenna connector is open or shorted.

#### Modulation Alignment.

1. Connect the FM Modulation Meter to the antenna connector.
2. Apply a 1 KHz 1V audio signal from the AF Oscillator to Pin 2 of the microphone connector.
3. Connect the oscilloscope to check point FCP105 and adjust R154 for symmetrical clipping of the wave forms on the scope.
4. Adjust R175 for  $\pm 4.8$  KHz modulation (peak deviation).

FX - 46AVOLTAGES ON SEMICONDUCTORS

No. 1

SYMBOL	TYPE	BASE (GATE 1)	COLLECTOR (DRAIN)	EMITTER (SOURCE)	(GATE 2)	NOTES
Q101	2SA639-G	7.5	8.0	8.3		R
Q102	MFE521	3.7	8.3	0.6	6.1	R
Q103	2SC763	1.6	4.0	0.8		R
Q104	2SC945-P	2.4	7.8	2.0		R
Q105	2SC1571-G	1.4	2.1	1.3		R Squelch-OFF
Q105	2SC1571-G	0	8.4	0		R Squelch-ON
Q106	2SC945-P	0.6	0	0 (E)		R
Q106	2SC945-P	0	8.8	0 (E)		T
Q107	2SC945-P	4.3	8.1	0.55		R Squelch-OFF
Q107	2SC945-P	4.2	7.9	0.35		R Squelch-ON
Q108	2SC945-P	1.15	5.3	0.6		R Squelch-OFF
Q108	2SC945-P	1.1	5.0	0.7		R Squelch-ON
Q109	2SC945-P	0.2	8.0	0 (E)		R Squelch-OFF
Q109	2SC945-P	0.5	0	0 (E)		R Squelch-ON
Q110	2SC945-P	4.5	9.0	4.0		T
Q111	2SC945-P	4.8	8.2	4.4		T
Q112	2SC945-P	0.65	5.9	0 (E)		T
Q113	2SC945-P	0.6	0.65	0 (E)		T
Q114	2SC1571-G	0.5	0.6	0 (E)		T
Q115	JA1050-G	6.5	8.0	8.7		T
Q116	2SC1571-G	7.0	8.0	6.7		T
Q117	-					
Q118	-					
Q119	-					
Q120	2SC945-P	3.5	13.6	4.2		R Dimmer-OFF
Q120	2SC945-P	7.7	7.0	7.0		R Dimmer-ON
Q121	2SD468	13.5	13.2	13.5		R Dimmer-OFF
Q121	2SC9468	7.3	13.2	6.5		R Dimmer-ON
Q122	2SC945-P	4.2	4.2	4.2		R Dimmer-OFF
Q122	2SC945-P	0.1	10.5	0.1		R Dimmer-ON
Q123	-					

FX - 46AVOLTAGES ON SEMICONDUCTORS

No. 2

SYMBOL	TYPE	BASE (GATE 1)	COLLECTOR (DRAIN)	EMITTER (SOURCE)	(GATE 2)	NOTES
Q124	3SK-40-M	0	6.7	0.2	0.6	T
Q125	2SC2026	0.85	6.1	0.32		T
Q126	2SC2053	1.4	8.0	0.8		T
Q301	2SC945-P	0.74	0.03	0 (E)		T
Q302	JA1050-G	8.3	8.85	8.9		T
Q303	2SC945-P	0.2	0.03	0 (E)		T
Q304	2SC945-P	0.84	1.58	0.28		T High-Power
Q304	2SC945-P	0.88	1.57	0.28		T Low-Power
Q305	2SC945-P	0.1	1.58	0.28		T High-Power
Q305	2SC945-P	0.01	1.57	0.28		T Low-Power
Q306	2SD468	0.54	11.7	0 (E)		T High-Power
Q306	2SD468	0.53	12.4	0 (E)		T Low-Power
Q307	2SB529-D	12.0	3.5	12.6		T High-Power
Q307	2SB529-D	12.6	0.9	13.2		T Low-Power
Q601	2SD468	0.8	13.0	0.3		T
Q601	2SD468	9.5	13.0	9.0		R
Q602	2SD359	9.4	11.2	9.0		T
Q602	2SD359	0.9	13.8	0.4		R
Q603	2SC945-P	0.7	9.5	0.3		T
Q603	2SC945-P	0.4	0.25	0.8		R
Q604	2SC945-P	0	9.5	0.3		T
Q604	2SC945-P	0	0.25	0.8		R

VOLTAGES ON SEMICONDUCTORS

No.

SYMBOL	TYPE	BASE (GATE 1)	COLLECTOR (DRAIN)	EMITTER (SOURCE)	(GATE 2)	NOTES
Q401	2SC945	0.7	0.1	0		PLL
Q402	2SC945	0.3	13.0	0		CH16 PLL
Q403	2SD227	0.3	13.0	0		CH16 PLL
Q404	2SC945	0.7	0.08	0		CH16 PLL
Q405	2SC945	0.66	0.04	0		PLL
Q406	2SC945	0.66	0.75	0		PLL
Q407	JA7151	12.86	8.27	13.5		PLL
Q408	2SC945	0.61	7.84	0		PLL
Q409	2SC945	1.48	0.86	0.8		PLL
Q410	2SC945	0.2	8.27	0		PLL
Q411	JA1050	8.05	1.50	8.27		PLL
Q412	2SC945	0.67	0.04	0		SIMPLEX PLL
Q413	2SC945	0.2	13.5	0		PLL
Q414	2SC945	0.4	3.37	0		PLL
Q415	2SC763	0.71	8.14	0.54		PLL
Q416	2SC763	3.04	7.29	2.6		PLL
Q501	2SK19	0	7.24	0.94		VCO
Q502	2SC1571	4.6	7.55	4.0		CH16 VCO
Q503	3SK40	0	7.24	0.48	2.95	VCO
Q504	2SC945	8.22	8.27	7.55		VCO
Q505	2SC2053	3.53	7.64	2.83		VCO





**ICOM M25D FREQUENCY PROGRAMMING**

The frequency programming formula is shown below:

1. Injection (VCO) Frequency = Transmit Frequency – 21.4MHz

2.  $P = 127 - \frac{\text{VCO Frequency} - 133.525}{0.025}$  (MHz)

The matrix position value printed on the diode matrix board is (64, 32, 16, 8, 4, 2, 1) subtracted from "P" until zero is achieved. These numbers represent diode positions.

**EXAMPLE 1.**

Desired Frequency and Mode: 156.8MHz Simplex

1. VCO Frequency = 156.8 – 21.4 = 135.4 (MHz)

2.  $P = 127 - \frac{135.4 - 133.525}{0.025} = 52$

$$52 - 32 - 16 - 4 = 0$$

The frequency 156.8MHz Simplex would be programmed by placing diodes in positions 32, 16, 4 and SIM on the matrix board vertical line.

**EXAMPLE 2.**

Desired Frequency and Mode: 157.1MHz Duplex (Channel 22):

Since this is a Duplex frequency (one in which the transmit frequency and receive frequency are different), the transmit frequency is used in the formula.

(Transmit frequency: 157.1MHz)

(Receive frequency: 161.7MHz)

1. VCO Frequency = 157.1 – 21.4 = 135.7 (MHz)

2.  $P = 127 - \frac{135.7 - 133.525}{0.025} = 40$

$$40 - 32 - 8 = 0$$

Again the frequency would be programmed by placing diodes in positions 32 and 8 on the matrix board vertical line.

**SIMPLEX CHANNELS ARE PROGRAMMED BY PLACING DIODES IN THE "SIM" POSITION ON THE MATRIX BOARD VERTICAL LINE.**

**RECEIVE ONLY CHANNELS ARE PROGRAMMED BY PLACING DIODES IN THE "RX ONLY" POSITION ON THE MATRIX BOARD VERTICAL LINE. (In receive only channels, the receive frequency is used in the formula instead of a transmit frequency).**

Divided numbers (N) in the phase locked loop follow the formula below:

$$N = 127 - P \text{ (Formula 2)}$$

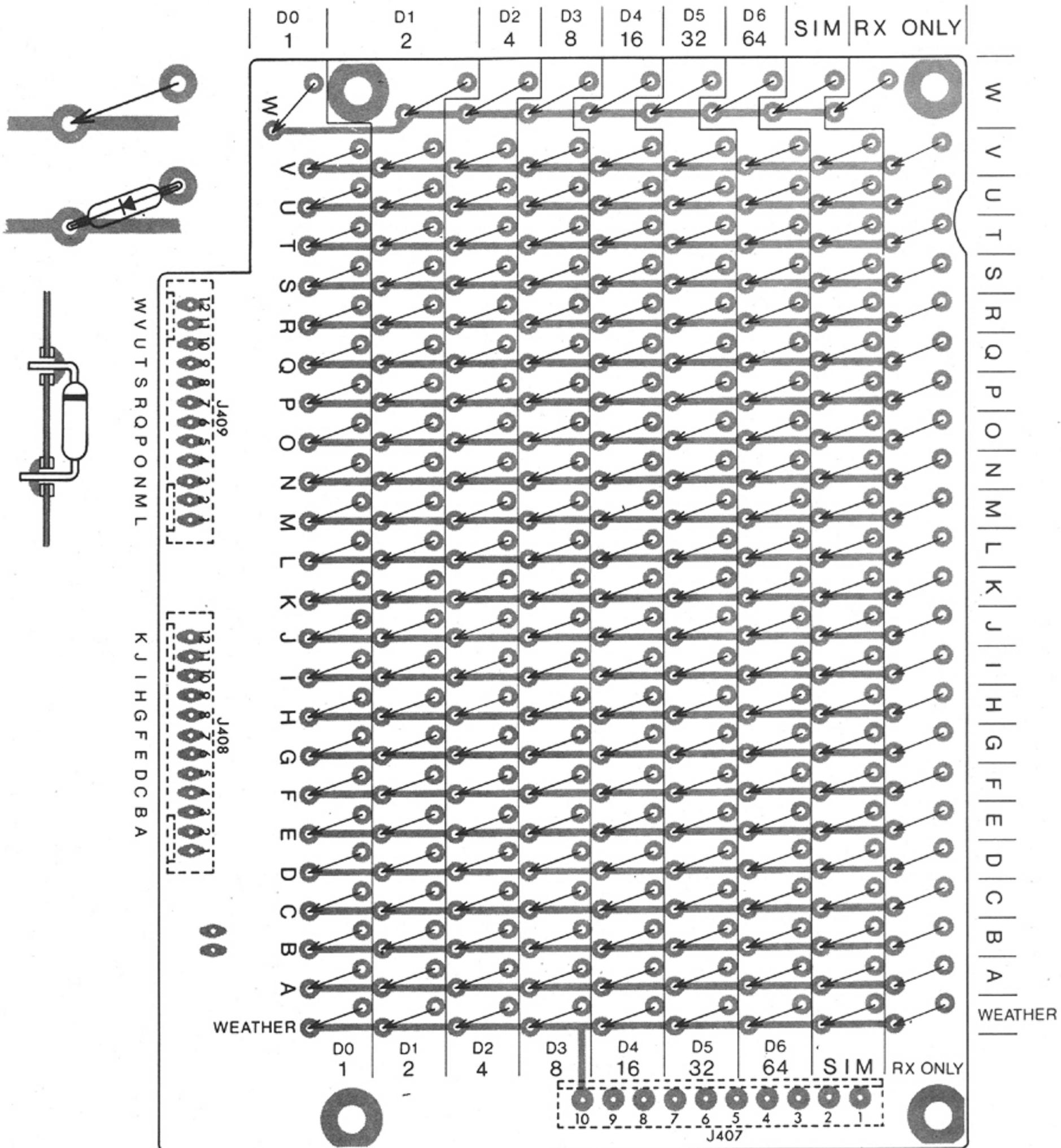
The diodes can be inexpensive Silicon type available most anywhere. **GERMANIUM DIODES CAN NOT BE USED.**



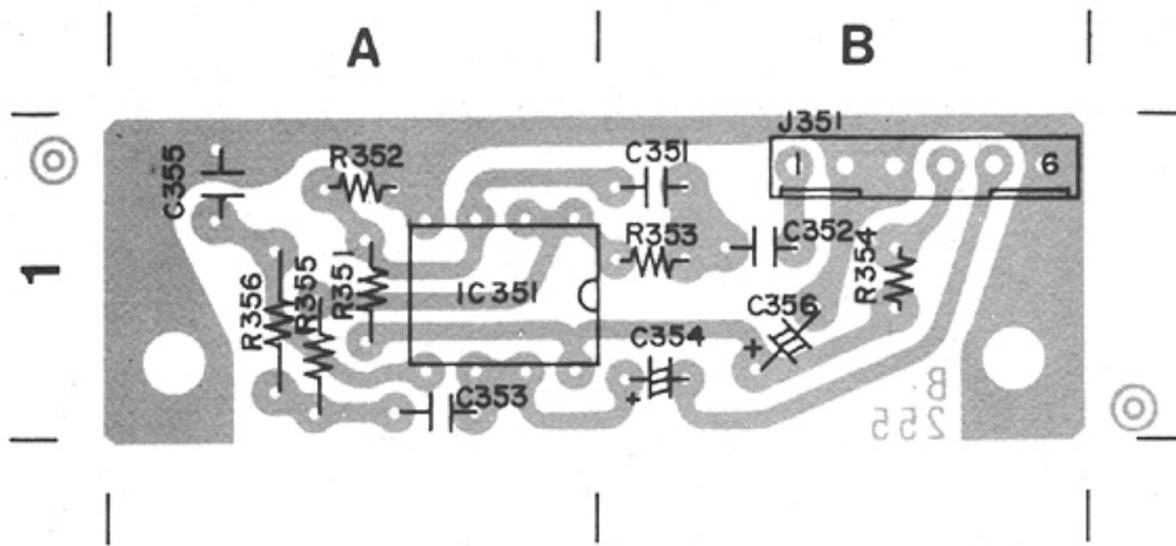
VHF MARINE MODEL ICOM M25D

FREQUENCY PROGRAMMING CHART (2)

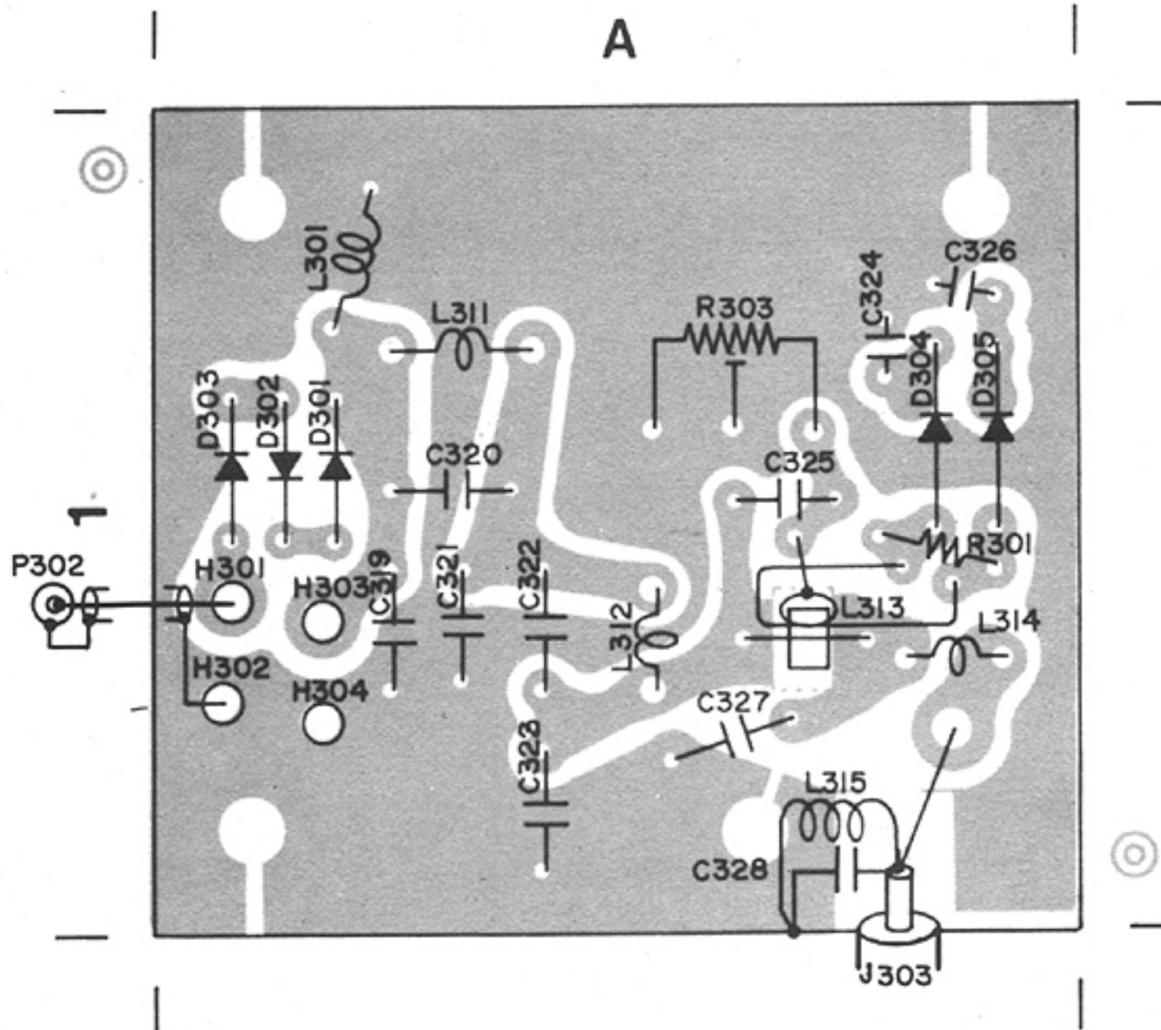
CHANNEL	TRANSMIT FREQ. MHz	RECEIVE FREQ. MHz	INJECTION FREQ. MHz	D0	D1	D2	D3	D4	D5	D6	SIM	RX ONLY
				1	2	4	8	16	32	64		
60	156.025	160.625	134.625	▲	▲			▲		▲		
61	156.075	160.675	134.675	▲	▲			▲		▲		
62	156.125	160.725	134.725	▲	▲	▲	▲	▲		▲		
63	156.175	160.775	134.775	▲	▲	▲	▲	▲		▲		
64	156.225	160.825	134.825	▲	▲	▲	▲	▲		▲		
65	156.275	160.875	134.875	▲	▲		▲			▲		
65A	156.275	156.275	134.875	▲	▲		▲			▲	▲	
66	156.325	160.925	134.925	▲	▲	▲	▲	▲		▲		
66A	156.325	156.325	134.925	▲	▲	▲	▲	▲		▲	▲	
67	156.375	156.375	134.975	▲	▲	▲	▲	▲		▲	▲	
68	156.425	156.425	135.025	▲	▲					▲	▲	
69	156.475	156.475	135.075	▲	▲					▲	▲	
70	156.525	156.525	135.125	▲	▲	▲	▲	▲	▲	▲	▲	
71	156.575	156.575	135.175	▲	▲	▲	▲	▲	▲	▲	▲	
72	156.625	156.625	135.225	▲	▲	▲	▲	▲	▲	▲	▲	
73	156.675	156.675	135.275	▲	▲		▲	▲	▲	▲	▲	
74	156.725	156.725	135.325	▲	▲	▲	▲	▲	▲	▲	▲	
75	--	156.775	135.375	▲	▲	▲	▲	▲	▲	▲	▲	▲
76	--	156.825	135.425	▲	▲	▲	▲	▲	▲	▲	▲	▲
77	156.875	156.875	135.475	▲	▲			▲	▲	▲	▲	
78	156.925	161.525	135.525	▲	▲	▲	▲	▲	▲	▲		
78A	156.925	156.925	135.525	▲	▲	▲	▲	▲	▲	▲	▲	
79	156.975	161.575	135.575	▲	▲	▲	▲	▲	▲	▲		
79A	156.975	156.975	135.575	▲	▲	▲	▲	▲	▲	▲	▲	
80	157.025	161.625	135.625	▲	▲				▲	▲	▲	
80A	157.025	157.025	135.625	▲	▲				▲	▲	▲	
81	157.075	161.675	135.675	▲	▲		▲		▲	▲	▲	
81A	157.075	157.075	135.675	▲	▲		▲		▲	▲	▲	
82	157.125	161.725	135.725	▲	▲	▲	▲	▲	▲	▲	▲	
82A	157.125	157.725	135.725	▲	▲	▲	▲	▲	▲	▲	▲	
83	157.175	161.775	135.775	▲	▲				▲	▲	▲	
83A	157.175	157.175	135.775	▲	▲				▲	▲	▲	
84	157.225	161.825	135.825	▲	▲	▲	▲	▲	▲	▲	▲	
85	157.275	161.875	135.875	▲	▲	▲	▲	▲	▲	▲	▲	
86	157.325	161.925	135.925	▲	▲	▲	▲	▲	▲	▲	▲	
87	157.375	161.975	135.975	▲	▲	▲	▲	▲	▲	▲	▲	
88	157.425	162.025	136.025	▲	▲		▲	▲	▲	▲	▲	
88A	157.425	157.425	136.025	▲	▲		▲	▲	▲	▲	▲	
WX1	--	162.550	141.150		▲	▲						▲
WX2	--	162.400	141.000		▲	▲		▲				▲
WX3	--	162.475	141.075		▲	▲		▲				▲
WX4	--	161.650	140.250		▲		▲		▲			▲



The weather position is connected to the weather button located on the front panel. The "RX ONLY" diode for the weather position need not be programmed, as it is already in the PLL unit. Diodes must be placed along the arrows as shown on the board, and must lie flat on the surface of the board.

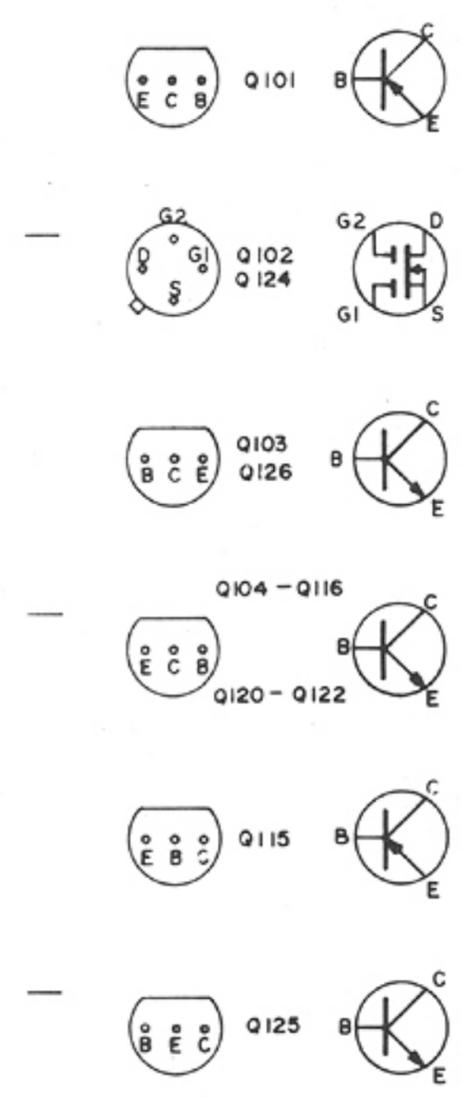
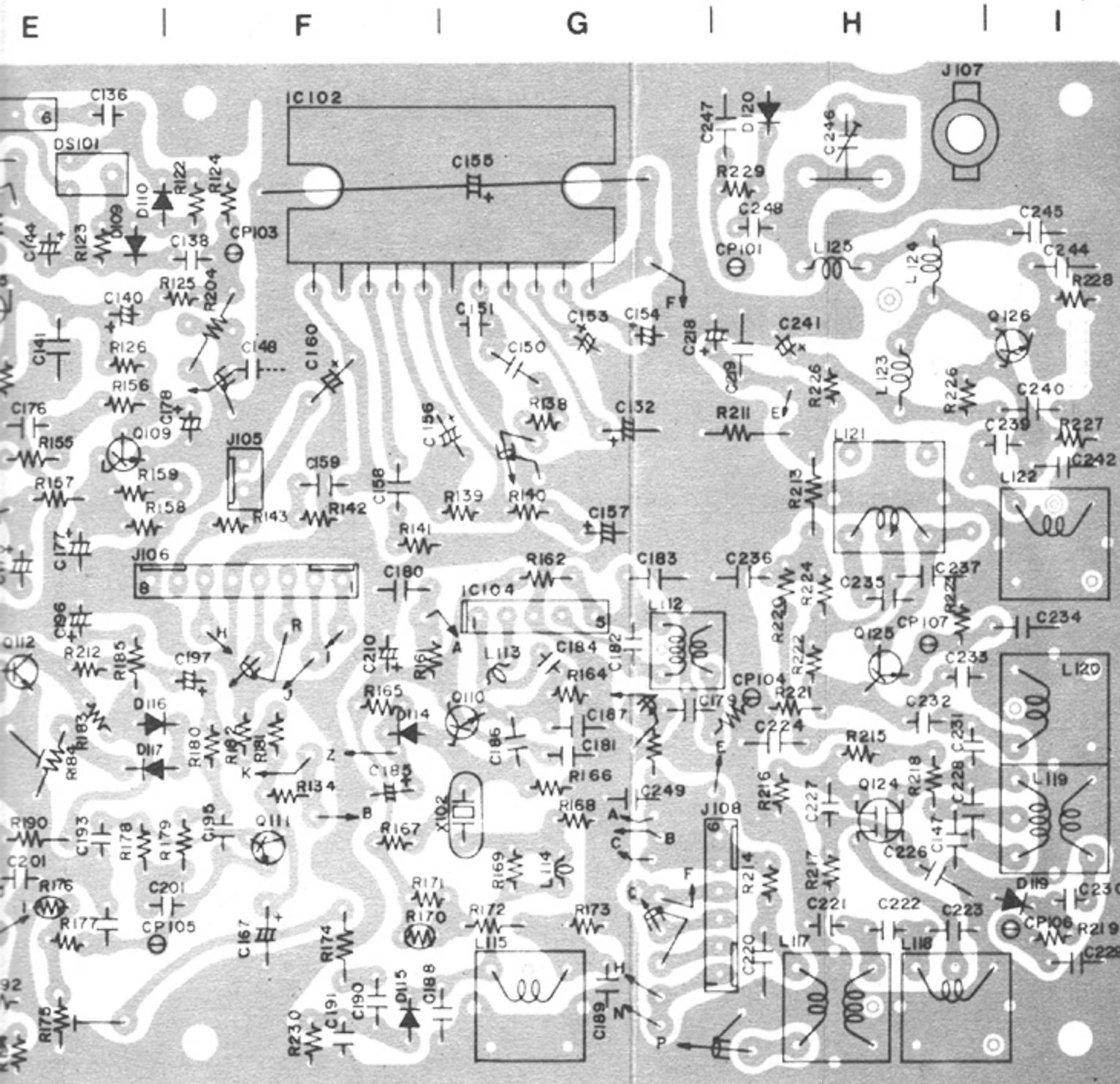


ICOM M25D AF FILTER UNIT  
(U - 140)



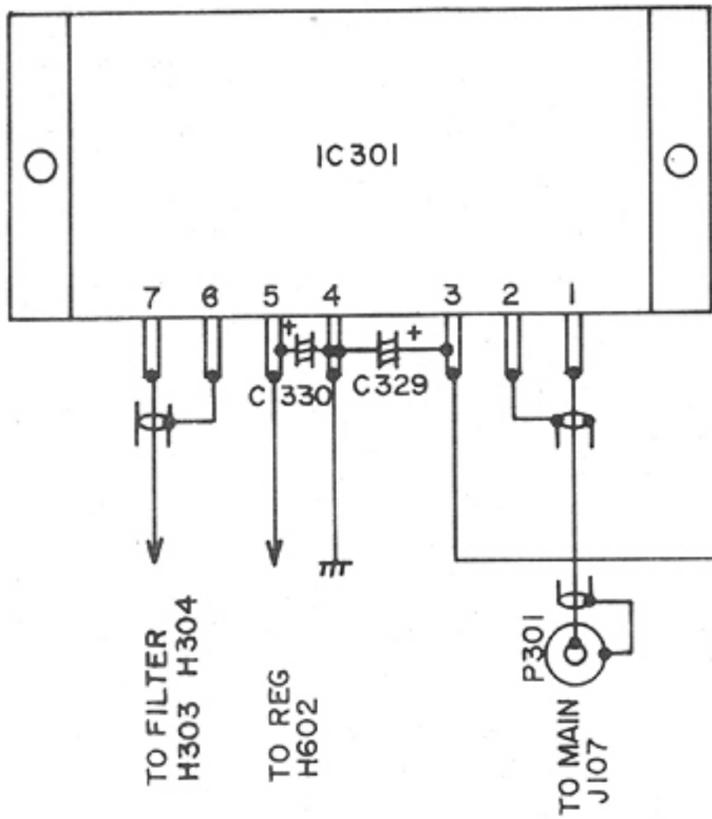
ICOM M25D FILTER UNIT  
(U - 138)



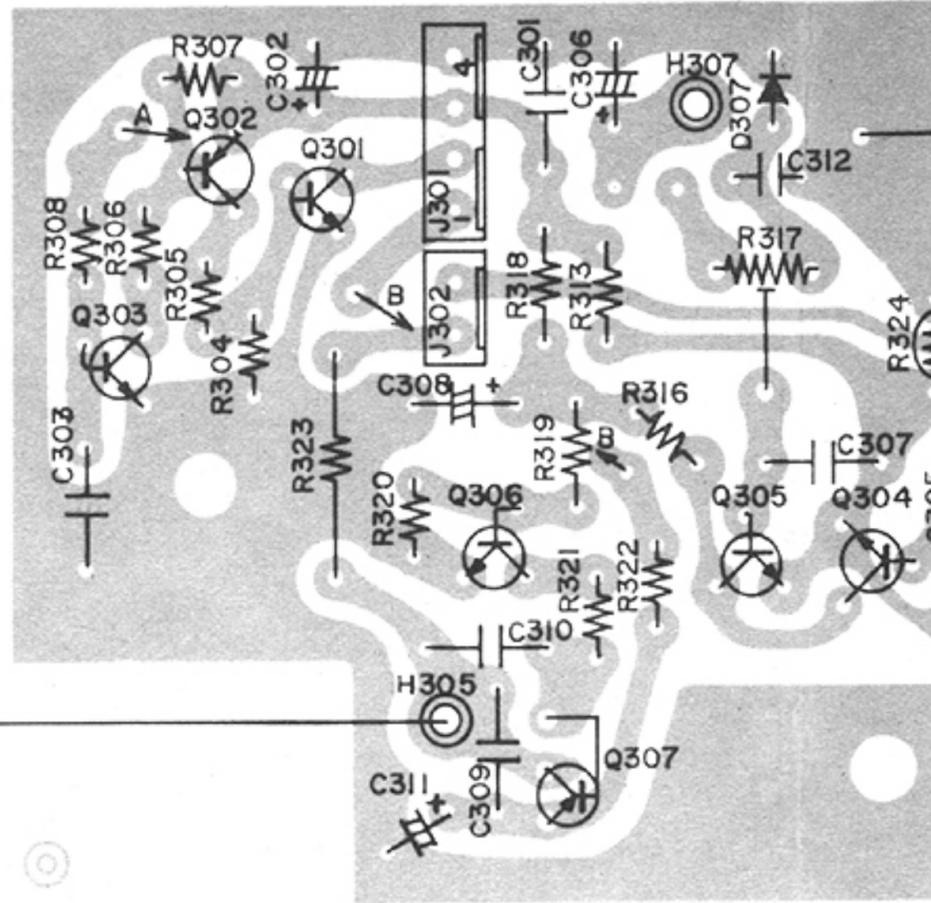


ICOM M25D MAIN UNIT  
(U - 136)

A



B



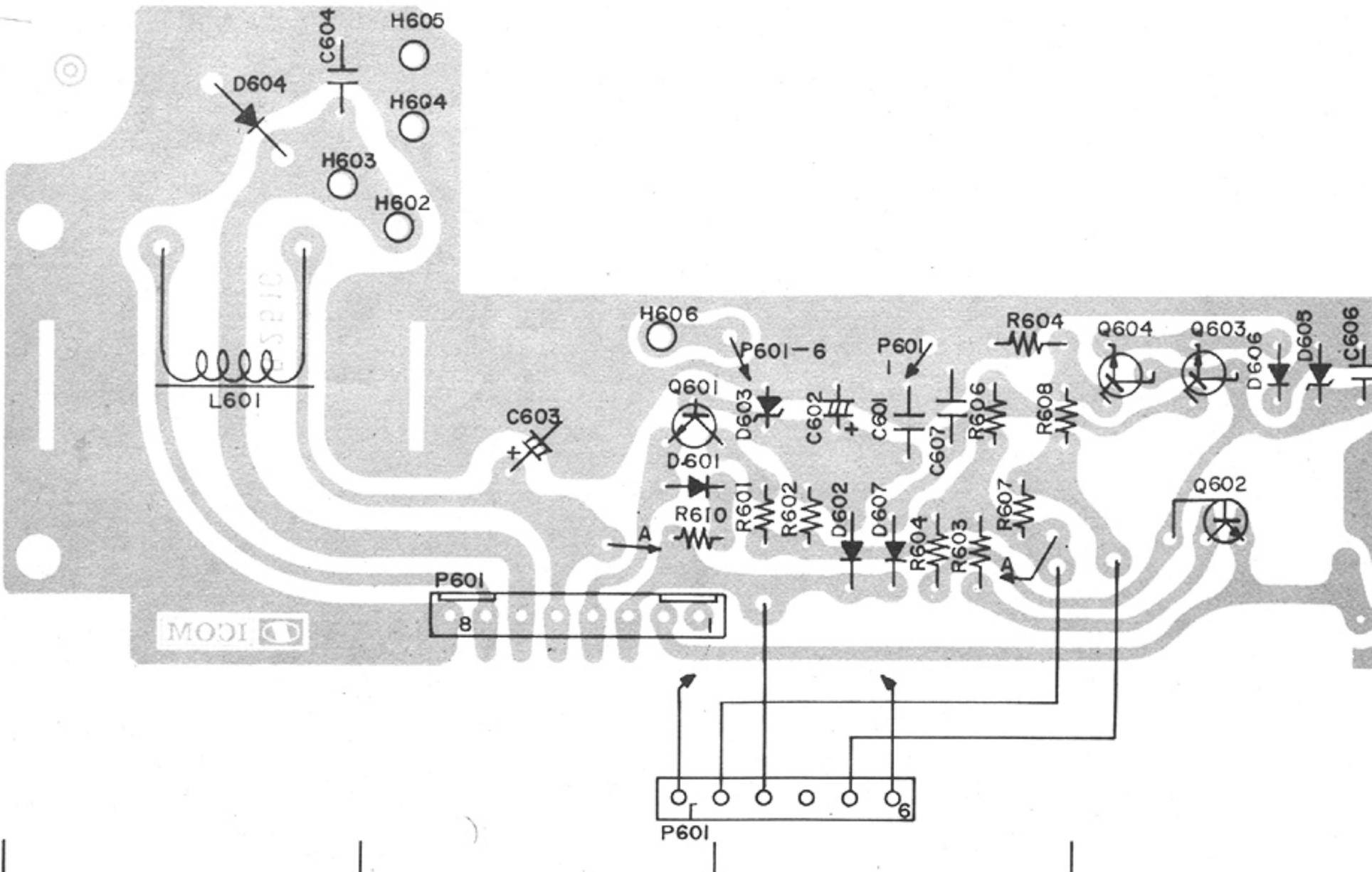
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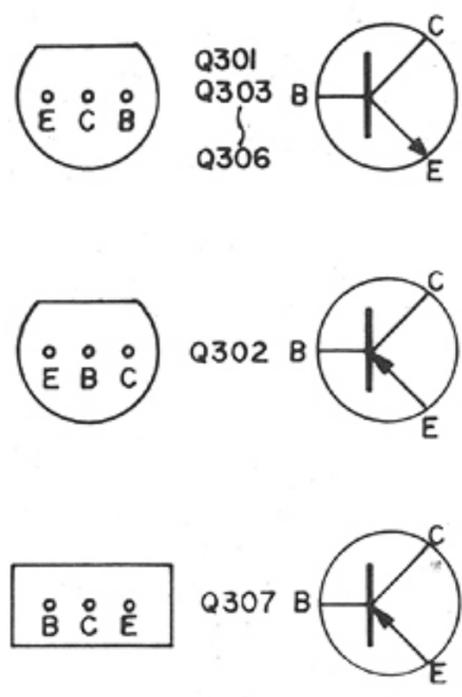
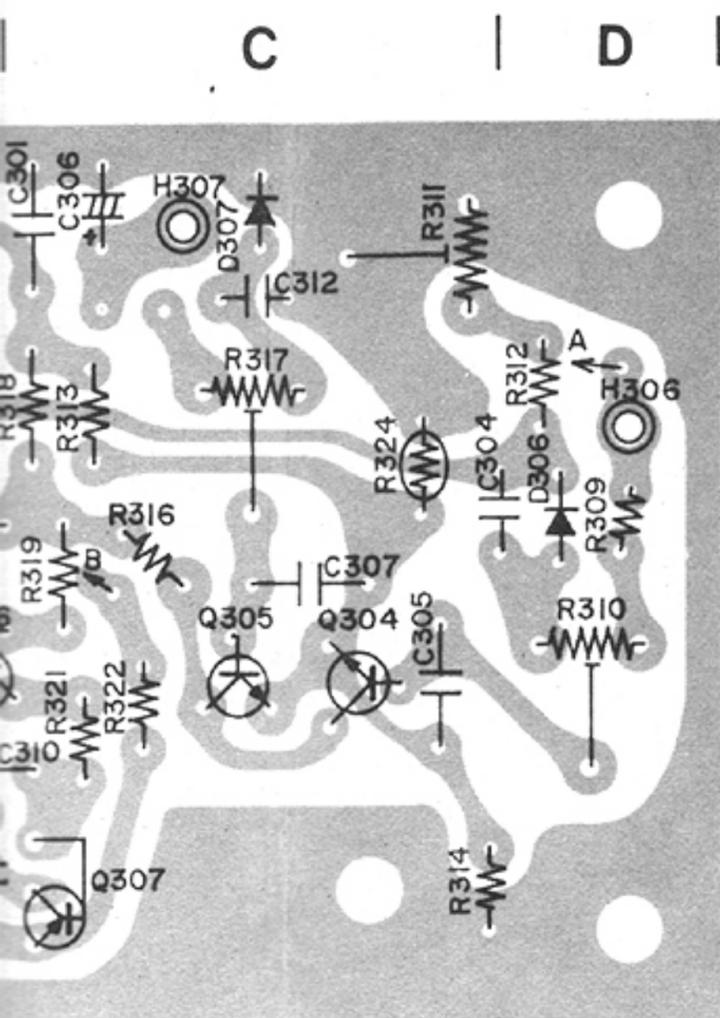
A

B

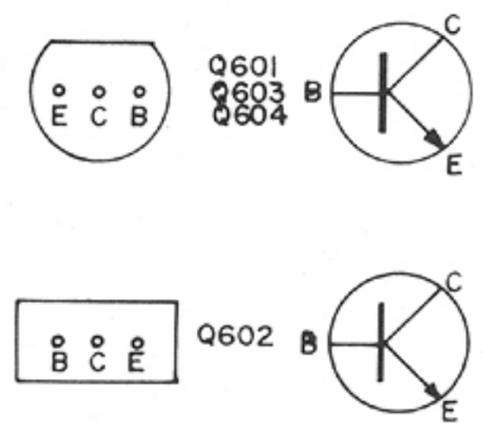
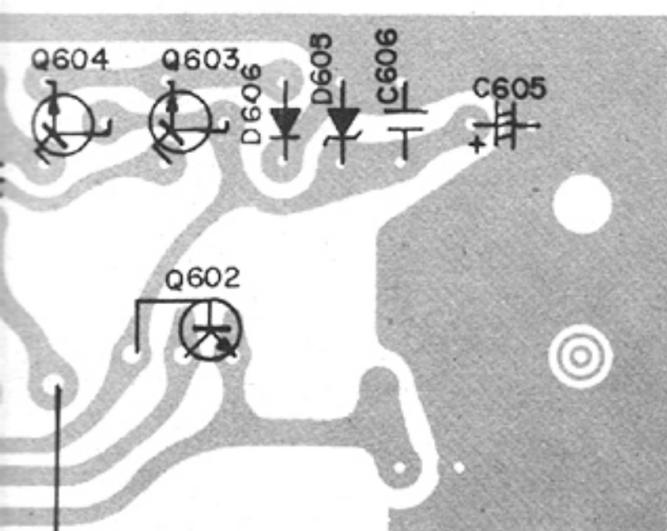
C

D

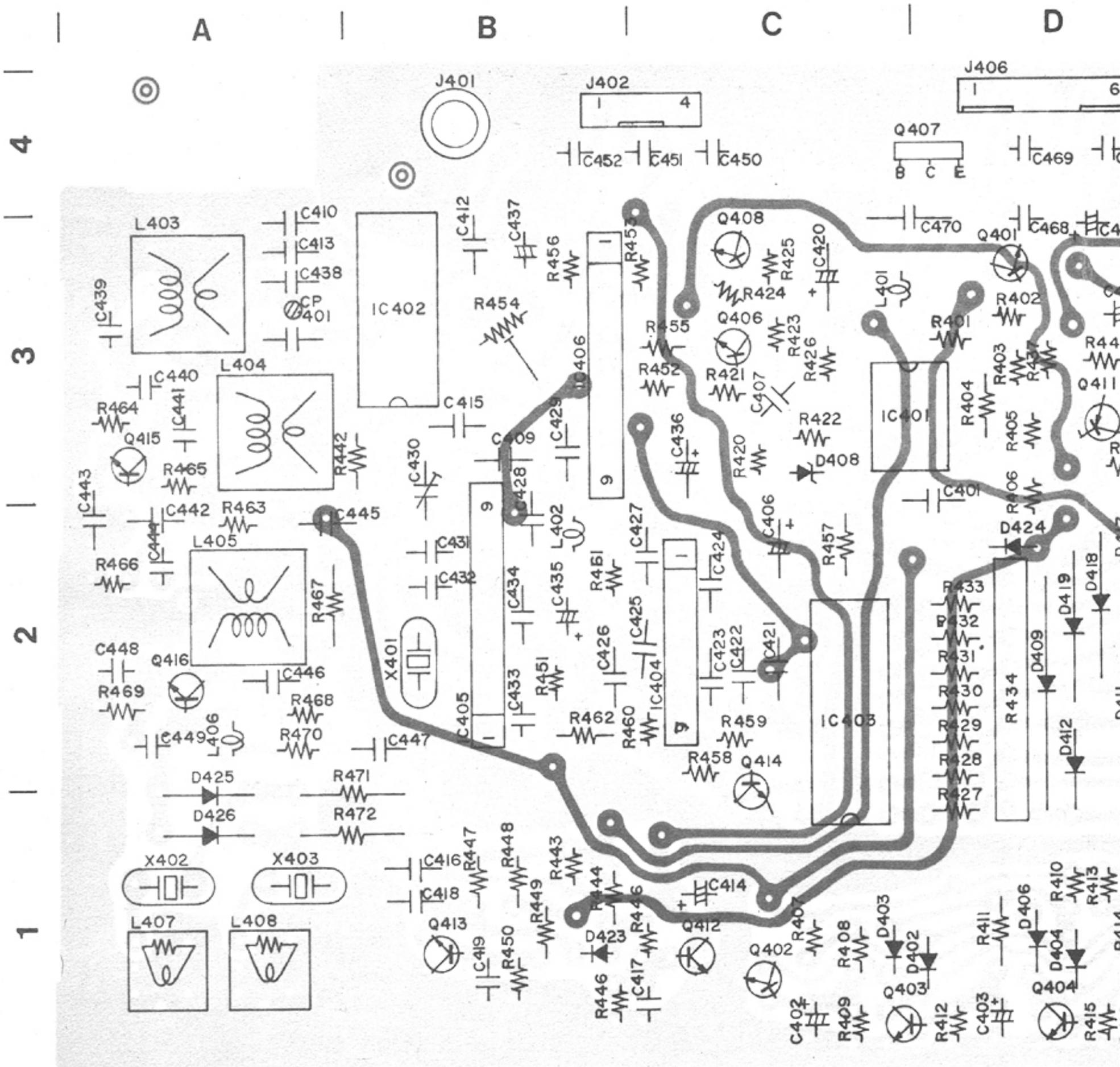




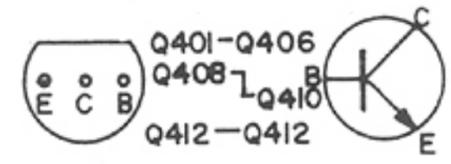
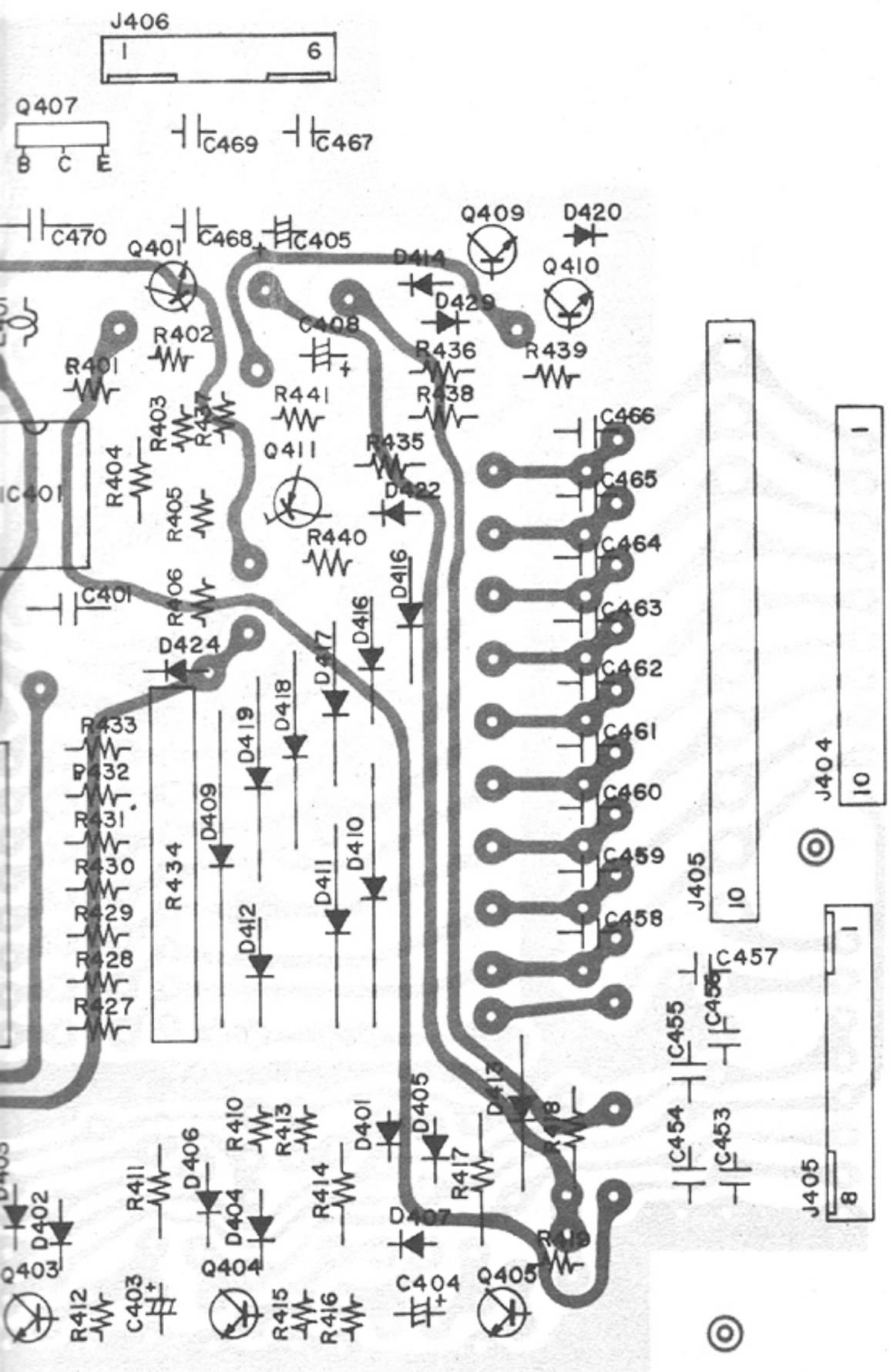
ICOM M25D PA UNIT  
(U - 137)



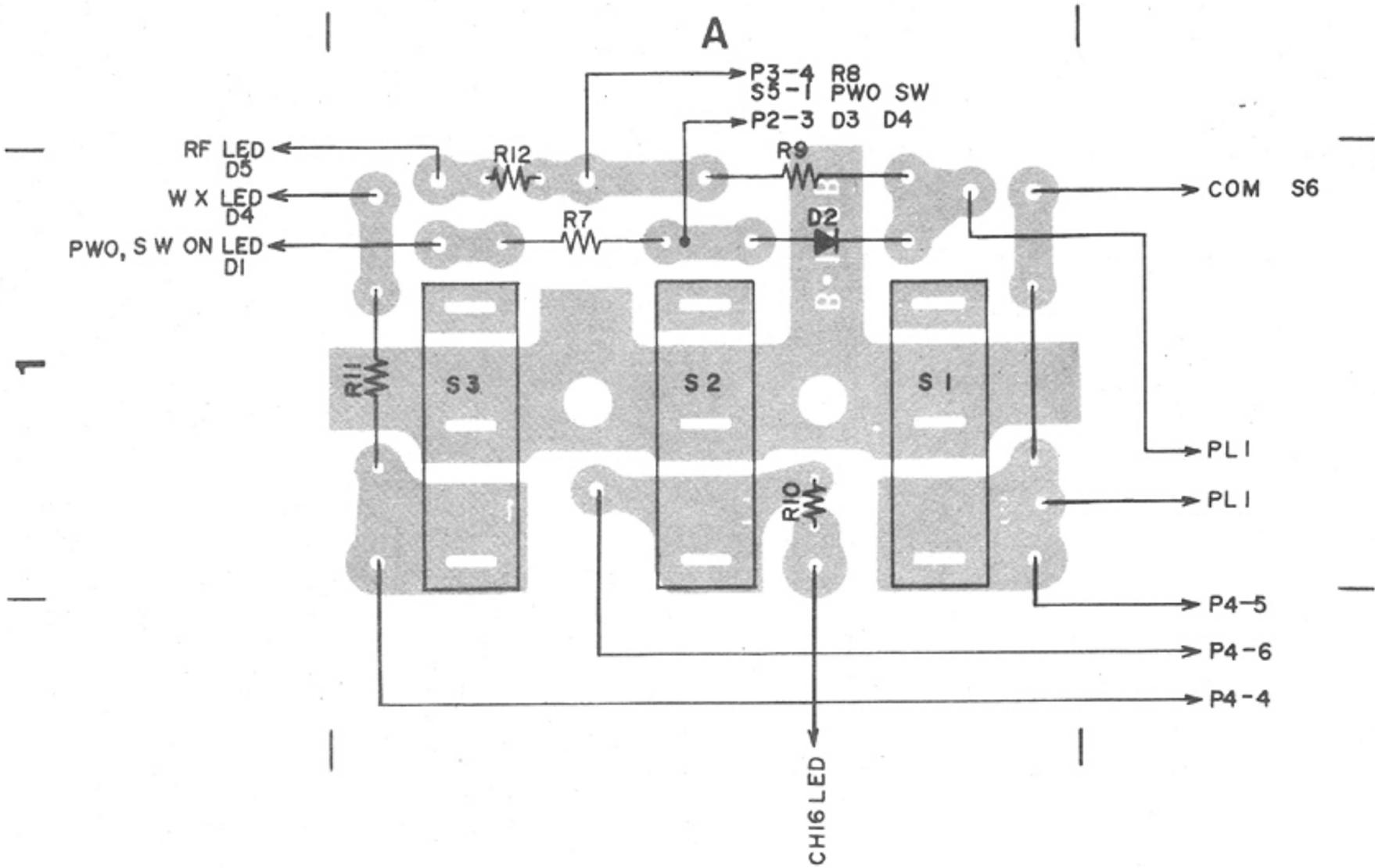
ICOM M25D REGULATOR UNIT  
(U - 139)



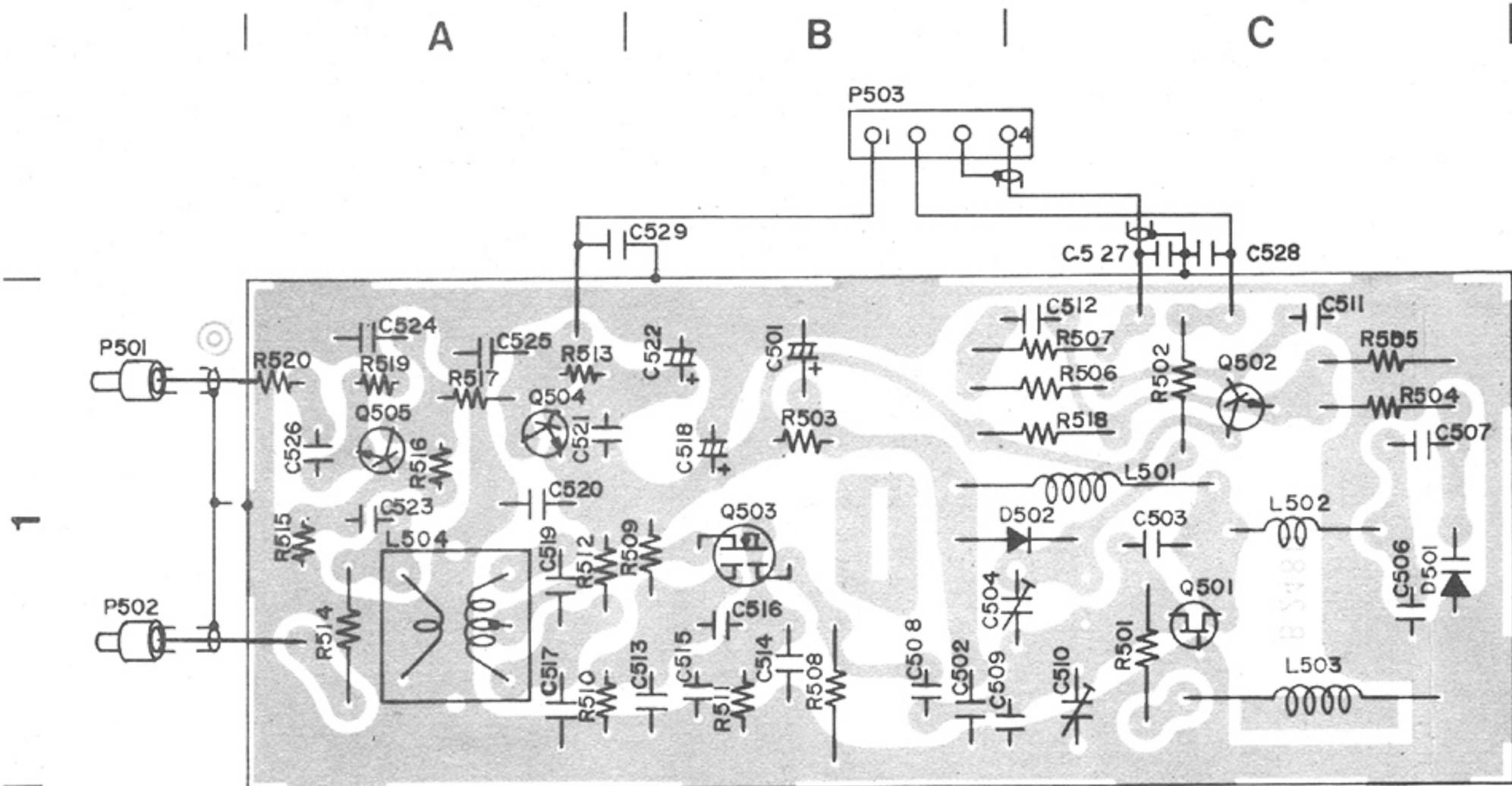
D E



ICOM M25D PLL UNIT  
(U - 141)



ICOM M25D SWITCH BOARD



COM S6

PL I

PL I

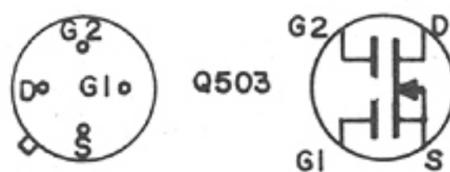
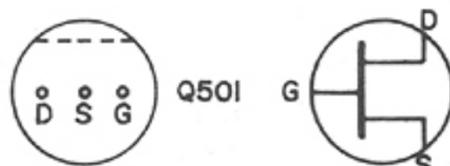
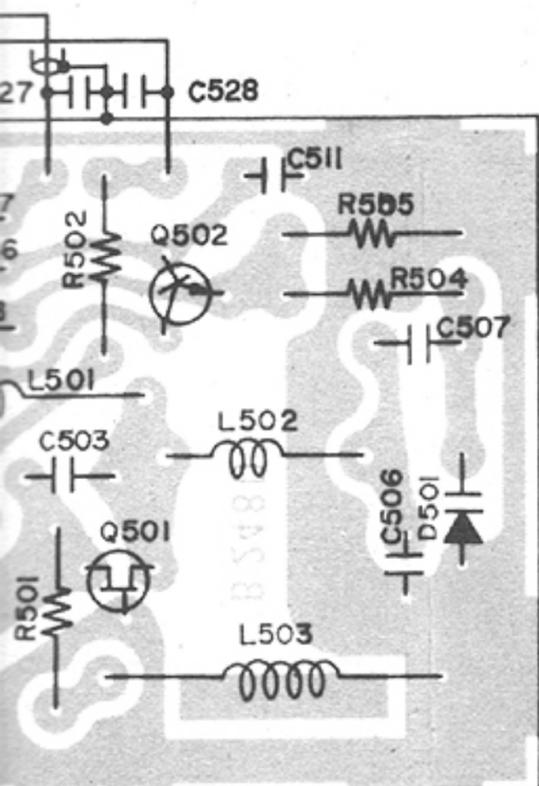
P4-5

P4-6

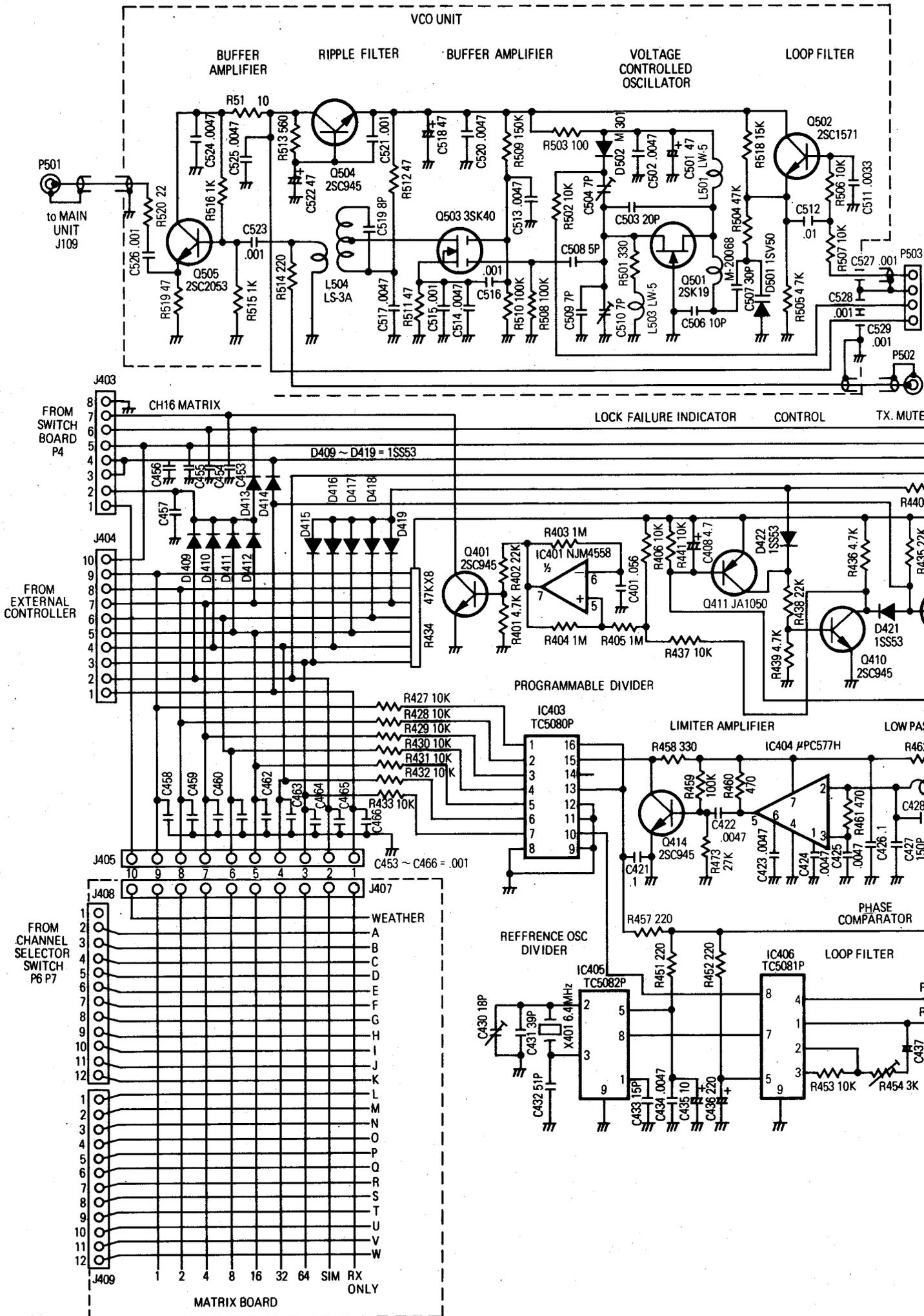
P4-4

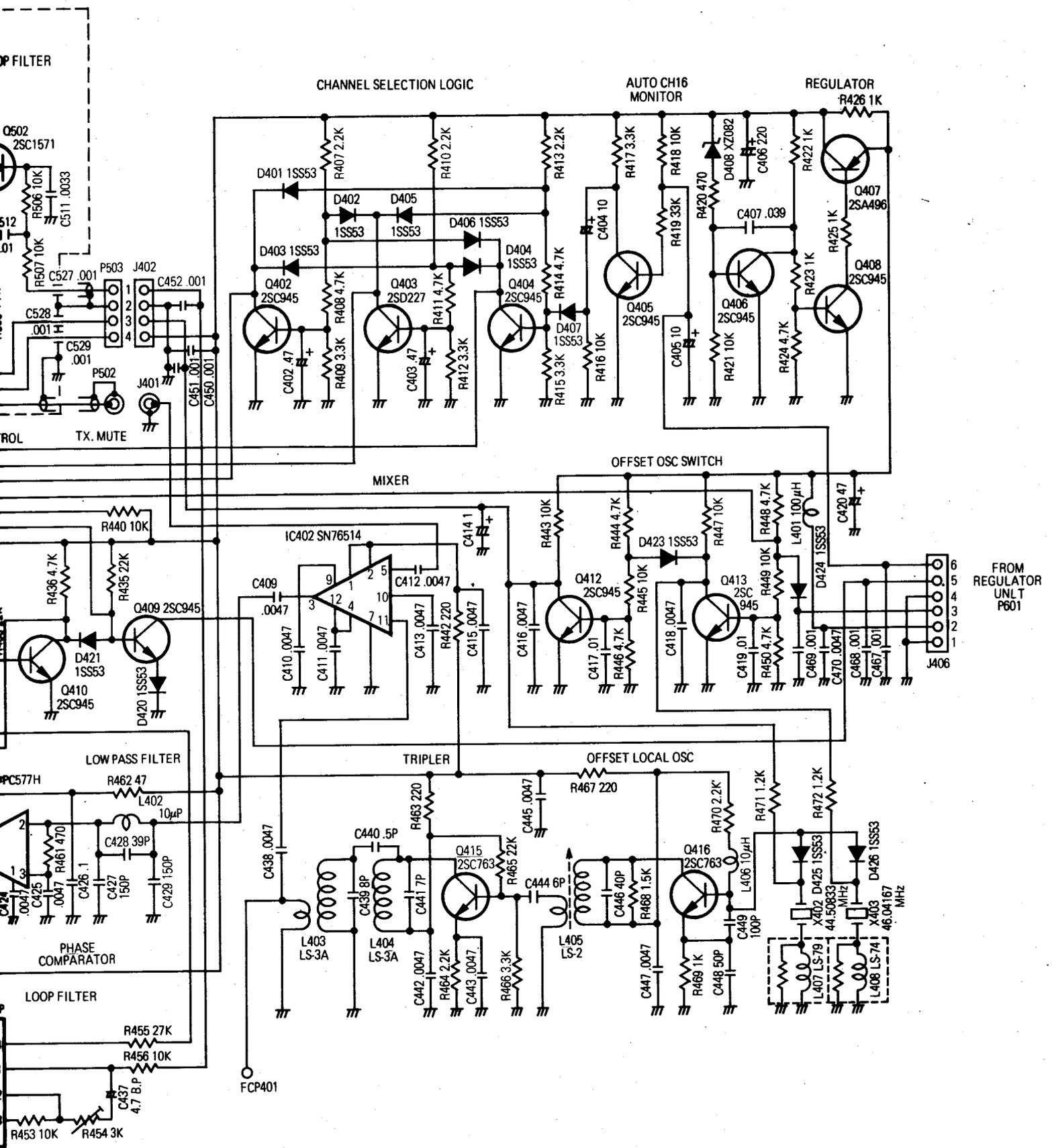
M25D SWITCH BOARD

C

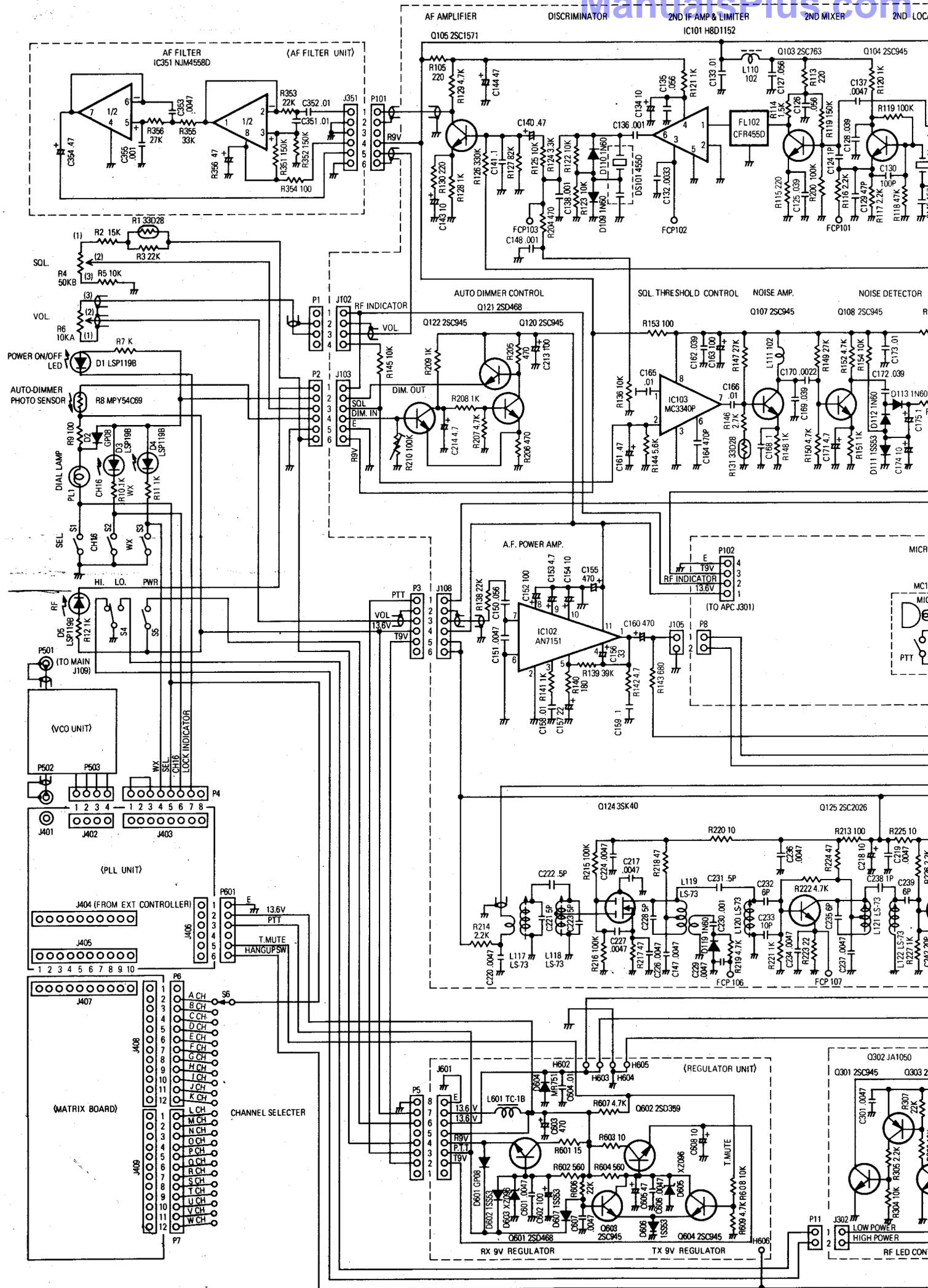


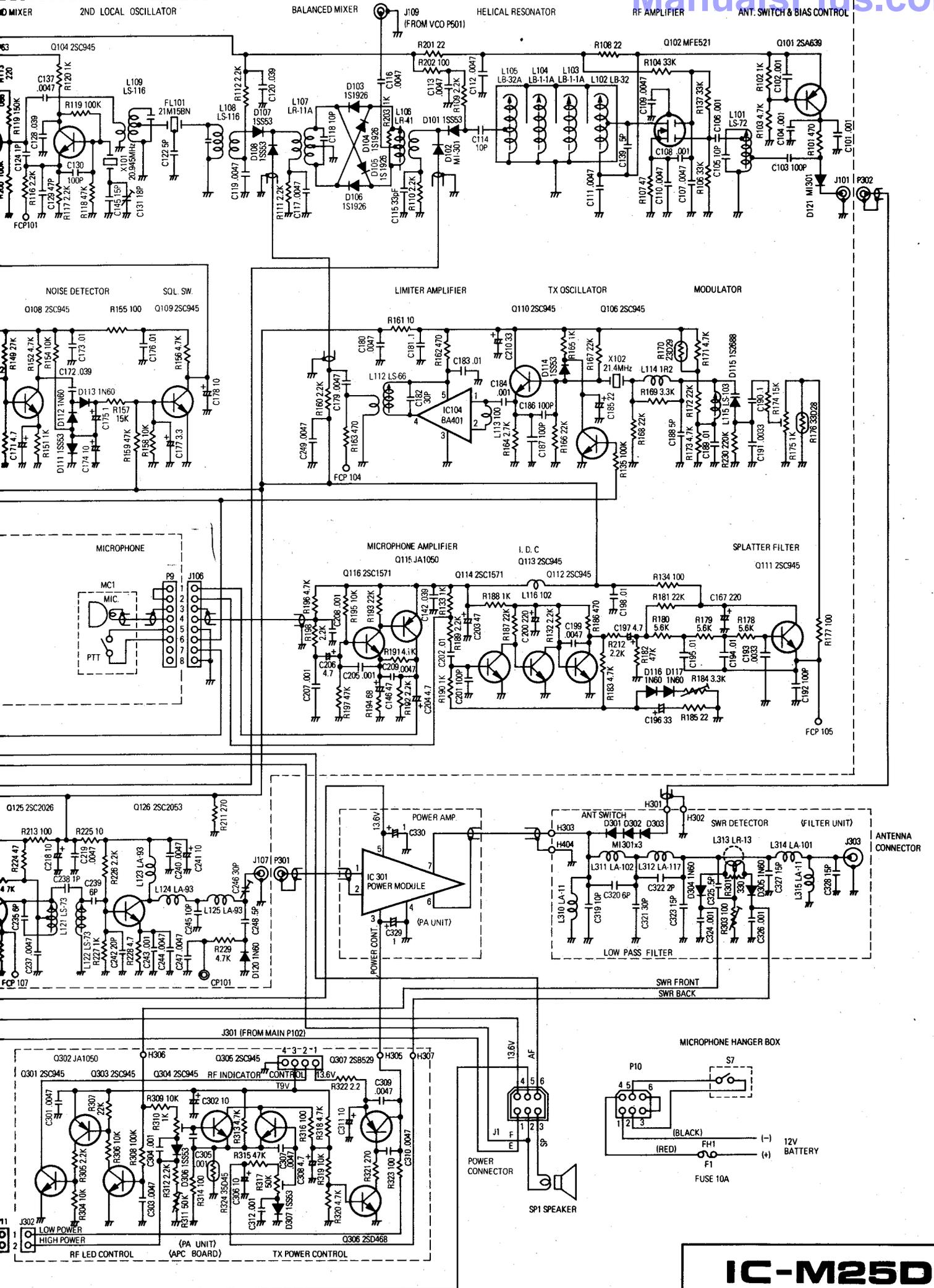
ICOM M25D VCO UNIT  
(U - 142)





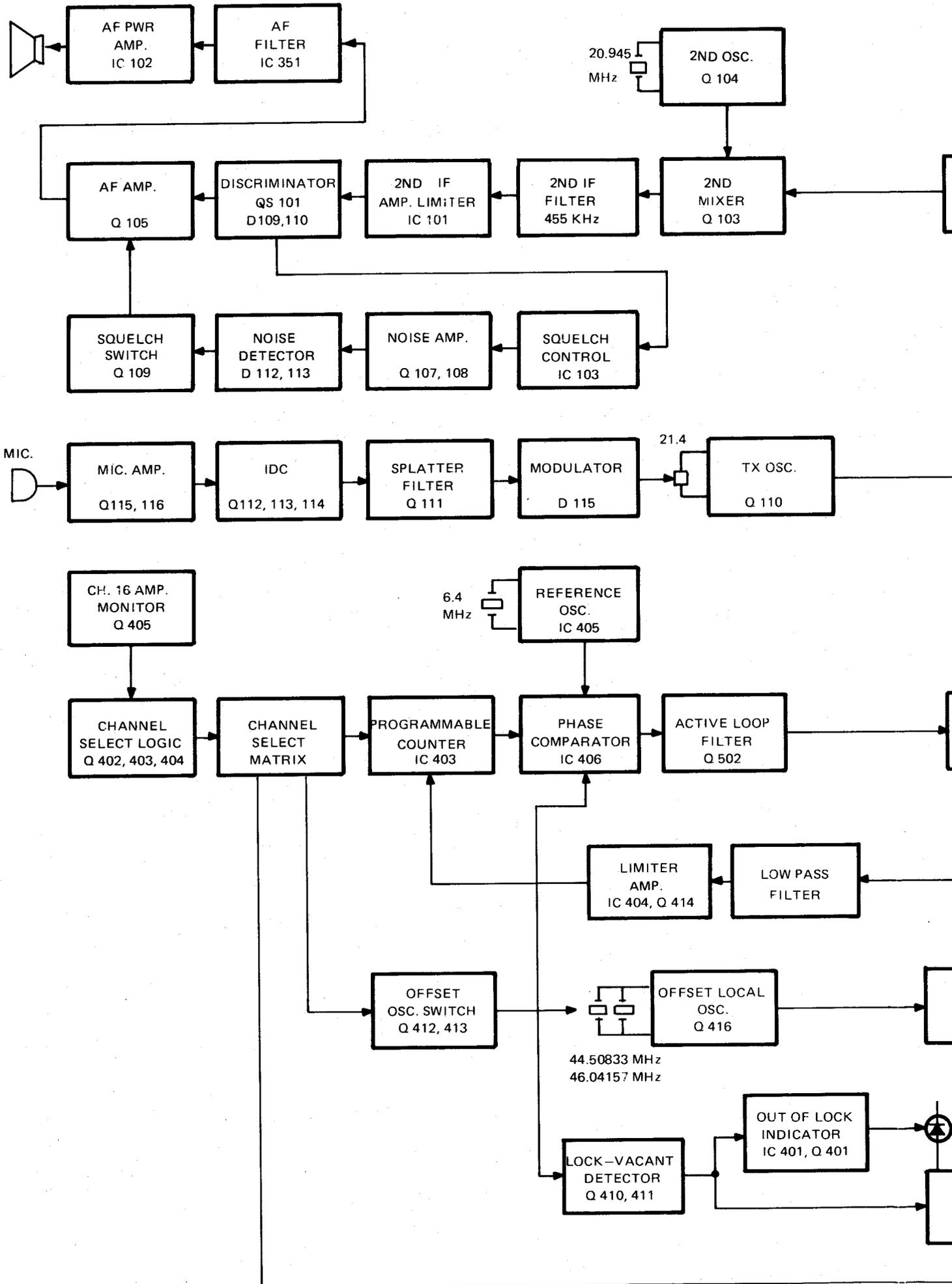
**IC-M25D**  
SCHEMATIC DIAGRAM 1

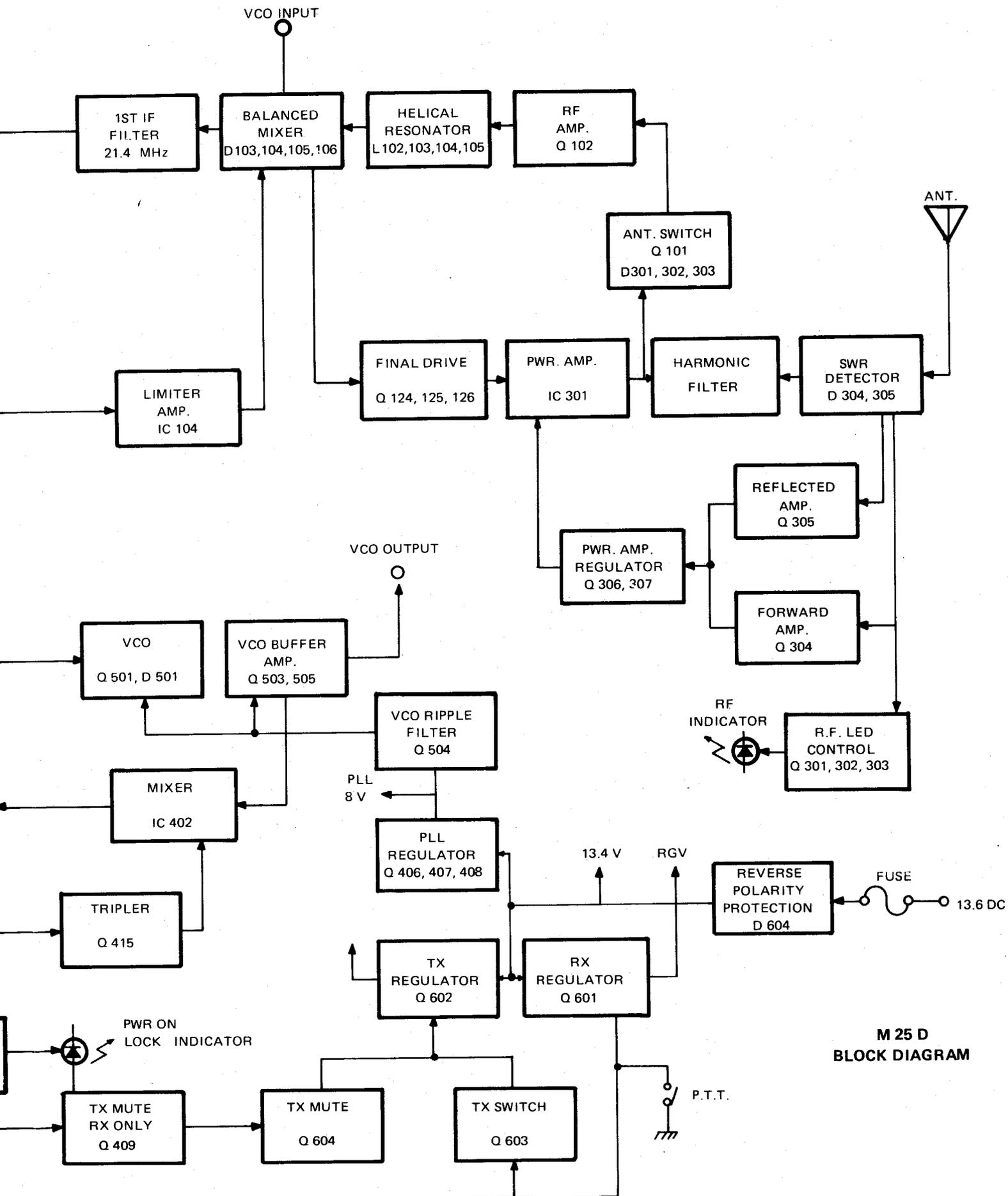




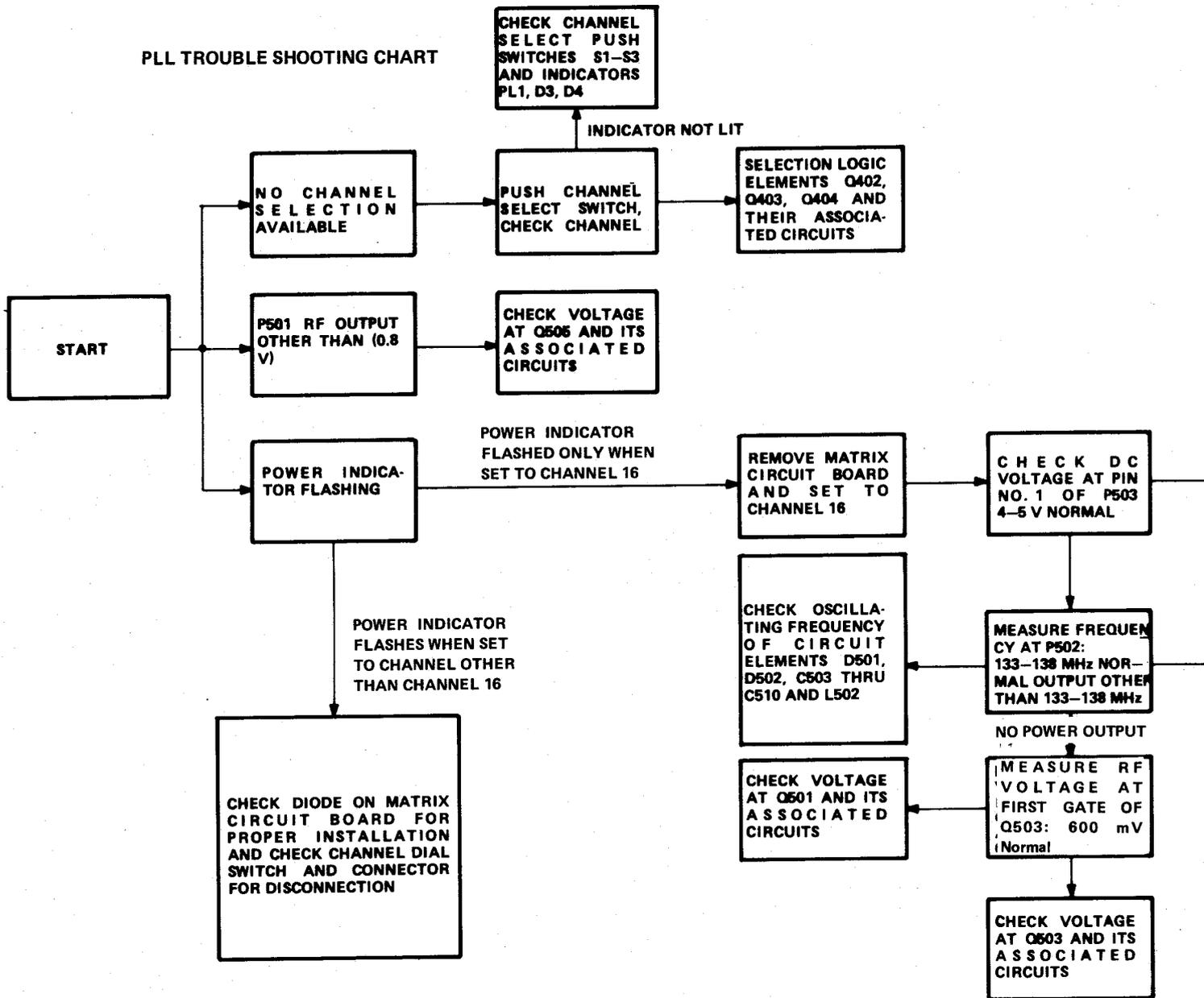
# IC-M25D

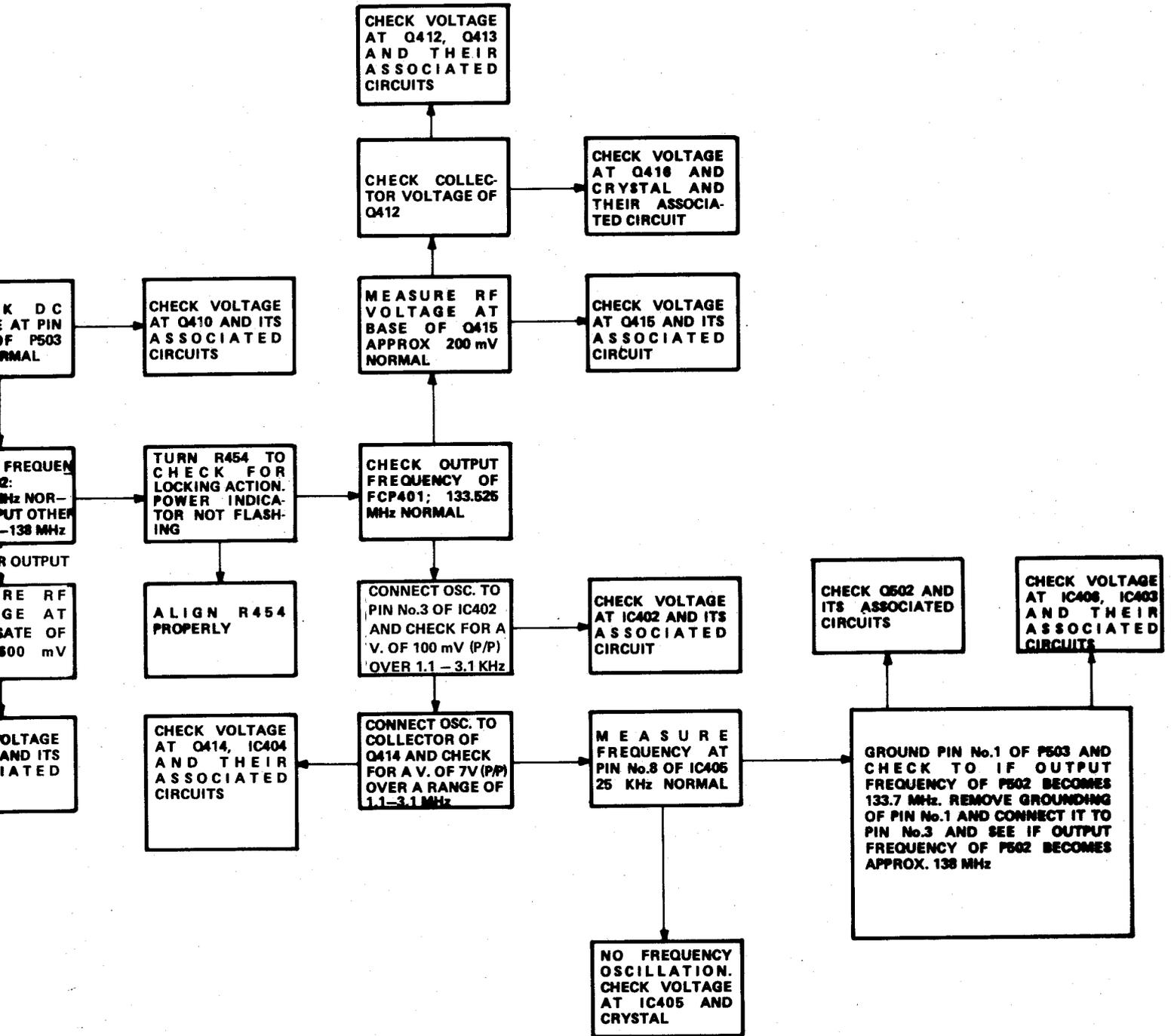
SCHEMATIC DIAGRAM 2



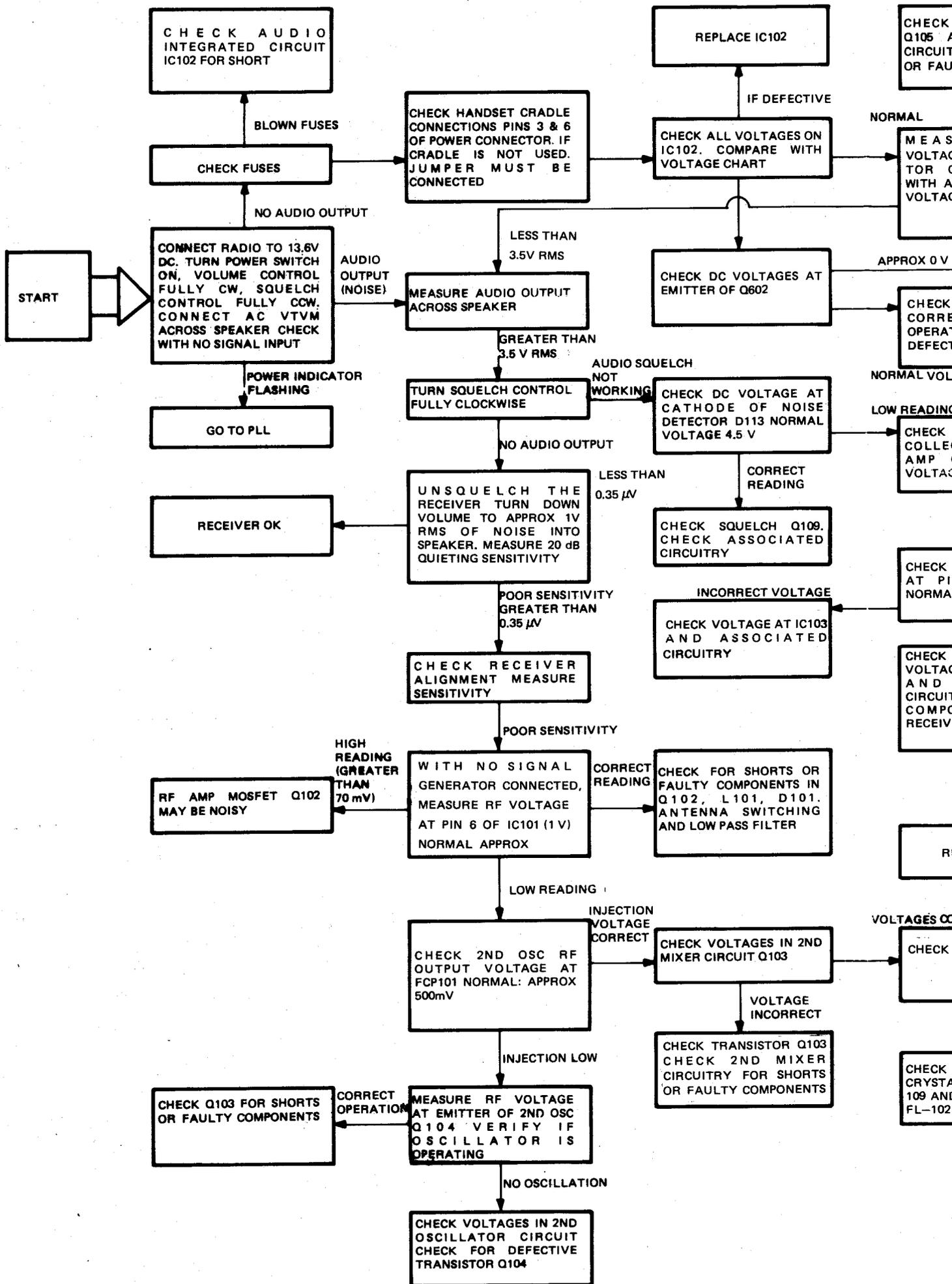


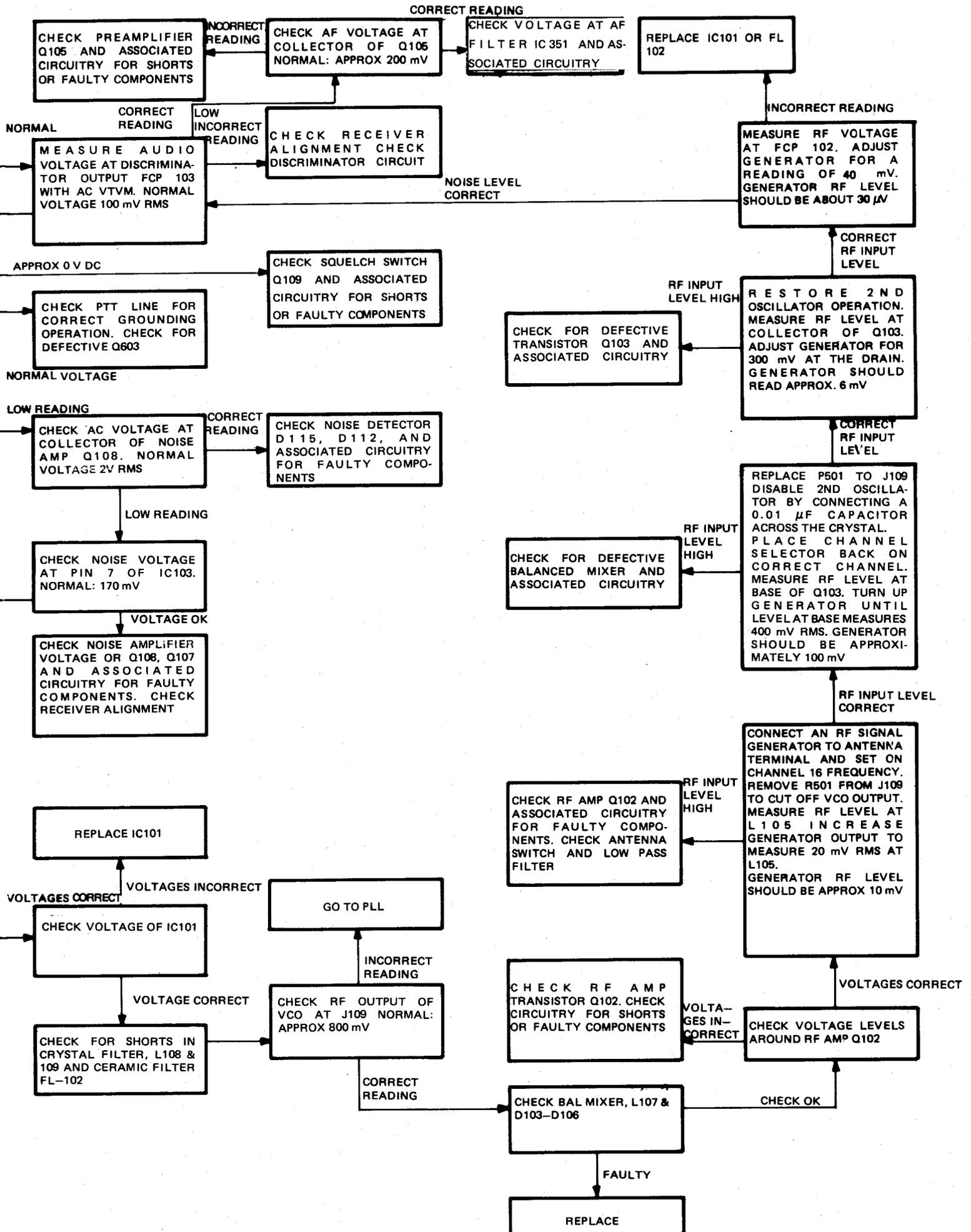
PLL TROUBLE SHOOTING CHART





RECEIVER TROUBLE SHOOTING CHART





TRANSMITTER TROUBLE SHOOTING CHART

