

VHF MARINE RADIOTELEPHONE

IC-M80

MAINTENANCE MANUAL



ICOM INCORPORATED

1-6-19, Kamikurazukuri Hirano-ku, Osaka, Japan
Phone: (06) 793-5301
Telex: ICOM TR J63649

ICOM EUROPE G.M.B.H.
Himmelgeister Strasse 100
4000 Duesseldorf 1
West Germany
Phone: 0211-346047
Telex: 41-8588082

ICOM AMERICA, INC.
2380 116th Avenue N.E.
Bellevue, WA 98004
Phone: (206) 454-8155
Telex: 230-152210 ICOM AMER BVUE

3331 Towerwood Dr., Suite 307
Dallas, Texas 75234
Phone: (214) 6202781

ICOM CANADA LTD.
810 S.W. Marine Drive
Vancouver, BC Canada
Phone: (604) 321-1833
Telex: 21-454315

ICOM AUSTRALIA, PTY, Ltd.
7 Duke Street, Windsor 3181
Victoria Australia
Phone: (03) 529-7582
Telex: 71-35521 ICOMAS AA35521

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SECTION 1 SPECIFICATIONS

GENERAL:

Number of Channels	: ● TYPE 225 70 marine channels plus 4 weather channels ● TYPE 370 All USA and INTERNATIONAL marine channels plus 10 weather channels
Operation	: Simplex/Semi-duplex
Antenna Impedance	: 50 Ohms unbalanced
Power Supply Requirements	: DC 13.8V $\pm$ 15% Negative Ground 6.0A Max.
Current Drain	: Transmitting: High output Approx. 5.5A Low output Approx. 1.7A Receiving: At Max. Audio. Approx. 0.8A Squelched Approx. 0.3A
Operating Temperature	: -20°C to $+60^{\circ}\text{C}$
Dimensions	: 78mm(H) x 228mm(W) x 208mm(D)
Net Weight	: 2.1Kg

TRANSMITTER:

Frequency Range	: 156 ~ 157.5MHz
Channel Spacing	: 25KHz spacing
Frequency Stability	: $\pm 0.0005\%$
Emission Mode	: 16F3 (F3E 16K0)
Output Power	: High 25 watts Low 1 watt
Max. Frequency Deviation	: 5KHz
Modulation System	: Variable reactance frequency modulation
Spurious Emission	: More than 70dB below carrier
Harmonic Emission	: More than 60dB below carrier
Microphone	: 600 ohm microphone or handset
Audio Frequency Response	: +1, -3dB of 6dB/octave pre-emphasis characteristic from 300 to 3000Hz
Audio Distortion	: Less than 7% at 1000Hz for $\pm 3\text{KHz}$ Deviation

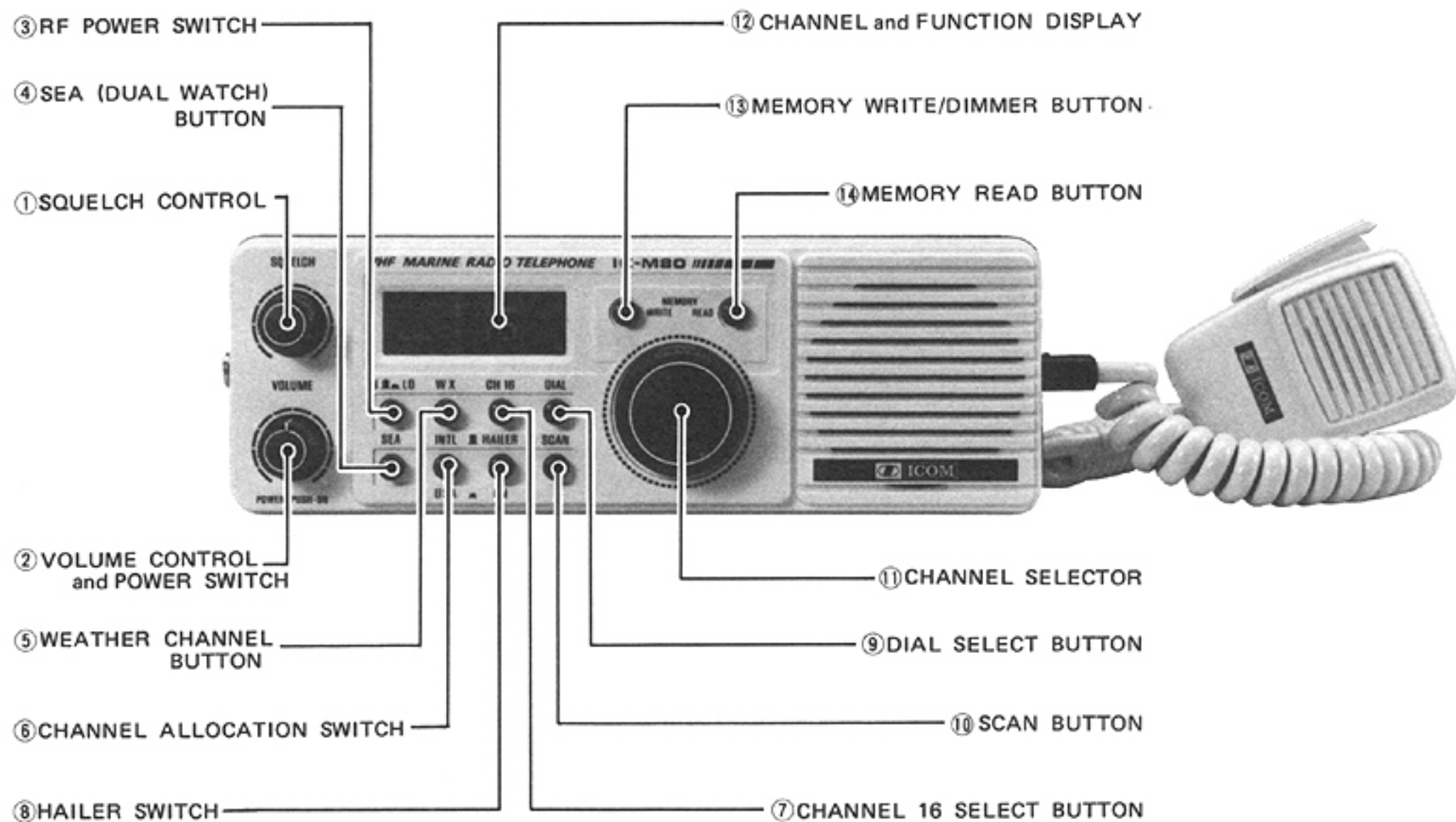
RECEIVER:

Frequency Range	: 156 ~ 163MHz
Modulation Acceptance	: 16F3 (F3E 16K0)
Receiving System	: Double superheterodyne
Intermediate Frequency	: First IF 21.4MHz Second IF 455KHz
Sensitivity	: Less than $0.3\mu\text{V}$ for 12dB SINAD
Squelch Sensitivity	: Less than $0.2\mu\text{V}$
Spurious Response Rejection Ratio	: More than 80dB
Adjacent Channel Rejection Ratio	: More than 70dB
Intermodulation Rejection Ratio	: More than 75dB
Selectivity	: $\pm 6\text{KHz}$ at the -6dB point $\pm 12.5\text{KHz}$ at the -70dB point
Audio Output Power	: More than 5 Watts to 4 ohm speaker with less than 10% distortion
Audio Output Impedance	: 4 ~ 8 Ohms

SECTION 2 OPERATING CONTROLS

2 - 1 FRONT PANEL

2 - 1 - 1 For TYPE 225



1. SQUELCH CONTROL

Controls squelch threshold level which quiets the receiver when no signal is present.

2. VOLUME CONTROL and POWER SWITCH

Pushing this knob, switches the power supplied to the radio ON and OFF.

Turning this knob, controls the audio output level of the receiver.

3. RF POWER SWITCH

Switches the transmitter output power. In the "LO" position, the power is 1 watt, sufficient for local communication. In the "HI" position, the output is a full 25 watts for long distance communication.

4. SEA (DUAL WATCH) BUTTON

Turns the SEA (DUAL WATCH) function ON. During a communication or receiving on a channel (except on channel 16), if you would like to monitor channel 16, push this button, and the receiving frequency will sample channel 16 every two or three seconds.

5. WEATHER CHANNEL BUTTON

Pushing this button, selects a weather channel which is selected by the channel selector.

6. CHANNEL ALLOCATION SWITCH

Switches the channels for the international allocation and U.S.A. allocation.

7. CHANNEL 16 SELECT BUTTON

Sets the radio to Channel 16. This function overrides all other channel selecting buttons and selector.

8. HAILER SWITCH

Switches the set between transceiver operation and hailer (public address) operation.

9. DIAL SELECT BUTTON

Sets the radio to a channel which is selected by the channel selector.

10. SCAN START BUTTON

Starts the scanning operation by pushing this button. To stop the scanning operation, push any one of the channel selecting buttons (WX, CH16, DIAL. Memory write and Memory Read buttons), or turn the channel selector.

11. CHANNEL SELECTOR

Selects a channel of the programmed channels, memory channels or weather channels.

12. CHANNEL and FUNCTION DISPLAY

Displays the operating channel and status of the radio.

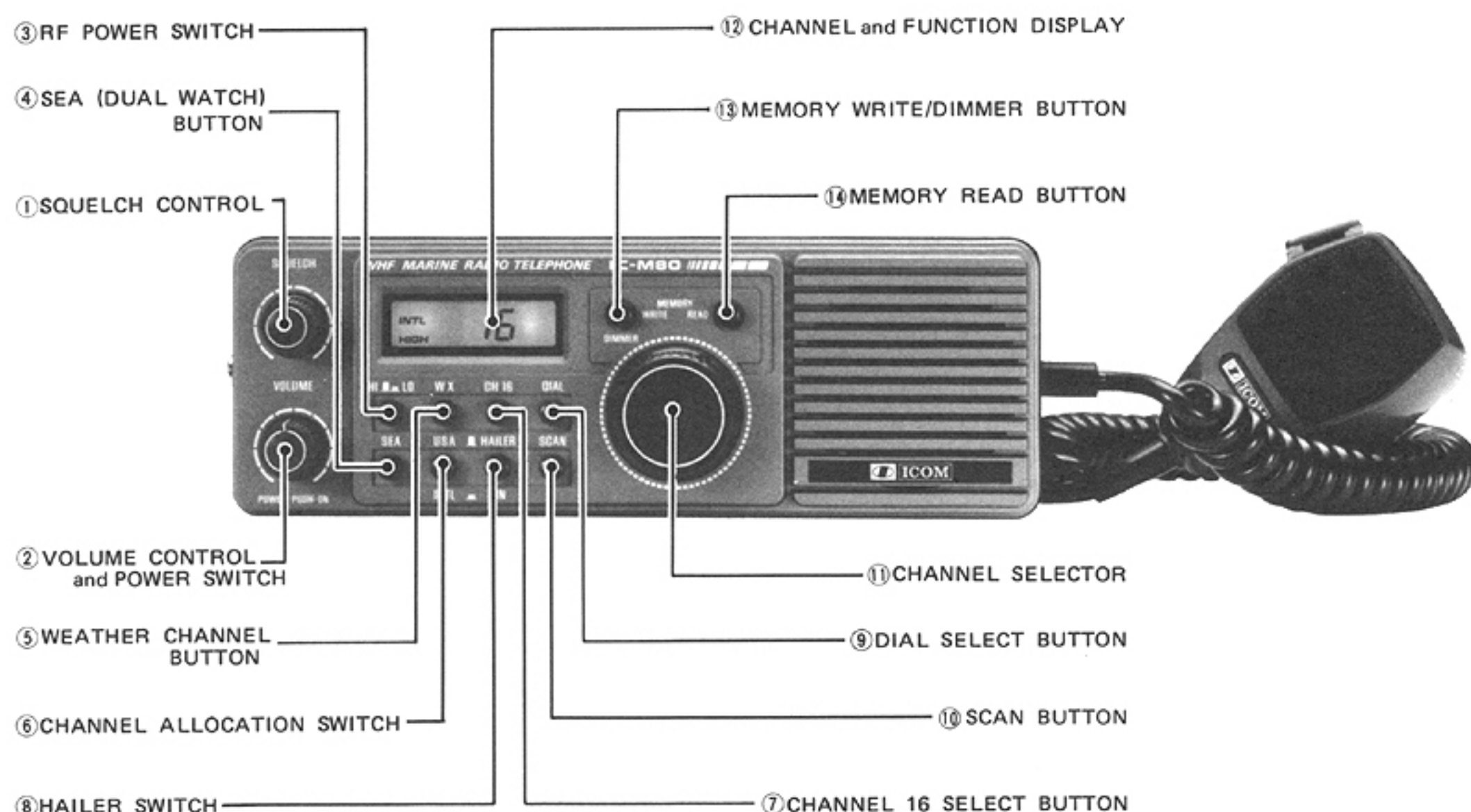
13. MEMORY WRITE BUTTON

Transfers your desired channel into a memory channel.

14. MEMORY READ BUTTON

Sets the radio to a memory channel which is selected by the channel selector.

2-1-2 For TYPE 370



1. SQUELCH CONTROL

Controls squelch threshold level which quiets the receiver when no signal is present.

2. VOLUME CONTROL and POWER SWITCH

Pushing this knob, switches the power supplied to the radio ON and OFF.

Turning this knob, controls the audio output level of the receiver.

3. RF POWER SWITCH

Switches the transmitter output power. In the "LO" position, the power is 1 watt, sufficient for local communication. In the "HI" position, the output is a full 25 watts for long distance communication.

4. SEA (DUAL WATCH) BUTTON

Turns the SEA (DUAL WATCH) function ON. During a communication or receiving on a channel (except on channel 16), if you would like to monitor channel 16, push this button, and the receiving frequency will sample channel 16 every two or three seconds.

5. WEATHER CHANNEL BUTTON

Pushing this button, selects a weather channel which is selected by the channel selector.

6. CHANNEL ALLOCATION SWITCH

Switches the channels for the international allocation and U.S.A. allocation.

7. CHANNEL 16 SELECT BUTTON

Sets the radio to Channel 16. This function overrides all other channel selecting buttons and selector.

8. HAILER SWITCH

Switches the set between transceiver operation and hailer (public address) operation.

9. DIAL SELECT BUTTON

Sets the radio to a channel which is selected by the channel selector, and enables the channel selector to select channels.

10. SCAN BUTTON

Starts the scanning operation by pushing this button. To stop the scanning operation, push this button or any one of the channel selecting buttons (WX, CH16, DIAL, Memory write and Memory Read buttons), or turn the channel selector.

11. CHANNEL SELECTOR

Selects a channel of the programmed channels, memory channels or weather channels. Turning this selector while holding the MEMORY WRITE/DIMMER button changes the intensity of the display.

12. CHANNEL and FUNCTION DISPLAY

Displays the operating channel and status of the radio.

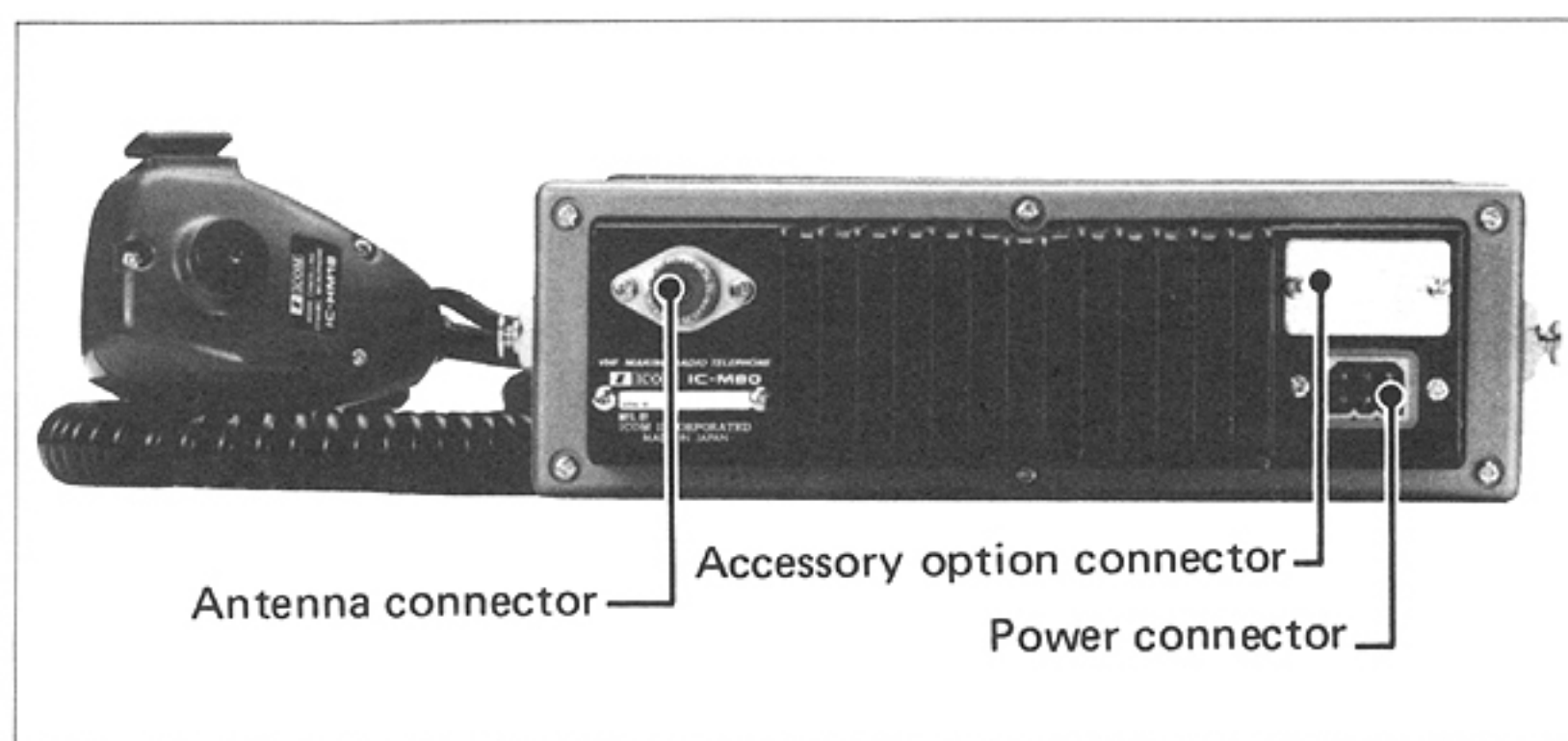
13. MEMORY WRITE/DIMMER BUTTON

Transfers your desired channel into a memory channel, and enables the channel selector to change the intensity of the display.

14. MEMORY READ BUTTON

Sets the radio to a memory channel which is selected by the channel selector.

2-2 REAR PANEL



15. ANTENNA CONNECTOR

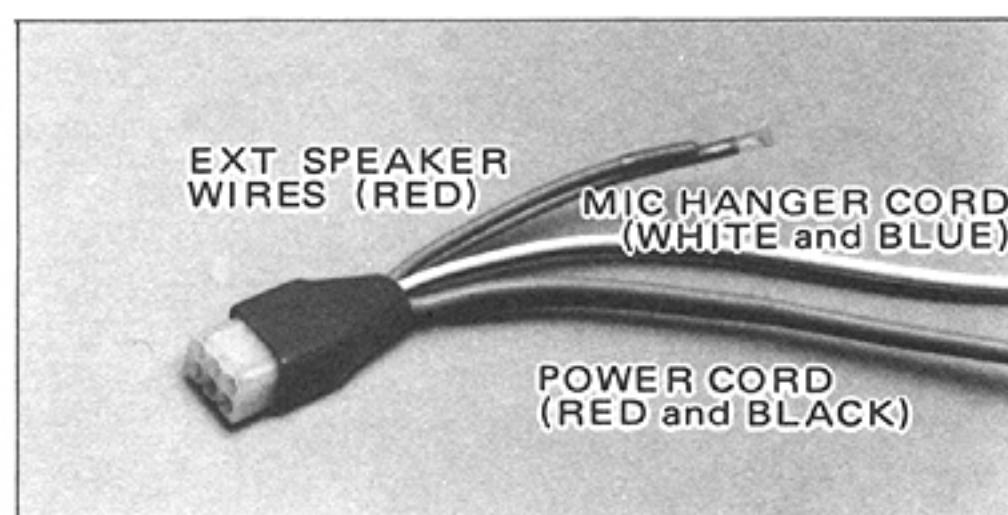
This is used to connect an antenna to the set. Its impedance is 50 ohms and connects with a PL-259 connector.

16. POWER CONNECTOR

Connects the plug of the supplied power cord to this connector. The power plug also provides to connect the microphone hanger box with its cord (white and blue wires) and an external speaker with the external speaker wires (short red wires).

17. POSITION FOR OPTIONAL ACCESSORY SOCKET

The optional 24-pin accessory socket can be installed at this position for remote controlling.



2-3 ADDITIONAL CONTROLS

1. Microphone Hanger Box

Triggers the Channel 16 Auto-Monitor circuit when the microphone is replaced in the hanger.

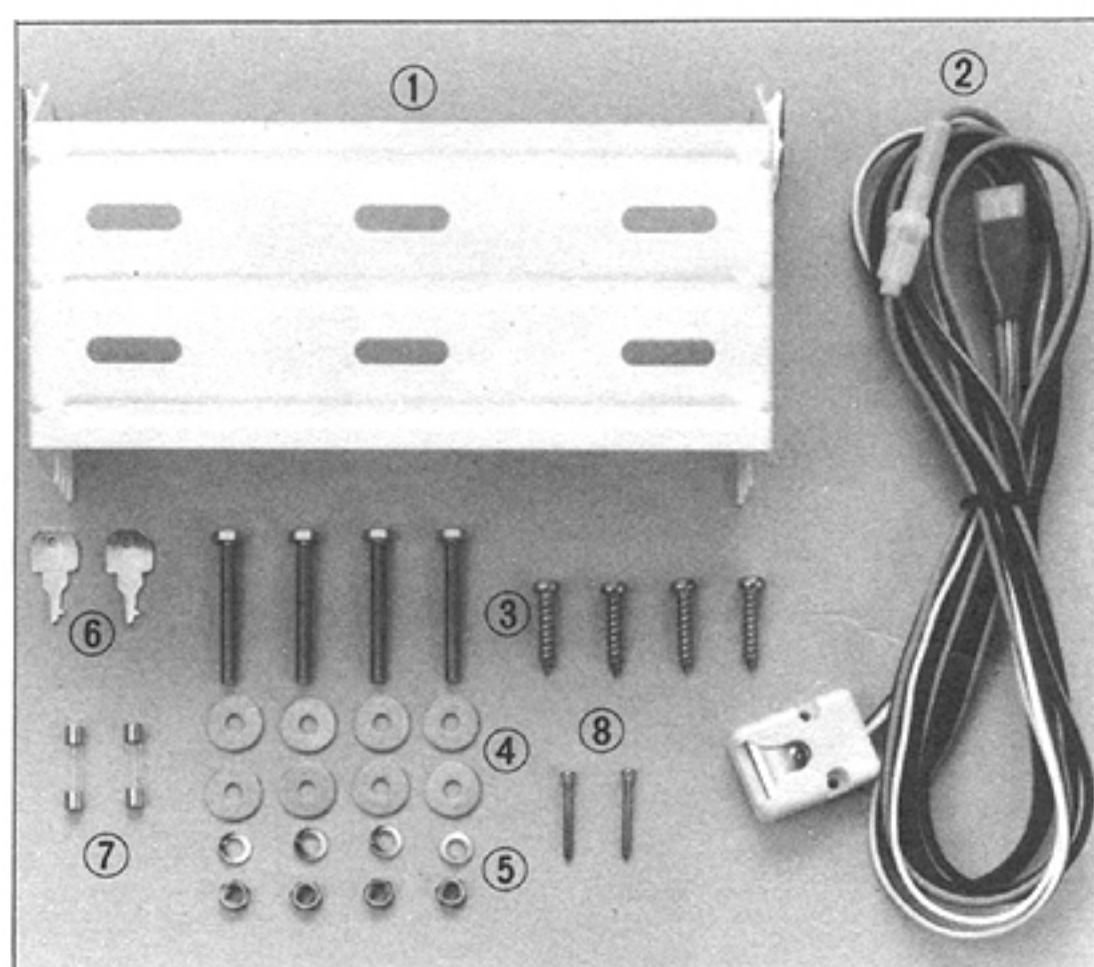
2. Handset Cradle

When the optional Handset is used, the internal switch mutes the front speaker and applies audio to the handset speaker. When the handset is replaced in the cradle, the internal switch turns on the front speaker and triggers the Channel 16 Auto-Monitor circuit.

2-4 ACCESSORIES

The supplied accessories are as follows.

1. Mounting Bracket
2. Power Cord and Microphone Hanger Box
3. Mounting Screws
4. Mounting Washers
5. Mounting Nuts
6. Keys
7. Fuses 10A
8. Microphone Hanger Box Mounting Screws



SECTION 3 OPERATING INSTRUCTIONS

3-1 BASIC OPERATION

Channel 16 Auto-Monitor

The Channel 16 Auto-Monitor circuit simplifies operation of the radio by automatically switching to Channel 16 when the mic or handset is replaced on its hanger. However, even with the mic or handset in its hanger, any channel including weather can be monitored simply by pushing the appropriate button and/or turning the channel selector.

Receiving

1. Turn the ② VOLUME CONTROL and ① SQUELCH CONTROL fully counterclockwise.
2. Press the ② POWER SWITCH and channel "16" will be indicated on the ⑫ CHANNEL and FUNCTION DISPLAY. Now the set is turned ON and receiving on channel 16.
3. Turn the Volume Control slowly clockwise until you reach a comfortable level of noise, if no signal is present, or audio if a signal is present.
4. Turn the Squelch Control carefully clockwise until the noise just disappears. (Approximately 11 o'clock position). The radio is now set and will remain quiet until a signal is heard. (This should be done when no signal is present.)
5. When you wish to receive one of the channels installed, first, select the international or U.S.A. allocation which includes the desired channel, by the ⑥ CHANNEL ALLOCATION SWITCH. Check the channelization list for appropriate channel selections.

Then push the ⑨ DIAL SELECT BUTTON and rotate the Channel Selector to the desired channel.

At this time, the selected allocation (INTL or USA) and channel number are displayed on the CHANNEL and FUNCTION DISPLAY.

6. When you wish to monitor a weather channel, push the ⑤ WEATHER CHANNEL BUTTON, then rotate the Channel Selector to the desired weather channel. At this time, the letters of "WX" and selected weather channel number (TYPE 225 : 0 ~ 4, TYPE 370 : 0 ~ 9) are displayed on the CHANNEL and FUNCTION DISPLAY.
7. When you wish to receive one of the memory channels, push the ⑩ MEMORY READ BUTTON and rotate the Channel Selector to the desired memory channel. At this time, the selected memory channel number (MEMO 0 ~ 9), and the

allocation and channel number of the memorized channel are displayed on the CHANNEL and FUNCTION DISPLAY.

8. When you wish to return channel 16, simply push the ⑦ CHANNEL 16 SELECT BUTTON, and the channel number of "16" is displayed on the CHANNEL and FUNCTION DISPLAY.

External speaker

When the external speaker is added to the IC-M80, both the external speaker and the internal speaker carry receive audio. This is true in the receive mode and when the unit is placed in the hailer mode. Pressing the microphone Push-To-Talk switch causes the unit to transmit when the unit is in the receive mode, muting both speakers. In the hailer mode, activating the Push-To-Talk switch mutes the internal speaker and allows public address audio to go out the external speaker.

The external speaker is connected to the receiver all of the time when the unit is ON.

If an application requires control of the external speaker from the transceiver, an external switch must be used (not supplied by ICOM). This switch should be electrically in series with one of the wires going to the external speaker.

Transmitting

1. Push the DIAL SELECT BUTTON and rotate the Channel Selector until you find an empty channel that can be used for the type of communication you wish. Be sure the channel is open.
2. Push the CHANNEL 16 SELECT BUTTON, and after confirming that the channel is open, call the party you wish to contact. When contact is made, go to the channel you previously selected by pushing the DIAL SELECT BUTTON.
3. Hold the mic fairly close to your mouth and speak in a clear, natural voice. When you have finished your part of the conversation, release the PTT switch on the microphone, and the radio will receive.
4. When your conversation is completely finished, replace the mic or handset in its hanger, and the radio will automatically return to Channel 16.

(Before Transmitting, be sure that the ③ RF POWER SWITCH is in the proper position for the distance and needs of your contact. Use 25 watts only when necessary, to avoid interfering with others trying to use the same channel in another area.)

3 - 2 MEMORY CHANNEL OPERATION

Memory Writing (Programming the Memory Channels)

1. Push the ⑭ MEMORY READ BUTTON and a memory channel will be displayed on the CHANNEL and FUNCTION DISPLAY.
2. Rotate the ⑪ CHANNEL SELECTOR to the channel to be programmed (MEMO 0 ~ 9). As an example, set it at the memory channel 1 (MEMO 1).

The display will show the memory channel number "MEMO 1" and the previously programmed channel number. The radio will receive on this channel.

If no channel has been programmed since first turning the power ON, "16" will be shown on the display, and the radio will receive on channel 16.

3. (For Type 225) While holding the ⑬ MEMORY WRITE BUTTON in, rotate the channel selector, and the displayed channel number will be changed. Rotate the channel selector so that the display shows the desired channel, then release your finger from the MEMORY WRITE BUTTON. At this moment, the desired channel will be memorized into the selected memory channel. The selected allocation, either the "INTL" or "USA", will be memorized as well.
3. (For Type 370) While holding both the ⑭ MEMORY READ BUTTON and the ⑬ MEMORY WRITE/DIMMER BUTTON in, rotate the channel selector, and the displayed channel number will be changed. Rotate the channel selector so that the display shows the desired channel, then release your finger from the MEMORY WRITE/DIMMER BUTTON then from the MEMORY READ BUTTON. At this moment, the desired channel will be memorized into the selected memory channel. The selected allocation, either the "INTL" or "USA", will be memorized as well.
4. Program desired channels into other memory channels in the same manner. (The weather channels can not be memorized into any memory channels.)
5. The programmed channels in the memory channels are maintained by an internal MEMORY BACKUP battery, even if the radio is removed from the vessel.

Memory Reading

Push the MEMORY READ BUTTON, then rotate the Channel Selector to the desired memory channel, MEMO 0, MEMO 1, MEMO 2, - - - - or MEMO 9, and the previously programmed channel is then recalled.

3 - 3 SCANNING OPERATION

All Channel Scan

To scan all channels (INTL allocation : Channel 1 ~ Channel 88, USA allocation : Channel 6 ~ Channel 88);

1. Engage the SQUELCH, then push the ⑨ DIAL SELECT BUTTON, and a channel number is displayed on the ⑫ CHANNEL and FUNCTION DISPLAY. Depressing the ⑩ SCAN START BUTTON starts the scan from the displayed channel to the highest channel (Channel 88).

If the SQUELCH is not engaged, the scan does not start.

2. When the scanning channel reaches the highest channel, it automatically returns to the lowest channel (INTL : Channel 1, USA : Channel 6), and continues scanning up to provide endless scanning operation.
3. While the SQUELCH is engaged, the squelch opening as a signal is received will stop the scanning automatically. When the scan has been stopped by the auto-stop function, the scan will restart after the signal goes away.
4. To stop the scanning operation, depress the SCAN BUTTON (Type 370 only), the DIAL SELECT BUTTON or rotate the Channel Selector.
5. If you transmit on the auto-stopped channel, the scan function will be disengaged.

Memory Channel Scan

To scan the ten memory channels continuously;

1. Program ten desired channels into the Memory Channels 0 ~ 9.
2. Push the ⑭ MEMORY READ BUTTON, and a memory channel number and programmed channel number are displayed on the display.
3. Depress the ⑩ SCAN START BUTTON (Type 370 : SCAN BUTTON), and the radio starts scanning the programmed channels in the Memory Channels 0, 1, 2, 3, - - - - 9, and 0, 1, 2, 3, - - - -.
4. To stop scanning without opening the squelch, depress the SCAN BUTTON (Type 370 only), MEMORY READ BUTTON or turn the Channel Selector.
5. Other operations are the same as the All Channel Scan.

Weather Channel Scan

To scan the ten (Type 225: four) weather channels continuously;

1. Push the ⑤ WEATHER CHANNEL BUTTON and depress the ⑪ SCAN BUTTON, and the radio starts scanning the weather channels 0, 1, 2, 3, ----- 9, and 0, 1, 2, 3, ----- (Type 225 : 0, 1, 2, 3, 4, 0, 1, 2, -----).
2. To stop the scan operation, depress the SCAN BUTTON (Type 370 only), WEATHER CHANNEL BUTTON or rotate the Channel Selector.
3. Other operations are the same as the All Channel Scan.

3 - 4 SEA (DUAL WATCH) OPERATION

This function allows a check of channel 16 while operating on another channel. If a signal appears on channel 16, the radio watches it until the signal has disappeared, then the radio returns to operate on the other channel.

1. Select the channel 16 by pushing the ⑦ CHANNEL 16 SELECT BUTTON, then engage the SQUELCH.
2. Select your desired channel by pushing the ⑦ DIAL SELECT BUTTON, (④ MEMORY READ BUTTON or ⑤ WEATHER CHANNEL BUTTON depending on your desired channel), and turning the ⑪ CHANNEL SELECTOR.
3. Push the ④ SEA (DUAL WATCH) BUTTON, and the radio operates on the selected channel for two or three seconds and on channel 16 for a moment (about 0.1 second) alternately.
4. If a signal appears (the squelch will be opened by the signal) on channel 16, the radio receives on channel 16 until the signal has disappeared, then the radio will continue the SEA OPERATION.
5. The radio can transmit on the selected channel (except weather channels), even if the SEA OPERATION is functioning and the radio is receiving on channel 16. When the radio returns in the receive mode, the radio will continue the SEA OPERATION.

If you wish to transmit on channel 16, push the ⑦ CHANNEL 16 SELECT BUTTON, and the SEA OPERATION is disengaged and the radio operates on channel 16.

6. If you wish to disengage the SEA OPERATION, push the DIAL SELECT BUTTON, (MEMORY READ BUTTON or WEATHER CHANNEL BUTTON depending on the selected channel), and the radio operates on the selected channel.

3 - 5 HAILER OPERATION

You can use the radio as an audio amplifier for a hailer or public address.

1. Provide an external speaker which is 8 ohms and capable 5 watts or more, and put it as far as possible from the radio to prevent howling.
2. Connect the speaker to the external speaker wires of the radio with a piece of low impedance speaker cord or heavy duty AC power cord.
3. Depress and lock the ⑧ HAILER SWITCH; the display blinks to show the radio is in the hailer mode, however the radio is still in the receive mode and receives on the indicated channel.
4. Depress the PTT (Push-To-Talk) switch on the microphone and talk into the microphone.
5. To disengage the HAILER OPERATION, push again the HAILER SWITCH and release it.

SECTION 4 CIRCUIT DESCRIPTION

4 - 1 RECEIVER CIRCUITS

1. Antenna Switching Circuit

A signal from the antenna connector JB1 is fed to the antenna switching circuit consisting of DB1 ~ DB3 through the harmonic (low-pass) filter, then the incoming signal is fed to the RF amplifier in the MAIN unit. Transmit/receive switching is controlled by T8V and R8V which are activated in the transmit mode and in the receive mode respectively.

2. RF Amplifier and First Mixer Circuit

The incoming signal is fed to the RF amplifier QM25 through a band-pass filter consisting of LM20 and LM21. The amplified signal is again fed to a band-pass filter consisting of LM17 ~ LM19 and DM12 ~ DM14 which reduce interference and intermodulation from out of the band signals. DM12 ~ DM14 are varactor diodes, and are controlled by a control signal from the PLL unit to tune the center frequency of the band-pass filter for the receiving frequency.

The filtered signal is then fed to the first gate of QM24, the first mixer, and the PLL output signal to the second gate to obtain a 21.4MHz first IF signal.

The PLL output frequency can be calculated with the following formula:

$$f \text{ (PLL Output Frequency)} = (\text{Receiving Frequency} - 21.4\text{MHz})$$

3. IF Amplifiers Circuits

The 21.4MHz first IF signal is fed to the monolithic crystal filter, FIM1, and amplified by QM23. The amplified signal from QM23 is fed to QM22, the second mixer with the second local oscillator signal to obtain a 455KHz second IF signal. The second local oscillator QM19 oscillates at 20.945MHz with XM2 crystal unit. This mixed signal, 455KHz, is fed to the limiter amplifier ICM5 through the ceramic filters FIM2 and FIM3, and amplifiers QM20 and QM21. Then the signal is detected at discriminator DSM1, DM10 and DM11 to obtain an AF signal.

4. AF Amplifiers Circuit

The signal from the detector is fed to the AF power amplifier ICM3 through the AF amplifier QM17 and low-pass filter QM18, and amplified to drive the speaker.

5. Squelch Circuit

The signal from discriminator DSM1 is amplified by QM16 and filtered about 20KHz noise component by a resonator consisting of LM14 and CM74, then amplified again by QM15. Then the signal is rectified by DM7 and DM8. The rectified DC voltage is applied to the base of QM14, turning it on. Since the collector of QM14 is connected to the base bias network of the AF amplifier QM17 and it is turned off. Thus squelch action is applied and no audio is amplified by ICM3. When an incoming signal is received, noise is suppressed, the base voltage of QM14 falls, and QM14 is turned off. Therefore normal voltage is applied to the base of QM17, the squelch is opened, and audio signals are heard from the speaker.

4 - 2 TRANSMITTER CIRCUITS

1. AF Amplifier and Limiter Circuit.

Audio signals from the microphone are amplified by ICM2(A) and differentiated by RM34 and CM42, then fed to ICM2(B) which is a Limiter Amplifier and has 6dB/octave response between 300Hz and 3KHz. This output is fed to the Splatter Filter QM7 to cut components above 3KHz, then fed to varactor diode DM3 for modulation.

2. FM Modulation Circuit.

The amplified audio signals from the microphone are supplied to varactor diode DM3 connected in series with the crystal unit which oscillates at 21.4MHz through level adjust trimmer RM25. Voltage of these signals causes the capacitance of DM3 to vary and frequency modulation is effected. Since this transceiver is a heterodyne type, any frequency deviation that occurs in this circuit appears unchanged as a frequency deviation on the operation-frequency, and a crystal unit with special characteristics is used to ensure suitable frequency deviation and stability. RM26 is a thermistor, and makes temperature compensation to prevent the deviation is fluctuated by temperature variation.

The modulated signals are taken out at the emitter of QM5, and after amplified by ICM1 limiter amplifier, the signals are applied to the Transmit Mixer Circuit.

3. Transmit Mixer and Driver Circuit.

The local oscillator signal from the PLL Unit is mixed with the 21.4MHz modulated signal to give signal of the local oscillator frequency $\pm 21.4\text{MHz}$. As a doubly balanced mixer consisting of wide dynamic range FET's QM3 and QM4, used for this mixing stage, 21.4MHz and the local oscillator frequency signals are cancelled and not appear in the output. The mixed signal is further passed through a Band-Pass Filter consisting of LM4 to LM6 to produce signal in the operating band only. And amplified by QM2 and QM1, then fed to PA Module ICB1.

4. Power Amplifier Circuit.

The signal from QM1 in the Main unit is amplified by ICB1 in the PA unit to obtain 25W output. The heat from ICB1 is transmitted to the diecast heatsink which radiates the heat very efficiently. ICB1 is a hybrid IC consisting of a two-stage RF power amplifier. The output signal of ICB1 is fed to the antenna terminal through the T/R switching diode DB1 and three-stage low-pass filter, which suppress harmonics by more than 60dB.

5. ALC Circuit.

This circuit stabilizes the output power, even when the power voltage or the antenna load is fluctuating. The variation of the output of ICB1 is detected at DB4 in the PA unit and amplified by differential amplifier QM12 and QM10 in the Main unit. The output voltage from QM12 and QM10 is fed to QM9 then QM8. This lowers QM1's collector voltage and PA module's driver stage voltage, and input excitation level to the power amplifier module and reduces input power to the final stage, thus preventing damage to the module due to high current. The output power can be adjusted by RM51.

6. Power Supply Circuit.

This circuit employs a multipurpose voltage regulator, ICM4. It puts out a constantly activated 8V, R8V which is operative during receive, and T8V which is operative during transmit. R8V is put out from Pin 6, and T8V is put out from Pin 8 of ICM4. By grounding Pin 5, R8V goes to 0V and T8V is actuated, thus the set will be turned to transmit mode.

4 - 3 HAILER CIRCUIT

This set can be used as a hailer by pushing the HAILER switch, and using an external speaker.

When the HAILER switch on the front panel is turned on, by pushing the PTT switch on the microphone, AF signals amplified by ICM2(A) are fed to the AF power amplifier ICM3 through contacts of the relay RLM1. This relay is made only when the PTT switch is pushed in the HAILER mode, and the voltage applied to the QM5 and ICM1 is grounded through the HAILER switch. Thus the transmitting signal is stopped, and the voice signals from the microphone are amplified and drive the external speaker. (The internal speaker is disconnected by another contacts of the relay in the HAILER mode.)

4 - 4 PLL (Phase Locked Loop) UNIT (For Type 225)

1. Local Oscillator Circuit.

This circuit oscillates 43.0875MHz signal with QP11, and the signal at 3 times this frequency, i.e., 129.2625 MHz, is taken from the collector of QP11.

2. Mixer, Low-Pass Filter, and Amplifier Circuit.

The output signal from the local oscillator circuit and the VCO signal amplified by QP10 are mixed by the MOS FET mixer QP4. The output signals are fed to low-pass filter to filter out only the signals below 15MHz. The output signal from the filter is amplified to the proper drive level (more than 3Vp-p) of the programmable divider ICP1 by QP3. Then the signal is fed to Pin 12 of ICP1.

3. Programmable Divider Circuit

The input signal at pin 12 of the PLL IC, ICP1, consisting of programmable divider, reference frequency generator and phase detector, is divided by the BCD input signals at pin 6 ~ 9 and its digit signals at pin 2 ~ 5.

4. Reference Frequency Generator Circuit.

Reference frequency generator consists of a crystal oscillator and a highspeed divider. XP1 oscillates at 6.40MHz which is divided by 512.

12.5KHz reference frequency is fed to the phase detector.

This 12.5KHz reference frequency decides the variation step of the PLL output frequency and the divided number N decides the PLL output frequency.

$$\text{PLL Output Freq.} = \text{Local oscillator Freq. (MHz)} + \frac{0.0125\text{MHz (the reference freq.)} \times N}{\text{(divide number of programmable divider)}}$$

5. Phase Detector and Loop Filter Circuit.

Digital phase detector detects the phase difference of the pulse signals of the 12.5KHz reference frequency and the output signal of the programmable divider, and proportionately puts out pulse signals at Pin 16, which becomes high impedance when the PLL is locked.

Pin 18 is for detecting the lock failures and changes to ground level according to the phase difference of the two pulse signals.

When the lock fails, pin 18 becomes the ground level and QP1 is turned off. Thus the collector of QP1 becomes HIGH level, and it is applied to the base of QM6 and shunt the base of 21.4MHz oscillator QM5 to the ground. This prevents to radiate unwanted signals. At the same time, the HIGH level voltage is applied to the base of QL1 and QL1 is turned on. This shunts the bias network of QM17, AF amplifier, and the receiver is squelched and no abnormal sounds can be heard from the speaker.

The loop filter, consisting of QP5, QP6, CP21, RP15 and RP17 converts the pulse signal from Pin 16 into a DC voltage and decides the response time of the whole loop.

The output signal is fed to varactor diode DP1 of the VCO circuit as the control voltage for the VCO frequency set.

A part of the output signal is fed to QP12, DC amplifier, then to DM12 ~ DM14 in the MAIN unit to tune the band-pass filter to the operating frequency.

6. VCO Circuit

The VCO (Voltage-Controlled Oscillator) is a modified Clapp circuit, using QP7, and oscillates in the 130 MHz range. The oscillation frequency is controlled by a DC voltage which is supplied from the loop filter in the PLL unit to varactor diode DP1, inserted in parallel with the oscillation coil.

The oscillator output is taken from the source of QP7, and fed to buffer amplifiers QP8, QP9 and QP10 in the PLL unit to become the local oscillator signal for the transmitter and receiver, and to get a DC voltage to control the frequency of the VCO.

The VCO frequency is decided by N data put out from the CPU. (NOTE: Actual divided number is N+107.)

The N data can be calculated with the following formula;

$$\begin{aligned} N &= \frac{\text{Desired operating frequency} - \text{Intermediate freq.} - \text{Local oscillator freq.}}{\text{Reference frequency}} (\text{MHz}) - 107 \\ &= \frac{(\text{Desired operating frequency} - 21.4) - 129.2625}{0.0125} (\text{MHz}) - 107 \end{aligned}$$

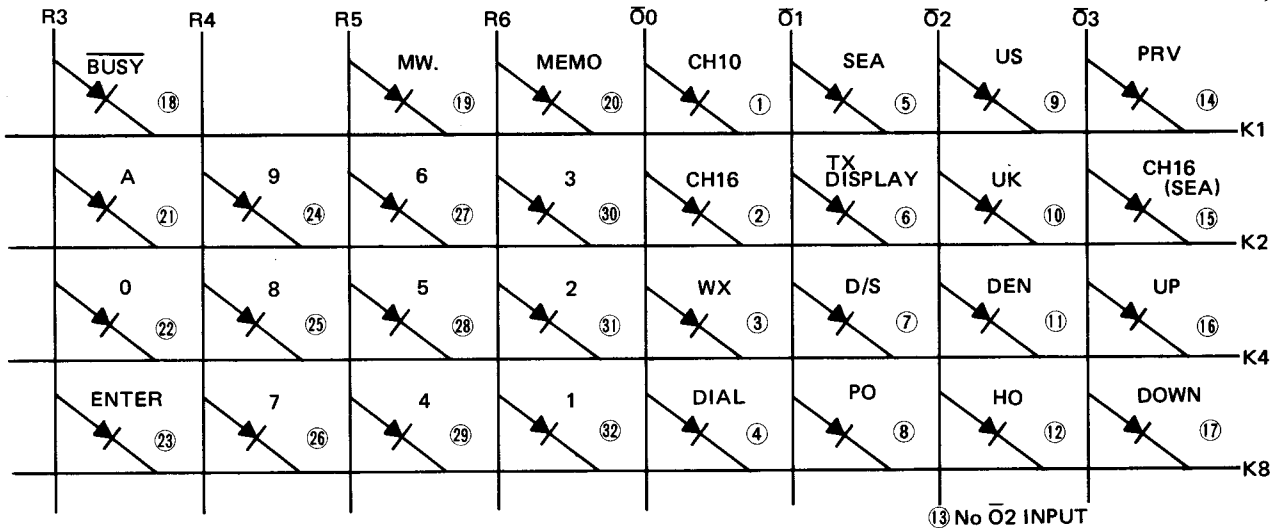
4 - 5 LOGIC UNIT (For Type 225)

1. CPU CONTROL CIRCUIT

The CPU in the unit is a 4-bit CPU and the input terminals are K1, K2, K4 and K8.

Since the CPU cannot make many functions with the small number of K input signals, to increase the functions of the CPU, scanning O and R output signals and are fed to the K input terminals through the matrix circuits.

The CPU reads the relationship of O and R output signals, and K input signals to decide the function as follows:



1. $\bar{O}0$ - K1 (CH10)

When this flow occurs, the operating frequency is set on channel 10. (This mode is not used for the standard version.)

2. $\bar{O}0$ - K2 (CH 16)

When this flow occurs, the operating frequency is set on channel 16.

3. $\bar{O}0$ - K4 (WX)

This flow occurs when the WEATHER CHANNEL button is pushed or a memory channel stored a weather channel is selected, and the operating frequency is set on one of four weather channels. At this time, the transmitting function is prohibited.

4. $\bar{O}0$ - K8 (DIAL)

This flow occurs when the DIAL SELECT button is pushed, and a desired operating channel can be selected by the CHANNEL SELECTOR.

5. $\bar{O}1$ - K1 (SEA)

This flow occurs when the SEA (DUAL WATCH) button is pushed, and the set is in the sea (dual watch) function and letters "SEA" are displayed on the channel and function display.

6. $\bar{O}1$ - K2 (TX DISPLAY)

This flow occurs when the set is in the transmit mode by depressing the PTT switch on the microphone and actual RF output is transmitted from antenna. At this time, letters "TX" are displayed on the channel and function display.

7. $\bar{O}1$ - K4 (DUPLEX/SIMPLEX)

When this flow occurs, the set is in the SIMPLEX mode (Receiving and transmitting frequencies are the same.).

When this flow does not occur, the set is in the DUPLEX mode and the receiving frequency is set 4.6 MHz above the transmitting frequency.

This function has been programmed in the CPU for each channel.

8. $\bar{O}1$ - K8 (POWER OUTPUT)

This flow occurs when the RF POWER switch is pushed in (LO position), and the RF output power is reduced to 1 watt and letters "LOW" are displayed.

This function has been programmed in the CPU for specified channels of some allocations.
When this flow does not occur, the RF power is set to 25 watts and letters "HIGH" are displayed.

9. $\bar{O}2$ - K1 (USA ALLOCATION)

When this flow occurs, the channels for the U.S.A. allocation are selected and letters "USA" are displayed.

10. $\bar{O}2$ - K2 (UK ALLOCATION)

When this flow occurs, the channels for the U.K. allocation are selected and letters "DOM" (means domestic) are displayed.

11. $\bar{O}2$ - K4 (DENMARK ALLOCATION)

When this flow occurs, the channels for the Denmark allocation are selected and letters "DOM" are displayed.

12. $\bar{O}2$ - K8 (THE NETHERLANDS ALLOCATION)

When this flow occurs, the channels for the Netherlands allocation are selected and letters "DOM" are displayed.

13. (INTERNATIONAL ALLOCATION)

When the $\bar{O}2$ signal is not fed to any K input terminals, the channels for the international allocation are selected and letters "INTL" are displayed.

14. $\bar{O}3$ - K1 (PRIVATE CHANNELS)

When this flow occurs, auxiliary channels programmed in the CPU are selected during the memory write button is depressed, and they can be written into memory channels. At this time letters "PRV" are displayed. (This function is not used for the standard version.)

15. $\bar{O}3$ - K2 (CH16-SEA)

During SEA (dual watch) operation, when this flow occurs the operating channel goes to channel 16.

16. $\bar{O}3$ - K4 (CHANNEL UP)

When this flow occurs, the operating channel or memory channel goes upper channel according to the programmed sequence.

17. $\bar{O}3$ - K8 (CHANNEL DOWN)

When this flow occurs, the operating channel or memory channel goes lower channel according to the programmed sequence.

18. R3 - K1 (BUSY-LCD DRIVER CONTROL)

When this flow occurs, the LCD driver accepts to get display data. At this time, the CPU does not accept any input data.

19. R5 - K1 (MEMORY WRITE)

In the memory channel operation, while the MEMORY WRITE button is depressed (this flow occurs), any channels are selected by turning the CHANNEL SELECTOR, and a selected channel is memorized into a memory channel at a moment the MEMORY WRITE button is released.

20. R6 - K1 (MEMORY READ)

When this flow occurs, memory channels can be selected by turning the CHANNEL SELECTOR, and a selected memory channel number and its memorized channel number are displayed.

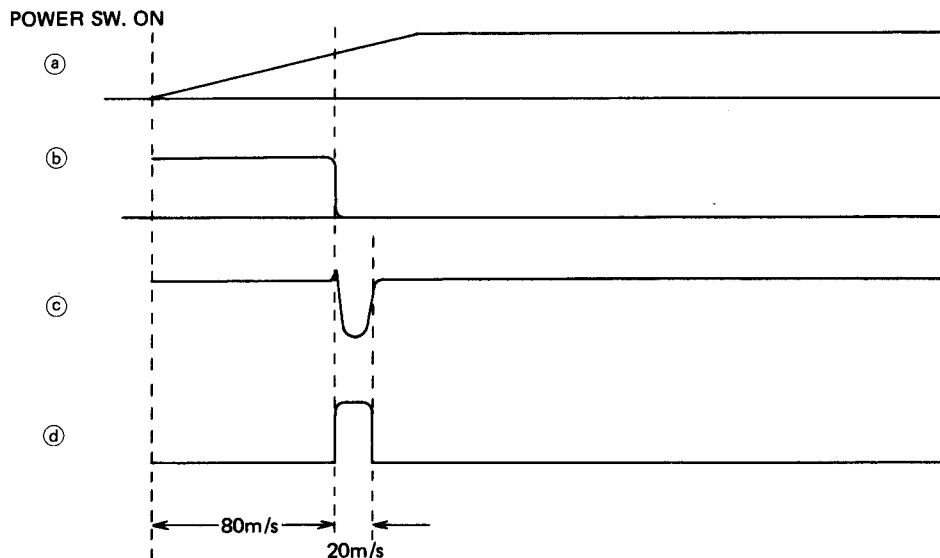
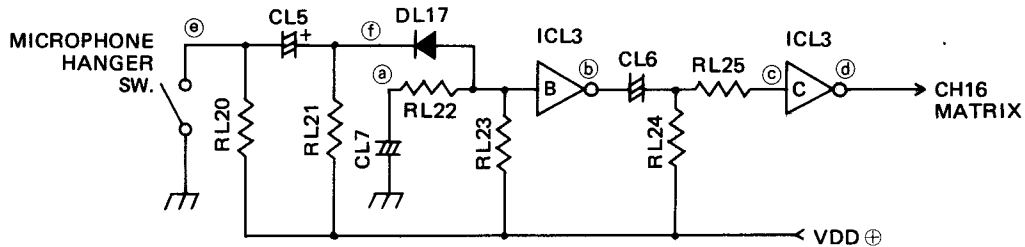
21 ~ 32. R3, 4, 5, 6 - K2, 4, 8 (TEN KEY INPUT)

These matrices are provided for an external ten key controller.

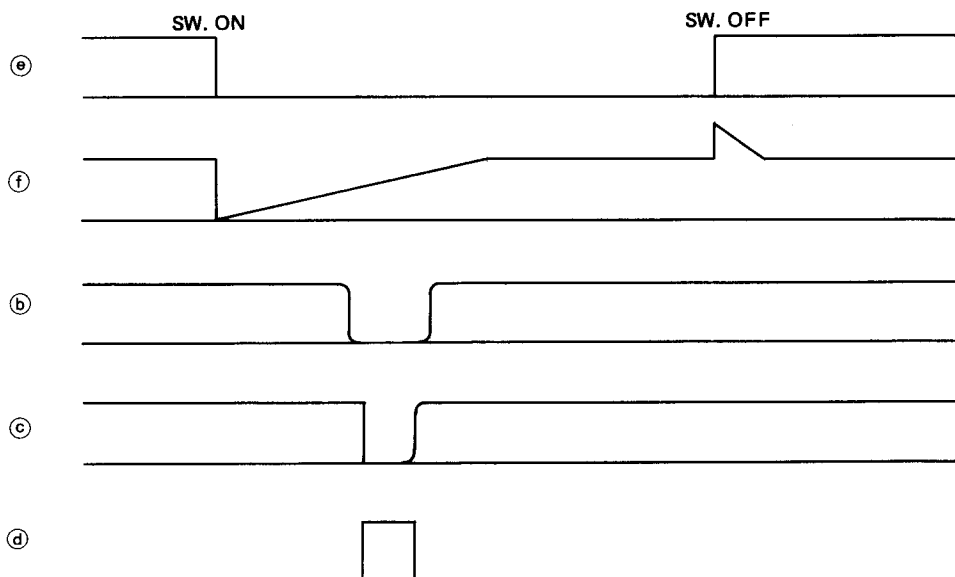
2. OTHER CONTROL CIRCUITS

1. AUTO CH16 SELECTION CIRCUIT

When the power switch is turned on, a 5V voltage is applied to CL7 through RL22 and RL23 and the voltage is charged to CL7 slowly. This charged voltage is applied to an inverter of ICL3. When the charged voltage exceeds the threshold level of the inverter, the output of ICL3 becomes LOW-level, and it is differentiated by CL6 and RL24, then fed to another inverter of ICL3. This inverter puts out a HIGH-level pulse and it is fed to the CH16 matrix, and channel 16 is selected.



When the microphone is put into its hanger, the microphone hanger switch is closed, therefore a rush current flows into CL5 through DL17 and RL23, and a HIGH-level pulse is generated and fed to the CH16 matrix the same as when power is turned on.



2. SEA (DUAL WATCH) FUNCTION CONTROL CIRCUIT

By pushing the SEA button, a 5V is applied to the SET terminal(a) of ICL5(A) flip-flop and its Q terminal(b) becomes HIGH-level. It starts to oscillate the unstable multivibrator consisting of ICL6(B) and ICL6(C), 2-input NAND gates. In the time constant circuit of this multivibrator, DL13 and RL17 make charging time of CL4 shorter and discharging time longer. This sets the duty-cycle of the oscillation about 10%.

This shorter pulse is fed to the CH16-SEA matrix through ICL2(B) 2-input NAND gate and the set receives on channel 16 during the pulse (about 100 milliseconds) is present.

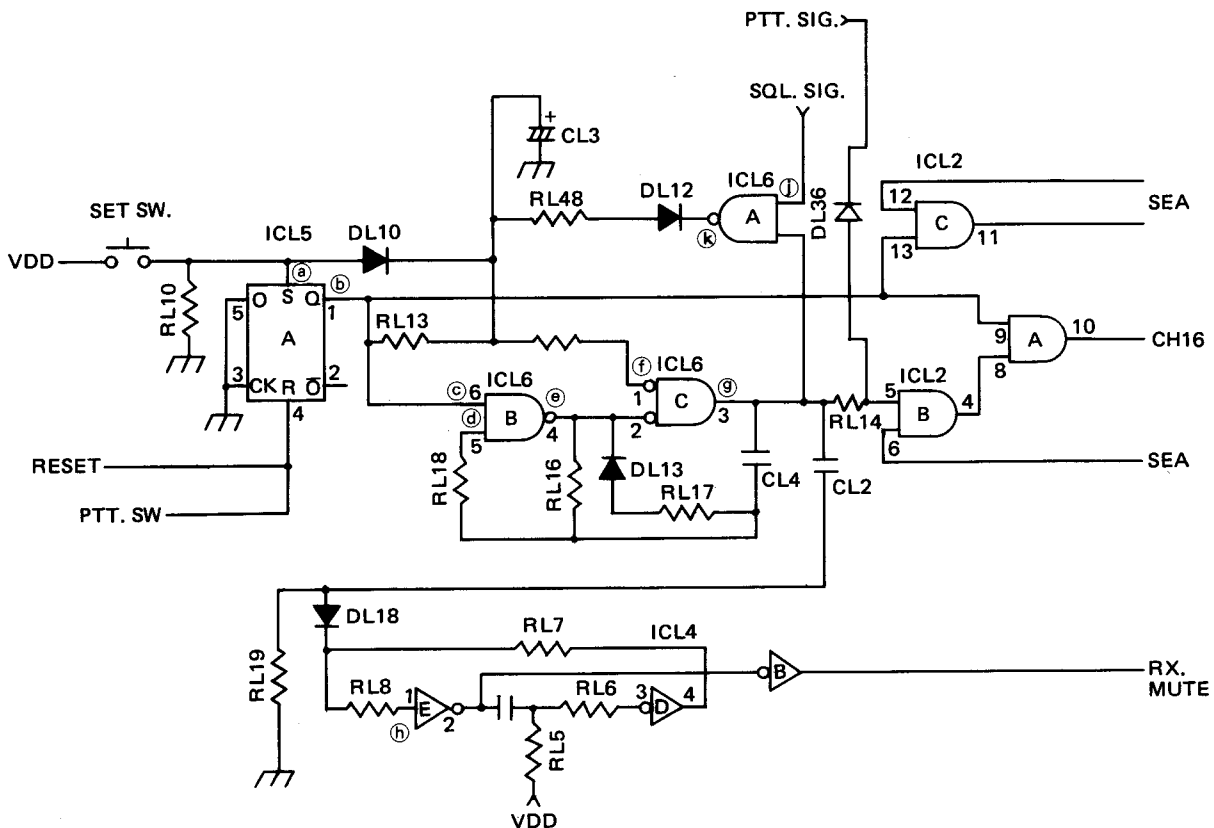
When a signal is received on channel 16, the output terminal(k) of ICL6(A), 2-input NAND gate, becomes LOW-level and one of input terminal of ICL6(C) becomes LOW-level too. Therefore the multivibrator stops to oscillate and ICL6(C) puts out HIGH-level continuously while the signal on channel 16 is present. When the signal has been disappeared, the output terminal of ICL6(A) becomes HIGH-level and the multivibrator resumes oscillating. Thus the SEA function is continued.

When you turn the radio to the transmit mode while in the SEA function, one of the input terminals of ICL2(B) 2-input AND gate is grounded through DL36 and PTT switch on the microphone. Therefore the HIGH-level pulse from the multivibrator is not fed to ICL2(B), and the radio does not go to channel 16 and transmit on the selected channel (except when a weather channel is selected).

The reset terminal of ICL5(A) flip-flop is connected to the WX, CH16, DIAL, MEMORY WRITE, MEMORY READ buttons, channel allocation switch and channel selector, and the SEA function is cleared by pushing or turning one of them.

The output of ICL2(C) is fed to SEA matrix and letters "SEA" are displayed during the radio is in SEA function.

ICL4(D) and ICL4(E) compose a one-shot multivibrator. The multivibrator is triggered by the HIGH-level pulse of ICL6's output and puts out a 20 milliseconds pulse, and it is fed to receiver mute circuit through an inverter ICL4(B) to keep silence the radio during the receiving channel is switched from channel 16 to the selected channel or vice versa.



3. SCANNING CONTROL CIRCUIT

When the SCAN START button is pushed, a pulse is fed to the clock terminal of ICL5(B) flip-flop and changes the state of Q output which is fed to an input terminal of 2-input NAND gate ICL6(D). When the Q output is HIGH-level, the unstable multivibrator consisting of ICL6(D) and ICL4(F) starts oscillation. This output is fed to the UP matrix through a 2-input NAND gate ICL2(D) and the radio starts scanning on channels.

When the Q output is LOW-level, the multivibrator does not oscillate and the scanning function does not activate.

When a signal is received on a channel, the squelch is opened and the control gate ICL6(D) is grounded through RL57, DL27 and gate of ICL6(A). Thus the scanning is stopped.

When the signal is disappeared, the output terminal of ICL6(A) becomes HIGH-level and DL27 isolates it from the input terminal of ICL6(D). Thus CL8 connected to the input terminal of ICL6(D) is charged slowly through RL27. When this charged voltage exceeds threshold voltage of the gate, the multivibrator starts again oscillation and the scanning function is resumed.

4. MEMORY BACKUP CIRCUIT

During the power switch is turned on with rating power supply voltage, a 6.2V regulated voltage is applied to the CPU, ICL7 and its HALT terminal is grounded through QL2, which is turned on by a voltage flowed through DL28 and RL47. Thus the CPU works normally.

When the 6.2V regulated voltage drops to less than 4.5V (Zener voltage of DL28) plus 0.7V (junction voltage of QL2), or the power switch is turned off, QL2 is turned off and the CPU becomes in the HALT condition.

At this time the CPU stops its clock oscillation and all functions. However, a 6V memory backup voltage from the backup battery BTL1 is applied to the CPU through DL24, and the CPU keeps all current data such as operating channel, all memorized channels, selected allocation and so on.

In this condition, the current into the CPU is less than 10 microamperes.

Thus the battery (high reliable fluoridated graphite-lithium battery) will be active more than 6 years.

5. DISPLAY CIRCUIT

The display employs a Liquid Crystal Display (LCD) which is lighted from the back to make it easy-to-read in the dark.

A flat-package IC, ICD1 is employed to drive the LCD, which operates in static mode. Input data for the driver are serial data thus the wiring is minimum.

The display lighting is made by two lamps, DSD2 and 3, and applied voltage is controlled by QL5 and RL51 thermistor in the LOGIC unit to keep constant the LCD's intensity from fluctuation of temperature.

4 - 6 PLL UNIT (For Type 370)

The PLL employs a dual modulus prescaler circuit. Therefore, the VCO stage oscillates directly at the 1st local oscillator's frequency. The PLL consists of prescaler IC5 and PLL IC4. The latter receives the N data from the CPU.

N data is defined as:

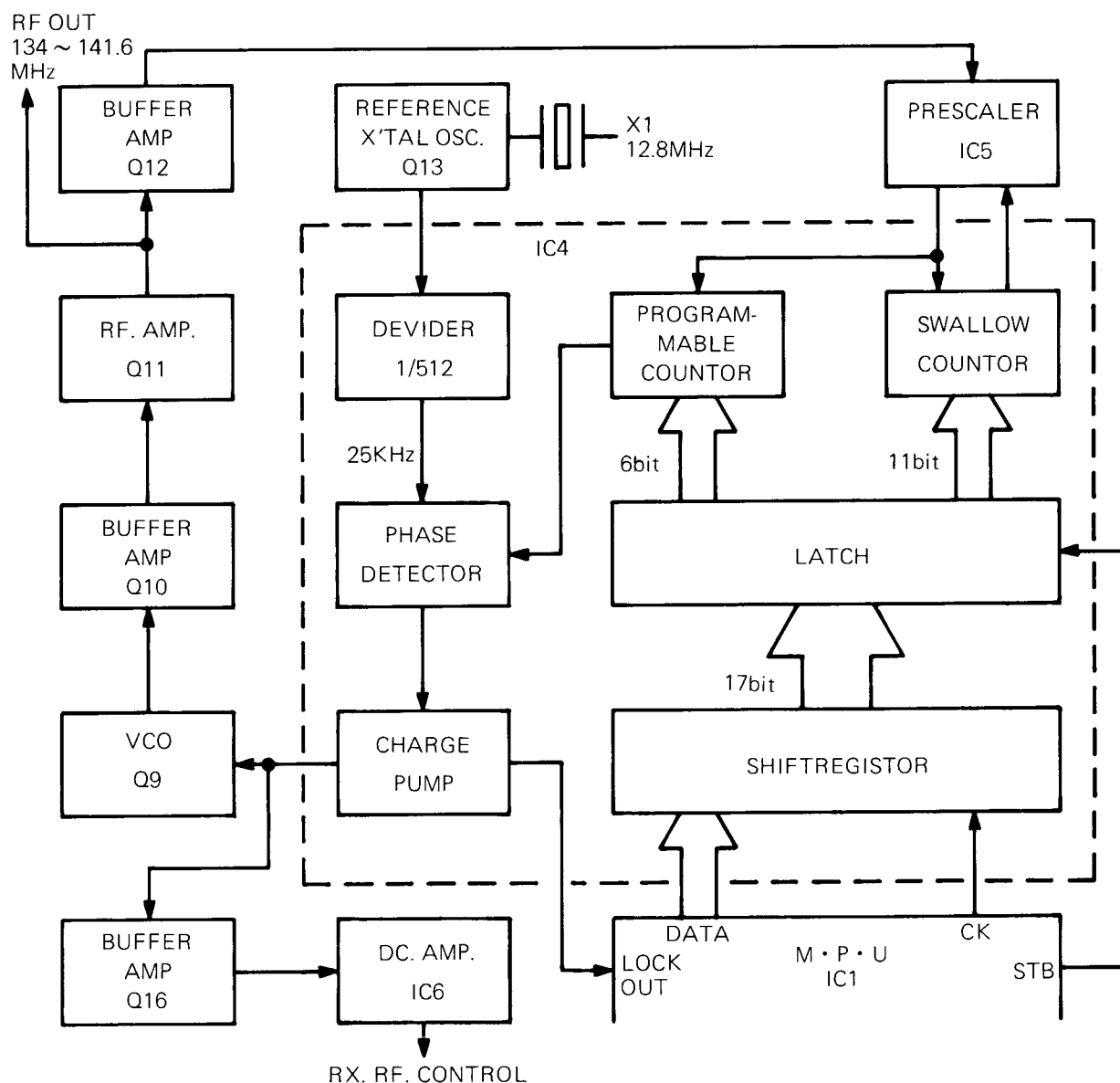
$$N = \frac{\text{1st L.O. frequency}}{\text{Reference frequency}}$$

$$N = \frac{\text{Desired frequency} - 21.4}{0.025} \text{ (MHz)}$$

The reference frequency is generated by X1 and Q13, and is divided to 25KHz by IC4.

The RF signal generated by the VCO stage passes to buffer amplifier Q12. The output from Q12 is divided by the N factor (IC5, IC4), passed to a phase shift detector and a DC voltage is output from pin 11 of IC4. This voltage passes to the varactor diode D18 via the loop filter, and control is thus maintained over the VCO frequency. Few spurious emissions result from this circuit as the PLL does not use a mixer or multiplexer.

The output from the loop filter is also supplied to IC6 which controls the receive RF band-pass filter on the MAIN board.



4 - 7 LOGIC UNIT (For Type 370)

1. M.P.U.

The LOGIC stage employs an 8-bit CMOS CPU which has 32 I/O ports. For this reason, there are few external components in this stage.

The CPU contains 112 bytes of random access memory (RAM) and 2106 bytes of read only memory (ROM).

Below is an explanation of the I/O ports.

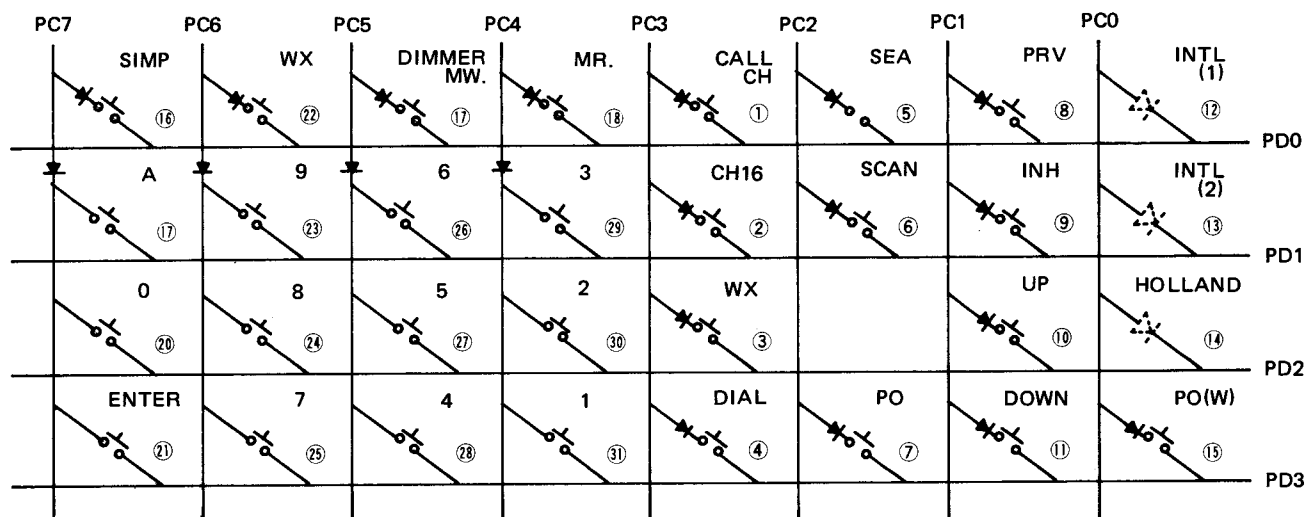
PA0	(pin 11)	in:	CH 16 (hanger switch and power ON)
PA1	(pin 10)	out:	RF OUT (HI/LOW control)
PA2	(pin 9)	out:	Tx MUTE
PA3	(pin 8)	out:	Rx MUTE
PA4	(pin 7)	in:	LCD DRIVER - BUSY
PA5	(pin 6)	out:	
PA6	(pin 5)	out:	LAMP CONTROL
PA7	(pin 4)	out:	
PB0	(pin 12)	out:	LCD DRIVER - RESET
PB1	(pin 13)	out:	LCD DRIVER - SCK
PB2	(pin 14)	out:	LCD DRIVER - C/D
PB3	(pin 15)	out:	LCD DRIVER - CS
PB4	(pin 16)	out:	LCD DRIVER - SI
PB5	(pin 17)	out:	PLL IC - CK
PB6	(pin 18)	out:	PLL IC - STROB
PB7	(pin 19)	out:	PLL IC - DATA
PC0	(pin 28) ~ PC7	(pin 21)	out: MATRIX SCAN
PD0	(pin 29) ~ PD3	(pin 32)	in: MATRIX RETURN
PD4	(pin 32)	in:	Tx DISPLAY
PD5	(pin 33)	in:	UNLOCK FROM PLL
PD6	(pin 34)	in:	SEND
PD7	(pin 35)	in:	SQUELCH

2. CPU CONTROL CIRCUIT

The CPU in the unit is an 8-bit CPU and the input terminals are PD0, PD1, PD2 and PD3.

Since the CPU cannot make many functions with the small number of PD input signals, to increase the functions of the CPU, scanning PD output signals and are fed to the PD input terminals through the matrix circuits.

The CPU reads the relationship of PC output signals, and PD input signals to decide the function as follows:



1. **PC3 - PD0**
By pushing the CALL switch, a channel memorized in the CPU is selected. (Any channel except weather channel can be memorized.)
2. **PC3 - PD1 (CH 16)**
When this flow occurs, the operating frequency is set on channel 16.
3. **PC3 - PD2 (WX)**
This flow occurs when the WEATHER CHANNEL button is pushed or a memory channel stored a weather channel is selected, and the operating frequency is set on one of 9 weather channels. At this time, the transmitting function is prohibited.
4. **PC3 - PD3 (DIAL)**
This flow occurs when the DIAL SELECT button is pushed, and a desired operating channel can be selected by the CHANNEL SELECTOR.
5. **PC2 - PD0 (SEA)**
This flow occurs when the SEA (DUAL WATCH) button is pushed, and the set is in the sea (dual watch) function and letters "SEA" are displayed on the channel and function display.
6. **PC2 - PD1 (SCAN START/STOP)**
Push to enable the scan feature. Push again to disable the scan. Selecting another function (WX, CH 16, DIAL, Memory write, Memory read) will also cancel the scan.
7. **PC2 - PD3 (POWER OUTPUT)**
This flow occurs when the RF POWER switch is pushed in (LO position), and the RF output power is reduced to 1 watt and letters "LOW" are displayed.

This function has been programmed in the CPU for specified channels of some allocations.
When this flow does not occur, the RF power is set to 25 watts and letters "HIGH" are displayed.
8. **PC1 - PD0 (PRIVATE CHANNELS)**
If this switch is ON, CPU programmed channels may be selected with the channel selector with the exception of the WX channels. Located in the LOGIC stage.
9. **PC1 - PD1 (INH)**
A non-latching switch. The purpose of this switch is to erase channels not required in a particular country. To erase, select the channel, and push the INH switch. The display will show "- -" to indicate the channel is erased. To recall, set PRV switch ON, select the deleted channel and push the INH switch. Located in the LOGIC stage.
10. **PC1 - PD2 (CHANNEL UP)**
When this flow occurs, the operating channel or memory channel goes upper channel according to the programmed sequence.
11. **PC1 - PD3 (CHANNEL DOWN)**
When this flow occurs, the operating channel or memory channel goes lower channel according to the programmed sequence.
12. ~ 14. **PC0 - PD0, PD1, PD2 (INTERNATIONAL 1, 2/HOLLAND)**
This is a diode switch on the LOGIC board used to select the different versions of the radio.
15. **PC0 - PD4 (POWER OUTPUT WRITE)**
A non-latching switch. Push to program a single channel for LOW power operation. To delete the function, set the HI/LOW switch to high and push the POC(W) switch. Located in the LOGIC stage.
16. **PC7 - PD0 (SIMPLEX)**
This switch is used to program the SIMPLEX function into memory on a particular channel.

- 1) Set the PRV switch ON.
- 2) Push the Memory Read switch and select a memory channel with the channel selector.
- 3) Push and hold the Memory Write switch.
- 4) Set the SIM switch ON.
- 5) Select the private channel with the channel selector.
- 6) Release the Memory Write switch.
- 7) Release the Memory Read switch.
- 8) Set the SIM switch OFF.
- 9) Set the PRV switch OFF.

17. PC5 - PD0 (DIMMER/MEMORY WRITE)

While depressing the MEMORY WRITE/DIMMER button, by turning the CHANNEL SELECTOR clockwise, the display intensity will be increased, and by turning it counterclockwise the intensity will be decreased.

18. PC5 - PD0 (DIMMER/MEMORY WRITE)

In the memory channel operation, while the MEMORY WRITE button is depressed (this flow occurs) any channels are selected by turning the CHANNEL SELECTOR, and a selected channel is memorized into a memory channel at a moment the MEMORY WRITE button is released.

19. PC4 - PD0 (MEMORY READ)

When this flow occurs, memory channels can be selected by turning the CHANNEL SELECTOR, and a selected memory channel number and its memorized channel number are displayed.

20. ~ 30. PC7, PC6, PC5, PC4 - PD1, 2, 3 (TEN KEY INPUT)

These matrices are provided for an external ten key controller.

3. MEMORY BACKUP CIRCUIT

During the power switch is turned on with rating power supply voltage, a 6.2V regulated voltage is applied to the CPU, ICL7 and its HALT terminal is grounded through QL2, which is turned on by a voltage flowed through DL28 and RL47. Thus the CPU works normally.

When the 6.2V regulated voltage drops to less than 4.5V (Zener voltage of DL28) plus 0.7V (junction voltage of QL2), or the power switch is turned off, QL2 is turned off and the CPU becomes in the HALT condition. At this time the CPU stops its clock oscillation and all functions. However, a 6V memory backup voltage from the backup battery BTL1 is applied to the CPU through DL24, and the CPU keeps all current data such as operating channel, all memorized channels, selected allocation and so on.

In this condition, the current into the CPU is less than 10 microamperes.

Thus the battery (high reliable fluoridated graphite-lithium battery) will be active more than 6 years.

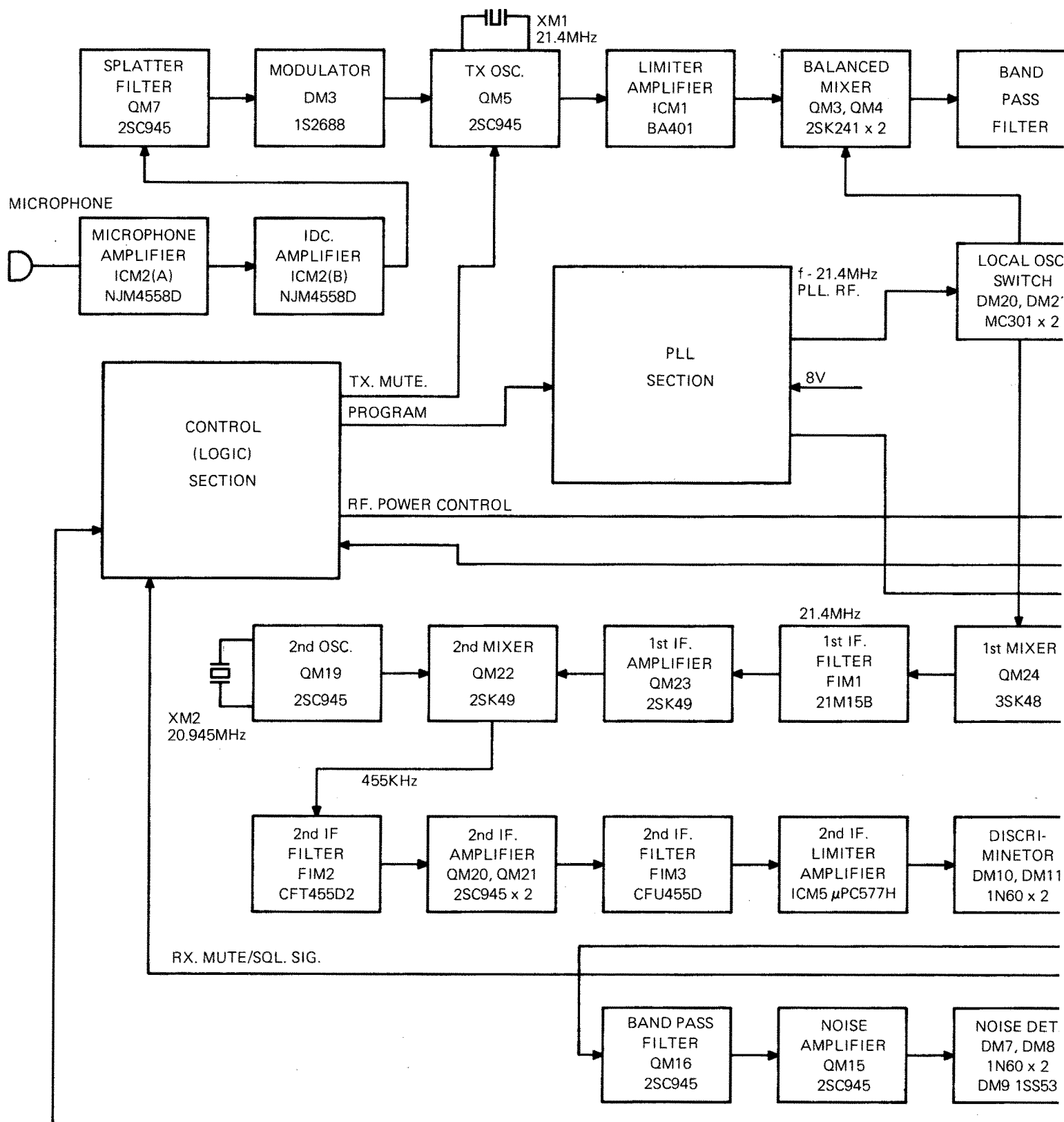
4. DISPLAY CIRCUIT

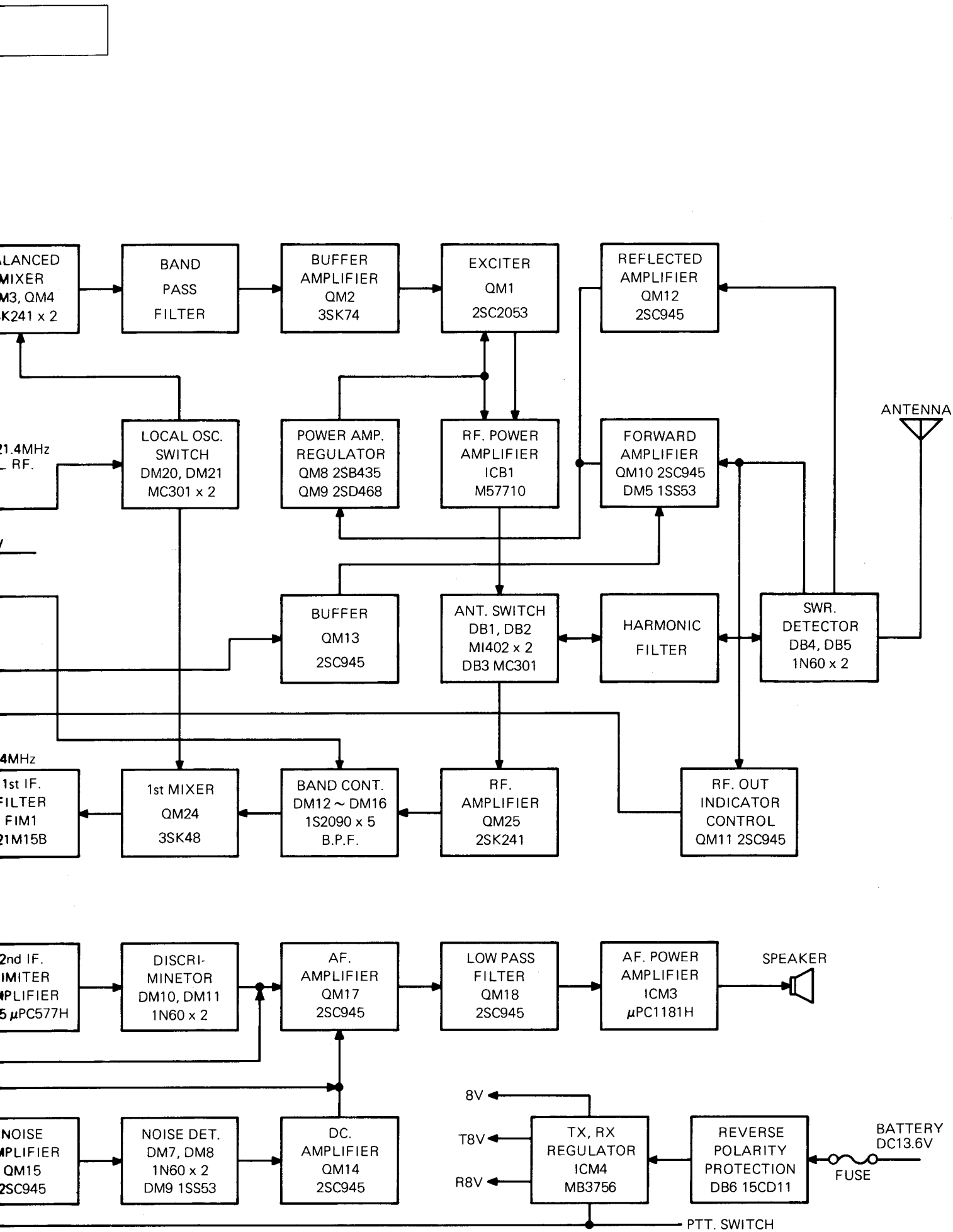
The display employs a Liquid Crystal Display (LCD) which is lighted from the back to make it easy-to-read in the dark.

A flat-package IC, ICD1 is employed to drive the LCD, which operates in static mode. Input data for the drive are serial data thus the wiring is minimum.

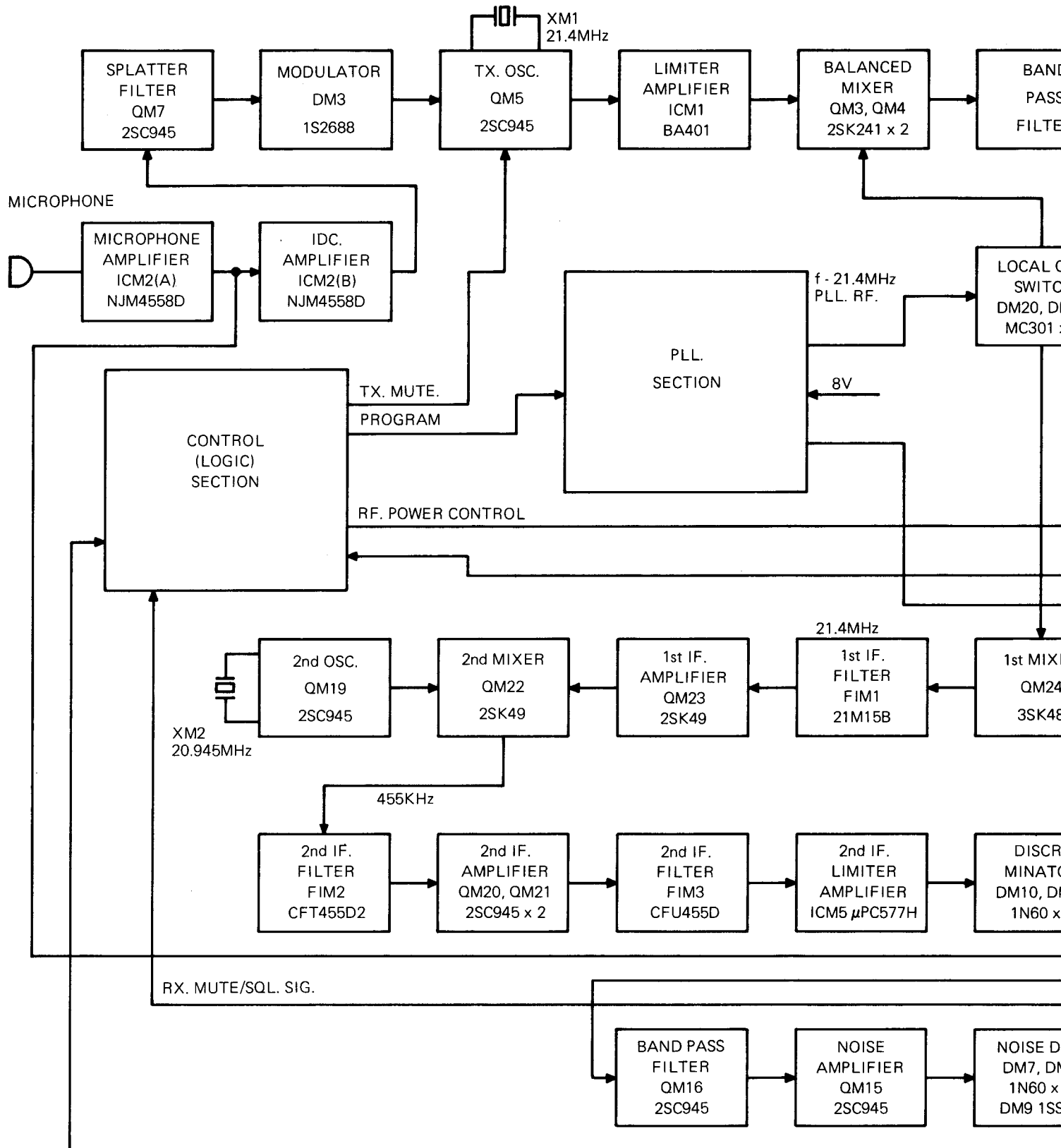
SECTION 5 BLOCK DIAGRAM

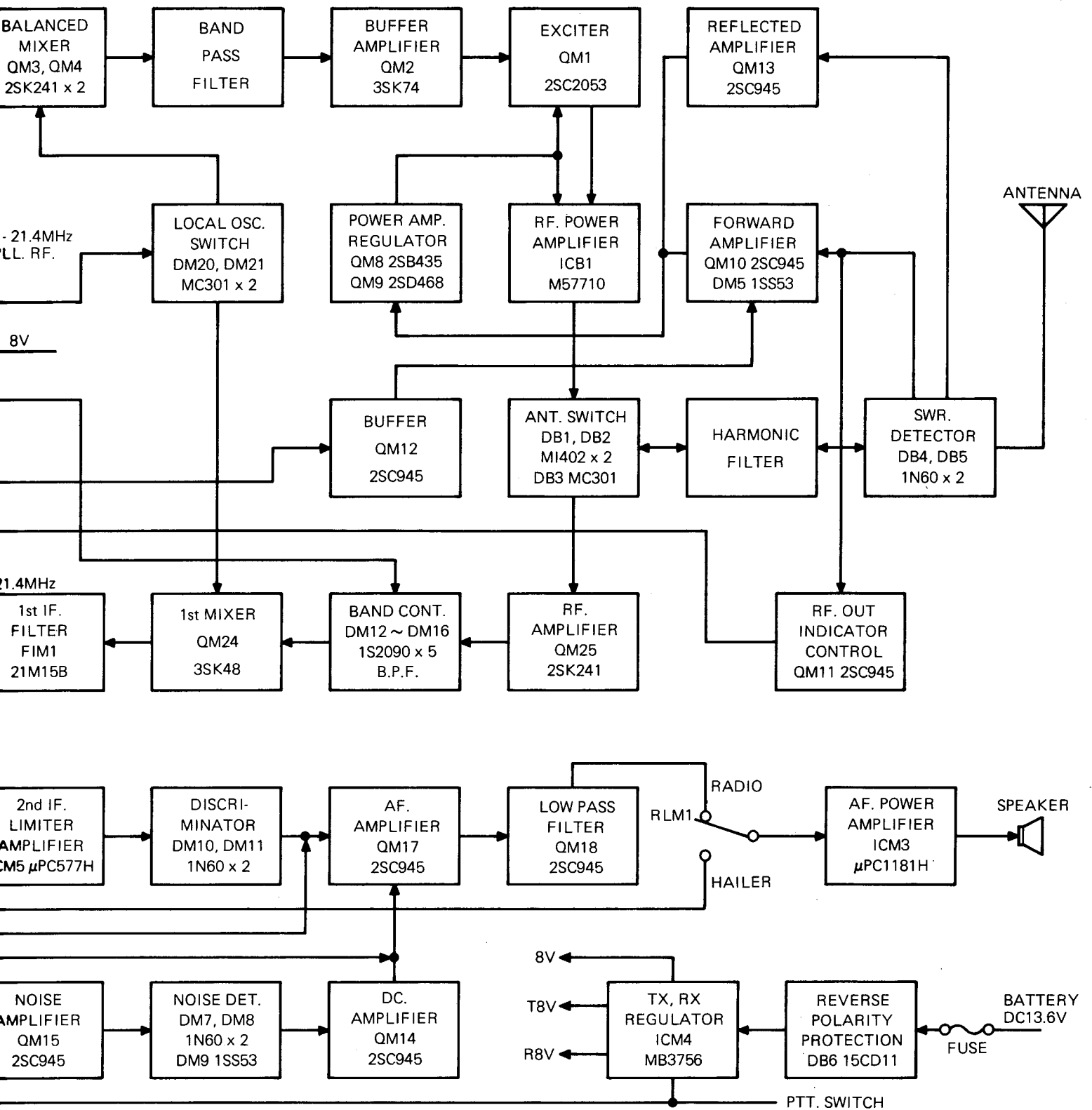
MAIN UNIT (U.S.A. Version)





MAIN UNIT (European Version)





LOGIC CIRCUIT

DISPLAY DSD1
HLC9053

DISPLAY DRIVER ICD1
μPD7225G

CPU ICL7
MP5019A

MEMORY BACK UP
QL2 2SC1815
BTL1 BR2325-2P

FRONT PANEL CONTROL
CH16, WX
DIAL etc.

DIMMER CONTROL QL3
2SD468

CH16 SWITCH
ICL1(D) TC4081
ICL3(B, D) TC4069

HANGER SWITCH

TX. CHANNEL CONTROL
ICL1(C) TC4081
ICL4(A) TC4069

PTT. SWITCH

REGULATOR ICL8
μA78L062

SEA CONTROL
ICL2(A ~ C) TC4081
ICL4(B ~ E) TC4069
ICL5(A) TC4013
ICL6(A ~ C) TC4011

SCAN CONTROL
ICL2(D) TC4081
ICL4(F) TC4069
ICL5(B) TC4013
ICL6(D) TC4011

RF. OUT CONTROL BUFFER ICL3(F) TC4069

TX. MUTE OR DL29, DL30 1SS53 x 2

TX. INDI. CONTROL
ICL1(B) TC4081
ICL3(A) TC4069

SCAN STOP CONTROL ICL3(D, E) TC4069

RX. MUTE QL1 2SC1815

LAMP

DATA BUS

TX. INHIBIT

RF. POWER CONTROL

TX. MUTE

RF. OUT DETECTOR

SQL SIG.

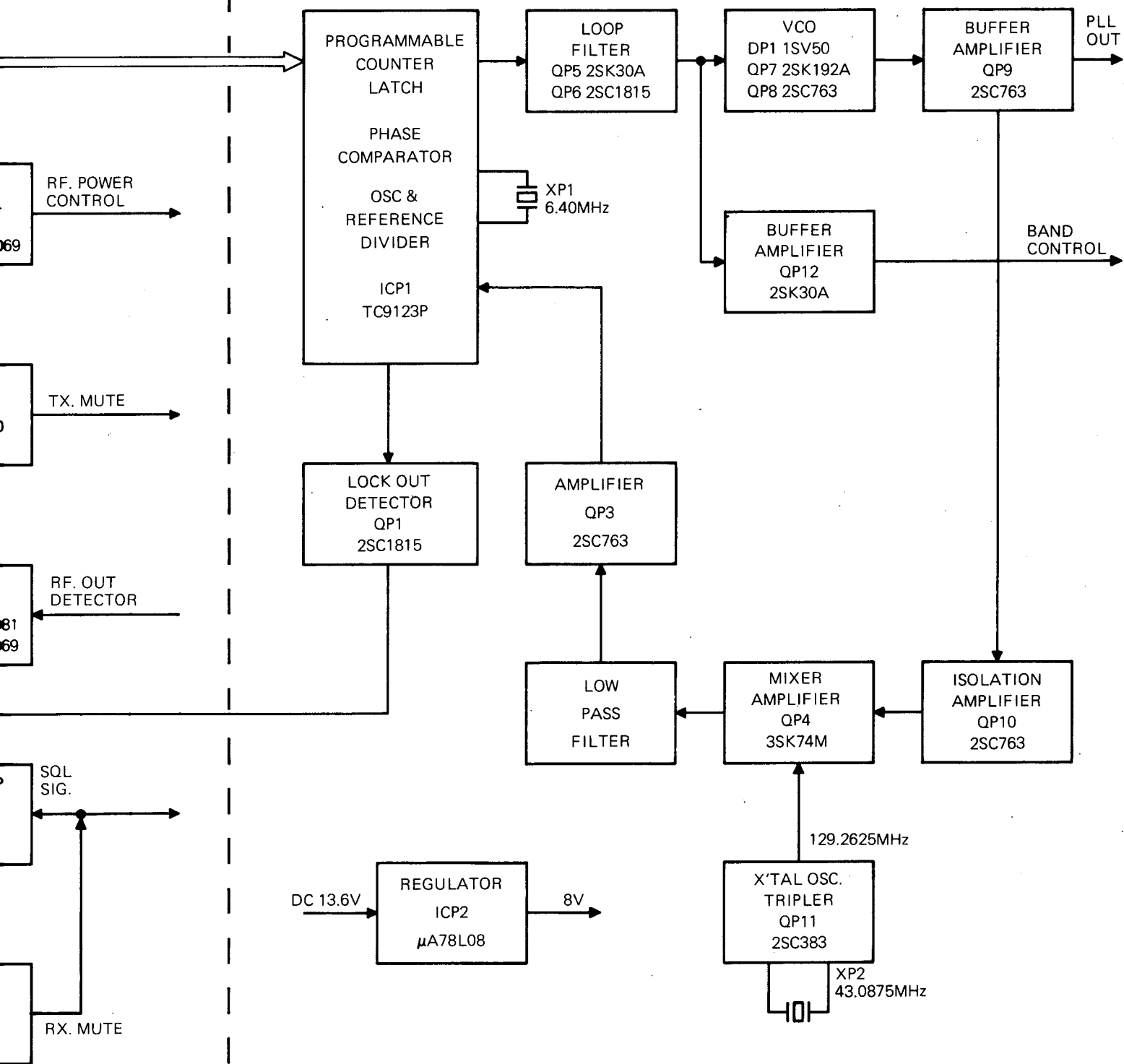
RX. MUTE

6.2V

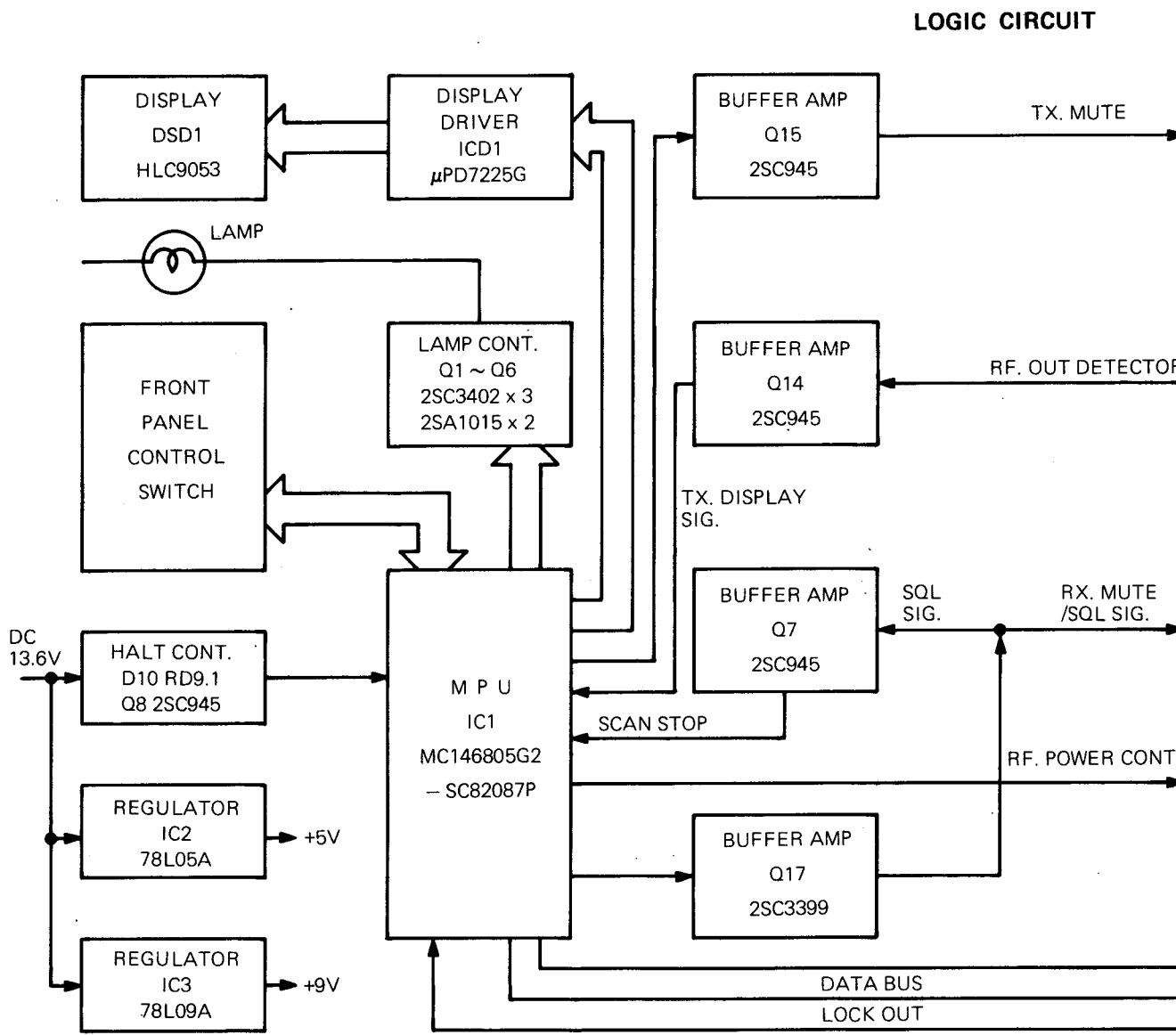
DC. 13.6V

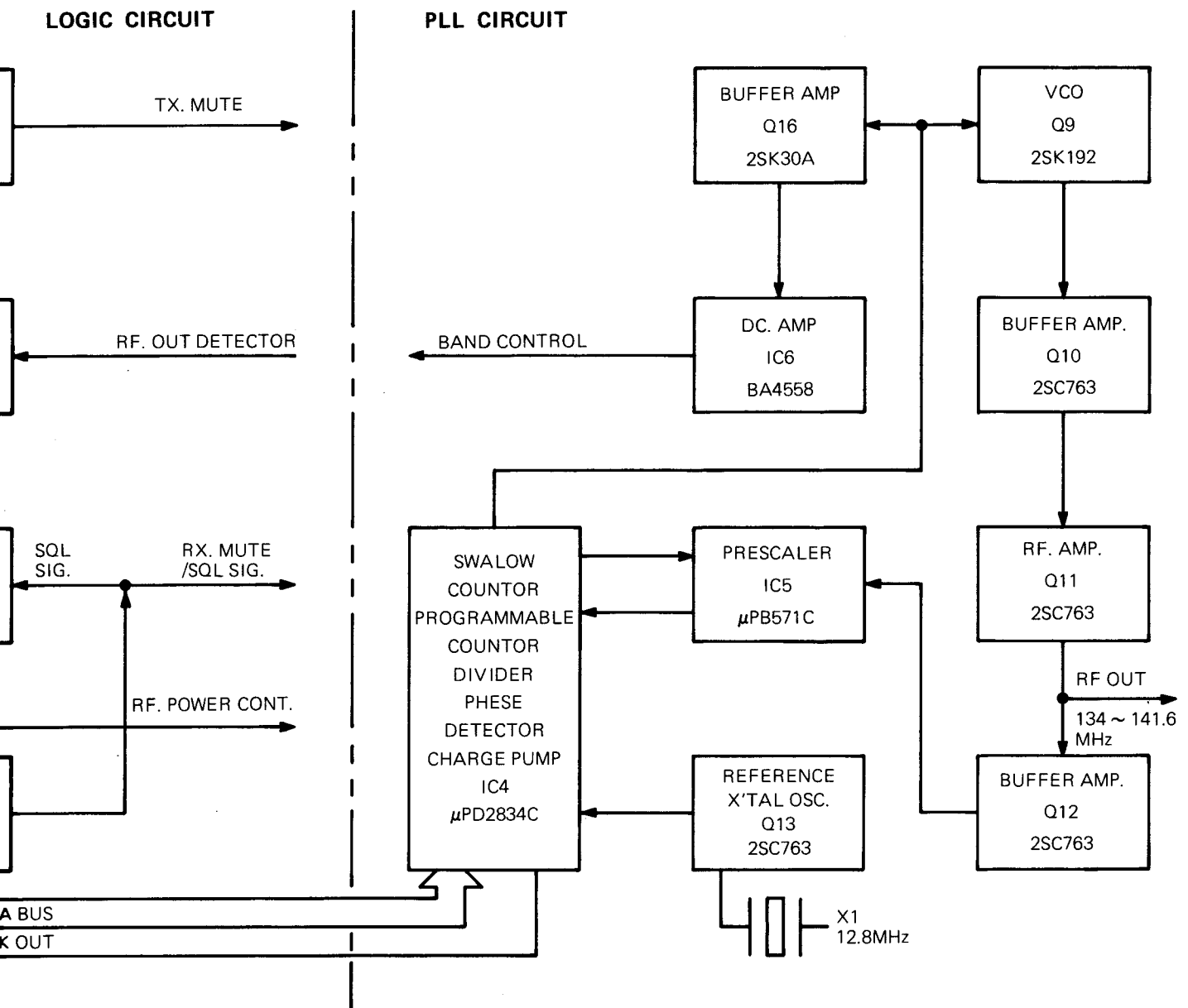
UIT

PLL CIRCUIT



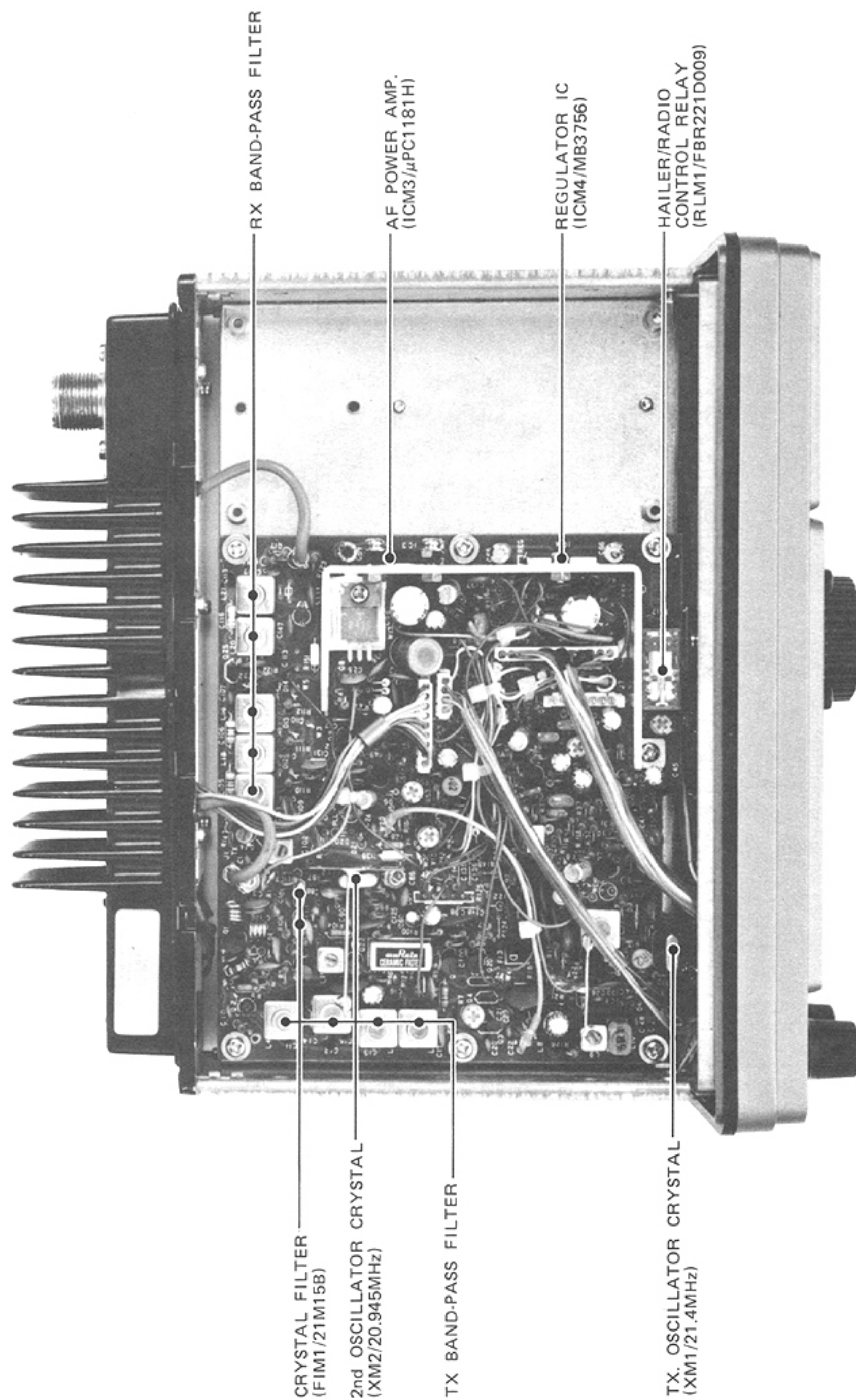
PLL-LOGIC UNIT (Type 370)



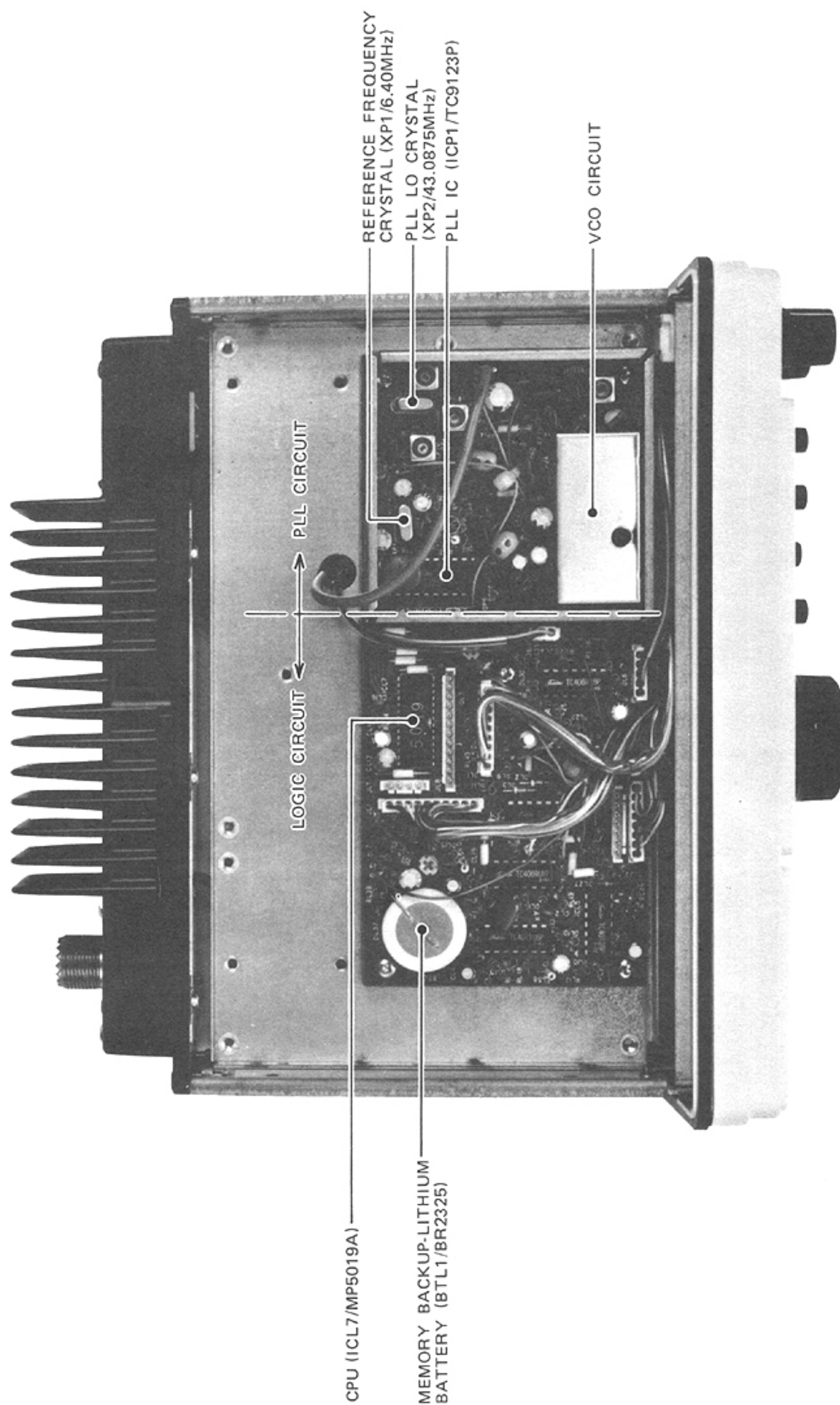


SECTION 6 INSIDE VIEWS

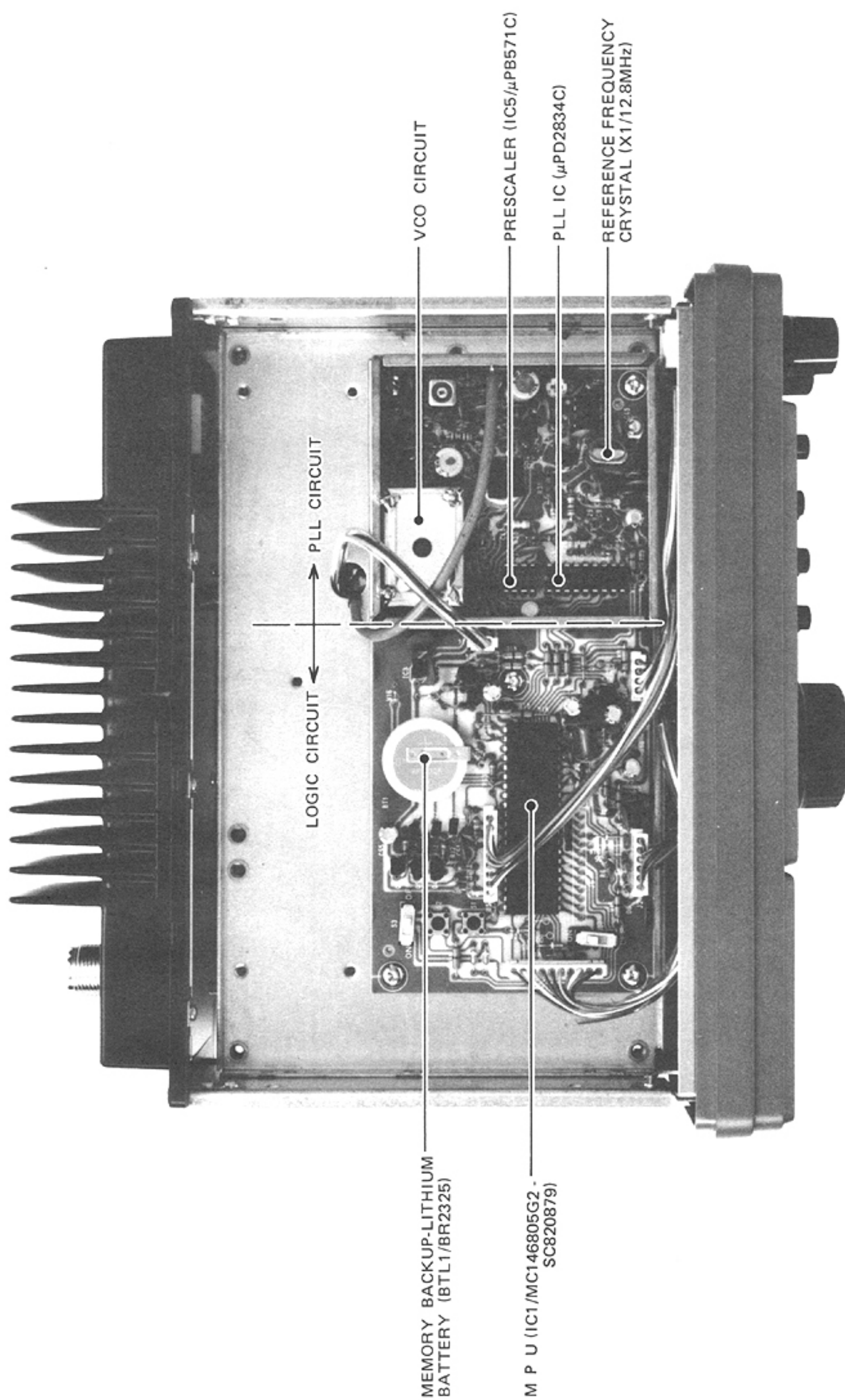
MAIN UNIT



PLL-LOGIC UNIT (Type 225)



PLL-LOGIC UNIT (Type 370)



SECTION 7 FREQUENCY CHARTS

International Marine channels (Type 225)

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
01	156.050	160.650	25W & 1W
02	156.100	160.700	25W & 1W
03	156.150	160.750	25W & 1W
04	156.200	160.800	25W & 1W
05	156.250	160.850	25W & 1W
06	156.300	156.300	25W & 1W
07	156.350	160.950	25W & 1W
07A	—	—	
08	156.400	156.400	25W & 1W
09	156.450	156.450	25W & 1W
10	156.500	156.500	25W & 1W
11	156.550	156.550	25W & 1W
12	156.600	156.600	25W & 1W
13	156.650	156.650	25W & 1W
14	156.700	156.700	25W & 1W
15	156.750	156.750	25W & 1W
16	156.800	156.800	25W & 1W
17	156.850	156.850	25W & 1W
18	156.900	161.500	25W & 1W
18A	—	—	
19	156.950	161.550	25W & 1W
19A	—	—	
20	157.000	161.600	25W & 1W
21	157.050	161.650	25W & 1W
21A	—	—	
22	157.100	161.700	25W & 1W
22A	—	—	
23	157.150	161.750	25W & 1W
23A	—	—	
24	157.200	161.800	25W & 1W
25	157.250	161.850	25W & 1W
26	157.300	161.900	25W & 1W
27	157.350	161.950	25W & 1W
28	157.400	162.000	25W & 1W
60	156.025	160.625	25W & 1W
61	156.075	160.675	25W & 1W
62	156.125	160.725	25W & 1W
63	156.175	160.775	25W & 1W

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
64	156.225	160.825	25W & 1W
65	156.275	160.875	25W & 1W
65A	—	—	
66	156.325	160.925	25W & 1W
66A	—	—	
67	156.375	156.375	25W & 1W
68	156.425	156.425	25W & 1W
69	156.475	156.475	25W & 1W
70	156.525	156.525	25W & 1W
71	156.575	156.575	25W & 1W
72	156.625	156.625	25W & 1W
73	156.675	156.675	25W & 1W
74	156.725	156.725	25W & 1W
75	—	—	
76	—	—	
77	156.875	156.875	25W & 1W
78	156.925	161.525	25W & 1W
78A	—	—	
79	156.975	161.575	25W & 1W
79A	—	—	
80	157.025	161.625	25W & 1W
80A	—	—	
81	157.075	161.675	25W & 1W
81A	—	—	
82	157.125	161.725	25W & 1W
83	157.175	161.775	25W & 1W
83A	—	—	
84	157.225	161.825	25W & 1W
85	157.275	161.875	25W & 1W
86	157.325	161.925	25W & 1W
87	157.375	161.975	25W & 1W
88	157.425	162.025	25W & 1W
88A	—	—	
WX1	—	162.550	RX only
WX2	—	162.400	RX only
WX3	—	161.650	RX only
WX4	—	162.475	RX only

USA Marine channels (Type 225)

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
01	—	—	
02	—	—	
03	—	—	
04	—	—	
05	—	—	
06	156.300	156.300	25W & 1W
07	156.350	160.950	25W & 1W
07A	156.350	156.350	25W & 1W
08	156.400	156.400	25W & 1W
09	156.450	156.450	25W & 1W
10	156.500	156.500	25W & 1W
11	156.550	156.550	25W & 1W
12	156.600	156.600	25W & 1W
13	156.650	156.650	25W & 1W
14	156.700	156.700	25W & 1W
15	—	156.750	RX only
16	156.800	156.800	25W & 1W
17	156.850	156.850	25W & 1W
18	156.900	161.500	25W & 1W
18A	156.900	156.900	25W & 1W
19	156.950	161.550	25W & 1W
19A	156.950	156.950	25W & 1W
20	157.000	161.600	25W & 1W
21	157.050	161.650	25W & 1W
21A	157.050	157.050	25W & 1W
22	157.100	161.700	25W & 1W
22A	157.100	157.100	25W & 1W
23	157.150	161.750	25W & 1W
23A	157.150	157.150	25W & 1W
24	157.200	161.800	25W & 1W
25	157.250	161.850	25W & 1W
26	157.300	161.900	25W & 1W
27	157.350	161.950	25W & 1W
28	157.400	162.000	25W & 1W
60	—	—	
61	—	—	
62	—	—	
63	—	—	

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
64	—	—	
65	156.275	160.875	25W & 1W
65A	156.275	156.275	25W & 1W
66	156.325	160.925	25W & 1W
66A	156.325	156.325	25W & 1W
67	156.375	156.375	25W & 1W
68	156.425	156.425	25W & 1W
69	156.475	156.475	25W & 1W
70	156.525	156.525	25W & 1W
71	156.575	156.575	25W & 1W
72	156.625	156.625	25W & 1W
73	156.675	156.675	25W & 1W
74	156.725	156.725	25W & 1W
75	—	—	
76	—	—	
77	156.875	156.875	25W & 1W
78	156.925	161.525	25W & 1W
78A	156.925	156.925	25W & 1W
79	156.975	161.575	25W & 1W
79A	156.975	156.975	25W & 1W
80	157.025	161.626	25W & 1W
80A	157.025	157.025	25W & 1W
81	157.075	161.675	25W & 1W
81A	157.075	157.075	25W & 1W
82	157.125	161.725	25W & 1W
82A	157.125	157.125	25W & 1W
83	157.175	161.775	25W & 1W
83A	157.175	157.175	25W & 1W
84	157.275	161.825	25W & 1W
85	157.275	161.875	25W & 1W
86	157.325	161.925	25W & 1W
87	157.375	161.975	25W & 1W
88	157.425	162.025	25W & 1W
88A	157.425	157.425	25W & 1W
WX1	—	162.550	RX only
WX2	—	162.400	RX only
WX3	—	161.650	RX only
WX4	—	162.475	RX only

UK. Marin channels (Type 225)

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
00	156.000	156.000	25W & 1W
01	156.050	160.650	25W & 1W
02	156.100	160.700	25W & 1W
03	156.150	160.750	25W & 1W
04	156.200	160.800	25W & 1W
05	156.250	160.850	25W & 1W
06	156.300	156.300	25W & 1W
07	156.350	160.950	25W & 1W
07A	—	—	
08	156.400	156.400	25W & 1W
09	156.450	156.450	25W & 1W
10	156.500	156.500	25W & 1W
11	156.550	156.550	25W & 1W
12	156.600	156.600	25W & 1W
13	156.650	156.650	25W & 1W
14	156.700	156.700	25W & 1W
15	156.750	156.750	1W only
16	156.800	156.800	25W & 1W
17	156.850	156.850	1W only
18	156.900	161.500	25W & 1W
18A	—	—	
19	156.950	161.550	25W & 1W
19A	—	—	
20	157.000	161.600	25W & 1W
21	157.050	161.650	25W & 1W
21A	—	—	
22	157.100	161.700	25W & 1W
22A	—	—	
23	157.150	161.750	25W & 1W
23A	—	—	
24	157.200	161.800	25W & 1W
25	157.250	161.850	25W & 1W
26	157.300	161.900	25W & 1W
27	157.350	161.950	25W & 1W
28	157.400	162.000	25W & 1W
60	156.025	160.625	25W & 1W
61	156.075	160.675	25W & 1W
62	156.125	160.725	25W & 1W

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
63	156.175	160.775	25W & 1W
64	156.225	160.825	25W & 1W
65	156.275	160.875	25W & 1W
65A	—	—	
66	156.325	160.925	25W & 1W
66A	—	—	
67	156.375	156.375	25W & 1W
68	156.425	156.425	25W & 1W
69	156.475	156.475	25W & 1W
70	156.525	156.525	25W & 1W
71	156.575	156.575	25W & 1W
72	156.625	156.625	25W & 1W
73	156.675	156.675	25W & 1W
74	156.725	156.725	25W & 1W
75	—	—	
76	—	—	
77	156.875	156.875	25W & 1W
78	156.925	161.525	25W & 1W
78A	—	—	
79	156.975	161.575	25W & 1W
79A	—	—	
80	157.025	161.625	25W & 1W
80A	—	—	
81	157.075	161.675	25W & 1W
81A	—	—	
82	157.125	161.725	25W & 1W
83	157.175	161.775	25W & 1W
83A	—	—	
84	157.225	161.825	25W & 1W
85	157.275	161.875	25W & 1W
86	157.325	161.925	25W & 1W
87	157.375	161.975	25W & 1W
88	157.425	162.025	25W & 1W
88A	—	—	
WX1	—	162.550	RX only
WX2	—	162.400	RX only
WX3	—	161.650	RX only
WX4	—	162.475	RX only

HOLLAND Marine channels (Type 225)

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
01	156.050	160.650	1W only
02	156.100	160.700	1W only
03	156.150	160.750	1W only
04	156.200	160.800	1W only
05	156.250	160.850	1W only
06	156.300	156.300	1W only
07	156.350	160.950	1W only
07A	—	—	
08	156.400	156.400	1W only
09	156.450	156.450	1W only
10	156.500	156.500	1W only
11	156.550	156.550	1W only
12	156.600	156.600	1W only
13	156.650	156.650	1W only
14	156.700	156.700	1W only
15	—	—	
16	156.800	156.800	25W & 1W
17	—	—	
18	156.900	161.500	1W only
18A	—	—	
19	156.950	161.550	1W only
19A	—	—	
20	157.000	161.600	1W only
21	157.050	161.650	1W only
21A	—	—	
22	157.100	161.700	1W only
22A	—	—	
23	157.150	161.750	25W & 1W
23A	—	—	
24	157.200	161.800	25W & 1W
25	157.250	161.850	25W & 1W
26	157.300	161.900	25W & 1W
27	157.350	161.950	25W & 1W
28	157.400	162.000	25W & 1W
60	156.025	160.625	1W only

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
61	156.075	160.675	1W only
62	156.125	160.725	1W only
63	156.175	160.775	1W only
64	156.225	160.825	1W only
65	156.275	160.875	1W only
65A	—	—	
66	—	—	
66A	—	—	
67	—	—	
68	—	—	
69	—	—	
70	—	—	
71	—	—	
72	—	—	
73	—	—	
74	—	—	
75	—	—	
76	—	—	
77	156.875	156.875	1W only
78	156.925	161.525	1W only
78A	—	—	
79	156.975	161.575	1W only
80	157.025	161.625	1W only
80A	—	—	
81	157.075	161.675	1W only
81A	—	—	
82	157.125	161.725	25W & 1W
83	157.175	161.775	25W & 1W
83A	—	—	
84	157.225	161.825	25W & 1W
85	157.275	161.875	25W & 1W
86	157.325	161.925	25W & 1W
87	157.375	161.975	25W & 1W
88	157.425	162.025	25W & 1W
88A	—	—	

Private Marine Band (Type 225)

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
00	156.000	156.000	25W & 1W
29	157.450	162.050	25W & 1W
30	157.500	162.100	25W & 1W
31	157.550	162.150	25W & 1W
32	157.600	162.700	25W & 1W
33	157.650	162.250	25W & 1W
34	157.700	162.300	25W & 1W
35	157.750	162.350	25W & 1W
36	157.800	162.400	25W & 1W
37	157.850	162.450	25W & 1W
37A	157.850	157.850	25W & 1W
38	157.900	162.500	25W & 1W
39	157.950	162.550	25W & 1W
40	158.000	162.600	25W & 1W
41	158.050	162.650	25W & 1W
42	158.100	162.700	25W & 1W
43	158.150	162.750	25W & 1W
44	158.200	162.800	25W & 1W
45	158.250	162.850	25W & 1W
46	158.300	162.900	25W & 1W
47	158.350	162.950	25W & 1W
48	158.400	163.000	25W & 1W
49	158.450	163.050	25W & 1W
50	158.500	163.100	25W & 1W
51	158.550	163.150	25W & 1W
52	158.600	163.200	25W & 1W
53	158.650	163.250	25W & 1W
54	158.700	163.300	25W & 1W
55	158.750	163.350	25W & 1W
56	158.800	163.400	25W & 1W

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
89	157.475	162.075	25W & 1W
90	157.525	162.125	25W & 1W
91	157.575	162.175	25W & 1W
92	157.625	162.225	25W & 1W
93	157.625	162.275	25W & 1W
94	157.725	162.325	25W & 1W
95	157.775	162.375	25W & 1W
96	157.825	162.425	25W & 1W
97	157.875	162.475	25W & 1W
98	157.925	162.525	25W & 1W
99	157.975	162.575	25W & 1W
100	158.025	162.625	25W & 1W
101	158.075	162.675	25W & 1W
102	158.125	162.725	25W & 1W
103	158.175	162.775	25W & 1W
104	158.225	162.825	25W & 1W
105	158.275	162.875	25W & 1W
106	158.325	162.925	25W & 1W
107	158.375	162.975	25W & 1W
108	158.425	163.025	25W & 1W
109	158.475	163.075	25W & 1W
110	158.525	163.125	25W & 1W
111	158.575	163.175	25W & 1W
112	158.625	163.225	25W & 1W
113	158.675	163.275	25W & 1W
114	158.725	163.325	25W & 1W
115	158.775	163.375	25W & 1W
116	158.825	163.425	25W & 1W
F1	155.625	155.625	25W & 1W
F2	155.775	155.775	25W & 1W
F3	155.825	155.825	25W & 1W
F4	155.525	155.525	25W & 1W
F5	155.500	155.500	25W & 1W

International Marine channels (Type 370)

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
01	156.050	160.650	25W & 1W
02	156.100	160.700	25W & 1W
03	156.150	160.750	25W & 1W
04	156.200	160.800	25W & 1W
05	156.250	160.850	25W & 1W
06	156.300	156.300	25W & 1W
07	156.350	160.950	25W & 1W
08	156.400	156.400	25W & 1W
09	156.450	156.450	25W & 1W
10	156.500	156.500	25W & 1W
11	156.550	156.550	25W & 1W
12	156.600	156.600	25W & 1W
13	156.650	156.650	25W & 1W
14	156.700	156.700	25W & 1W
15	156.750	156.750	1W only
16	156.800	156.800	25W & 1W
17	156.850	156.850	1W only
18	156.900	161.500	25W & 1W
19	156.950	161.550	25W & 1W
20	157.000	161.600	25W & 1W
21	157.050	161.750	25W & 1W
22	157.100	161.700	25W & 1W
23	157.150	161.750	25W & 1W
24	157.200	161.800	25W & 1W
25	157.250	161.850	25W & 1W
26	157.300	161.900	25W & 1W
27	157.350	161.950	25W & 1W
28	157.400	162.000	25W & 1W
60	156.025	160.625	25W & 1W
61	156.075	160.675	25W & 1W
62	156.125	160.725	25W & 1W
63	156.175	160.775	25W & 1W
64	156.225	160.825	25W & 1W
65	156.275	160.875	25W & 1W

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
66	156.325	160.925	25W & 1W
67	156.375	156.375	25W & 1W
68	156.425	156.425	25W & 1W
69	156.475	156.475	25W & 1W
70	156.525	156.525	25W & 1W
71	156.575	156.575	25W & 1W
72	156.625	156.625	25W & 1W
73	156.675	156.675	25W & 1W
74	156.725	156.725	25W & 1W
75	—	—	Guard
76	—	—	Guard
77	156.875	156.875	25W & 1W
78	156.925	161.525	25W & 1W
79	156.975	161.575	25W & 1W
80	157.025	161.725	25W & 1W
81	157.075	161.675	25W & 1W
82	157.125	161.725	25W & 1W
83	157.175	161.775	25W & 1W
84	157.225	161.825	25W & 1W
85	157.275	161.875	25W & 1W
86	157.325	161.925	25W & 1W
87	157.375	161.975	25W & 1W
88	157.425	162.025	25W & 1W
WX1	—	162.550	RX. only
WX2	—	162.400	RX. only
WX3	—	161.650	RX. only
WX4	—	162.475	RX. only
WX5	—	162.425	RX. only
WX6	—	162.500	RX. only
WX7	—	162.525	RX. only
WX8	—	162.450	RX. only
WX9	—	161.775	RX. only
WX0	—	163.275	RX. only

International Marine channels (USA) (Type 370)

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
01	156.050	160.650	25W & 1W
01A	156.050	156.050	25W & 1W
02	156.100	160.700	25W & 1W
02A	156.100	156.100	25W & 1W
03	156.150	160.750	25W & 1W
03A	156.150	156.150	25W & 1W
04	156.200	160.800	25W & 1W
04A	156.200	156.200	25W & 1W
05	156.250	160.850	25W & 1W
05A	156.250	156.250	25W & 1W
06	156.300	156.300	25W & 1W
07	156.350	160.950	25W & 1W
07A	156.350	156.300	25W & 1W
08	156.400	156.400	25W & 1W
09	156.450	156.450	25W & 1W
10	156.500	156.500	25W & 1W
11	156.550	156.550	25W & 1W
12	156.600	156.600	25W & 1W
13	156.650	156.650	25W & 1W
14	156.700	156.700	25W & 1W
15	156.750	156.750	1W only
16	156.800	156.800	25W & 1W
17	156.850	156.850	1W only
18	156.900	161.500	25W & 1W
18A	156.900	156.900	25W & 1W
19	156.950	161.550	25W & 1W
19A	156.950	156.950	25W & 1W
20	157.000	161.600	25W & 1W
20A	157.000	157.000	25W & 1W
21	157.050	161.650	25W & 1W
21A	157.050	157.050	25W & 1W
22	157.100	161.700	25W & 1W
22A	157.100	157.100	25W & 1W
23	157.150	161.750	25W & 1W
23A	157.150	157.150	25W & 1W
24	157.200	161.800	25W & 1W
25	157.250	161.850	25W & 1W
26	157.300	161.900	25W & 1W
27	157.350	161.950	25W & 1W
28	157.400	162.000	25W & 1W
60	156.025	160.025	25W & 1W
60A	156.025	156.025	25W & 1W
61	156.075	160.675	25W & 1W
61A	156.075	156.075	25W & 1W
62	156.125	160.725	25W & 1W
62A	156.125	156.125	25W & 1W
63	156.175	160.775	25W & 1W
63A	156.175	156.125	25W & 1W
64	156.225	160.825	25W & 1W

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
64A	156.225	156.225	25W & 1W
65	156.275	160.875	25W & 1W
65A	156.275	156.275	25W & 1W
66	156.325	160.925	25W & 1W
66A	156.325	156.325	25W & 1W
67	156.375	156.375	25W & 1W
68	156.425	156.425	25W & 1W
69	156.475	156.475	25W & 1W
70	156.525	156.525	25W & 1W
71	156.575	156.575	25W & 1W
72	156.625	156.625	25W & 1W
73	156.675	156.675	25W & 1W
74	156.725	156.725	25W & 1W
75	—	—	Guard
76	—	—	Guard
77	156.875	156.875	25W & 1W
78	156.925	161.525	25W & 1W
78A	156.925	156.925	25W & 1W
79	156.975	161.575	25W & 1W
79A	156.975	156.975	25W & 1W
80	157.025	161.625	25W & 1W
80A	157.025	157.025	25W & 1W
81	157.075	161.675	25W & 1W
81A	157.075	157.075	25W & 1W
82	157.125	161.725	25W & 1W
82A	157.125	157.125	25W & 1W
83	157.175	161.775	25W & 1W
83A	157.175	157.175	25W & 1W
84	157.225	161.825	25W & 1W
84A	157.225	157.225	25W & 1W
85	157.275	161.875	25W & 1W
85A	157.275	157.275	25W & 1W
86	157.325	161.925	25W & 1W
86A	157.325	152.325	25W & 1W
87	157.375	161.975	25W & 1W
87A	157.375	157.375	25W & 1W
88	157.425	162.025	25W & 1W
88A	157.425	157.425	25W & 1W
WX1	—	162.550	RX. only
WX2	—	162.440	RX. only
WX3	—	161.650	RX. only
WX4	—	162.475	RX. only
WX5	—	162.425	RX. only
WX6	—	162.500	RX. only
WX7	—	162.525	RX. only
WX8	—	162.450	RX. only
WX9	—	161.775	RX. only
WX0	—	163.275	RX. only

U.S.A. Marine channels (Type 370)

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
01A	156.050	156.050	25W & 1W
02A	156.100	156.100	25W & 1W
03A	156.150	156.150	25W & 1W
04A	156.200	156.200	25W & 1W
05A	156.250	156.250	25W & 1W
06	156.300	156.300	25W & 1W
07A	156.350	156.350	25W & 1W
08	156.400	156.400	25W & 1W
09	156.450	156.450	25W & 1W
10	156.500	156.500	25W & 1W
11	156.550	156.550	25W & 1W
12	156.600	156.600	25W & 1W
13	156.650	156.650	25W & 1W
14	156.700	156.700	25W & 1W
15	—	156.750	RX. only
16	156.800	156.800	25W & 1W
17	156.850	156.850	1W only
18A	156.900	156.900	25W & 1W
19A	156.950	156.950	25W & 1W
20	157.000	161.600	25W & 1W
20A	157.000	157.000	25W & 1W
21A	157.050	157.050	25W & 1W
22A	157.100	157.100	25W & 1W
23A	157.150	157.150	25W & 1W
24	157.200	161.800	25W & 1W
25	157.250	161.850	25W & 1W
26	157.300	161.900	25W & 1W
27	157.350	161.950	25W & 1W
28	157.400	162.000	25W & 1W
60A	156.025	156.025	25W & 1W
61A	156.075	156.075	25W & 1W
62A	156.125	156.125	25W & 1W
63A	156.175	156.175	25W & 1W
64A	156.225	156.225	25W & 1W
65A	156.275	156.275	25W & 1W

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
66A	156.325	156.325	25W & 1W
67	156.375	156.375	25W & 1W
68	156.425	156.425	25W & 1W
69	156.475	156.475	25W & 1W
70	156.525	156.525	25W & 1W
71	156.575	156.575	25W & 1W
72	156.625	156.625	25W & 1W
73	156.675	156.675	25W & 1W
74	156.725	156.725	25W & 1W
75	—	—	Guard
76	—	—	Guard
77	156.875	156.875	25W & 1W
78A	156.925	156.925	25W & 1W
79	156.975	156.975	25W & 1W
80A	157.025	157.025	25W & 1W
81A	157.075	157.075	25W & 1W
82A	157.125	157.125	25W & 1W
83A	157.175	157.175	25W & 1W
84	157.225	161.825	25W & 1W
85	157.275	161.875	25W & 1W
86	157.325	161.925	25W & 1W
87	157.375	161.975	25W & 1W
88	157.425	162.025	25W & 1W
88A	157.425	157.425	25W & 1W
WX1	—	162.550	RX. only
WX2	—	162.400	RX. only
WX3	—	161.650	RX. only
WX4	—	162.475	RX. only
WX5	—	162.425	RX. only
WX6	—	162.500	RX. only
WX7	—	162.525	RX. only
WX8	—	162.450	RX. only
WX9	—	161.775	RX. only
WX0	—	163.275	RX. only

Private Marine Band (Type 370)

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
00	156.000	156.000	25W & 1W
29	157.450	162.050	25W & 1W
30	157.500	162.100	25W & 1W
31	157.550	162.150	25W & 1W
32	157.600	162.200	25W & 1W
33	157.650	162.250	25W & 1W
34	157.700	162.300	25W & 1W
35	157.750	162.350	25W & 1W
36	157.800	162.400	25W & 1W
37	157.850	162.450	25W & 1W
38	157.900	162.500	25W & 1W
39	157.950	162.550	25W & 1W
40	158.000	162.600	25W & 1W
41	158.050	162.650	25W & 1W
42	158.100	162.700	25W & 1W
43	158.150	162.750	25W & 1W
44	158.200	162.800	25W & 1W
45	158.250	162.850	25W & 1W
46	158.300	162.900	25W & 1W
47	158.350	162.950	25W & 1W
48	158.400	163.000	25W & 1W
49	158.450	163.050	25W & 1W
50	158.500	163.100	25W & 1W
51	158.550	163.150	25W & 1W
52	158.600	163.200	25W & 1W
53	158.650	163.250	25W & 1W
54	158.700	163.300	25W & 1W
55	158.750	163.350	25W & 1W
56	158.800	163.400	25W & 1W
89	157.475	162.075	25W & 1W
90	157.525	162.125	25W & 1W
91	157.575	162.175	25W & 1W
92	157.625	162.225	25W & 1W
93	157.675	162.275	25W & 1W
94	157.725	162.325	25W & 1W
95	157.775	162.375	25W & 1W

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
96	157.825	162.425	25W & 1W
97	157.875	162.475	25W & 1W
98	157.925	162.525	25W & 1W
99	157.975	162.575	25W & 1W
100	158.025	162.625	25W & 1W
101	158.075	162.675	25W & 1W
102	158.125	162.725	25W & 1W
103	158.175	162.775	25W & 1W
104	158.225	162.825	25W & 1W
105	158.275	162.875	25W & 1W
106	158.325	162.925	25W & 1W
107	158.375	162.975	25W & 1W
108	158.425	163.025	25W & 1W
109	158.475	163.075	25W & 1W
110	158.525	163.125	25W & 1W
111	158.575	163.175	25W & 1W
112	158.625	163.225	25W & 1W
113	158.675	163.275	25W & 1W
114	158.725	163.325	25W & 1W
115	158.775	163.375	25W & 1W
116	158.825	163.425	25W & 1W
F1	155.975	155.975	25W & 1W
F2	155.925	155.925	25W & 1W
F3	155.175	155.175	25W & 1W
F4	155.150	155.150	25W & 1W
F5	155.125	155.125	25W & 1W
F6	155.100	155.100	25W & 1W
F7	157.375	157.375	25W & 1W
1P	155.625	155.625	25W & 1W
2P	155.775	155.775	25W & 1W
3P	155.825	155.825	25W & 1W
1L	155.500	155.500	25W & 1W
2L	155.525	155.525	25W & 1W

- * The channels on this table can be used when the frequency on the channel only is programmed on the radio.
- * The radio then has either duplex or simplex capability.
If the user want to use either duplex or simplex this capability can be chosen when programming.
- * An "A" is displayed next to the channel number when in simplex mode.

HOLLAND Marine channels (Type 370)

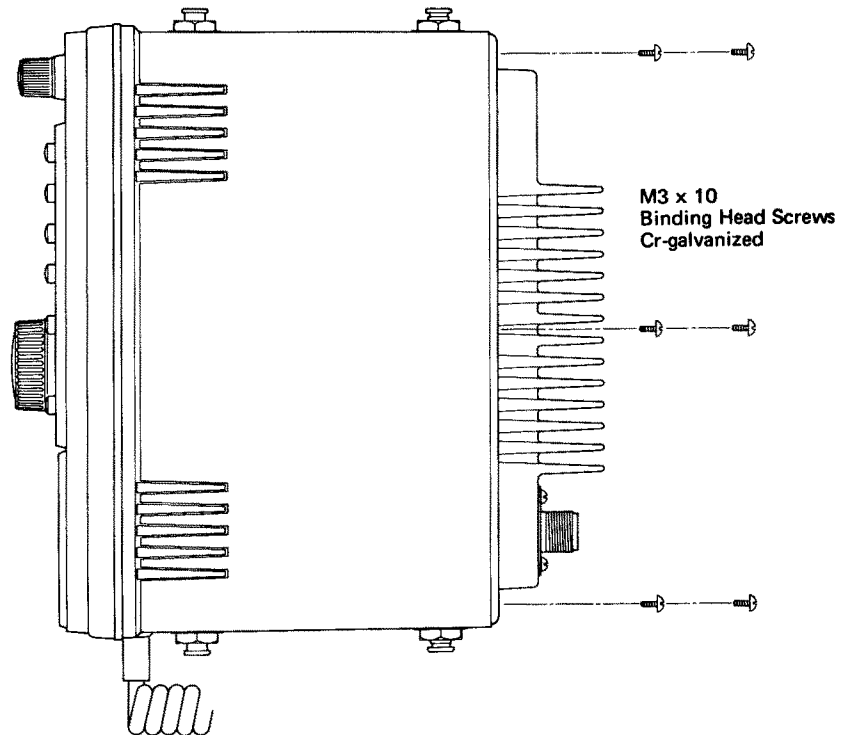
Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
01	156.050	160.650	1W only
02	156.100	160.700	1W only
03	156.150	160.750	1W only
04	156.200	160.800	1W only
05	156.250	160.850	1W only
06	156.300	156.300	1W only
07	156.350	160.950	1W only
08	156.400	156.400	1W only
09	156.450	156.450	1W only
10	156.500	156.500	1W only
11	156.550	156.550	1W only
12	156.600	156.600	1W only
13	156.650	156.650	1W only
14	156.700	156.700	1W only
15	156.750	156.750	1W only
16	156.800	156.800	25W & 1W
17	156.850	156.850	1W only
18	156.900	161.500	1W only
19	156.950	161.550	1W only
20	157.000	161.600	1W only
21	157.050	161.650	1W only
22	157.100	161.700	1W only
23	157.150	161.750	25W & 1W
24	157.200	161.800	25W & 1W
25	157.250	161.850	25W & 1W
26	157.300	161.900	25W & 1W
27	157.350	161.950	25W & 1W
28	157.400	162.000	25W & 1W

Channel No.	Frequency (MHz)		Transmitter RF Power
	Transmitter	Receiver	
60	156.025	160.625	1W only
61	156.075	160.675	1W only
62	156.125	160.725	1W only
63	156.175	160.775	1W only
64	156.225	160.825	1W only
65	156.275	160.875	1W only
66	156.325	160.925	1W only
67	156.375	156.375	1W only
68	156.425	156.425	1W only
69	156.475	156.475	1W only
70	156.525	156.525	1W only
71	156.575	156.575	1W only
72	156.625	156.625	1W only
73	156.675	156.675	1W only
74	156.725	156.725	1W only
75	—	—	Guard
76	—	—	Guard
77	156.875	156.875	1W only
78	156.925	161.525	1W only
79	156.975	161.575	1W only
80	157.025	161.625	1W only
81	157.075	161.675	1W only
82	157.125	161.725	25W & 1W
83	157.175	161.775	25W & 1W
84	157.225	161.825	25W & 1W
85	157.275	161.875	25W & 1W
86	157.325	161.925	25W & 1W
87	157.375	161.975	25W & 1W
88	157.425	162.025	25W & 1W

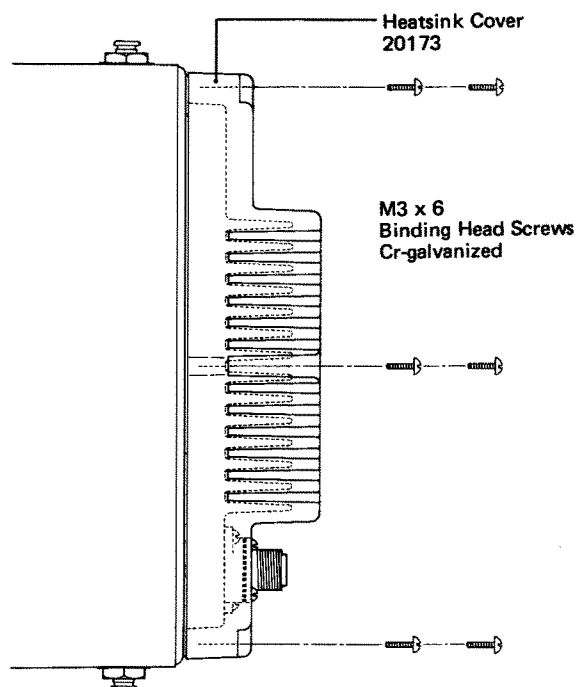
SECTION 8 MECHANICAL PARTS AND DISASSEMBLY

8 - 1 COVER DISASSEMBLY

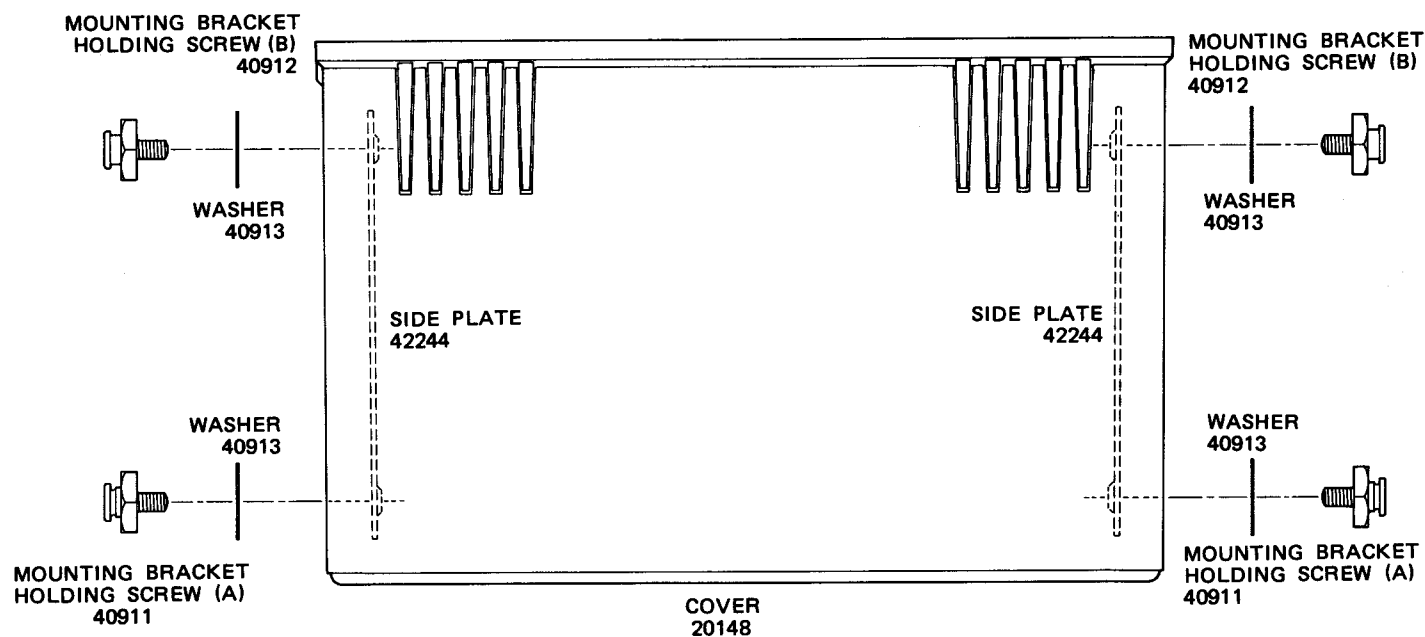
- Standard (Negative grounded) Type



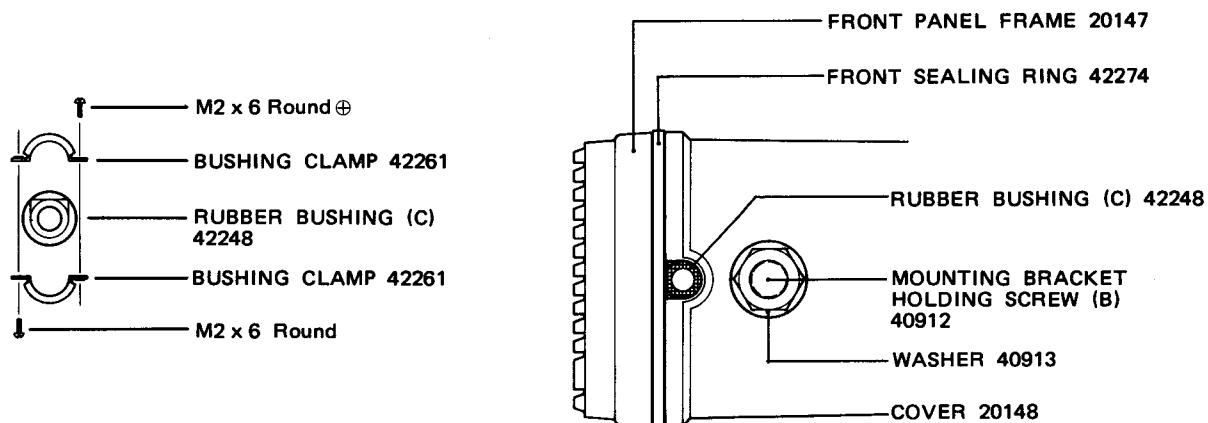
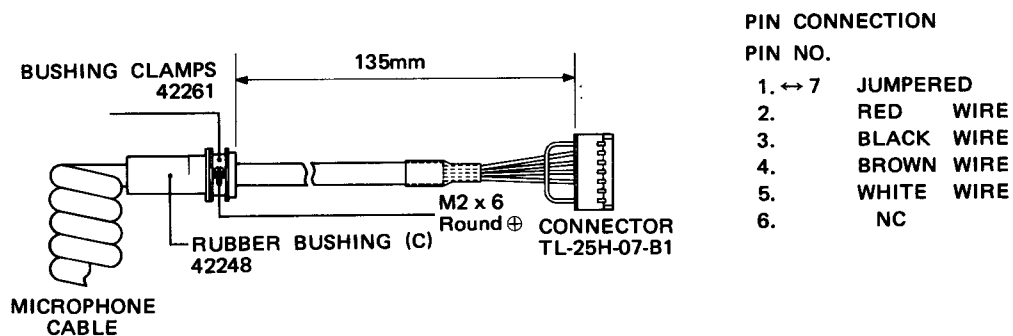
- Floating Type



8 - 1 COVER DISASSEMBLY (Continued)

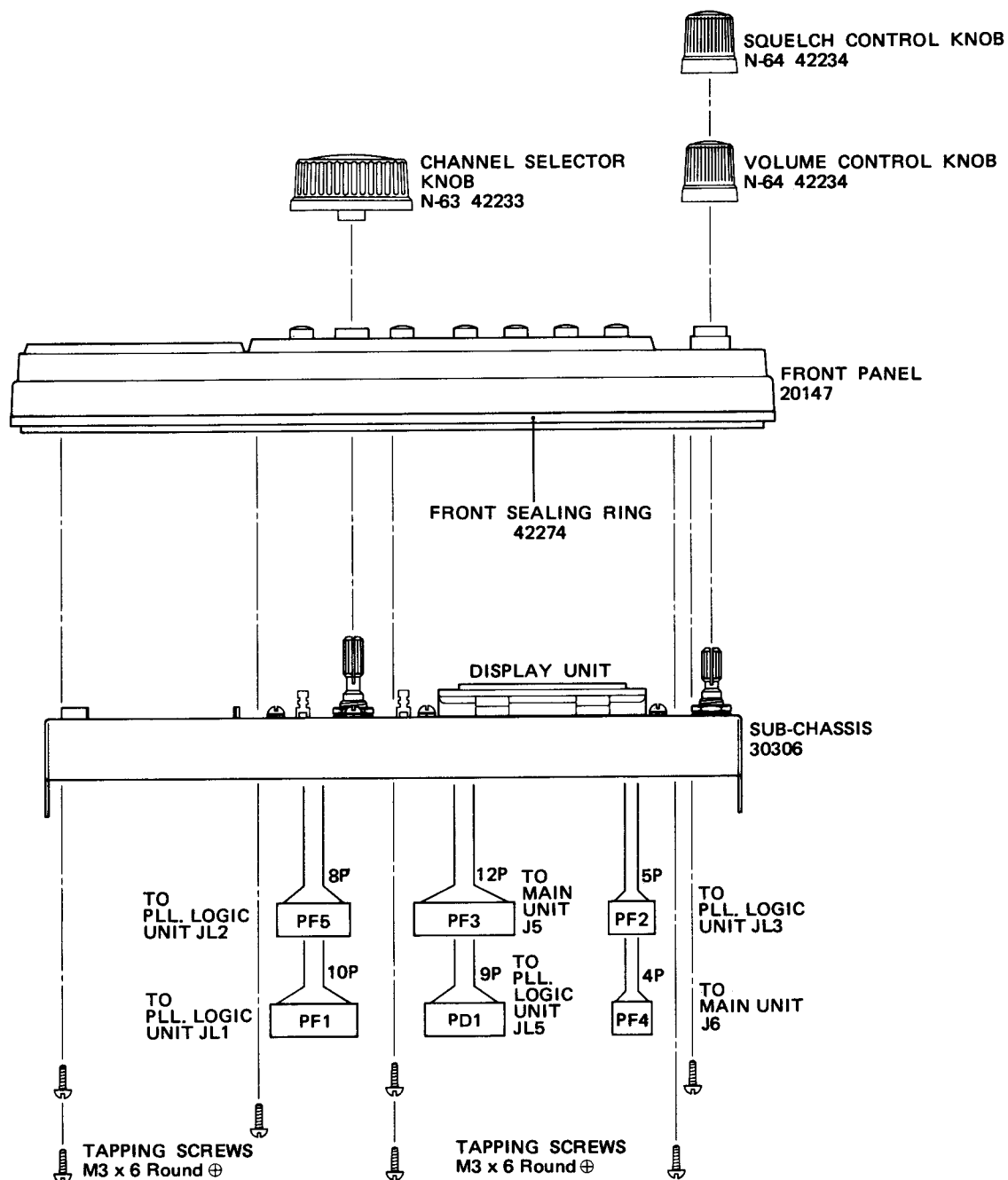


8 - 2 MICROPHONE CORD DISASSEMBLY



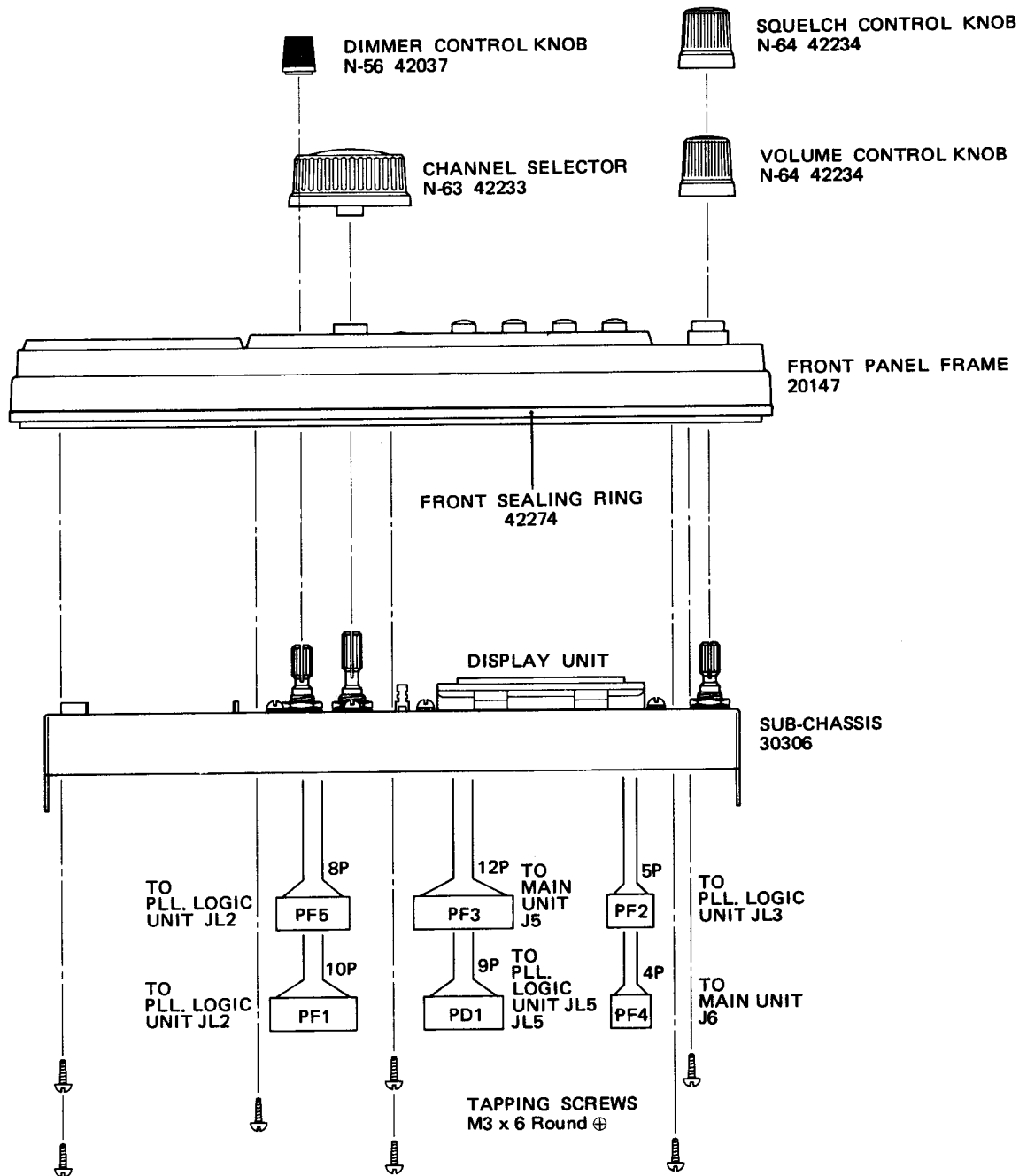
8-3 FRONT PANEL DISASSEMBLY

• USA/EUROPE Version



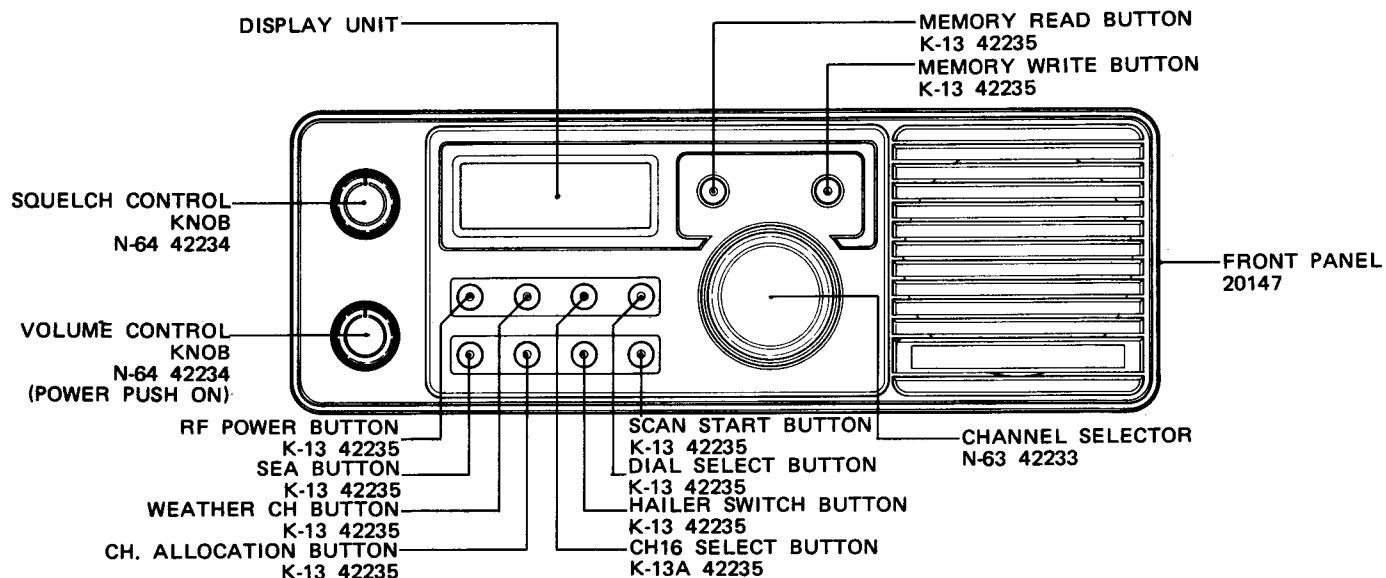
8-3 FRONT PANEL DISASSEMBLY (Continued)

- HOLLAND Version

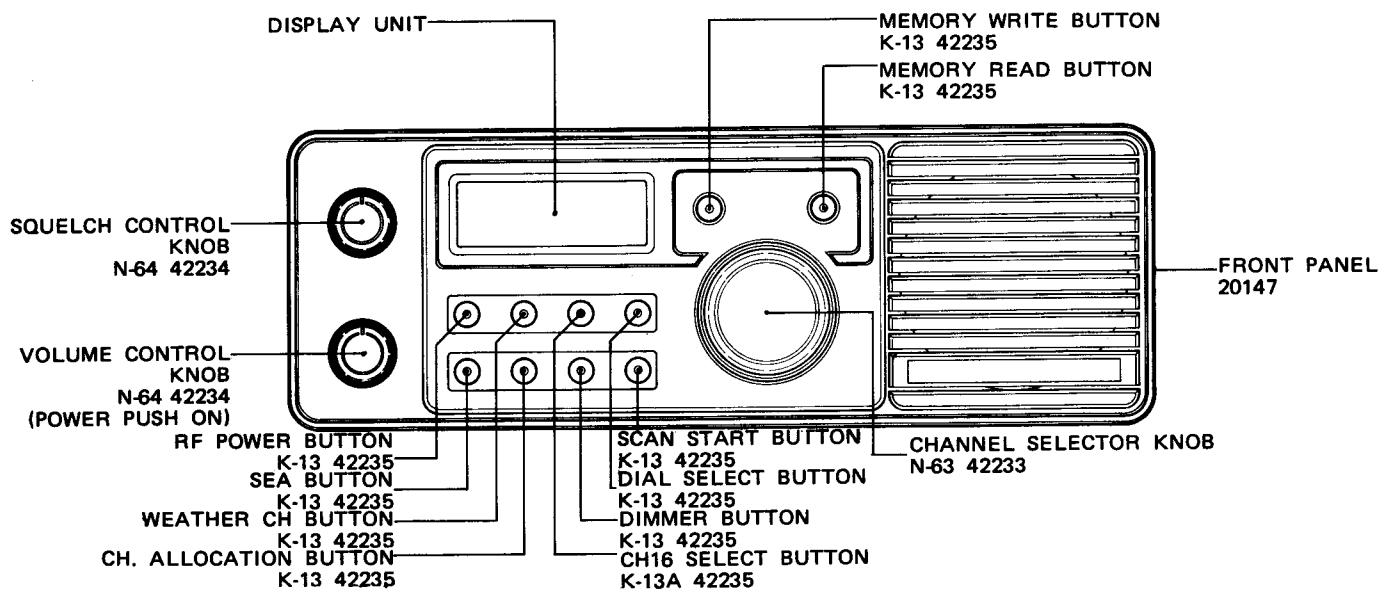


8 - 3 FRONT PANEL DISASSEMBLY (Continued)

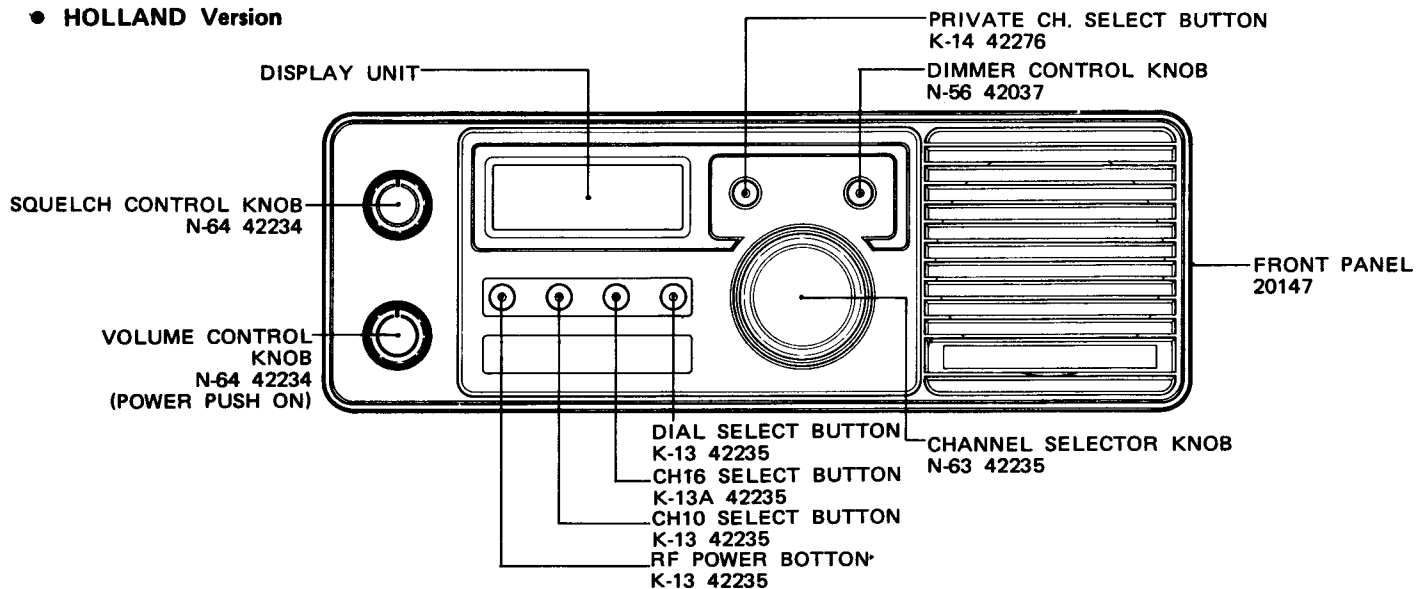
• USA Version



• EUROPE Version

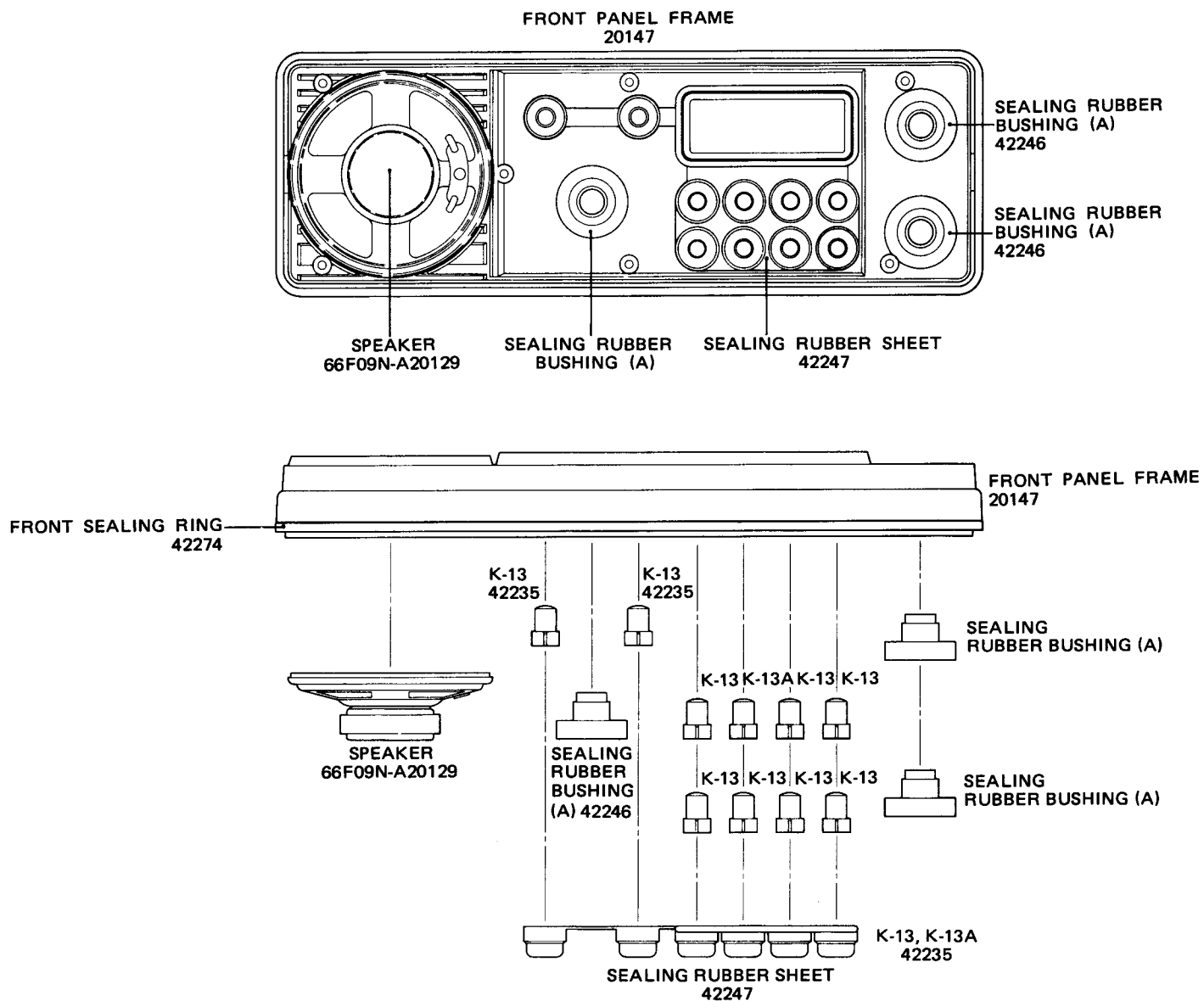


• HOLLAND Version



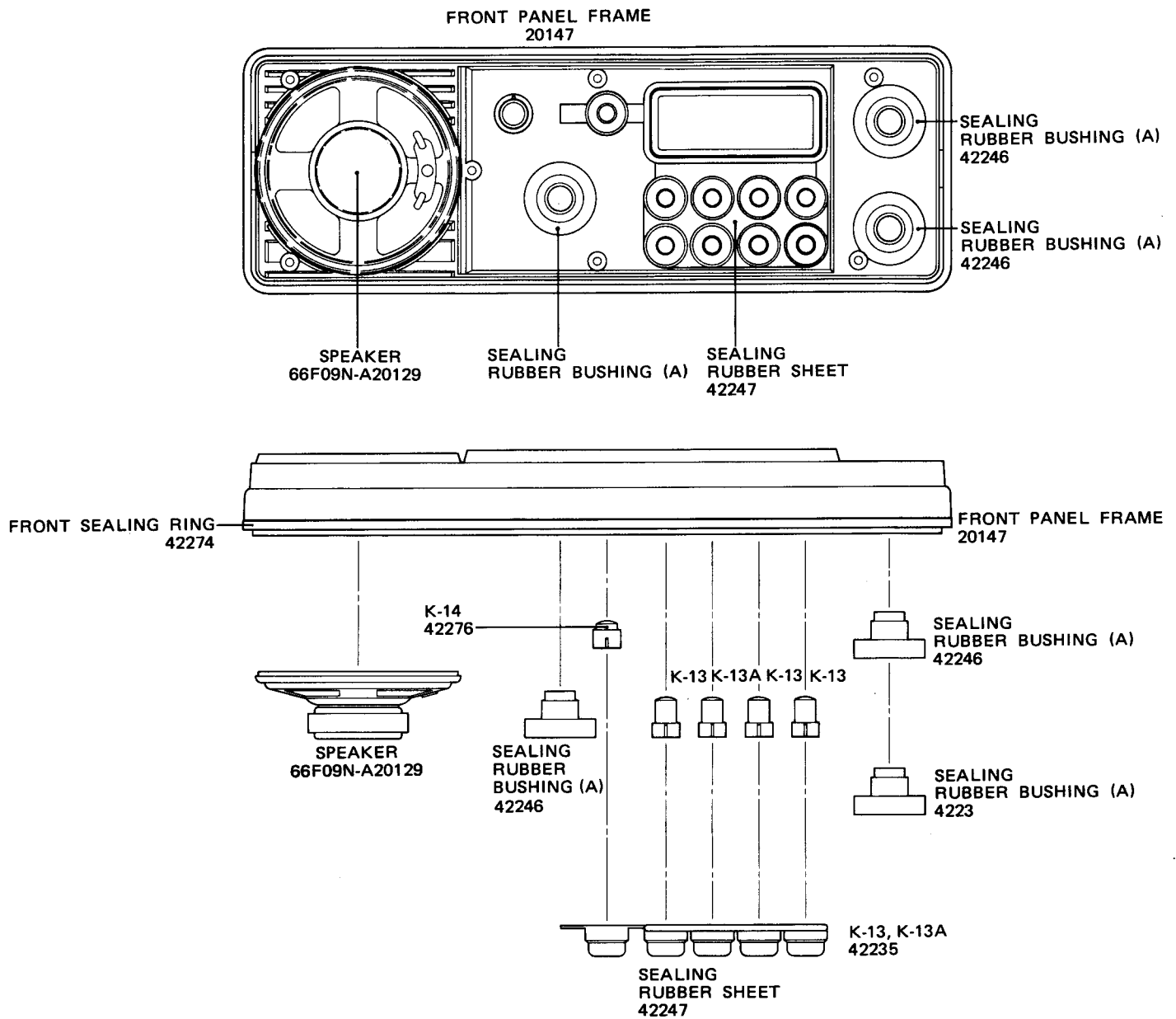
8-3 FRONT PANEL DISASSEMBLY (Continued)

● USA/EUROPE Version

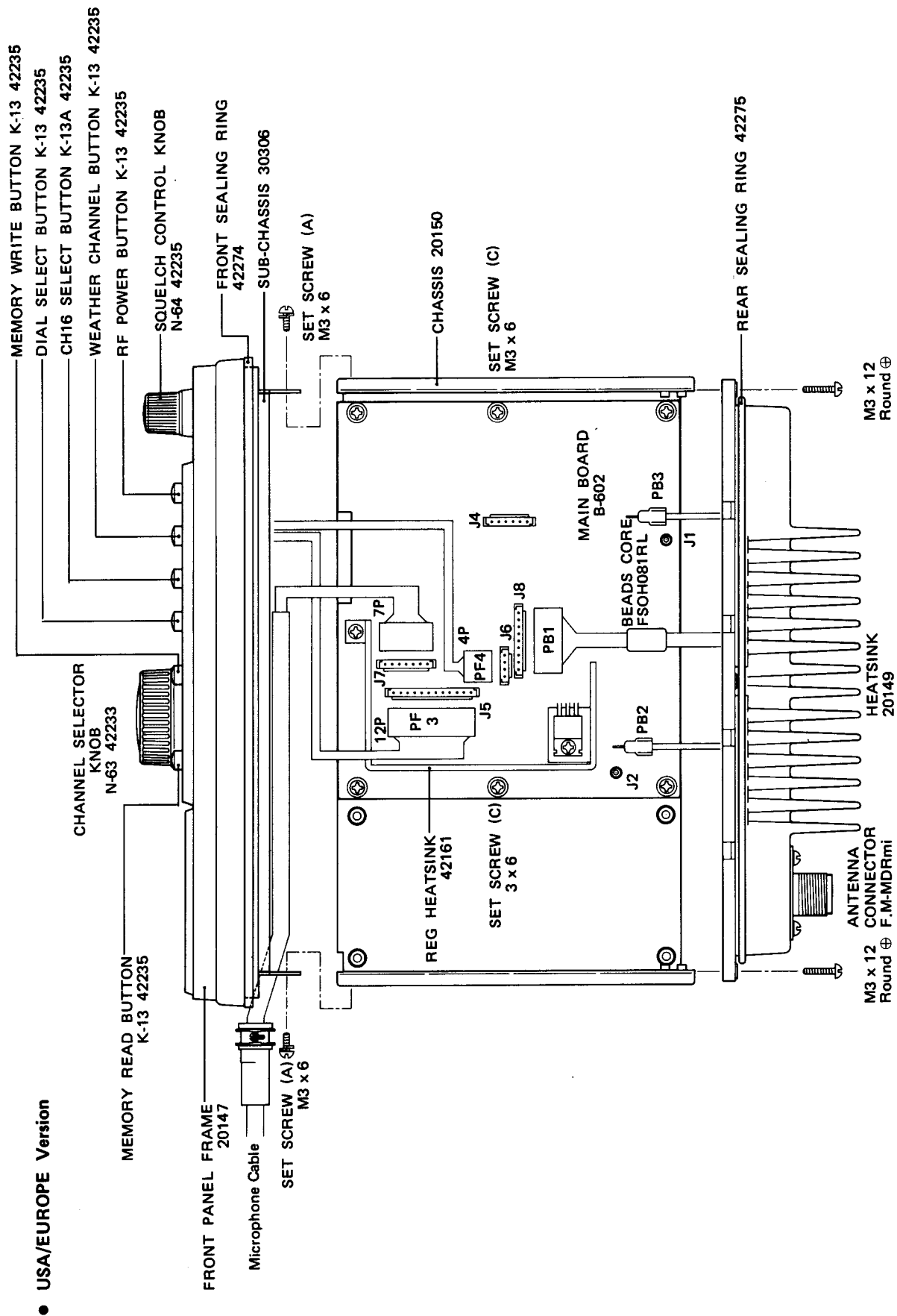


8 - 3 FRONT PANEL DISASSEMBLY (Continued)

• HOLLAND Version

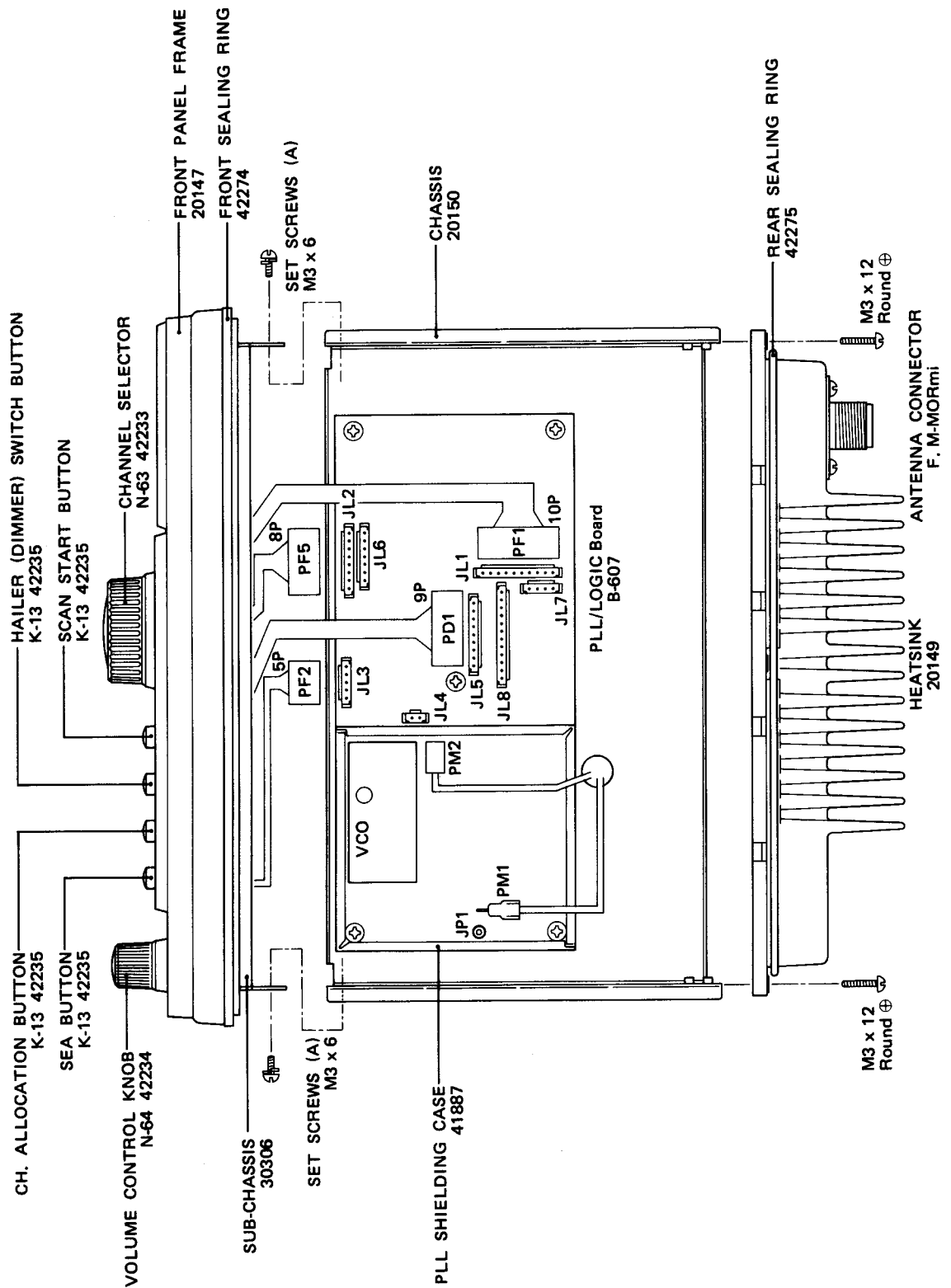


8 - 4 FRAME DISASSEMBLY and MAIN UNIT WIRING

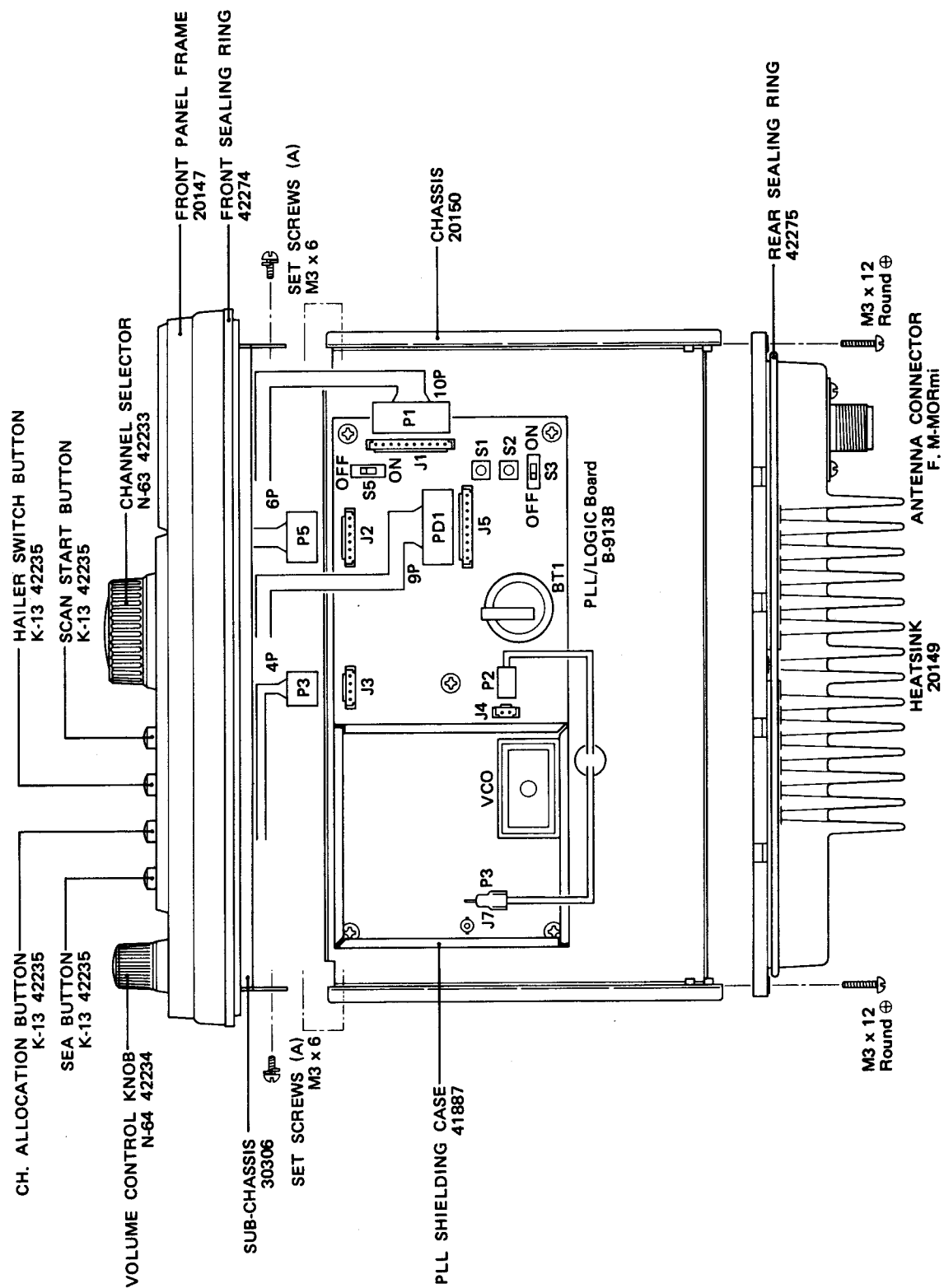


8 - 5 FRAME DISASSEMBLY and PLL/LOGIC UNITS WIRING (Type 225)

• USA/EUROPE Version

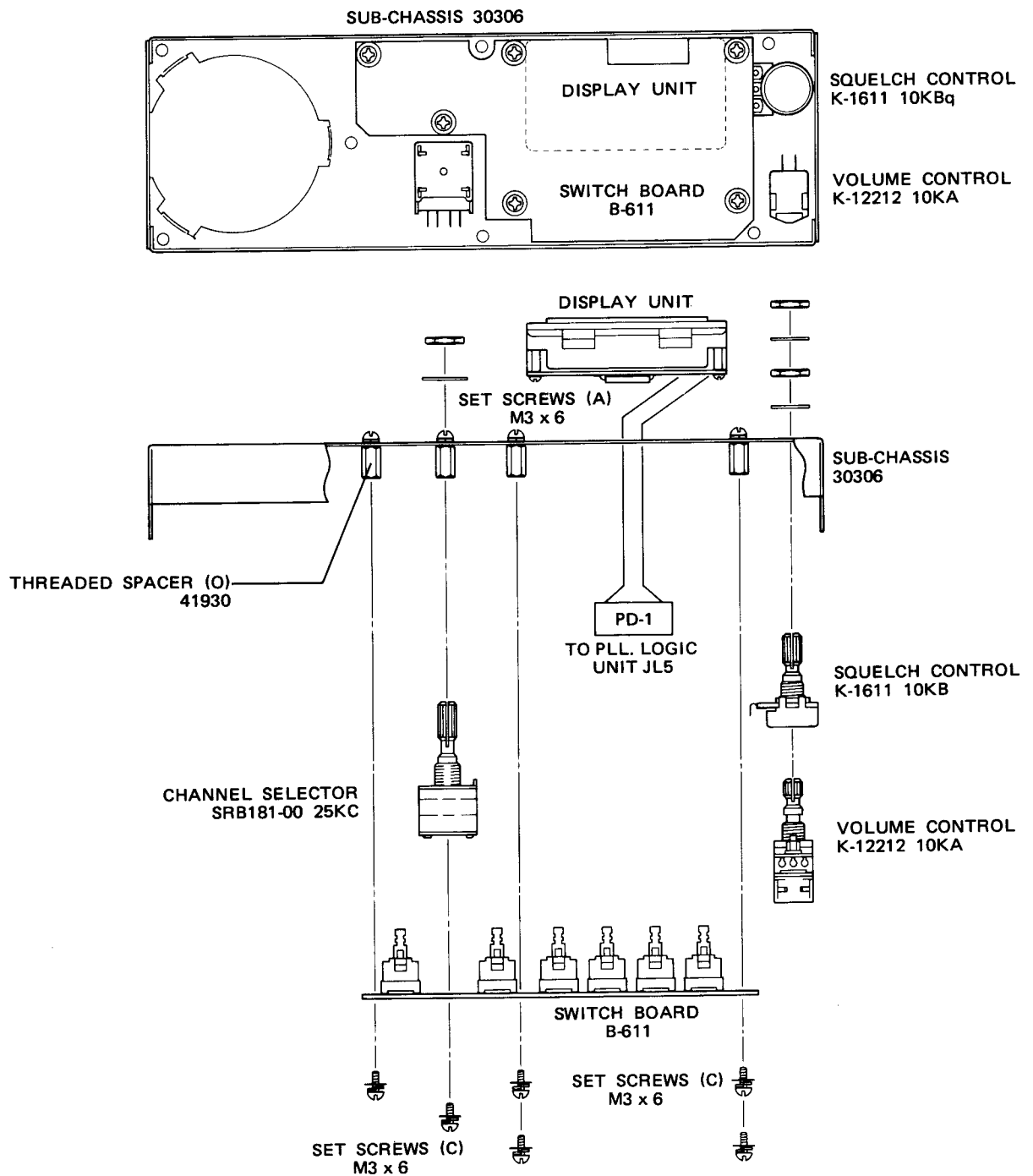


8 - 5 FRAME DISASSEMBLY and PLL/LOGIC UNITS WIRING (Type 370)



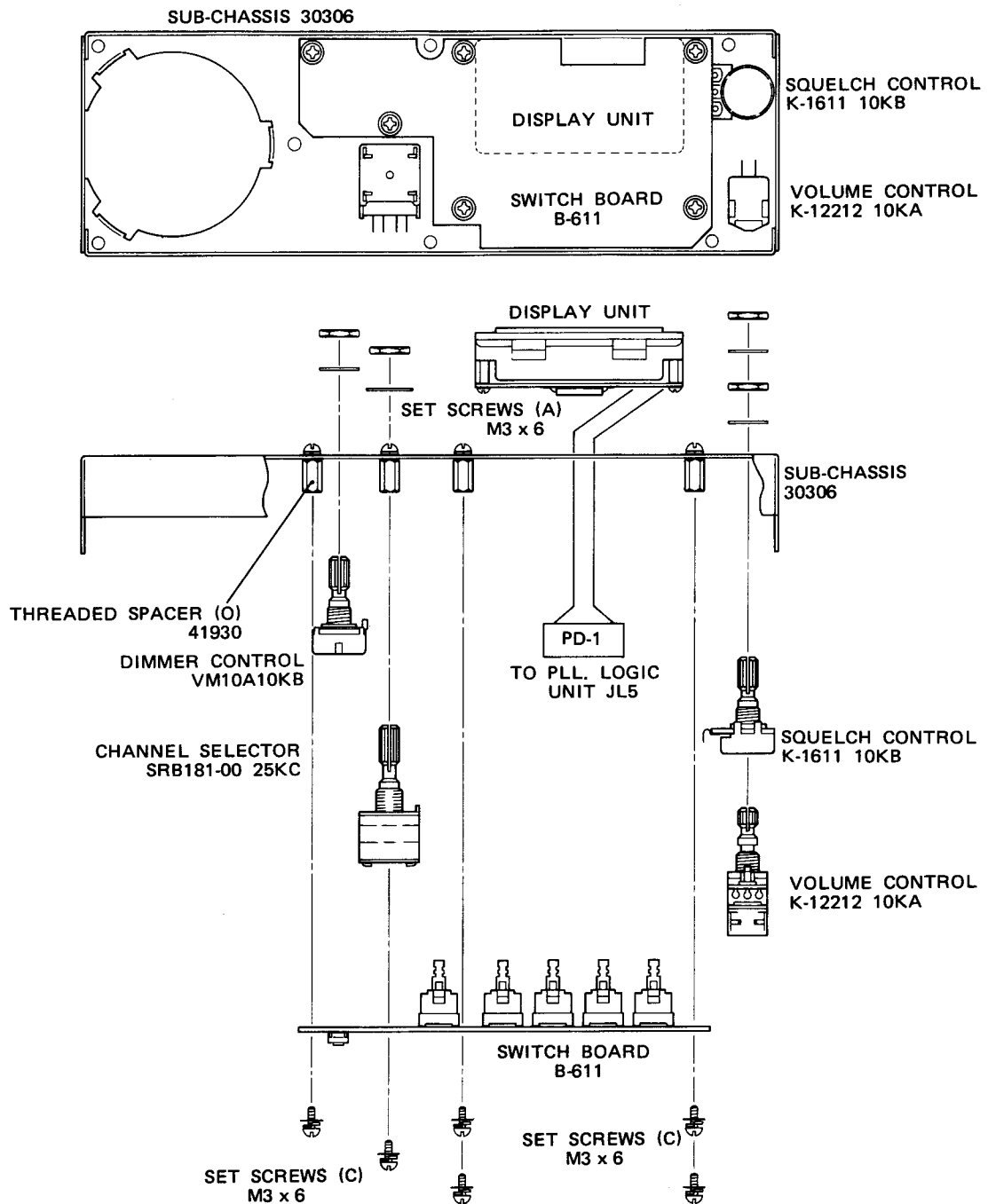
8 - 6 SUB-CHASSIS DISASSEMBLY

- USA/EUROPE Version



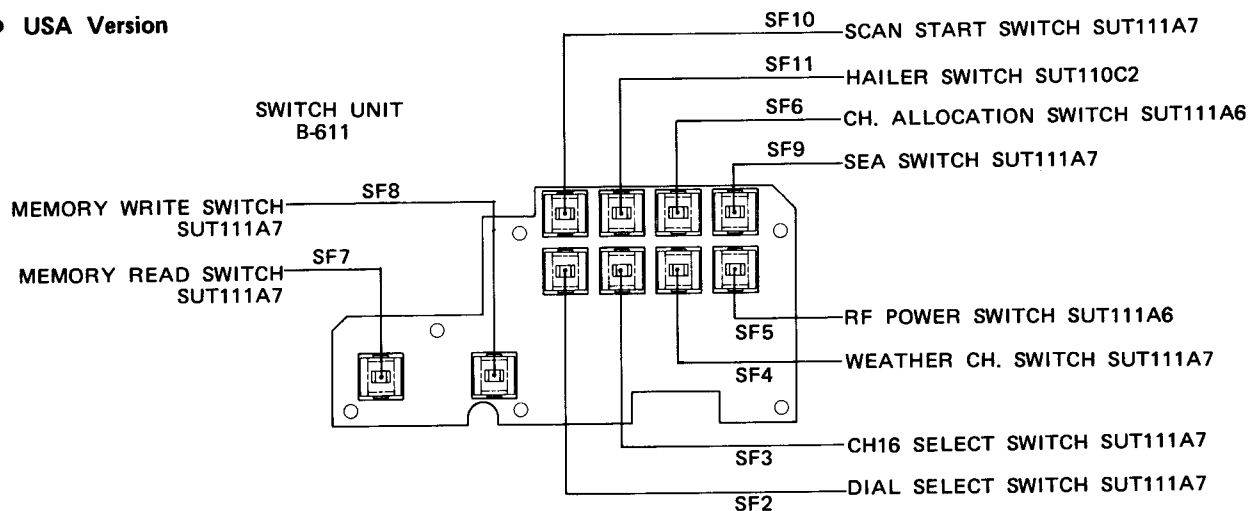
8 - 6 SUB-CHASSIS DISASSEMBLY (Continued)

• HOLLAND Version

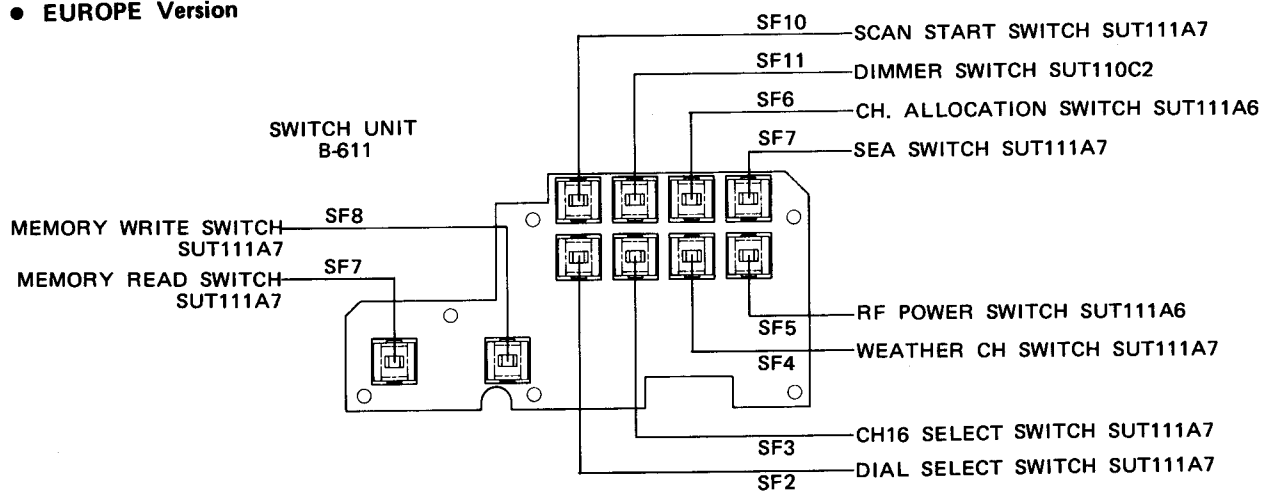


8 - 7 SWITCH UNIT DISASSEMBLY

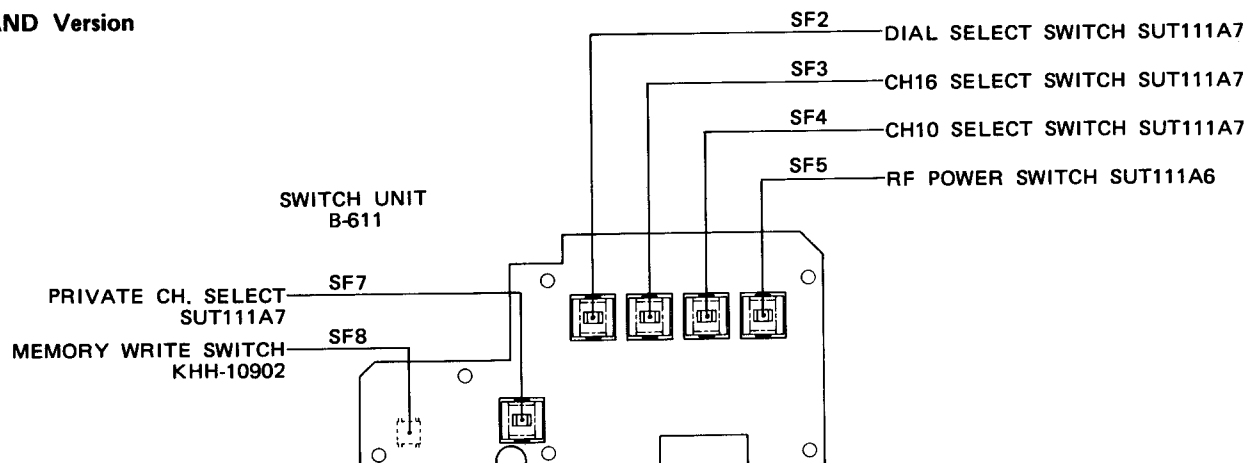
● USA Version



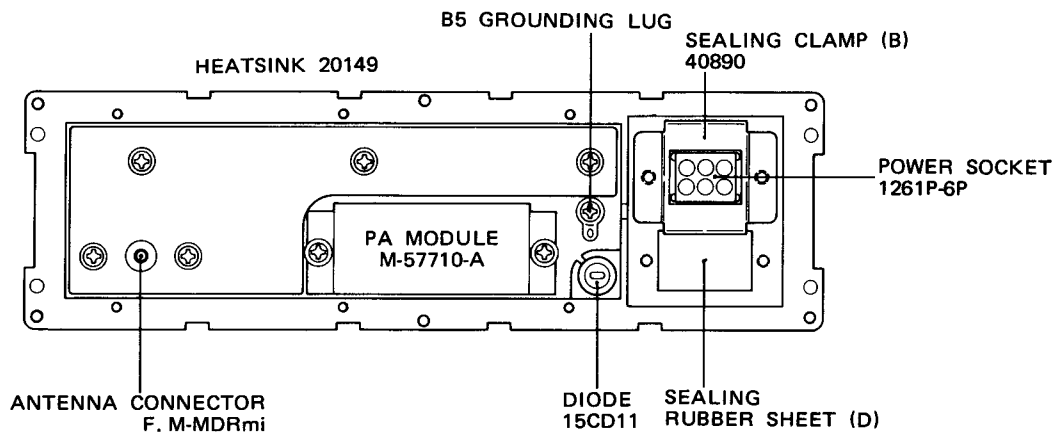
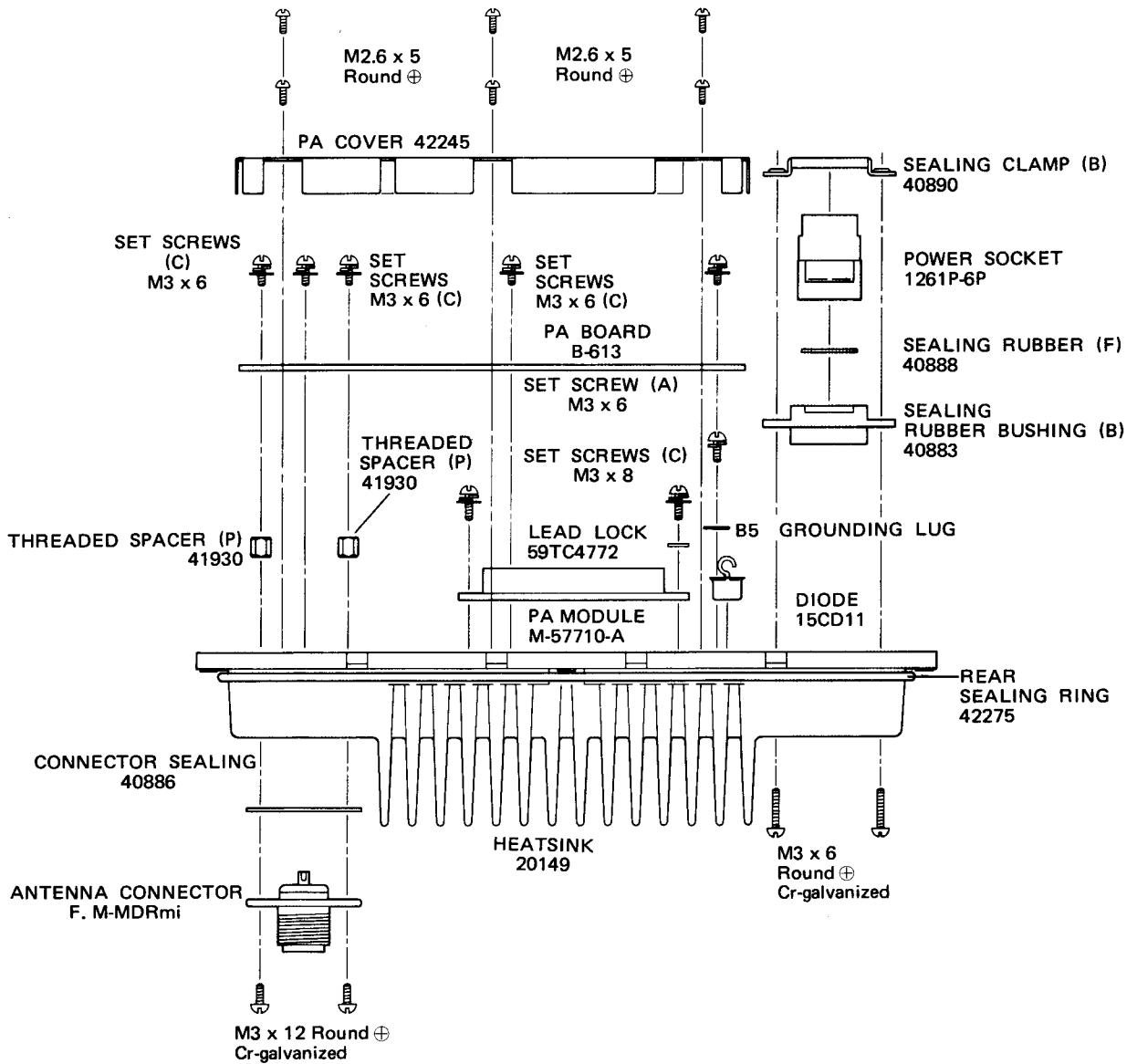
● EUROPE Version



● HOLLAND Version

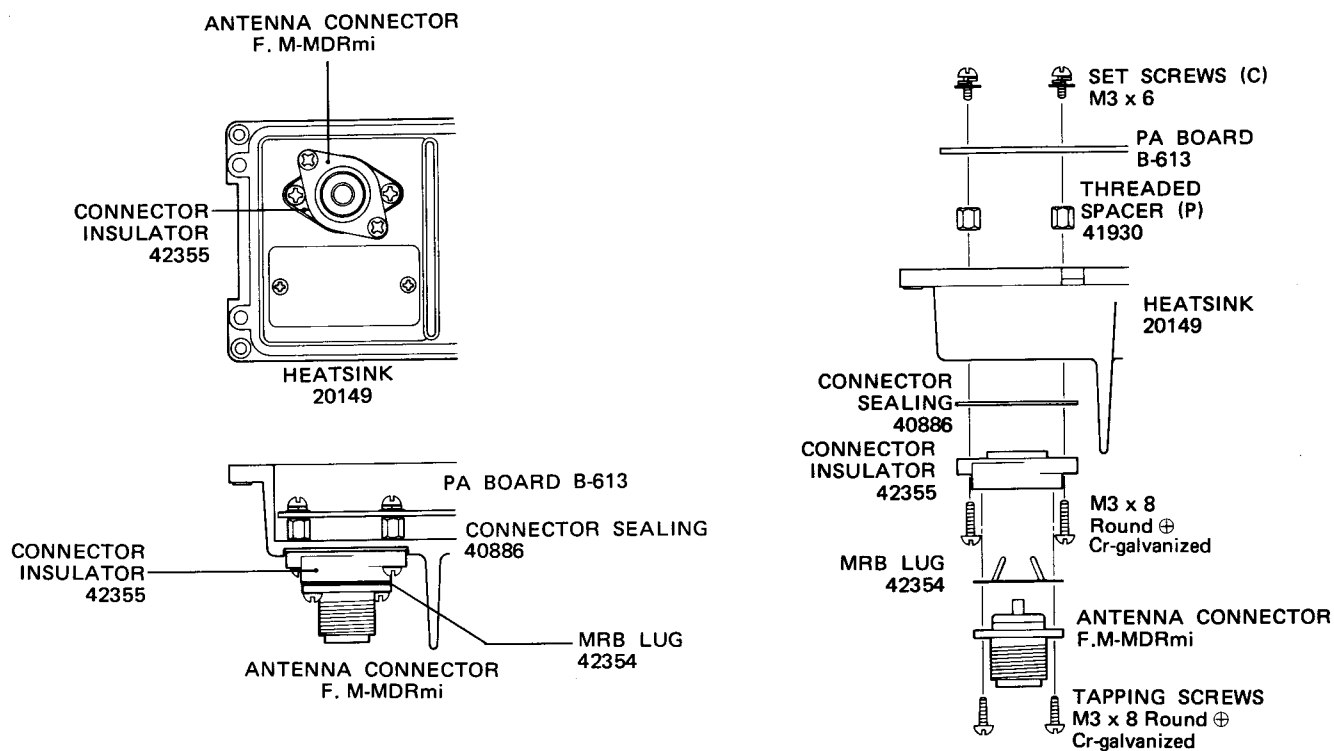


8-8 REAR PANEL DISASSEMBLY

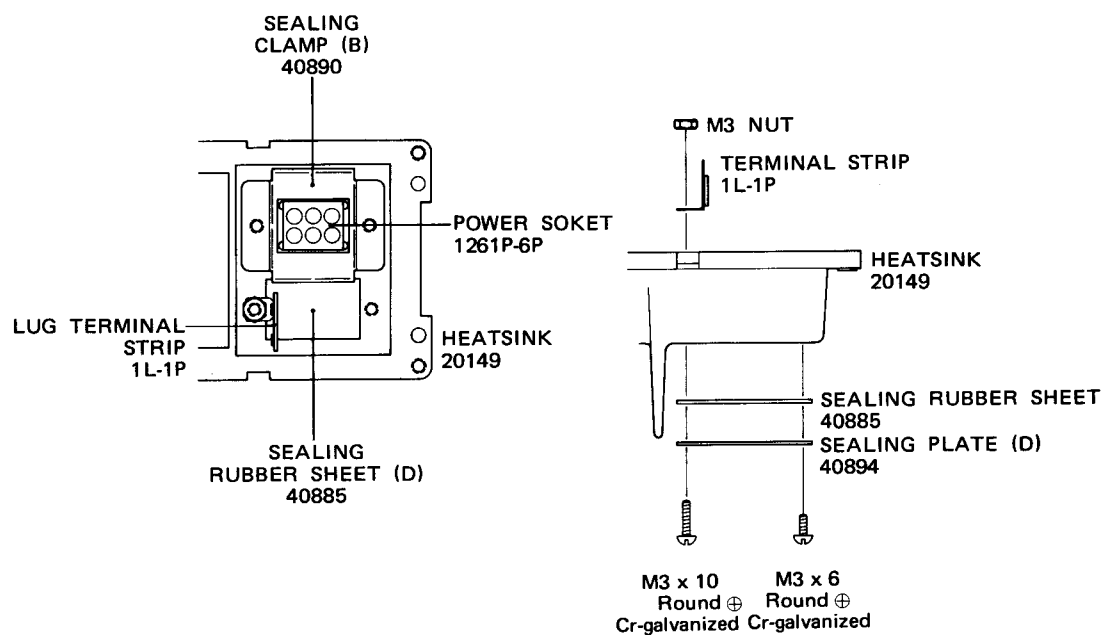


8 - 8 REAR PANEL DISASSEMBLY (Continued)

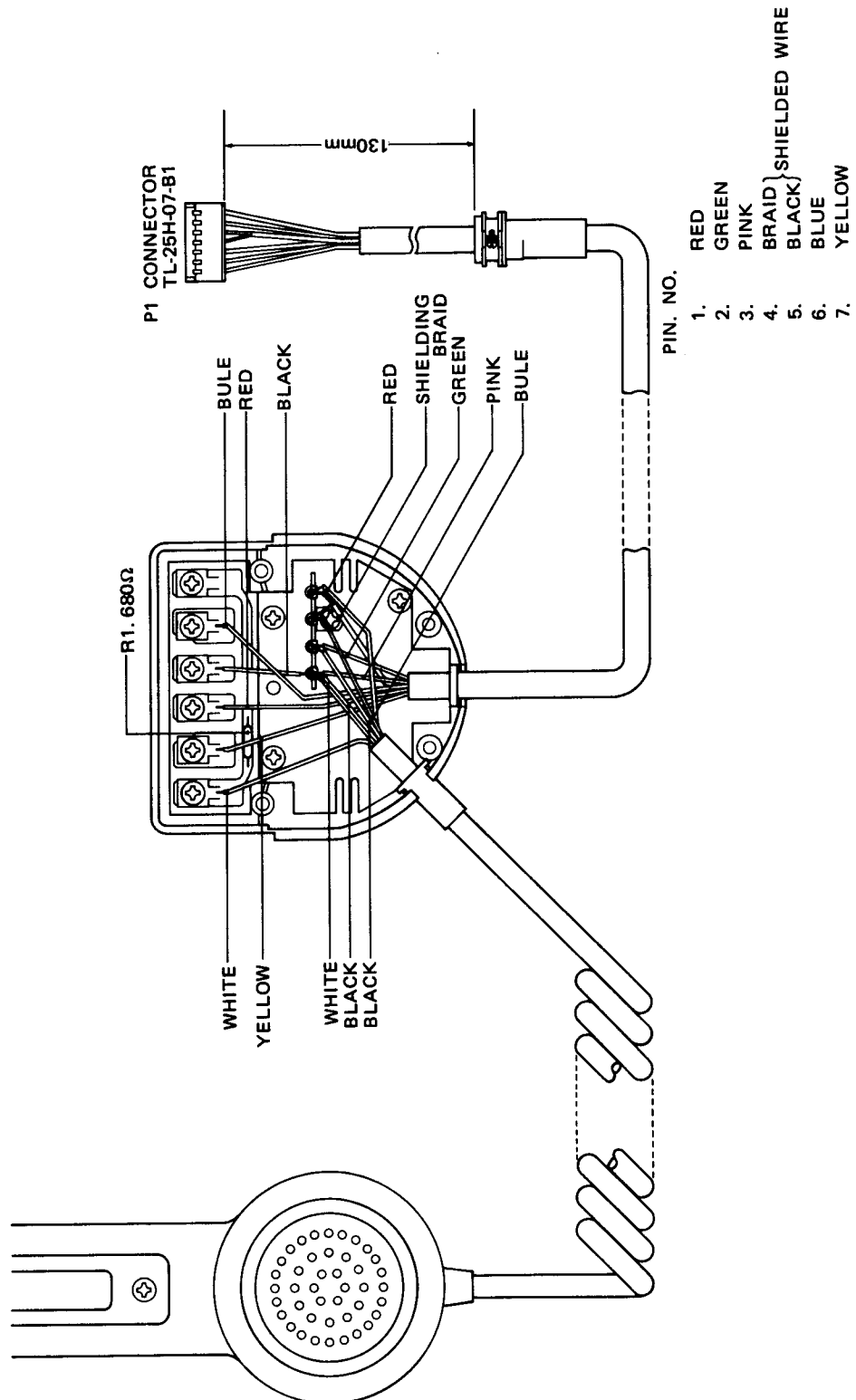
• FLOATING Version



• UK Version

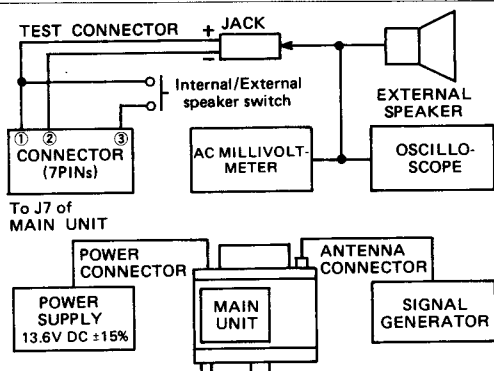


8 - 9 OPTIONAL HEADSET WIRING

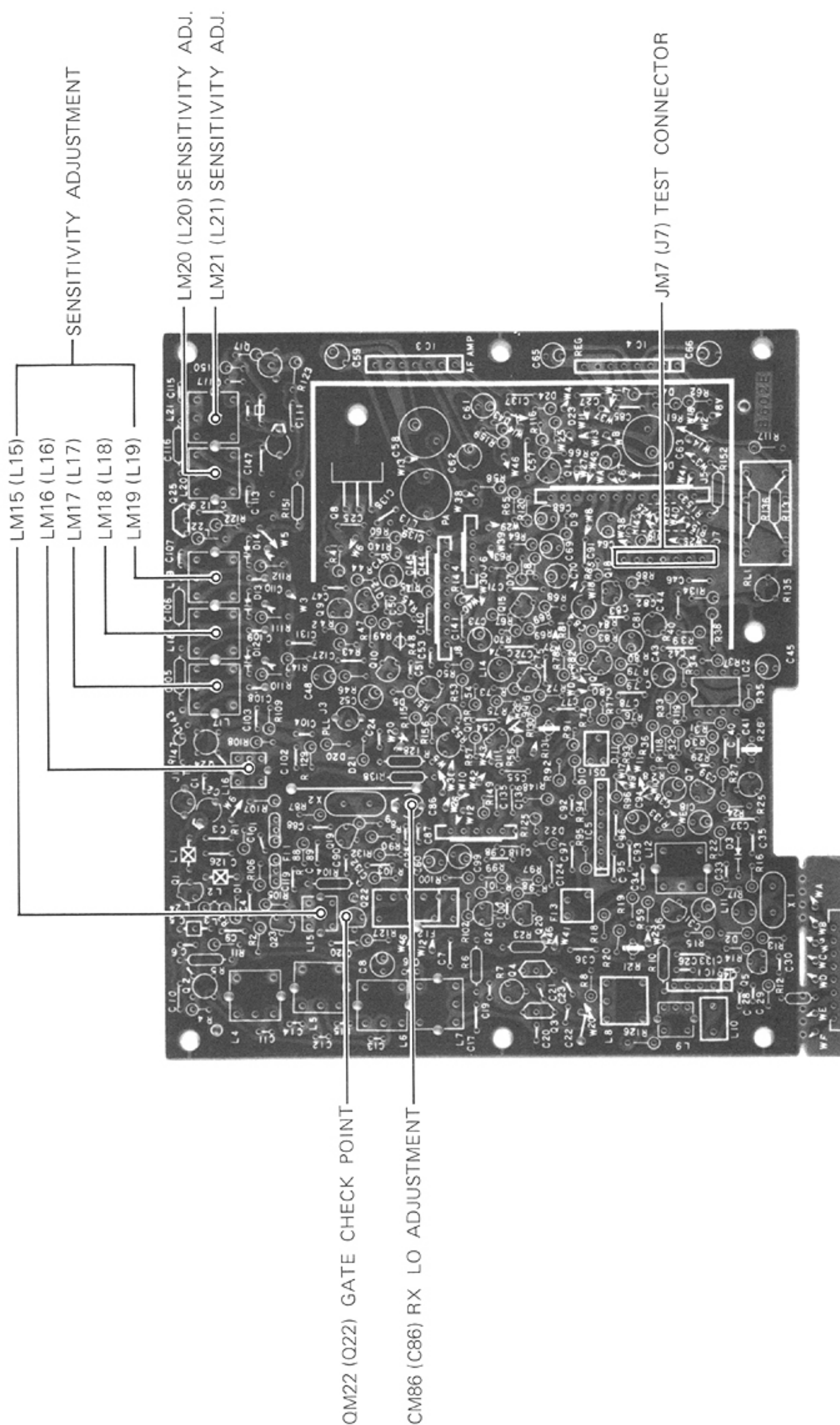


SECTION 9 MAINTENANCE AND ADJUSTMENT

9-1 RECEIVER ADJUSTMENT

INSTRUMENTS REQUIRED			CONNECTIONS			
(1) VARIABLE VOLTAGE REGULATED POWER SUPPLY : OUTPUT VOLTAGE 13.6V DC $\pm$ 15% : CAPACITY 6A or MORE (2) SIGNAL GENERATOR (SG output value shows loaded condition) : FREQUENCY RANGE 0.1MHz ~ 170MHz : OUTPUT VOLTAGE -20 ~ 90dB (0dB = 1 μ V) (3) AC MILLIVOLTMETER : MEASURING RANGE 0.1 ~ 3V (4) EXTERNAL SPEAKER : IMPEDANCE 8 Ω (5) OSCILLOSCOPE : FREQUENCY RANGE DC ~ 15MHz : MEASURING RANGE 0.01 ~ 10V						
Adjustment	Adjustment Conditions	Unit	Measurement Location	Adjust Value	Unit	Adjust Point
RX LO Frequency	1. • CH16 : ON • DISP.CH. : 16	MAIN	Connect the frequency counter to the gate of QM22	20.945MHz	MAIN	CM86
SENSITIVITY	1. • WX [PRV] : ON • DISP. CH. : WX1 [PRV 16 (116)] • SQUELCH : Fully counterclockwise Set the Signal Generator output level for +60dB μ with no modulation on 162.550MHz (HOLLAND version: 163.425 MHz).	MAIN	Connect the AC millivolt-meter to JM7.	Maximum noise quieting	MAIN	LM21, LM20
	Note: When 20dB noise quieting sensitivity does not reach to -8dB μ , adjust LM21 ~ LM15, However, this adjustment has influence on the pass-band of the radio, so take care for it.					
	2. • DIAL : ON • DISP. CH. : 06 Set the frequency of the Signal Generator to 156.300 MHz.	MAIN	Connect the AC millivolt-meter to JM7.	Maximum noise quieting	MAIN	LM21, LM20
Note: 20dB noise quieting sensitivity should be less than -8dB μ . The difference between 1. and 2. adjustments should be within 1dB. If not, repeat 1. and 2. adjustments several times, and also check the sensitivity on Ch17 (156.850MHz).						
CHECK	• While no signal is received, the squelch should be closed when the squelch control is set at 9 o'clock position. • When the squelch control is set at fully clockwise position, the squelch should be opened with a 10dBμ signal. • While +10dBμ modulated signal is received, when the volume control is set at fully clockwise position, the AF output should be more than 5.7V at 8 ohm load.					

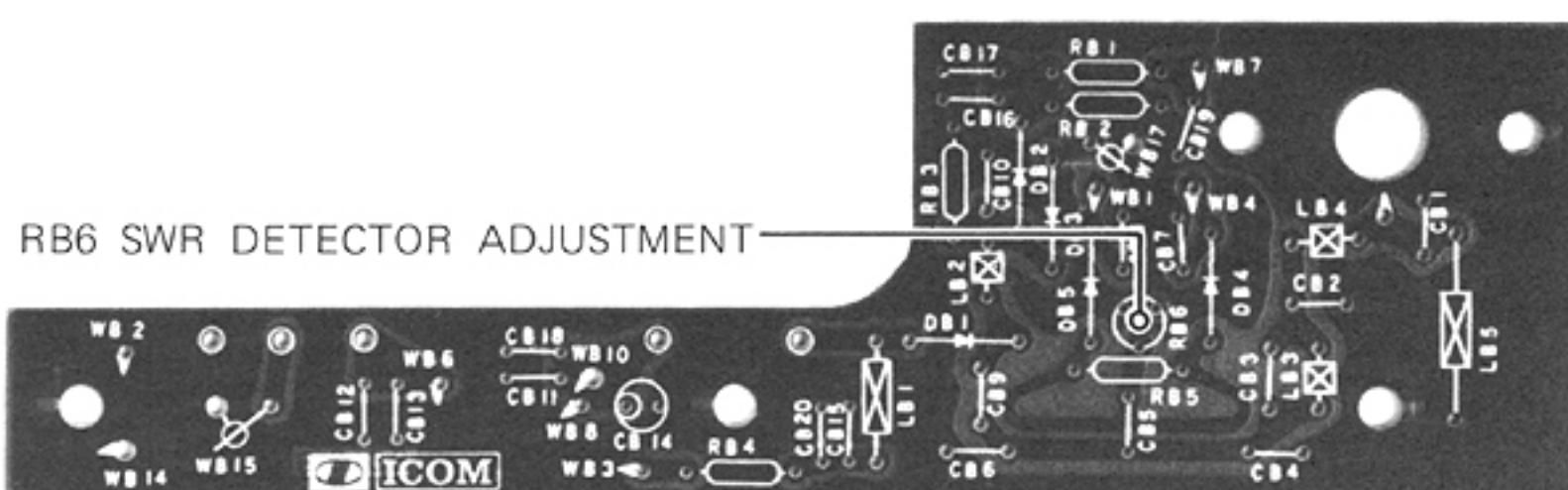
MAIN UNIT



9-2 TRANSMITTER ADJUSTMENT

INSTRUMENTS REQUIRED			CONNECTIONS			
(1) VARIABLE VOLTAGE REGULATED POWER SUPPLY : OUTPUT VOLTAGE 13.6V DC ±15% : CAPACITY 6A or MORE (2) MULTIMETER 50KΩ/Volt or BETTER (3) FREQUENCY COUNTER : FREQUENCY RANGE 0.1 ~ 170MHz : ACCURACY BETTER THAN ±1ppm : SENSITIVITY 100mV or BETTER (4) RF WATTMETER (Terminated Type) : MEASURING RANGE 35W : FREQUENCY RANGE 140 ~ 170MHz : IMPEDANCE 50Ω : SWR LESS THAN 1.1 (5) OSCILLOSCOPE : FREQUENCY RANGE DC ~ 15MHz. : MEASURING RANGE 0.01 ~ 10V (6) FM DEVIATION METER : FREQUENCY RANGE 140 ~ 170MHz : MEASURING RANGE 0 ~ ±10KHz (7) DIRECTIONAL COUPLER : FREQUENCY RANGE 140 ~ 170MHz (8) AF OSCILLATOR : OUTPUT FREQUENCY 200 ~ 3000Hz : OUTPUT VOLTAGE 0 ~ 200mV : DISTORTION LESS THAN 0.1% (9) AC MILLIVOLTMETER : MEASURING RANGE 0.1 ~ 3V						
Adjustment	Adjustment Condition	Unit	Measurement Location	Adjust Value	Unit	Adjust Point
SWR DETECTOR 1.	• CH16 : ON • DISP.CH. : 16 Set in TRANSMIT mode	MAIN	Connect the multimeter to JM8 Pin 5.	Adjust RB6 for minimum voltage, then turn RB6 counterclockwise to get more 1.5V (i.e. minimum +1.5V).	PA	RB6
TRANSMITTER 1.	• CH16 : ON • DISP.CH. : 16 • RM7 (MAIN UNIT) : Center	MAIN	Connect the frequency counter to RM126.	21.400MHz	MAIN	LM12
	• RM51 (MAIN UNIT) : Fully counterclockwise Set in TRANSMIT mode.	REAR PANEL	Read the ammeter provided in the power supply, or connect an ammeter to the power cable in series.	Maximum		LM4 ~ LM7
			Connect the RF POWER METER to the ANT connector.	Maximum (More than 30W)		CM2
POWER SET a. Hi Power 1.	• CH16 : ON • DISP.CH. : 16 Set in TRANSMIT mode.	REAR PANEL	Connect the RF POWER METER to the ANT connector.	25W (Current should be less than 5.5A)	MAIN	RM51
b. Low Power 2.	• HI/LO : LO			1W (Current should be less than 1.7A)		RM52
CHECK	• Check the output power on the high edge (Ch 88), low edge (Ch 01) and Ch 16. They should be about 25W. • When the power supply voltage is varied between 12.0V ~ 16.5V, the output power should be 22 ~ 30W. • During the radio is in TRANSMIT mode with HI power (25W), when the antenna connector is opened (antenna is not connected to the antenna connector), the consumption current should be less than 3A. • RM135 is the volume control for the HAILER.					

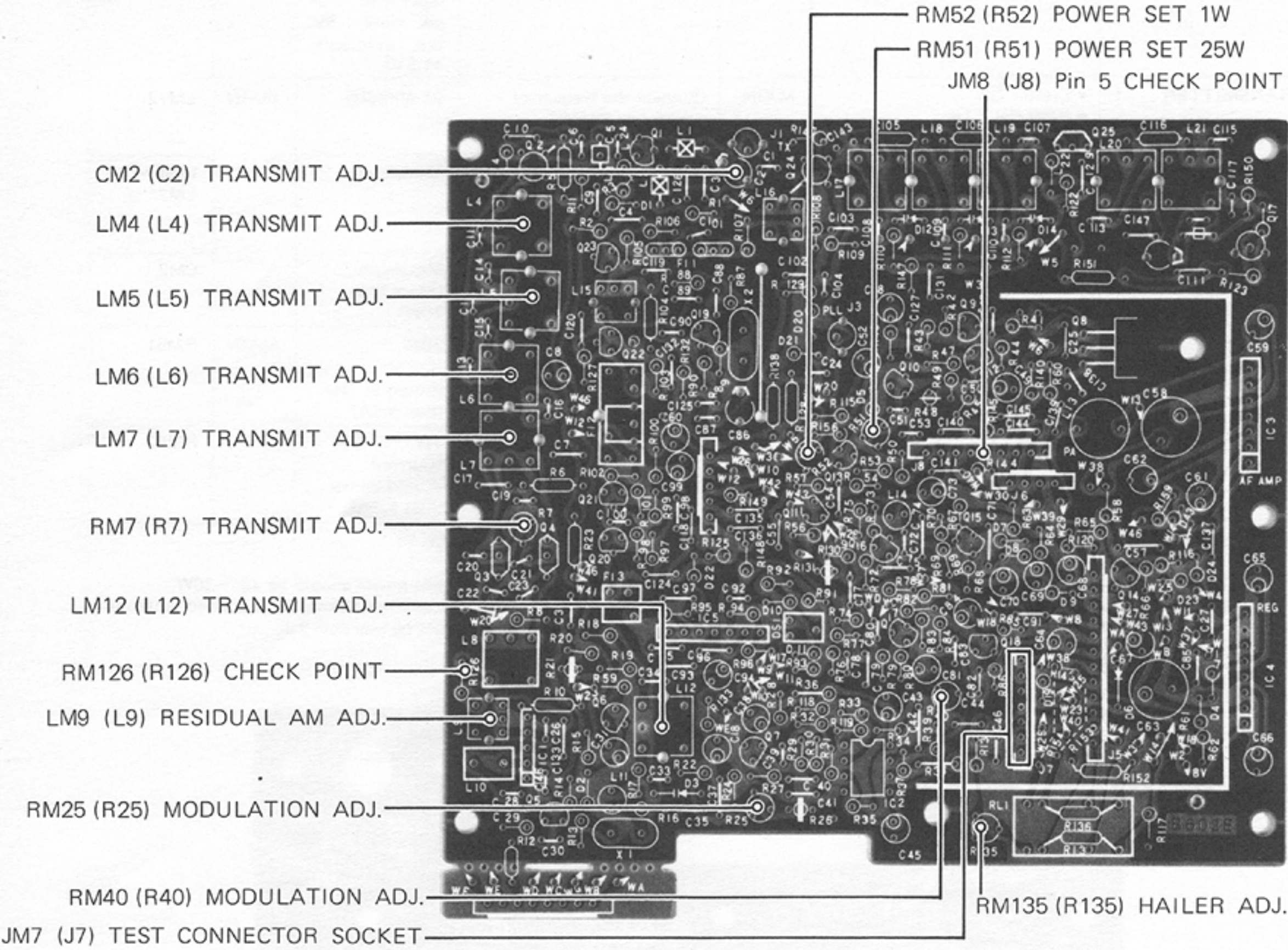
PA UNIT



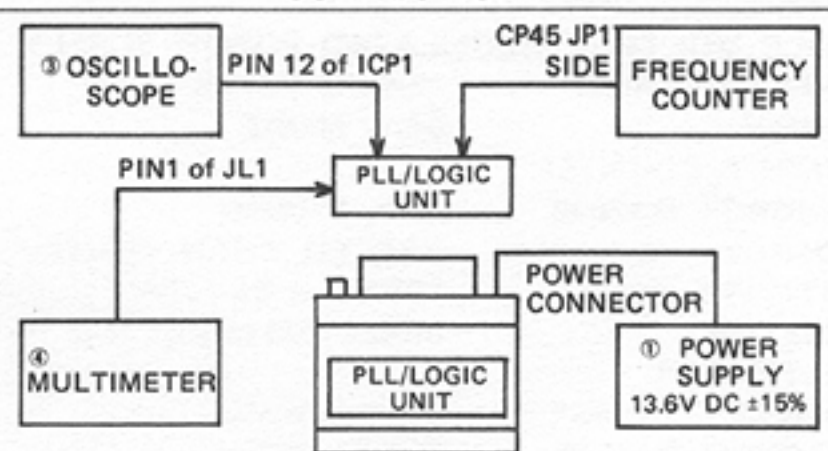
TRANSMITTER ADJUSTMENT (Continued)

Adjustment	Adjustment Condition	Unit	Measurement Location	Adjust Value	Unit	Adjust Point
MODULATION	1. • CH16 • DISP.CH. : 16 • AF Oscillator : 1KHz/15mV • FM Deviation meter (Tune to 156.800MHz) - LPF : 20KHz - HPF : 50Hz - DE-EMPHASIS : OFF - DEVIATION RANGE : 10KHz - DIVIATION SENSE : -P/+P Set in TRANSMIT mode.	REAR PANEL	Connect the oscilloscope to the AF output terminal of the deviation meter.	Maximum waveform and minimum distortion	MAIN	RM40
	2. • FM Deviation meter - DEVIATION SENSE : P-P/2		Read the meter of the deviation meter	4.5KHz		RM25
	3. • When the output level of the AF oscillator is set for 1.5 millivolts at 1KHz, the reading of the deviation meter should be as follows. - DEVIATION : About 3KHz - DISTORTION : Less than 10% - S/N : More than 40dB • When there are AM components, adjust L9 for minimum.					

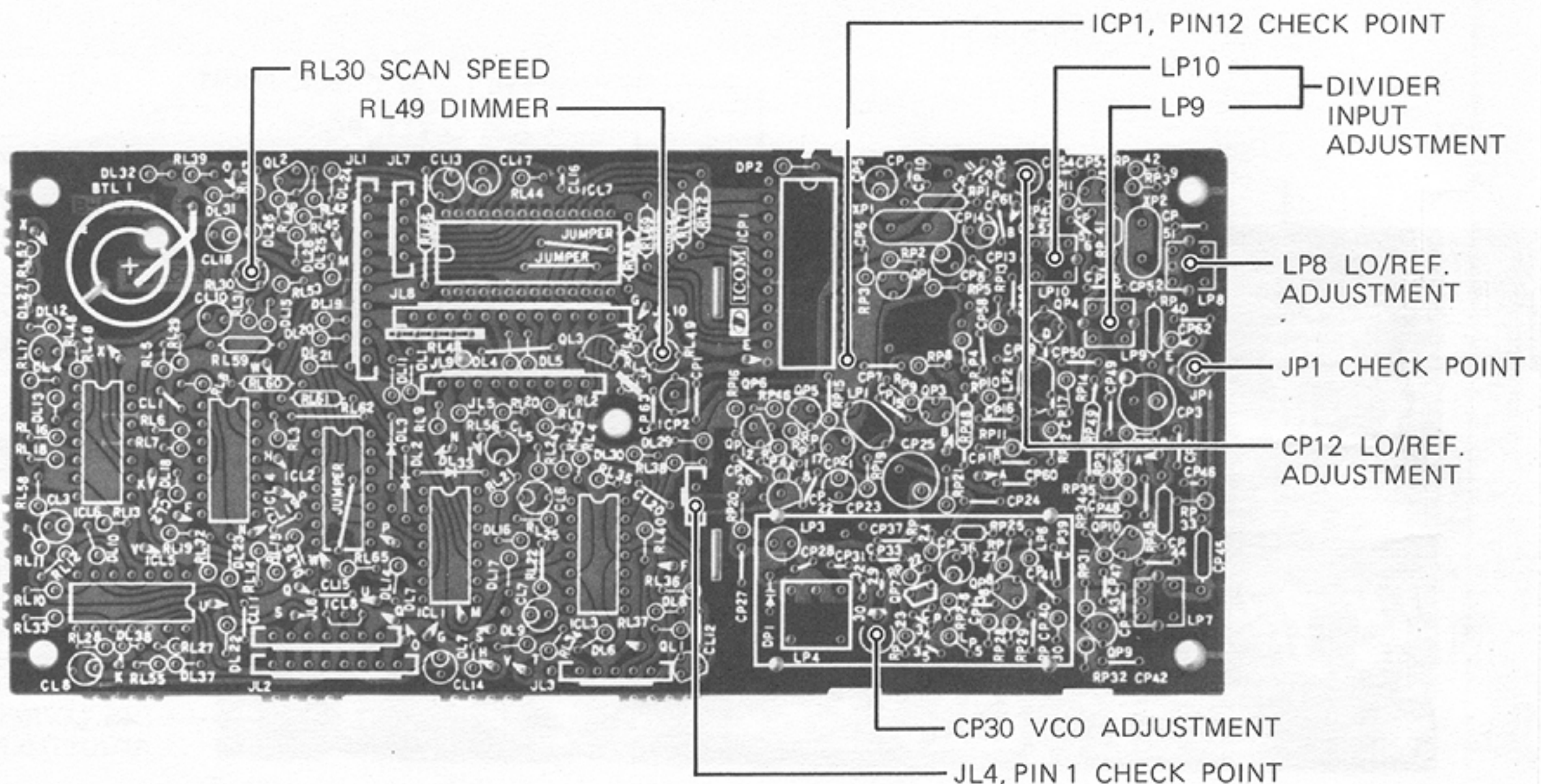
MAIN UNIT



9-3 PLL ADJUSTMENT (Type 225)

INSTRUMENTS REQUIRED			CONNECTIONS			
(1) VARIABLE VOLTAGE REGULATED POWER SUPPLY : OUTPUT VOLTAGE 13.6V DC ±15% : CAPACITY 6A or MORE (2) FREQUENCY COUNTER : FREQUENCY RANGE 0.1 ~ 170MHz : ACCURACY BETTER THAN ±1ppm : SENSITIVITY 100mV or BETTER (3) OSCILLOSCOPE : FREQUENCY RANGE DC ~ 15MHz : MEASURING RANGE 0.01 ~ 10V (4) MULTIMETER 50KΩ/Volt or BETTER						
Adjustment	Adjustment Condition	Unit	Measurement Location	Adjust Value	Unit	Adjust Point
LO REFERENCE FREQUENCY	1. • CH16 : ON • DISP.CH. : 16 Set in RECEIVE mode.	PLL	Unplug PM1 (from MAIN unit) inserted to JP1, and connect the frequency counter to JP1.	135.400MHz ±300Hz	PLL	LP8
	2. • DIAL : ON • DISP.CH. : 18			140.100MHz ±300Hz		CP12
	Note: • Repeat adjustments of 1. and 2. several times. • When adjustments are completed, plug PM1 to JP1 as original condition.					
DIVIDER INPUT VOLTAGE	1. • DIAL : ON • DISP.CH. : 18	PLL	Connect the oscilloscope to ICP1 pin12.	Maximum (More than 400mVp-p)	PLL	LP9, LP10
VCO	1. • DIAL : ON • DISP.CH. : 88 Set in RECEIVE mode.	LOGIC	Connect the multimeter to JL4 pin 1.	6.8V	PLL	CP30
	2. • CH16 : ON			3.0 ~ 3.5V		Confirming
	Note: • The adjust value should be less than 8V on PRV (Private channel) 16, more than 2.7V on PRV F5 and approx 9V when lock fails. • RL30 is for SCAN SPEED adjust and RL49 is for DIMMER adjust.					

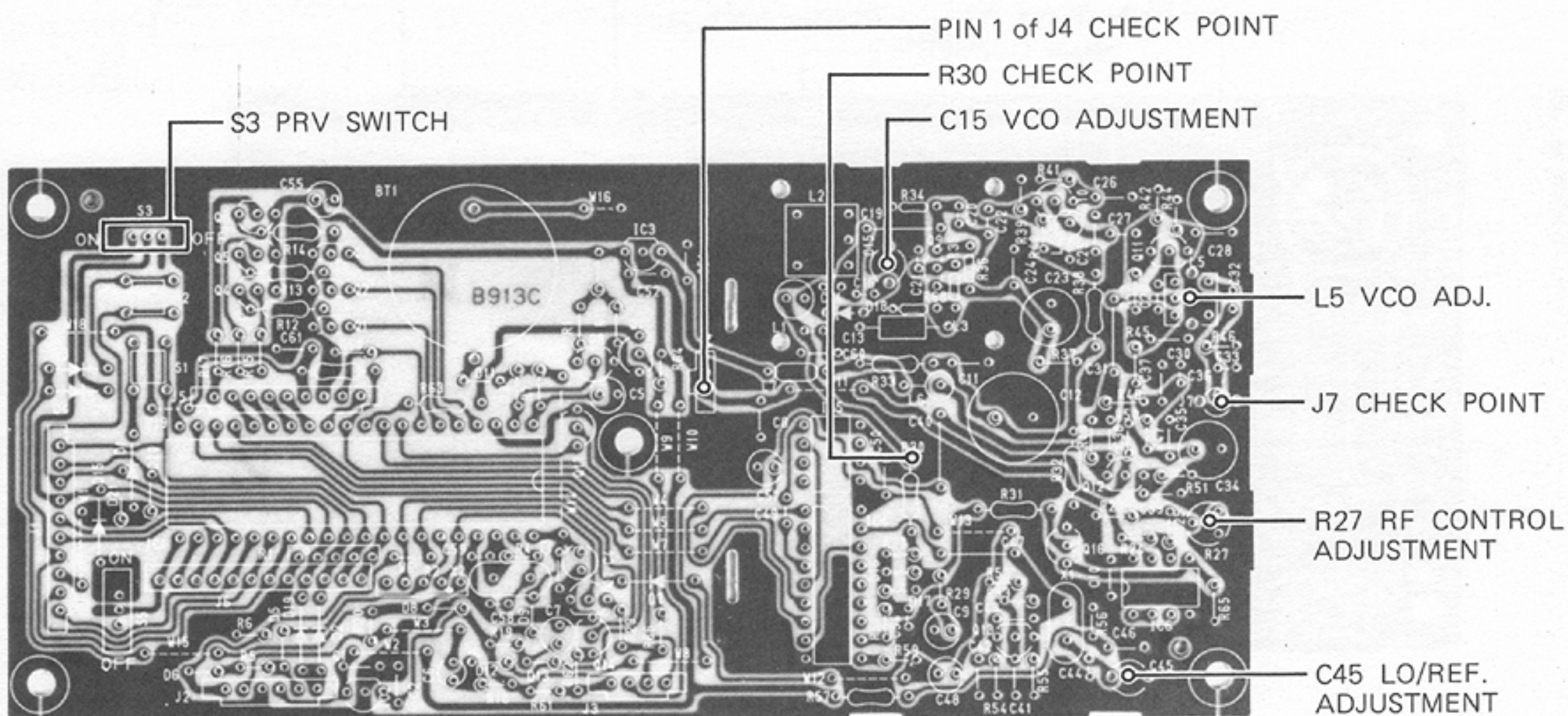
PLL UNIT



9 - 4 PLL ADJUSTMENT (Type 370)

INSTRUMENTS REQUIRED			CONNECTIONS			
(1) VARIABLE VOLTAGE REGULATED POWER SUPPLY : OUTPUT VOLTAGE 13.6V DC ±15% : CAPACITY 6A or MORE (2) FREQUENCY COUNTER : FREQUENCY RANGE 0.1 ~ 170MHz : ACCURACY BETTER THAN ±1ppm : SENSITIVITY 100mV or BETTER (3) MULTIMETER : MEASURING RANGE 50KΩ/Volt or BETTER (4) RF VOLTMETER : FREQUENCY RANGE 0.1 ~ 170MHz : MEASURING RANGE 0.001 ~ 10V						
Adjustment	Adjustment Condition	Unit	Measurement Location	Adjust Value	Unit	Adjust Point
LO/REFERENCE FREQUENCY	1. ● CH16 : ON Set in RECEIVE mode.	PLL	Unplug PM1 (from MAIN unit) inserted to J7, and connect the frequency counter to J7.	135.400MHz ±300Hz	PLL	C45
	2. ● DIAL : ON ● S3 (LOGIC UNIT) : ON ● DISP.CH. : PRV 16 (116)			142.025MHz ±300Hz		Confirming
Note: In the case of HOLLAND version or FRANCE version, jumper between D4 cathode and D15 cathode instead of turning on S3, and a PRV (Private) channel is selected.						
VCO	1. ● DIAL : ON ● S3 (LOGIC UNIT) : ON ● DISP.CH. : PRV 16 (116) Set in RECEIVE MODE.	PLL	Connect the multimeter to R30 (VCO side).	Approx 4V	PLL	C15
	2. ● DISP.CH. : PRV F6			Approx 2V		Confirming
	3. ● CH16 : ON		Unplug PM1 (from MAIN unit) inserted to J7, and connect the frequency counter to J7.	Maximum output (more than 0dBm)		L5
RF CONTROL	1. ● CH16 : ON	PLL	Connect the multimeter to J4 pin 1.	3.6V	PLL	R27
	2. ● DIAL : ON ● S3 (LOGIC UNIT) : ON ● DISP.CH. : PRV 16 (116)			Less than 8V		Confirming
	3. ● DISP.CH. : PRV F6			1.2 ~ 2.8V		
Note: When adjustments are completed, turn off S3 on LOGIC unit and plug PM1 to J7 as original conditions.						

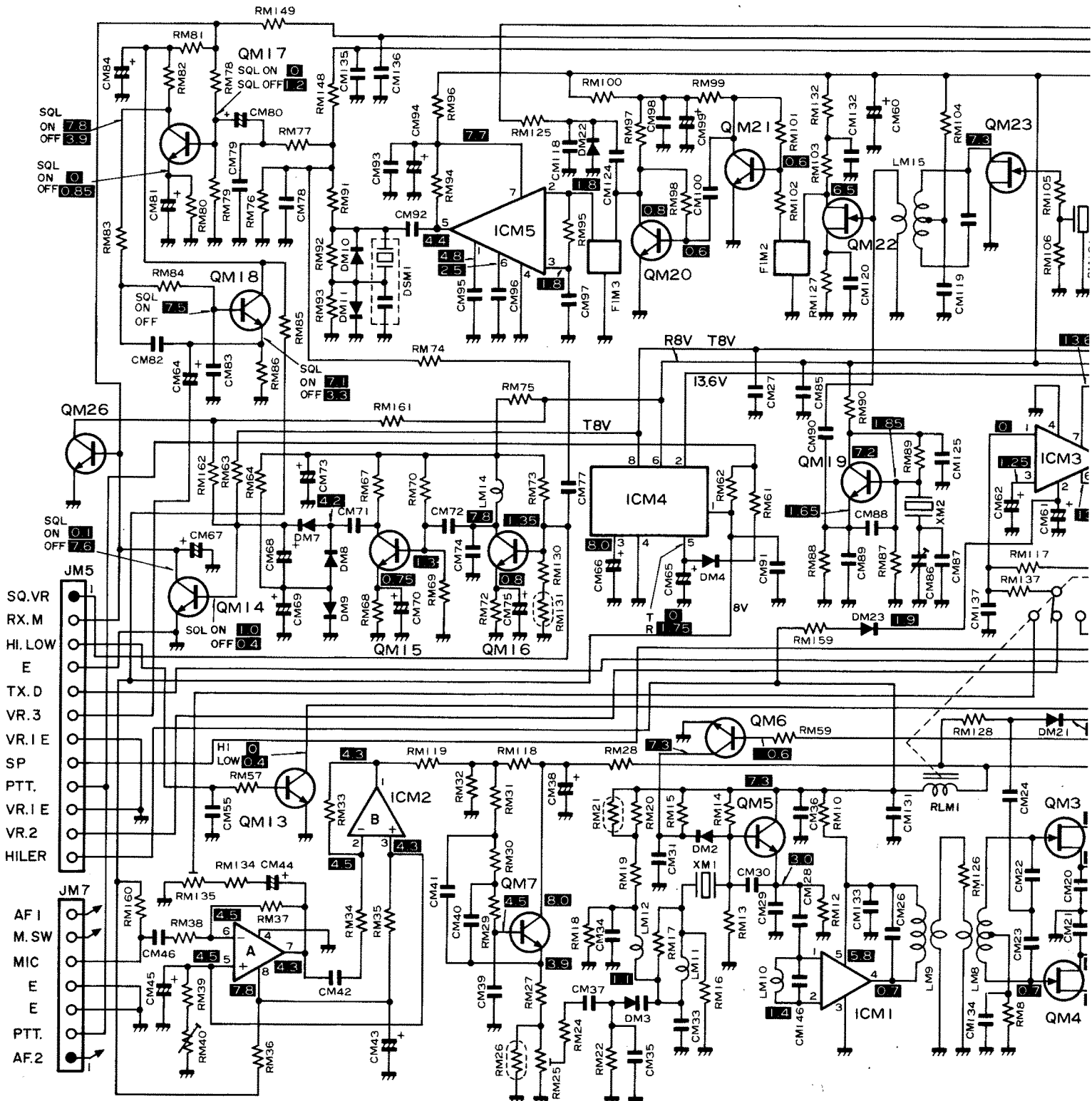
PLL UNIT

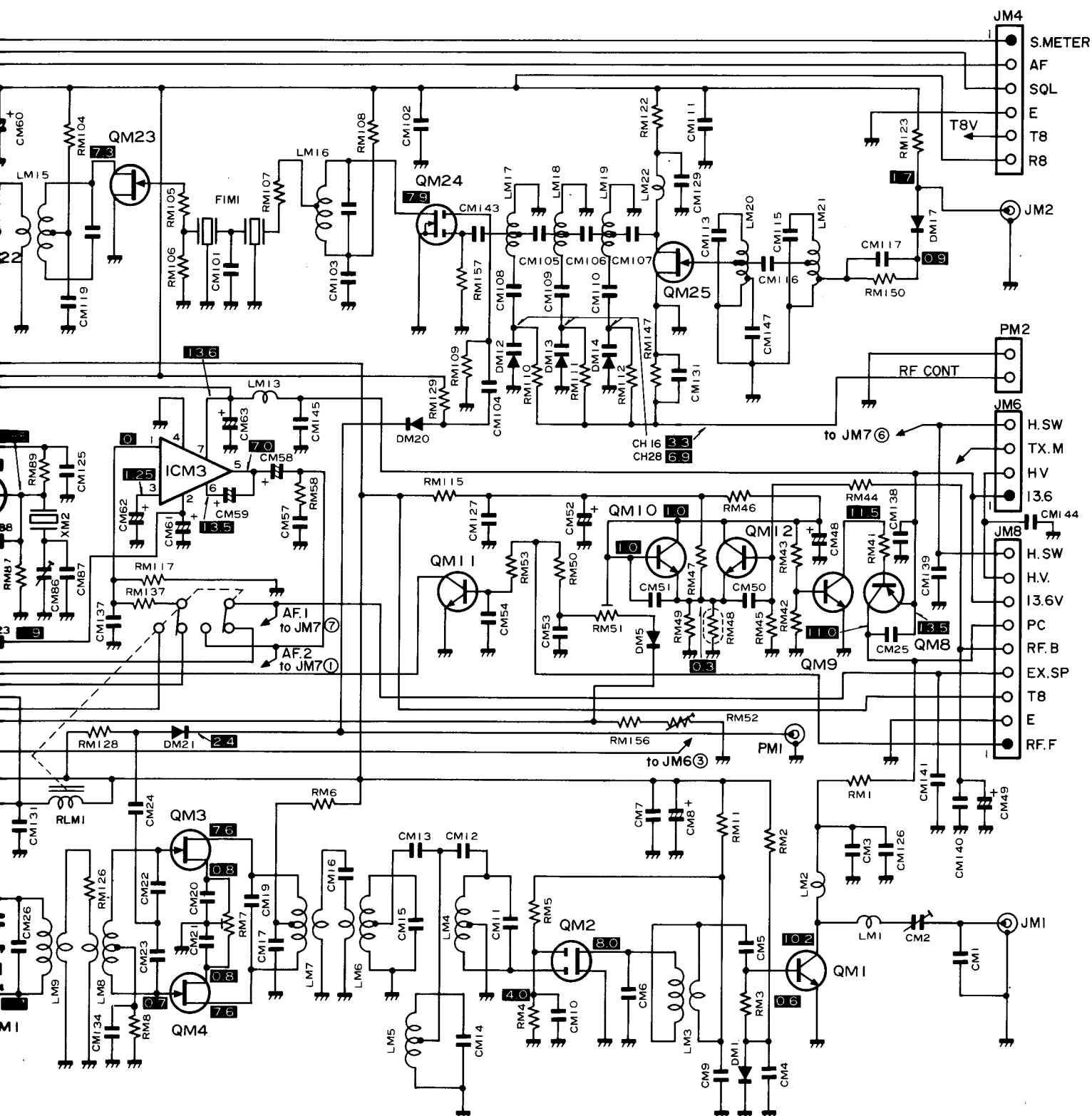


SECTION 10 VOLTAGE (CIRCUIT) DIAGRAMS

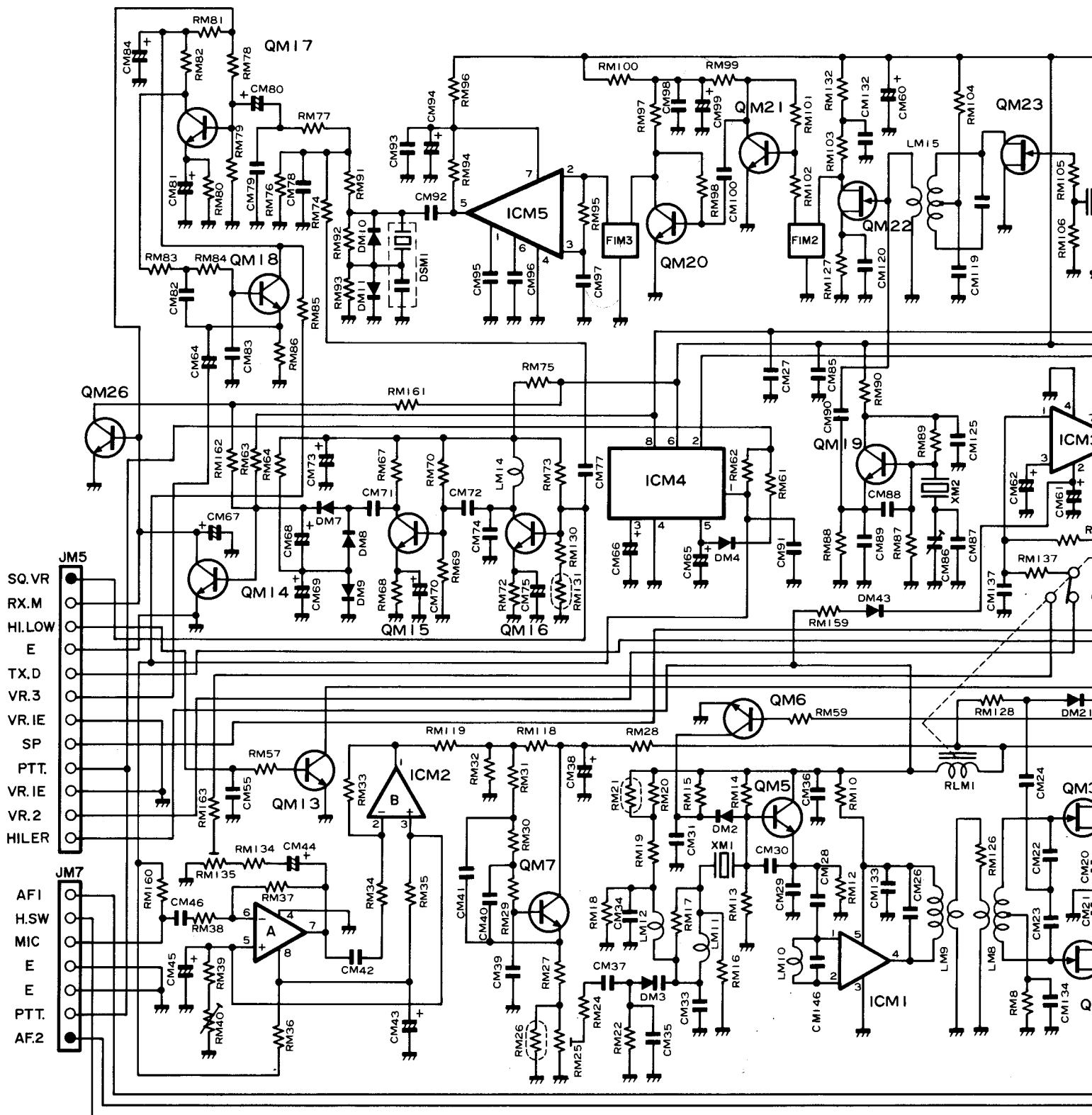
10-1 MAIN UNIT

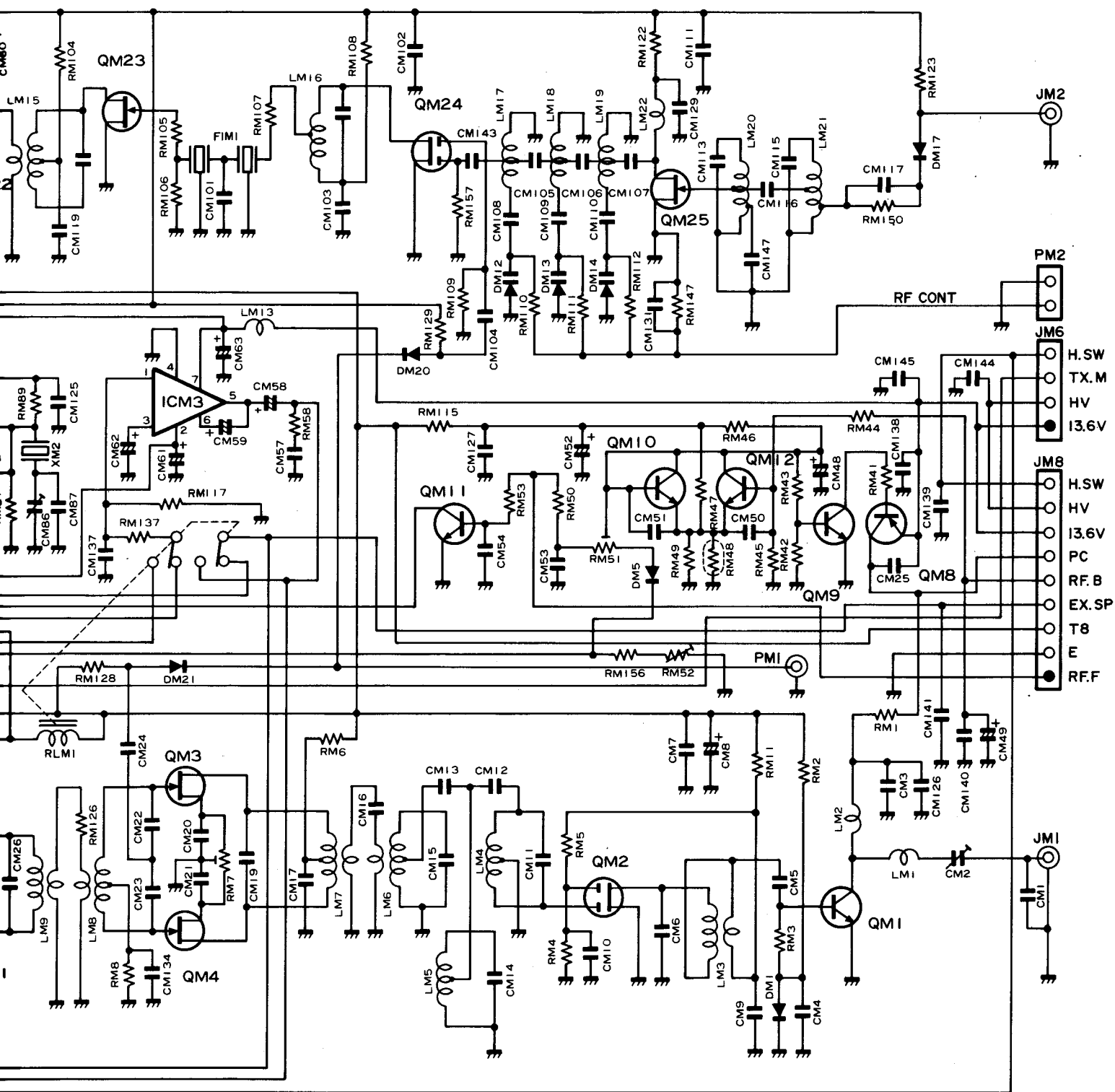
10-1-1 MAIN UNIT VOLTAGE AND CIRCUIT DIAGRAM (Type 225)



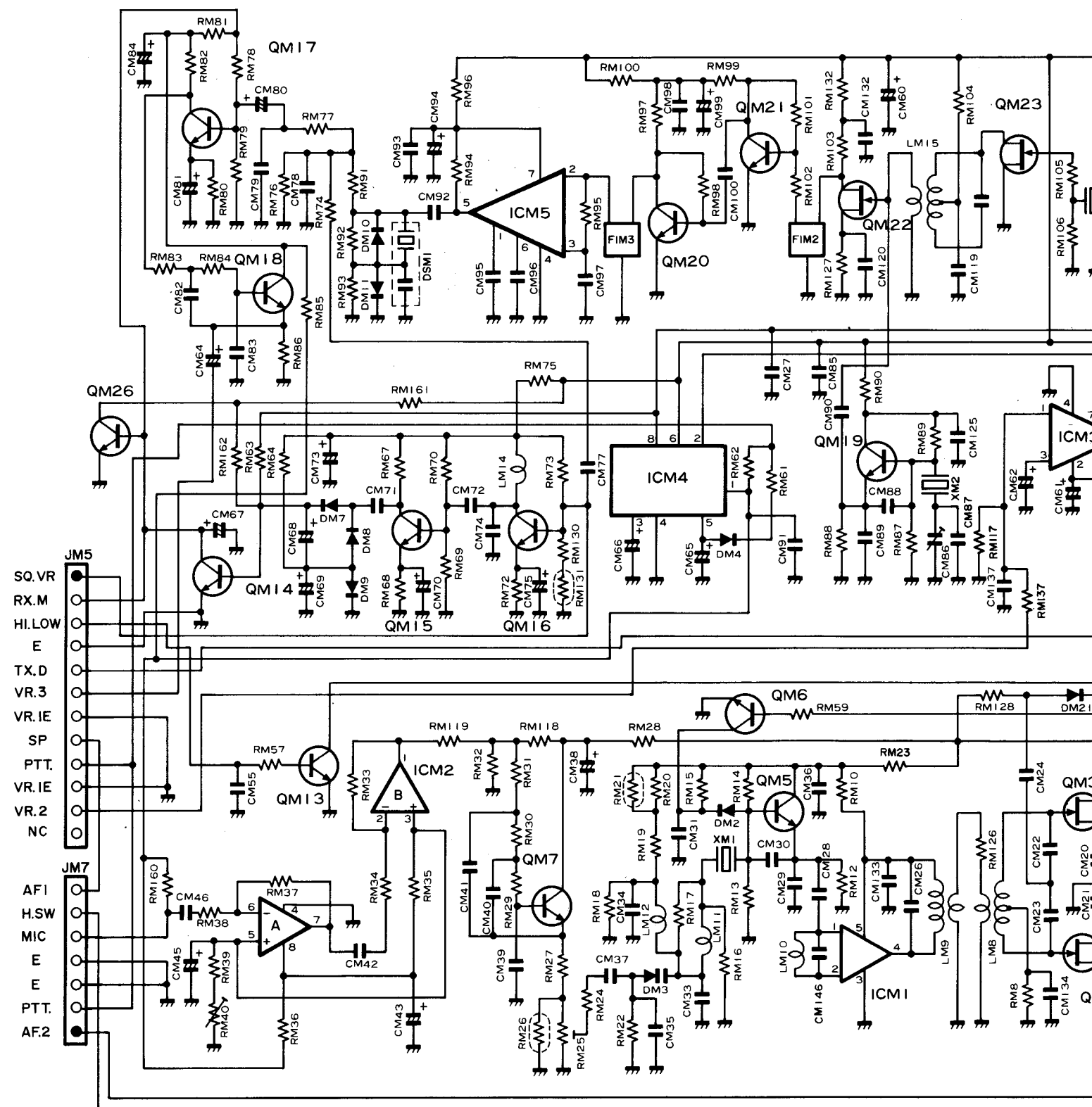


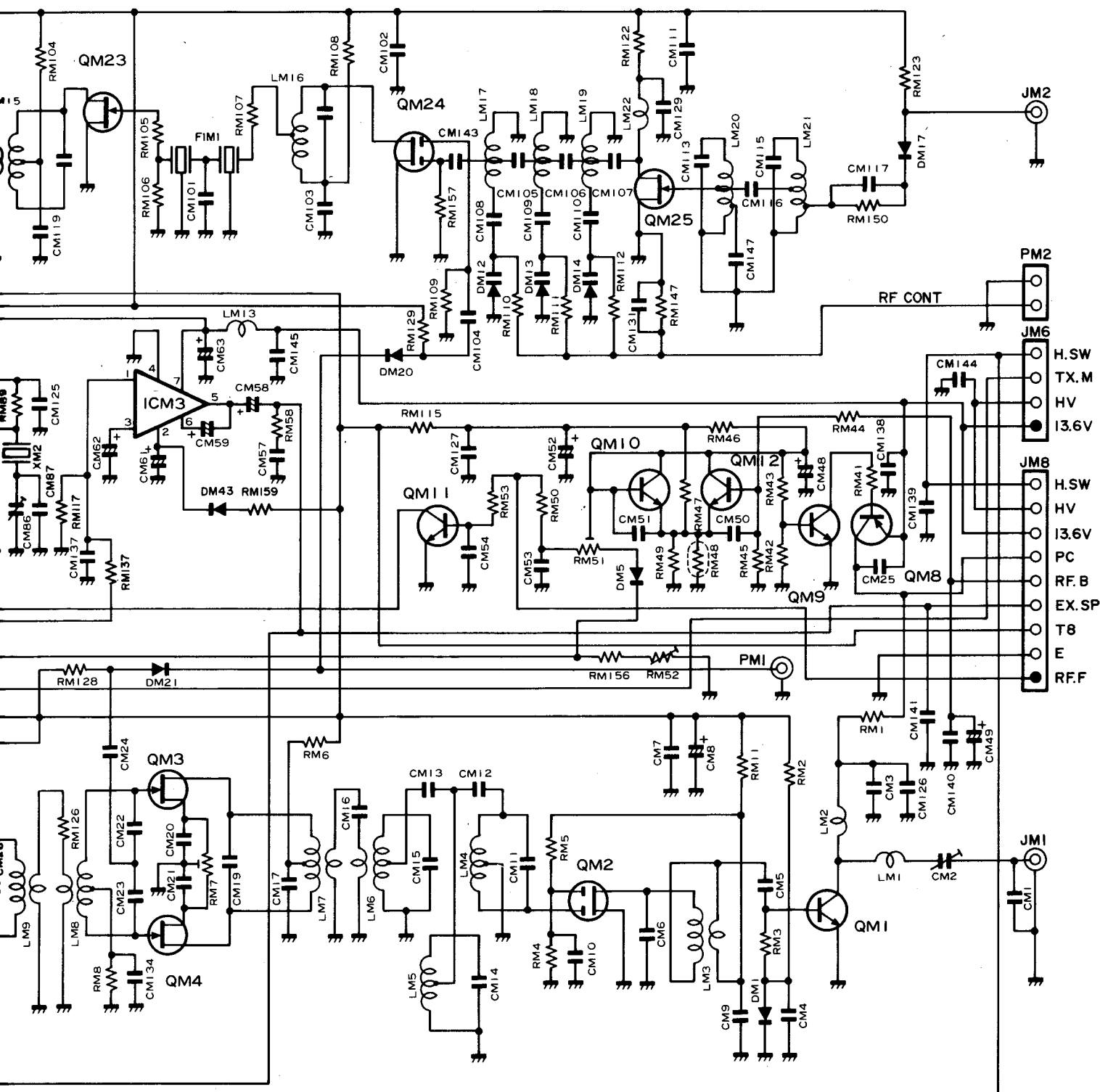
10 - 1 - 2 MAIN UNIT CIRCUIT DIAGRAM (Type 370)



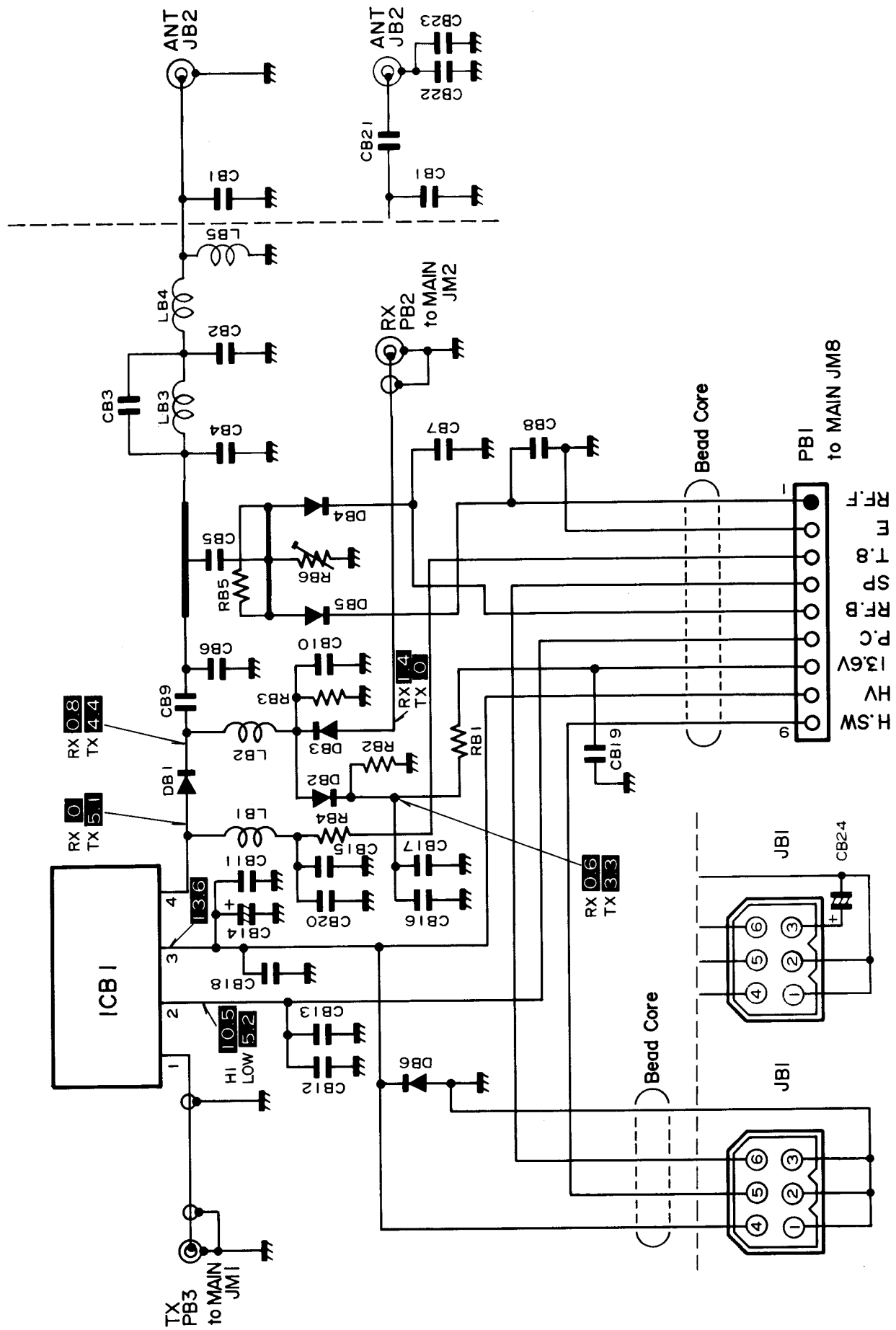


10 - 1 - 3 MAIN UNIT CIRCUIT DIAGRAM (HOLLAND and FRANCE versions) (Type 225 and 370)





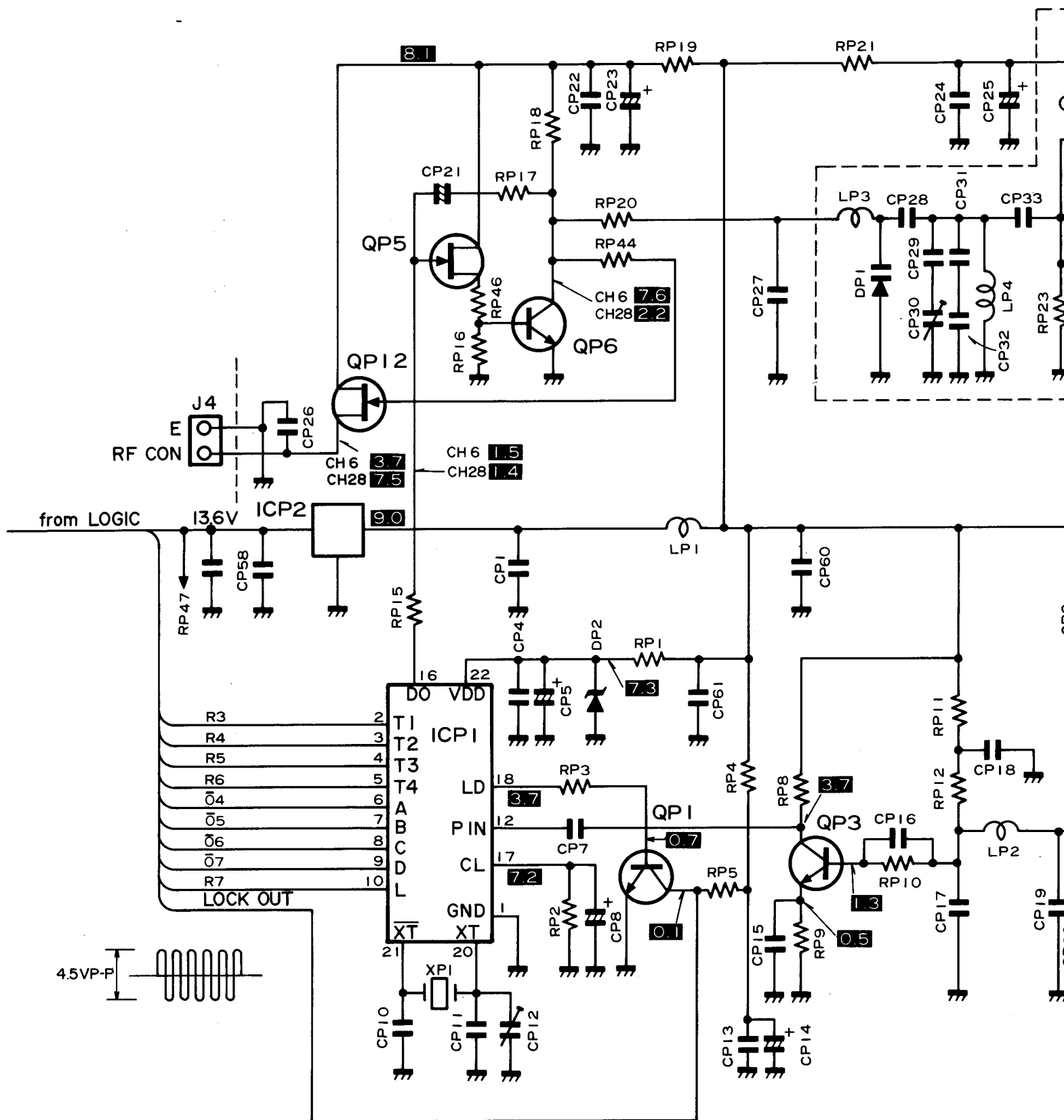
10-2 PA UNIT VOLTAGE (CIRCUIT) DIAGRAM

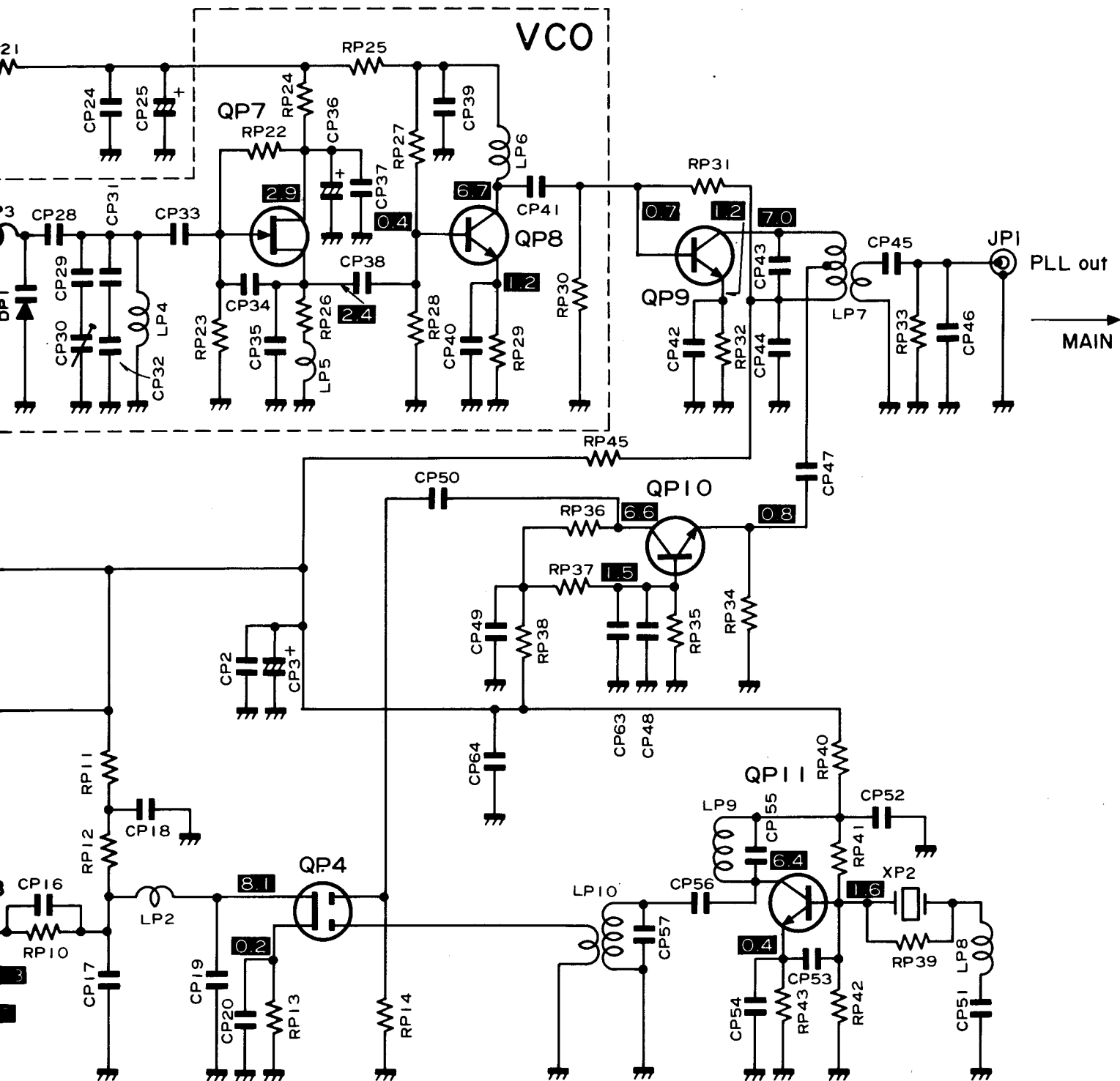


PA UNIT

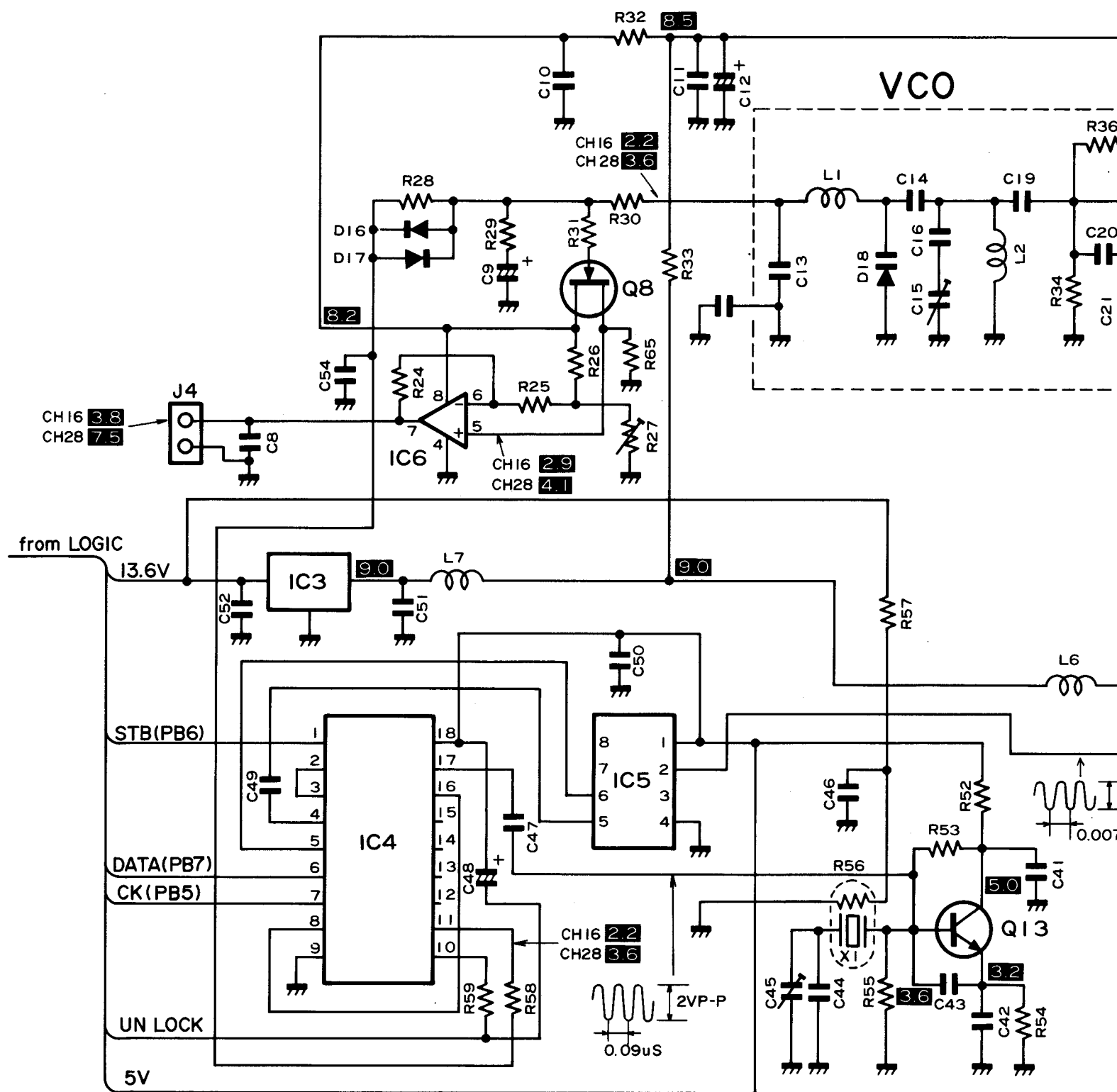
10-3 PLL UNIT

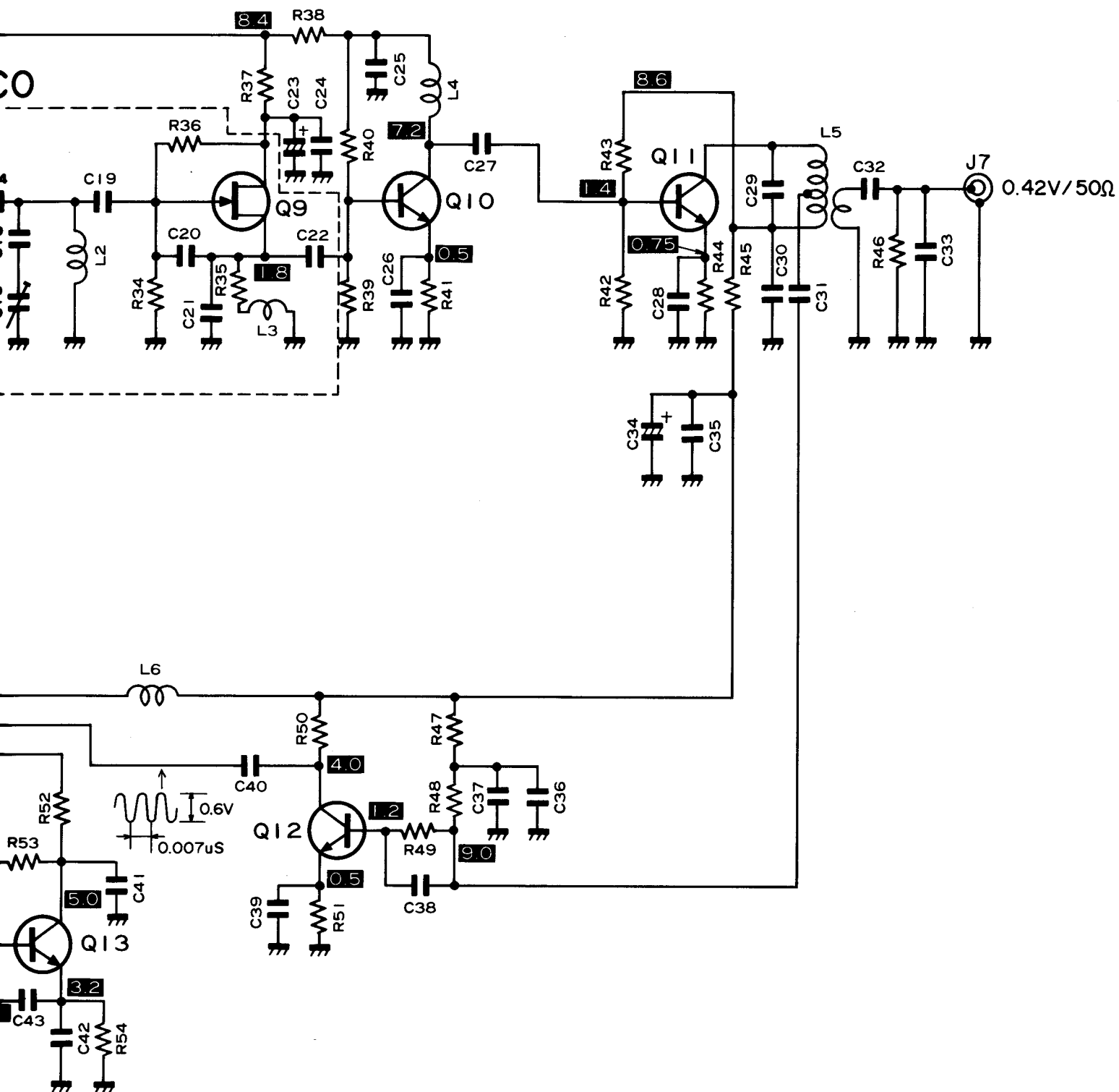
10-3-1 PLL UNIT VOLTAGE (CIRCUIT) DIAGRAM (Type 225)





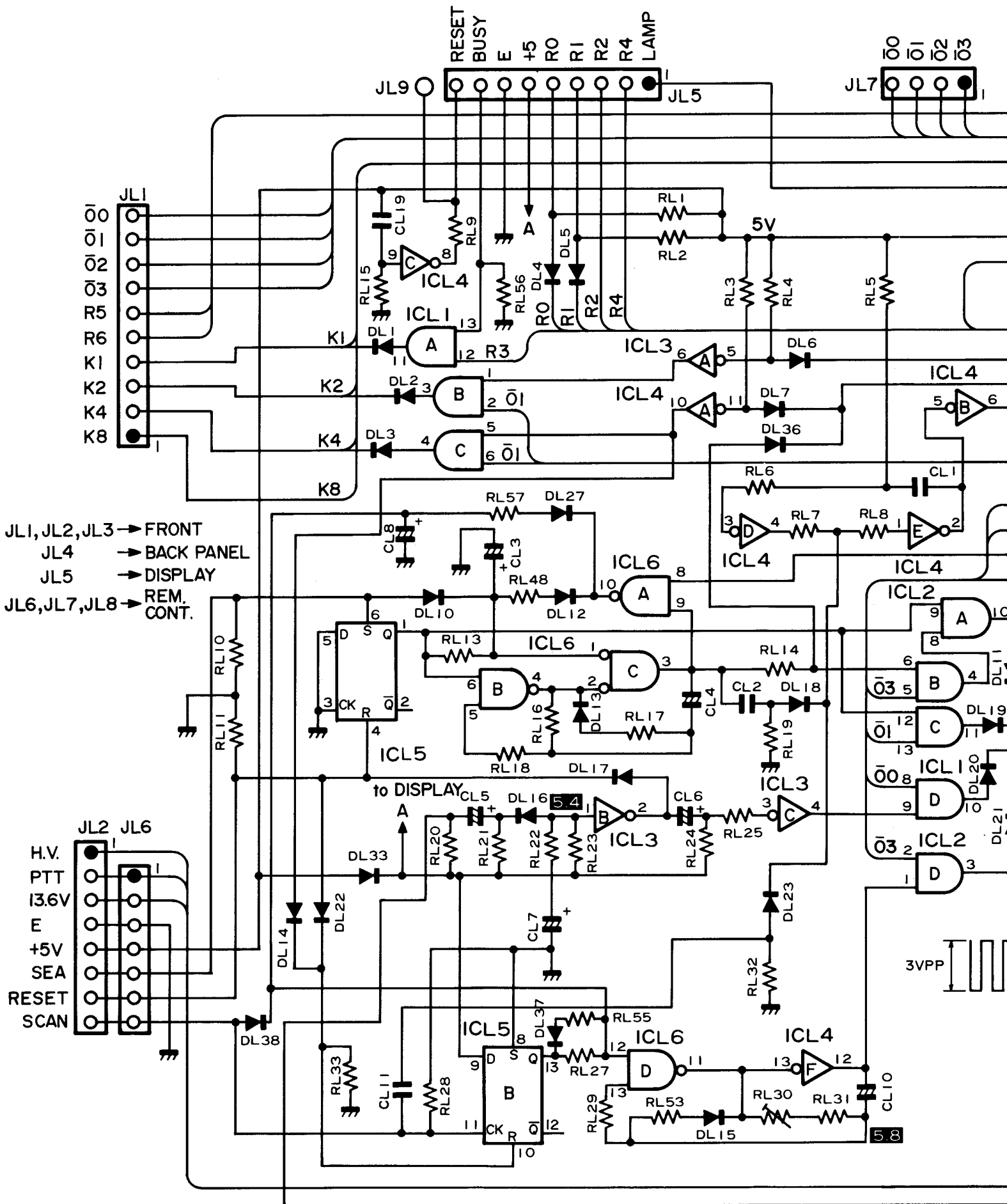
10-3-2 PLL UNIT VOLTAGE (CIRCUIT) DIAGRAM (Type 370)

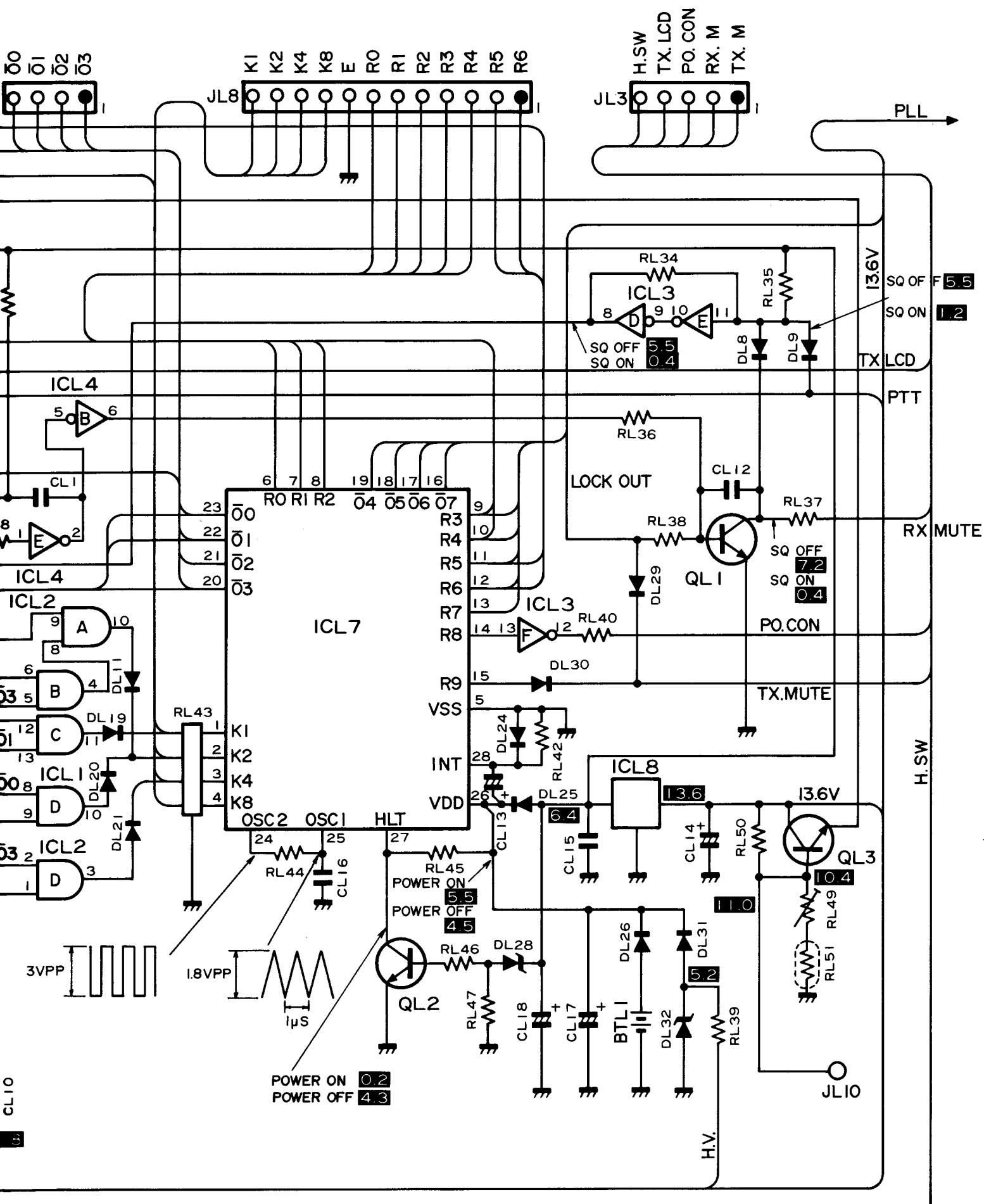




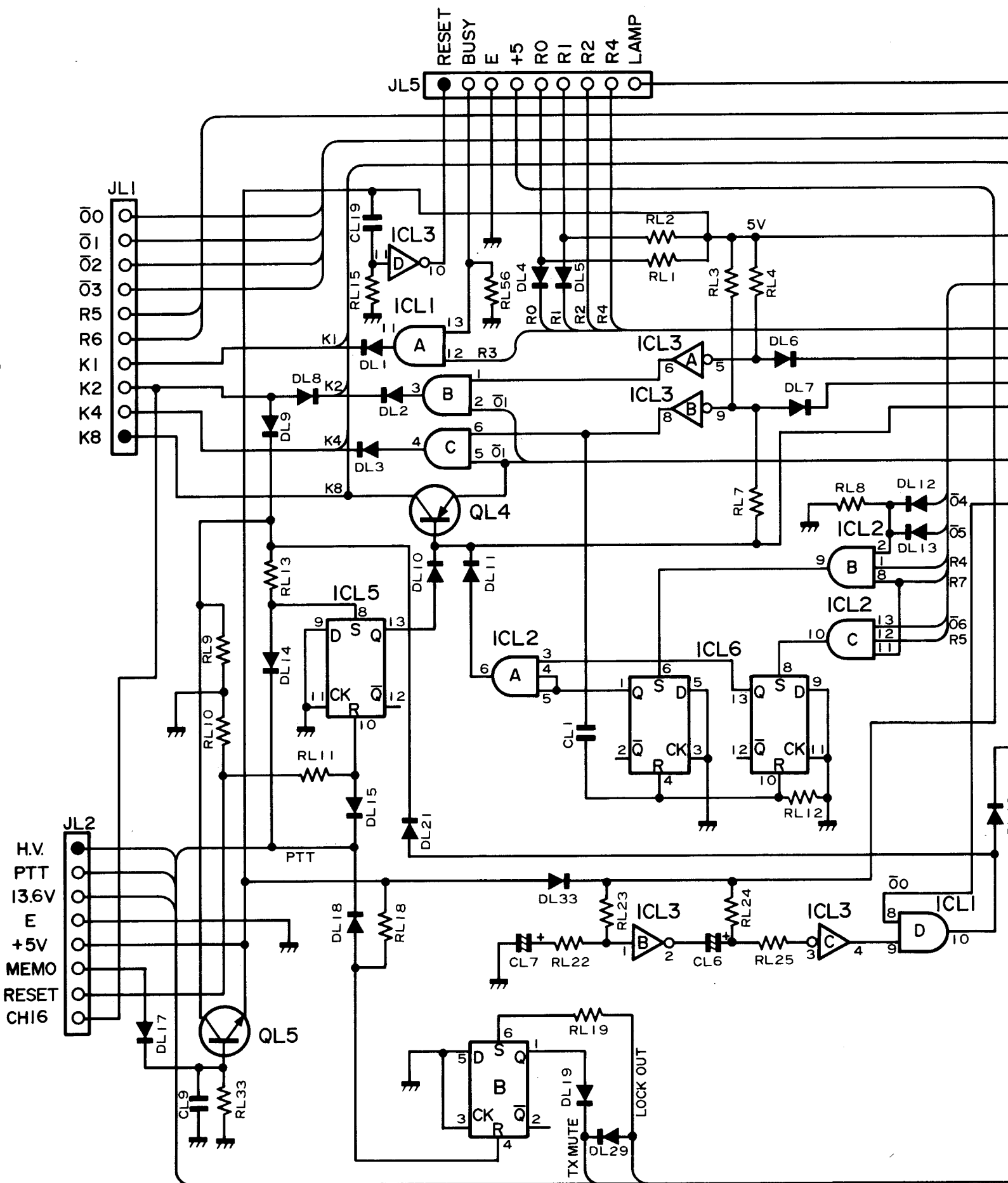
10-4 LOGIC UNIT

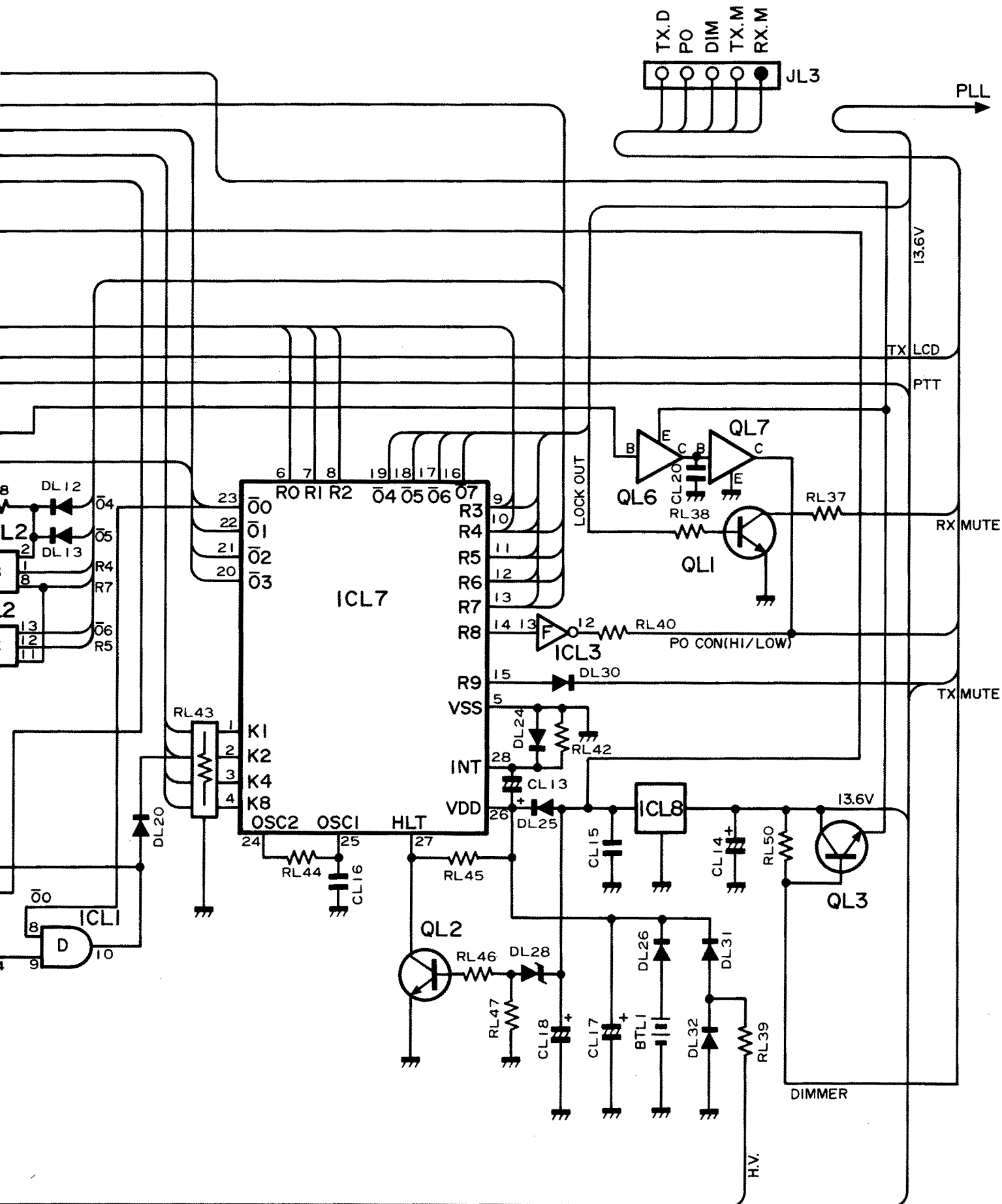
10-4-1 LOGIC UNIT VOLTAGE (CIRCUIT) DIAGRAM (Type 225)



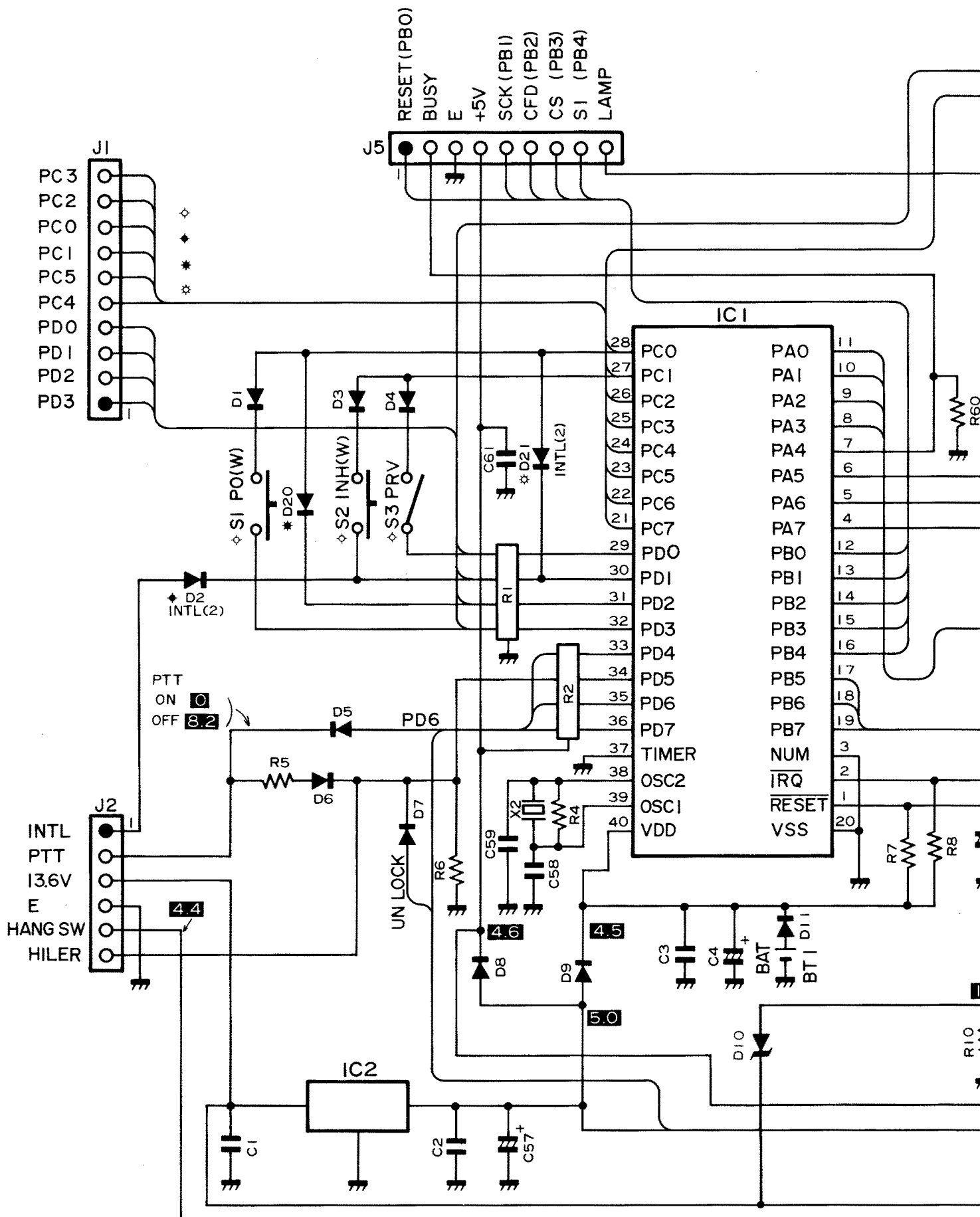


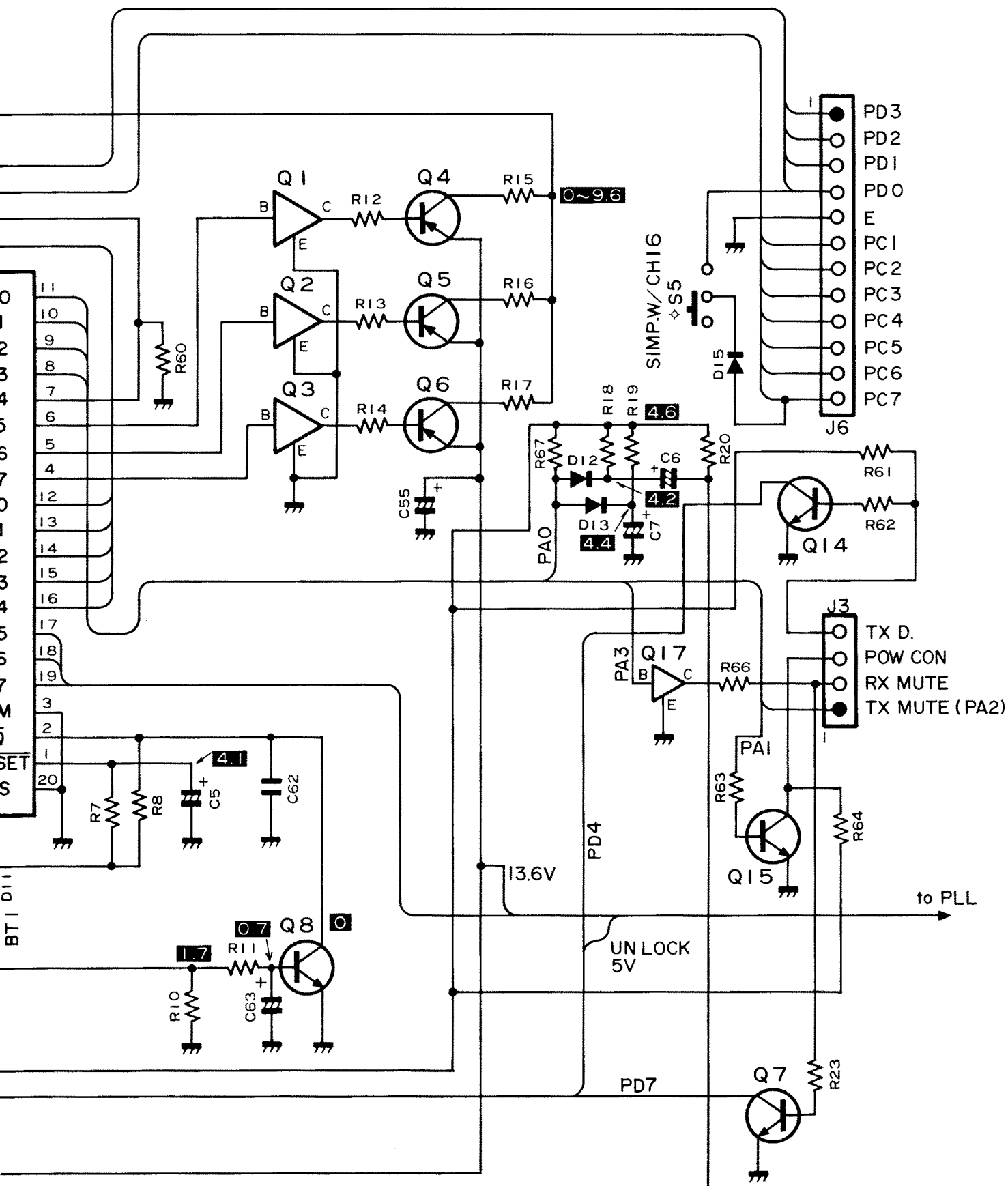
10 - 4 - 2 LOGIC UNIT CIRCUIT DIAGRAM (Type 225 HOLLAND version)



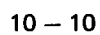


10-4-3 LOGIC UNIT VOLTAGE (CIRCUIT) DIAGRAM (Type 370)

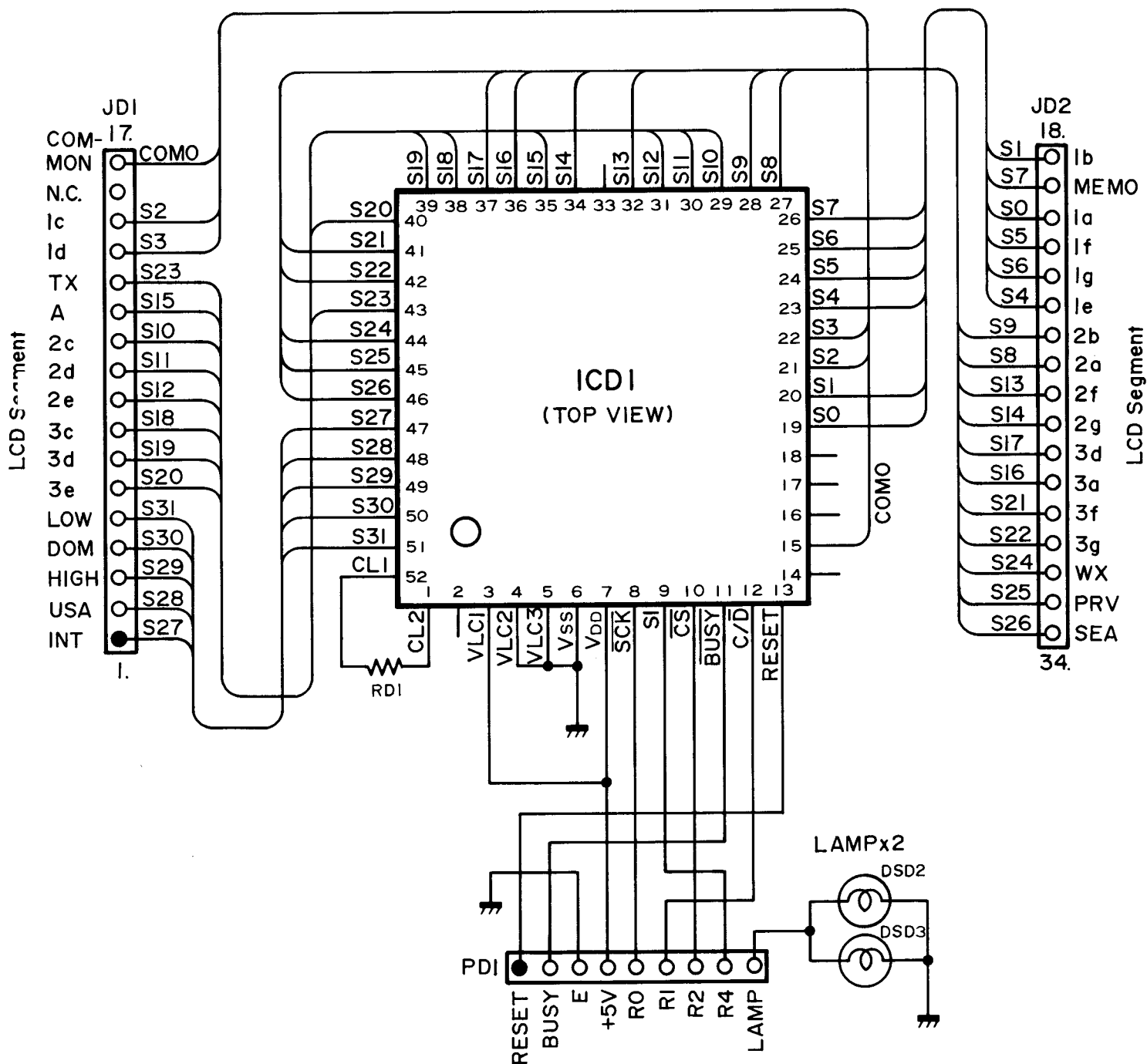




10 - 5 - 1 DISPLAY UNIT CIRCUIT DIAGRAM (Type 225)

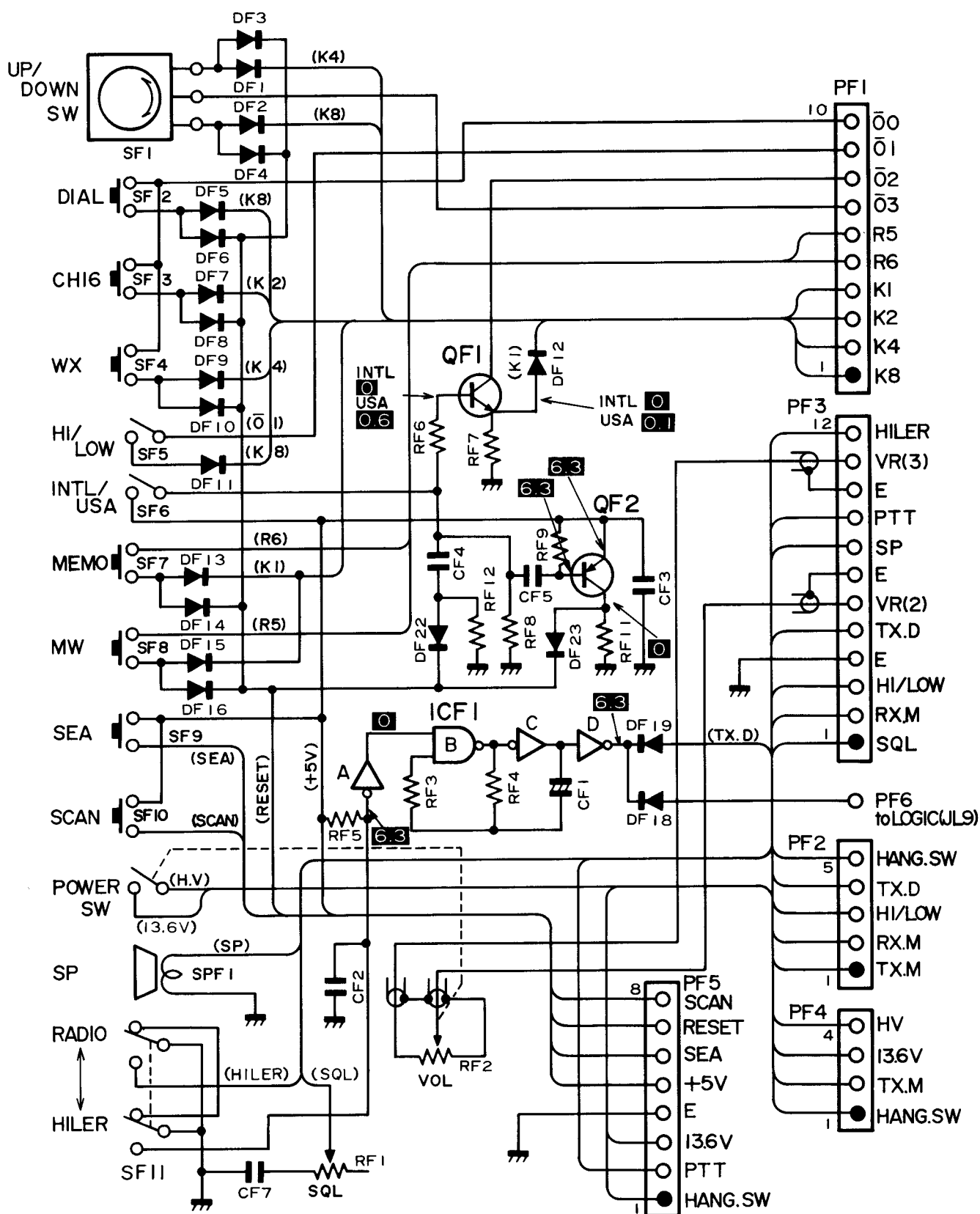


10 - 5 - 2 DISPLAY UNIT CIRCUIT DIAGRAM (Type 370)

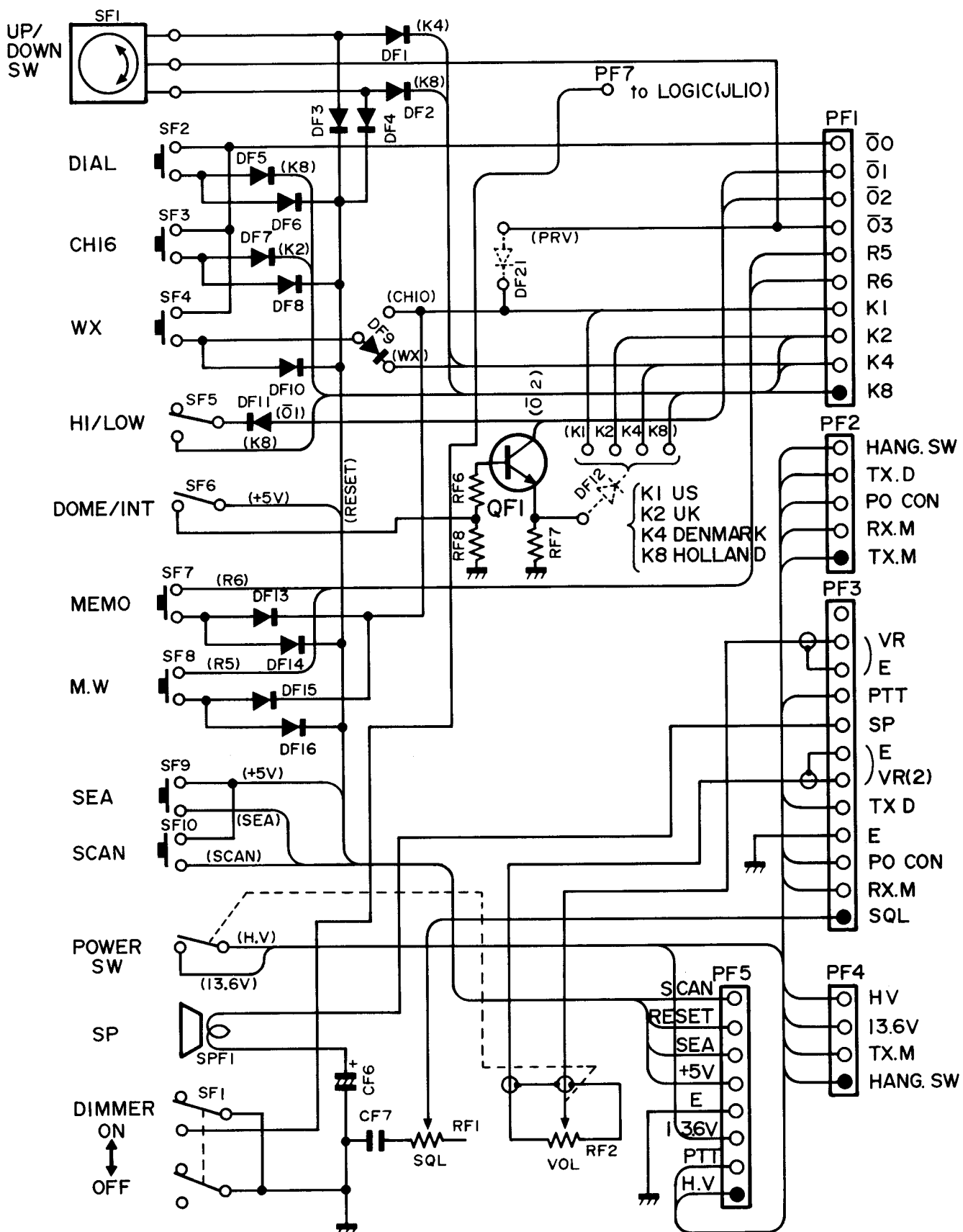


10 - 6 FRONT UNIT

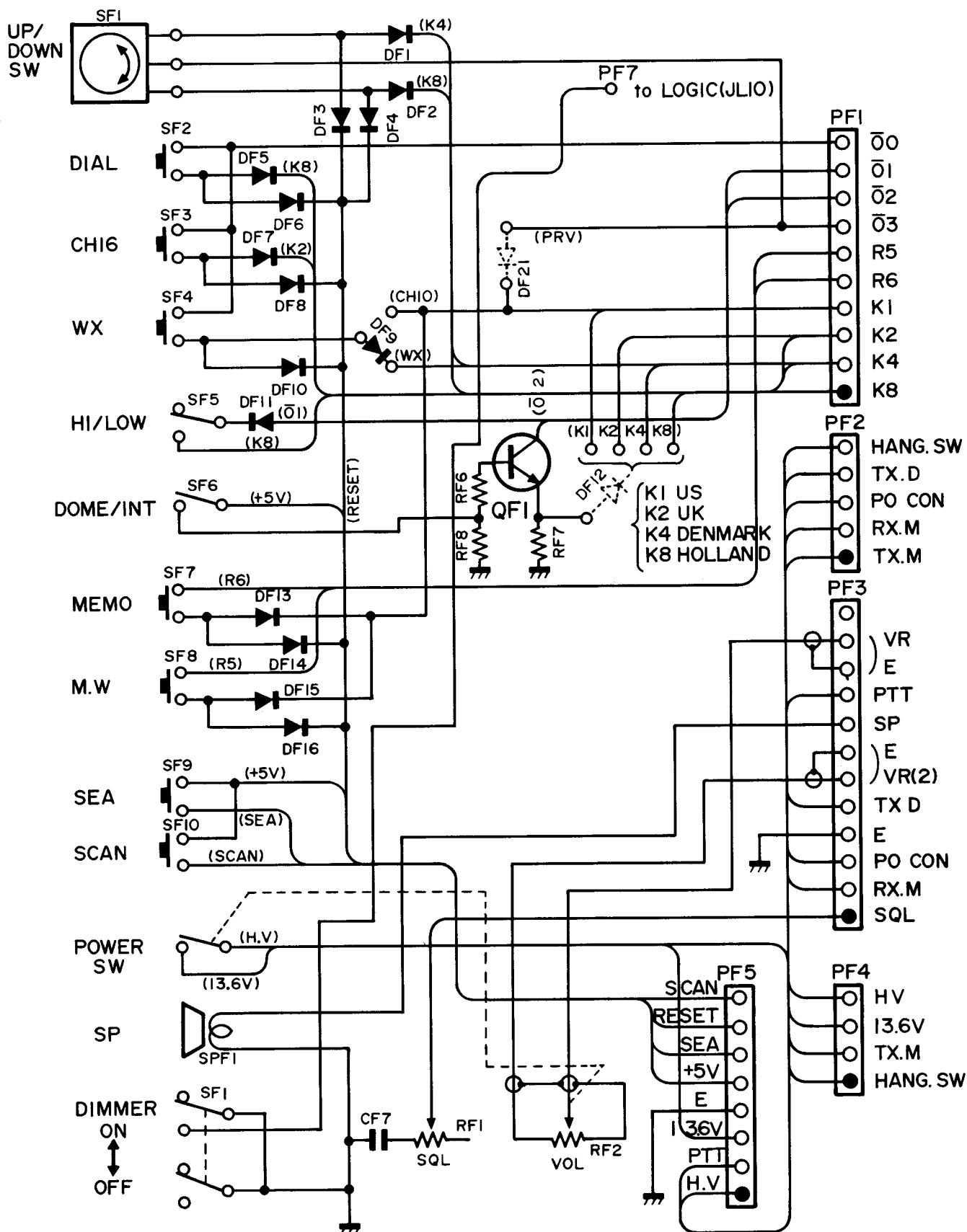
10 - 6 - 1 FRONT UNIT VOLTAGE (CIRCUIT) DIAGRAM (Type 225 USA version)



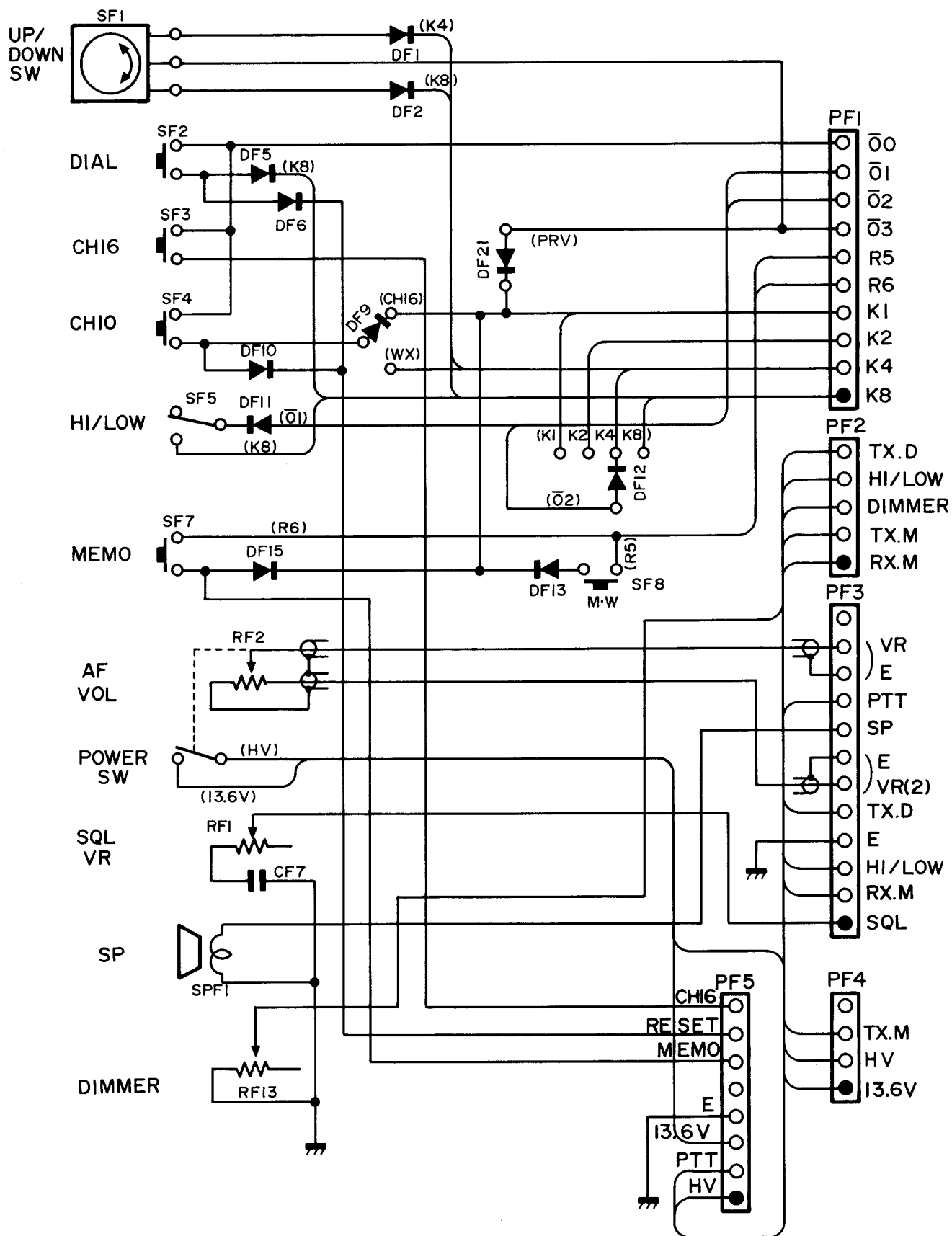
10 - 6 - 2 FRONT UNIT CIRCUIT DIAGRAM (Type 225 Europe version)



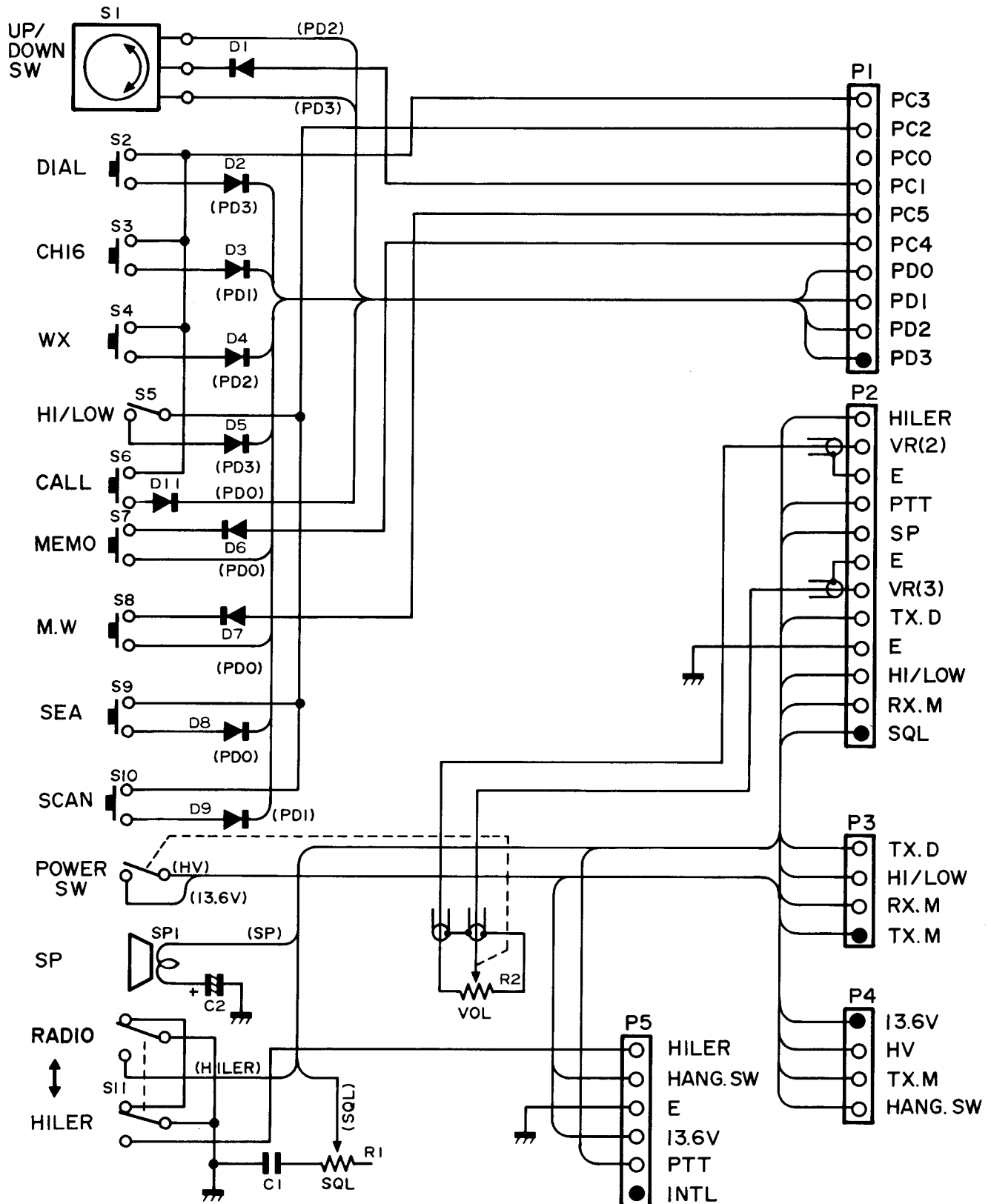
10 - 6 - 3 FRONT UNIT CIRCUIT DIAGRAM (Type 225 UK version)



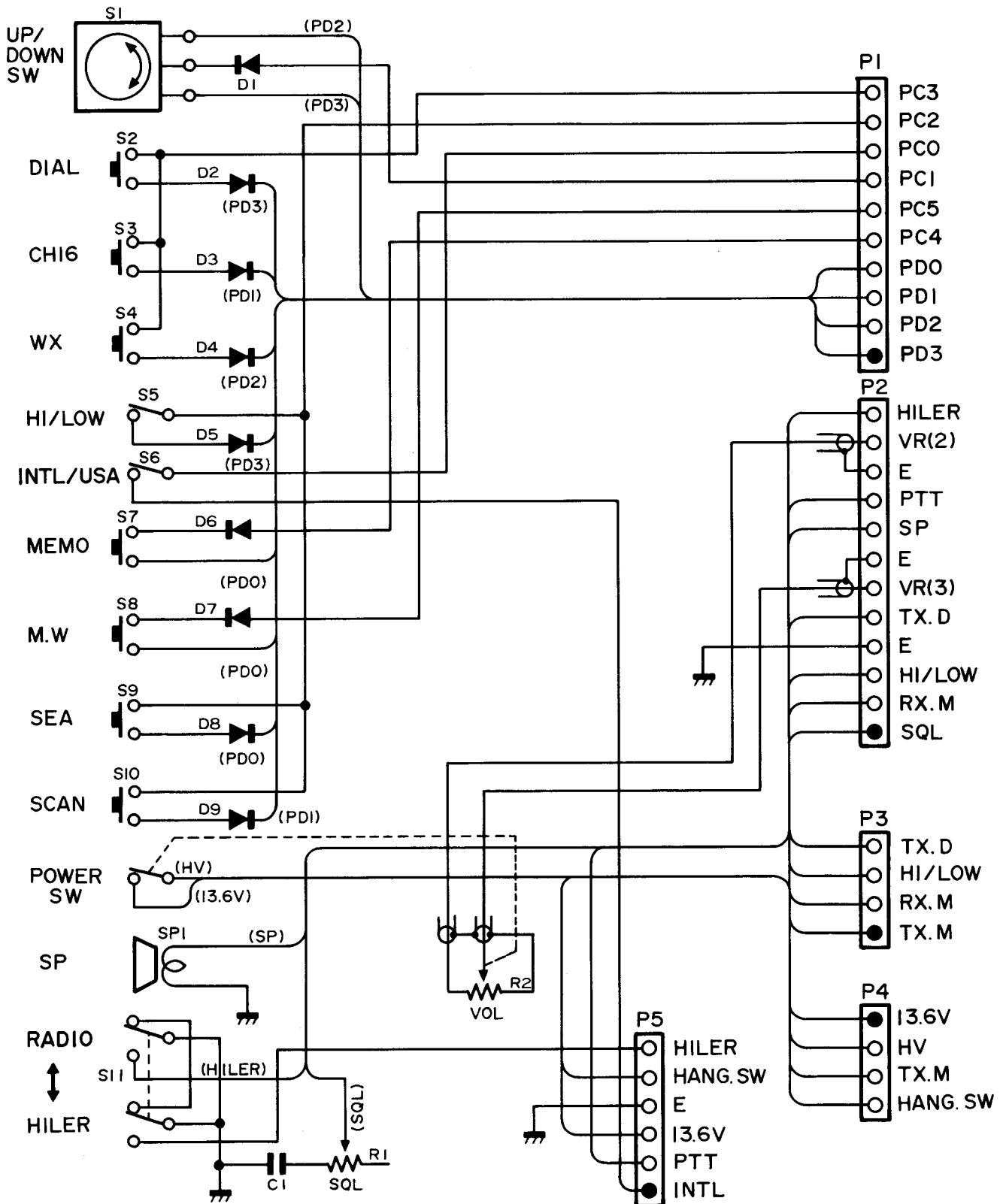
10 - 6 - 4 FRONT UNIT CIRCUIT DIAGRAM (Type 225 Holland version)



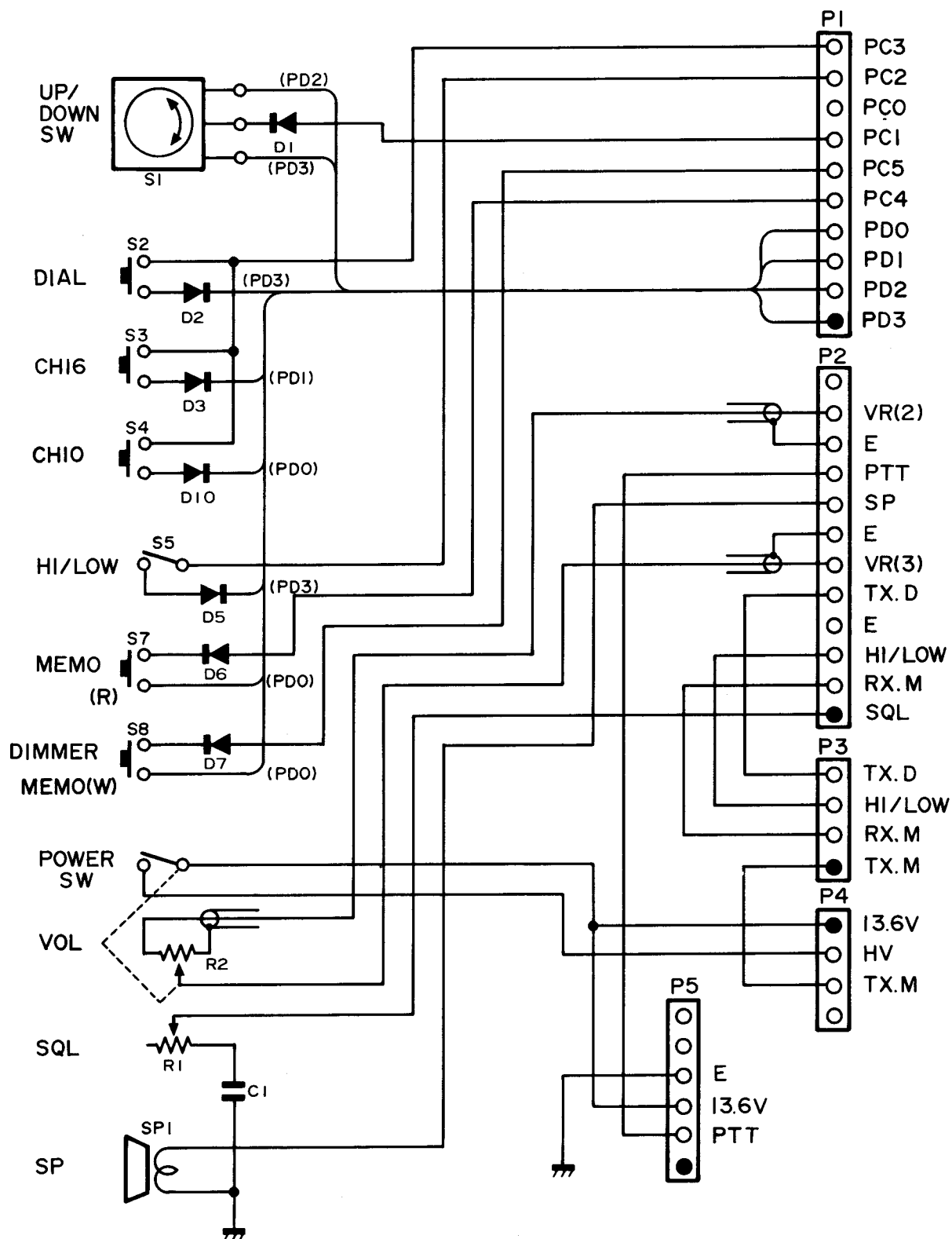
10 - 6 - 5 FRONT UNIT CIRCUIT DIAGRAM (Type 370 USA version)



10 - 6 - 6 FRONT UNIT CIRCUIT DIAGRAM (Type 370 Europe version)



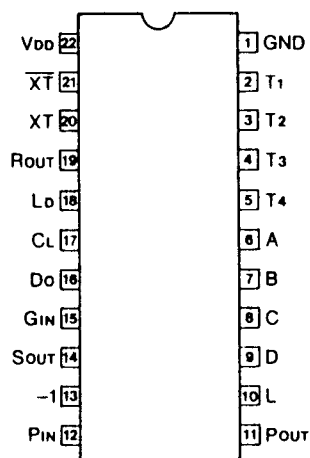
10 - 6 - 7 FRONT UNIT CIRCUIT DIAGRAM (Type 370 Holland/France version)



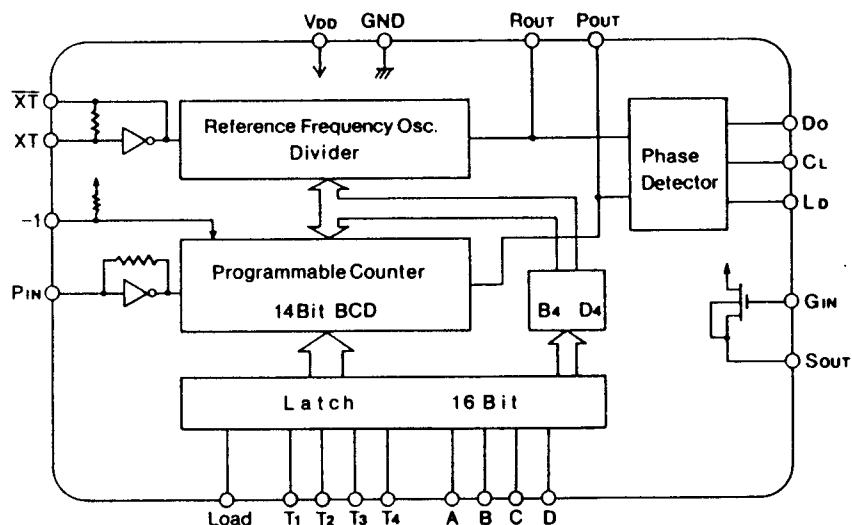
SECTION 11 IC RATINGS

TC-9123P (FM/AM SYNTHESIZER TUNER PLL)

PIN CONNECTION



BLOCK DIAGRAM



MAXIMUM RATINGS

ITEM	SYMBOL	RATING	UNIT
Power Supply Voltage	VDD	-0.3 ~ 9.0	V
Input Voltage	VIN	-0.3 ~ VDD +0.3	V
Operation Temperature	TOPR	-30 ~ +70	°C
Storage Temperature	TSTG	-55 ~ +125	°C

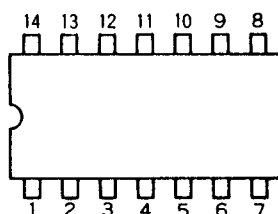
TC4011 (QUAD 2-INPUT POSITIVE NAND GATE)

TC4013 (DUAL D-TYPE FLIP FLOP)

TC4069 (HEX INVERTER)

TC4081 (QUAD 2-INPUT POSITIVE AND GATE)

PIN CONNECTION



MAXIMUM RATINGS

ITEM	SYMBOL	RATING	UNIT
Power Supply Voltage	VDD	Vss -0.5 ~ Vss +20	V
Input Voltage	VIN	Vss -0.5 ~ VDD +0.5	V
Output Voltage	VOUT	Vss -0.5 ~ VDD +0.5	V
Input Current	IIN	±10	mA
Power Dissipation	PD	300	mW
Storage Temperature	TSTG	-65 ~ +150	°C
Lead Temperature/time	TSQL	260°C · 10sec.	

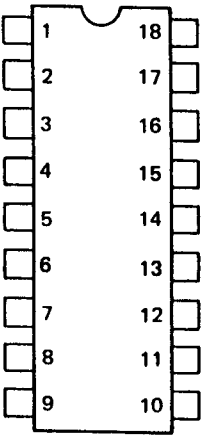
μPD2834C (PLL FREQUENCY SYNTHESIZER)

MAXIMUM RATINGS (Ta = 25°C)

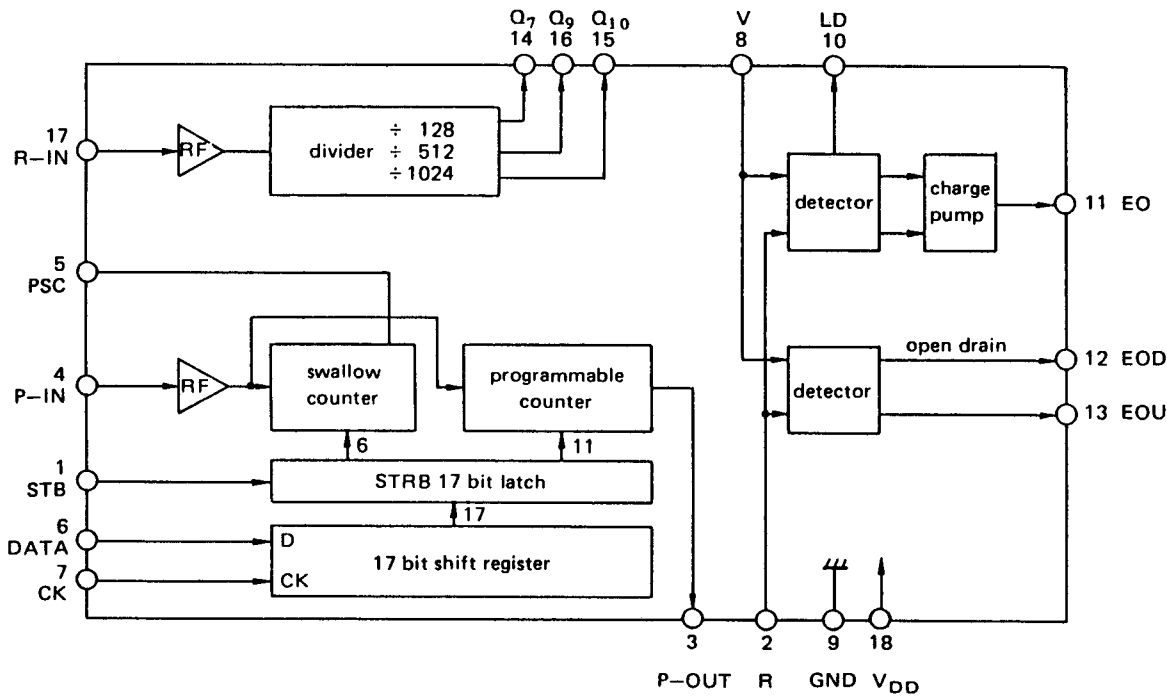
ITEM	SYMBOL	RATING	UNIT
Supply Voltage	VDD	-0.3 ~ +7.0	V
Input Voltage	VIN	-0.5 ~ +VDD +0.5	V
Output Voltage	VOUT	-0.5 ~ +VDD +0.5	V
Output Voltage *	VOUT	-0.5 ~ +VDD +3.0	V
Operating Temperature	TOPR	-40 ~ +85	°C
Storage Temperature	TSTR	-65 ~ +150	°C

* EOU pin only

PIN CONNECTION



BLOCK DIAGRAM

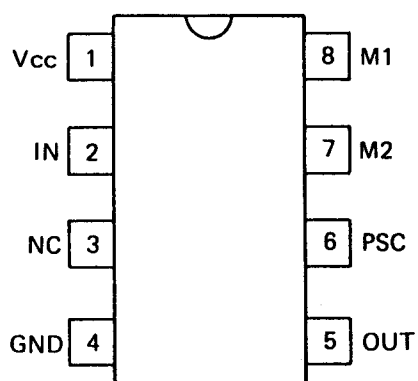


μPB571C (LOW POWER PRESCALER)

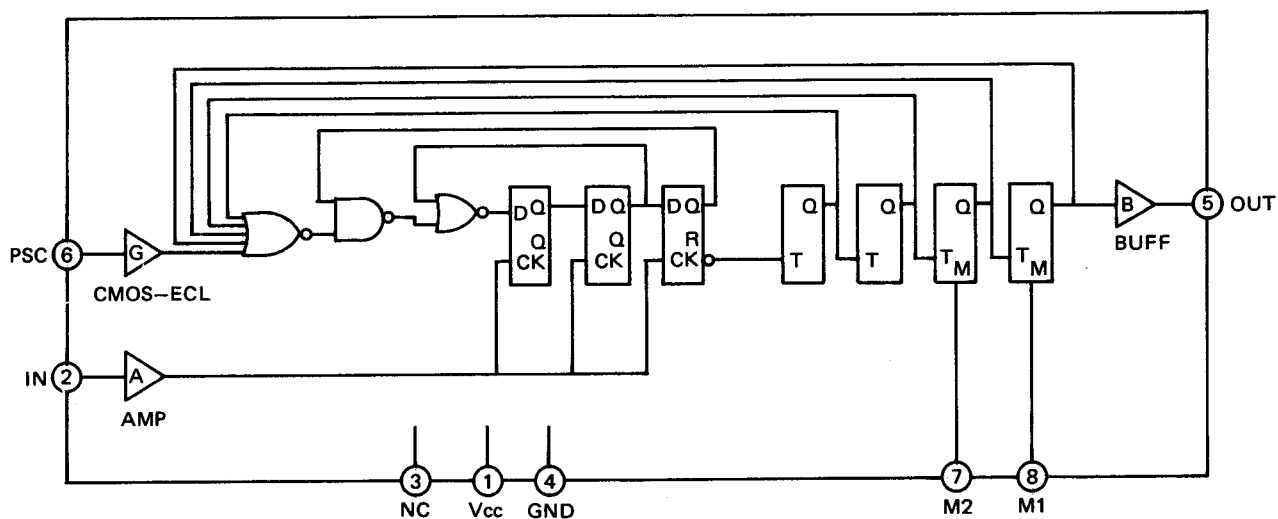
MAXIMUM RATINGS (Ta = 25°C)

ITEM	SYMBOL	RATING	UNIT
Supply Voltage (MAX)	V _{CC}	-0.5 ~ +6.0	V
Input Voltage	V _{IN}	-0.5 ~ +V _{CC} +0.5	V
Output Current	I _O	-10	mA
Storage Temperature	T _{STG}	-55 ~ +125	°C

PIN CONNECTION



BLOCK DIAGRAM



When M1 and M2 are Hi (V_{CC}), FF is equal to buffer.

MB3756 (VOLTAGE REGULATOR W/OUTPUT-SELECTOR)

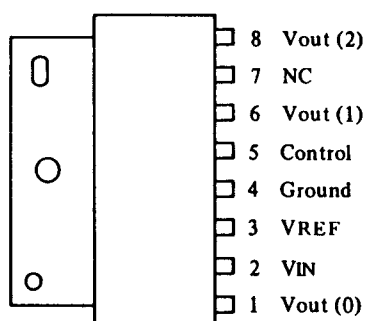
MAXIMUM RATINGS

ITEM	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{IN}	18	V
Power Dissipation	P _D	1*	W
		4**	W
Operation Temperature	T _{OP}	-30 ~ +80	°C
Storage Temperature	T _{STG}	-55 ~ +150	°C

* NO Heat Sink T_A ≤ 70°C

** Infinite Heat Sink T_A ≤ 70°C

PIN CONNECTION



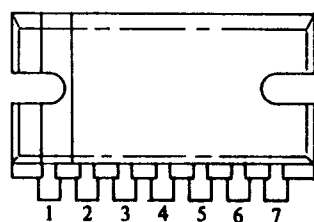
μPC1181H3 (5.8W AF POWER AMPLIFIER)

MAXIMUM RATINGS

ITEM	SYMBOL	RATING	UNIT
Power Supply Voltage (Surge)	V _{cc} 1 (200mS)	40	V
Power Supply Voltage (No-signal)	V _{cc} 1	25	V
Power Supply Voltage (Operation)	V _{cc} 2	18*	V
Circuitry Current	I _{cc} (peak)	45	A
Power Dissipation	P _D	12	W
Operation Temperature	T _{OPR}	-30 ~ +75*	°C
Storage Temperature	T _{STG}	-40 ~ +125	°C

* With 100mm x 100mm x 1mm aluminum heat sink

PIN CONNECTION



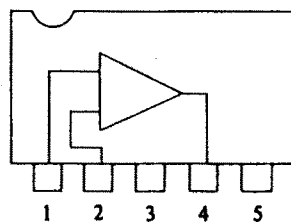
1. Input
2. Ripple filter
3. N. F. B.
4. Ground
5. Output
6. Bootstrap
7. Vcc

BA401 (FM/IF LIMITER)

MAXIMUM RATINGS

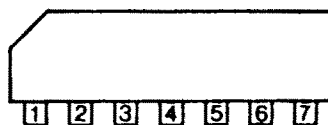
ITEM	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{cc}	15	V
Output Voltage	V _{OUT}	24	V
Input Voltage	V _{IN}	±3	V
Operation Temperature Range	TOPR	−25 ~ +75	°C
Storage Temperature Range	TSTG	−55 ~ +125	°C

BLOCK DIAGRAM



μPC577H (FM-IF AMPLIFIER)

PIN CONNECTION

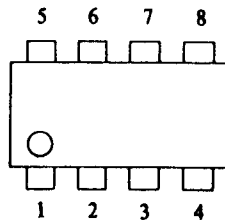


MAXIMUM RATINGS

ITEM	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{cc}	15	V
Terminal-Terminal Voltage	V _{IN}	±3.0	V
Power Dissipation	P _D	300	mW
Operation Temperature	TOPT	−20 ~ +75	°C
Storage Temperature	TSTG	−40 ~ +125	°C

NJM4558D (DUAL LOW NOISE AMP.)

PIN CONNECTION

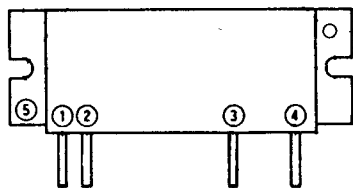


MAXIMUM RATINGS

ITEM	SYMBOL	RATING	UNIT
Power Supply Voltage	VDD	18	V
Input Voltage	V _{IN}	15	V
Operation Temperature Range	TOPT	-20 ~ +75	°C
Storage Temperature Range	TSTG	-40 ~ +125	°C

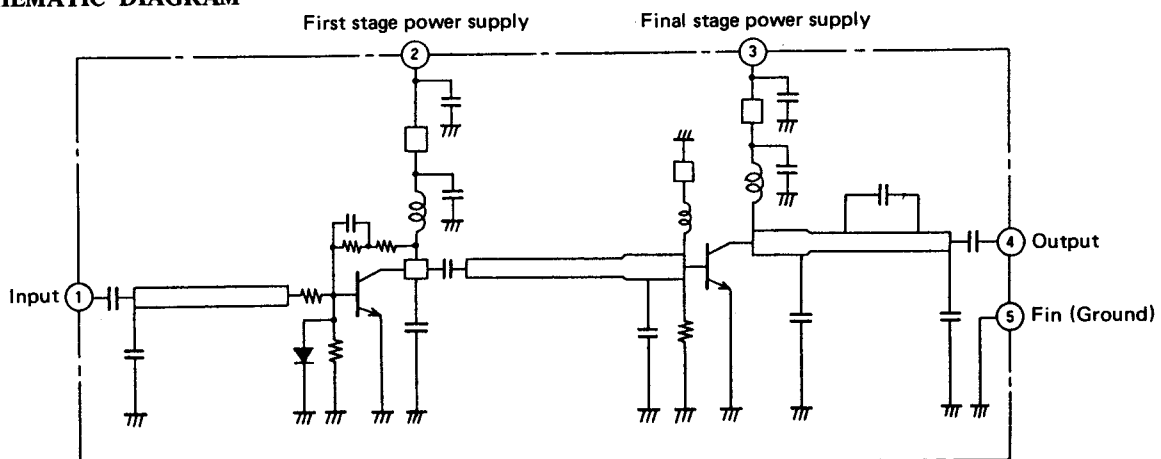
M57710-A (156 ~ 160MHz 25W FM POWER MODULE)

PIN CONNECTION



- 1 Input
- 2 First stage power supply
- 3 Final stage power supply
- 4 Output
- 5 Fin (Ground)

SCHEMATIC DIAGRAM

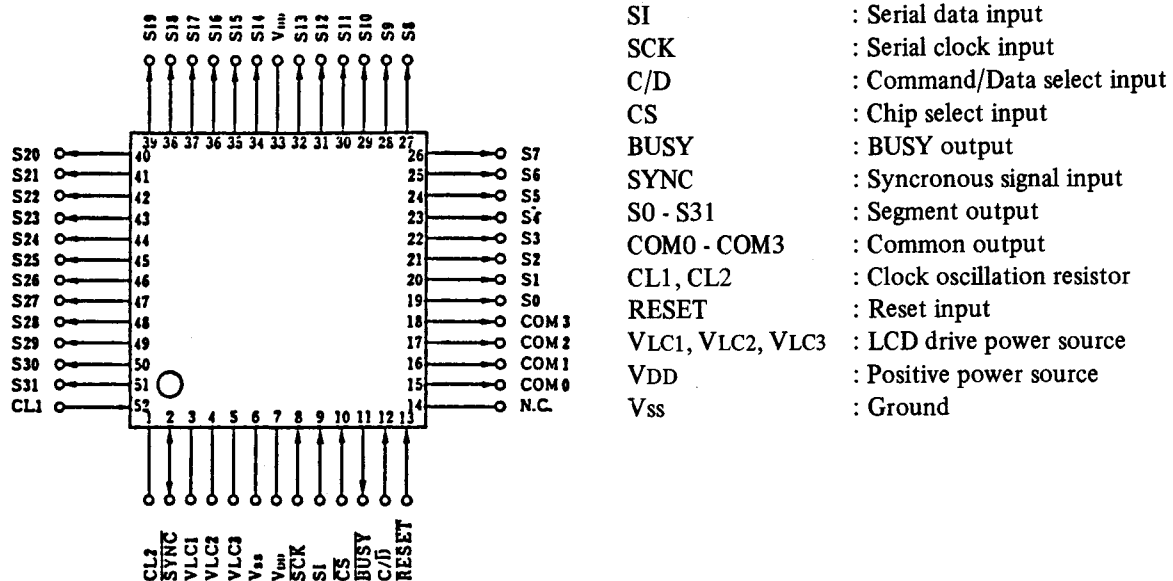


MAXIMUM RATINGS

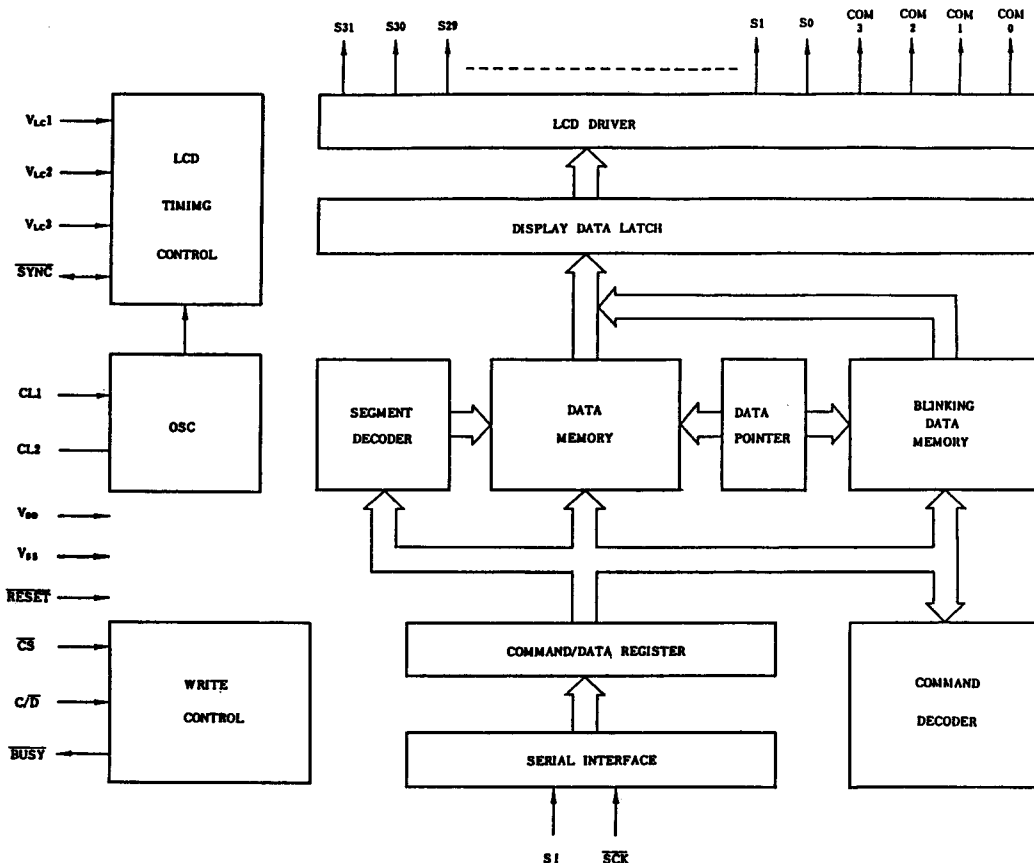
ITEM	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{cc}	17	V
Consumption Current	I _{cc}	7	A
Power Output	P _{o(max)}	40	W
Power Input	P _{in(max)}	0.4	W
Operation Temperature	T _{o(op)}	-30 ~ +110	°C
Storage Temperature	TSTG	-40 ~ +110	°C

μPD7225G (LCD CONTROLLER/DRIVER)

PIN CONNECTION



BLOCK DIAGRAM

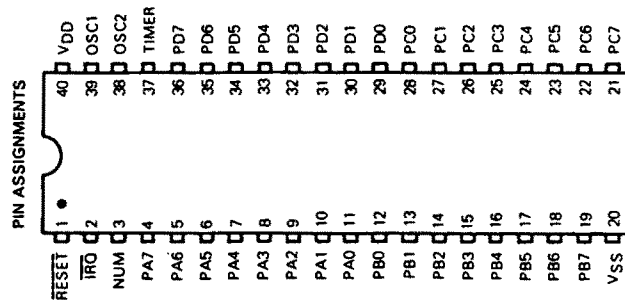


MAXIMUM RATINGS

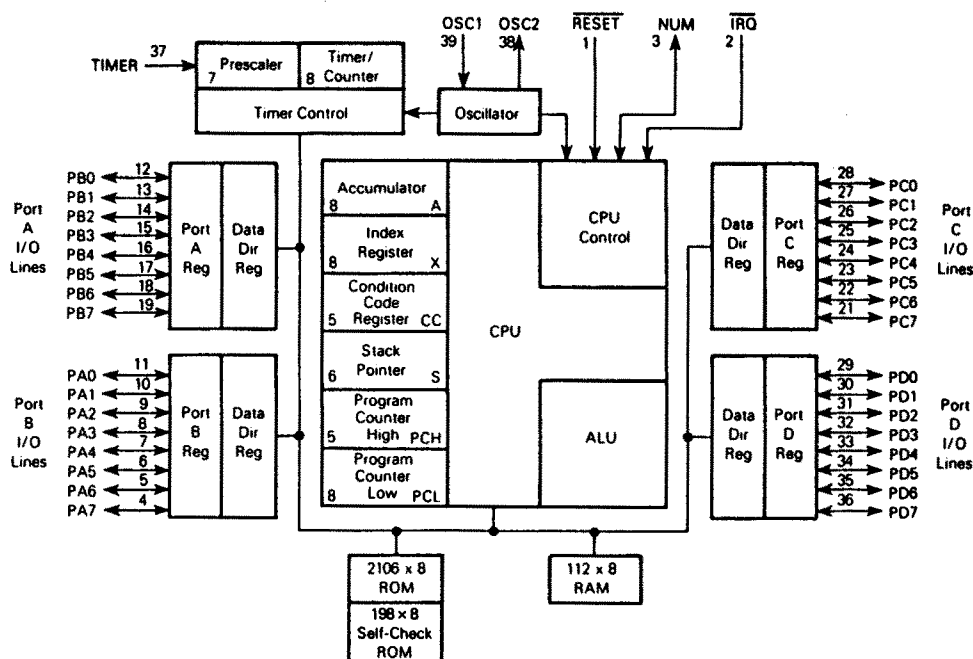
ITEM	SYMBOL	RATING	UNIT
Power Supply Volting	VDD	-0.3 ~ +7.0	V
Input Voltage	V _I	-0.3 ~ VDD +0.3	V
Output Voltage	V _O	-0.3 ~ VDD +0.3	V
Operation Temperature	TOPT	-10 ~ +70	°C
Storage Temperature	TSTG	-65 ~ +150	°C

MC146805G2 (C MOS 8-BIT MICROCOMPUTER UNIT)

PIN CONNECTION



BLOCK DIAGRAM



MAXIMUM RATINGS (Voltages Reterenced to Vss)

ITEM	SYMBOL	RATING	UNIT
Supply Voltage	VDD	-0.3 ~ +8.0	V
All Input Voltages Except OSC1	VIN	Vss -0.5 ~ VDD +0.5	V
Current Drain Per Pin Excluding VDD and Vss	I	10	mA
Operating Temperature Range	TA	0 ~ +70	°C
Storage Temperature Range	TSTG	-55 ~ +150	°C
Current Drain Total (PD4 - PD7 only)	IOH	40	mA

SECTION 12 PARTS LIST

12-1 PARTS LIST FOR TYPE 225

[FRONT UNIT]

REF. NO.	DESCRIPTION	PART NO.
DF1	Diode	1SS53
DF2	Diode	1SS53
DF3	See page 12 - 2	
DF4	See page 12 - 2	
DF5	Diode	1SS53
DF6	Diode	1SS53
DF7	See page 12 - 2	
DF8	See page 12 - 2	
DF9	Diode	1SS53
DF10	Diode	1SS53
DF11	Diode	1SS53
DF12	Diode	1SS53
DF13	Diode	1SS53
DF14	See page 12 - 2	
DF15	Diode	1SS53
DF16	See page 12 - 2	
DF18	See page 12 - 2	
DF19	See page 12 - 2	
DF21	See page 12 - 2	
DF22	See page 12 - 2	
DF23	See page 12 - 2	
ICF1	See page 12 - 2	
QF1	See page 12 - 2	
QF2	See page 12 - 2	
CF1	See page 12 - 2	
CF2	See page 12 - 2	
CF3	See page 12 - 2	
CF4	See page 12 - 2	
CF5	See page 12 - 2	
CF6	See page 12 - 2	
CF7	Barrier Lay	0.1 25V
PF1	Connector	TL-25H-10-B1
PF2	Connector	TL-25H-05-B1
PF3	Connector	TL-25H-12-B1
PF4	Connector	TL-25H-04-B1
PF5	Connector	TL-25H-08-B1
SPF1	Speaker	66F09N-A20129 8Ω
SF1	Rotary Switch	SRB181-00 2KC
SF2	Switch	SUT111A7
SF3	Switch	SUT111A7
SF4	Switch	SUT111A7
SF5	Switch	SUT111A6
SF6	See page 12 - 2	
SF7	Switch	SUT111A7
SF8	See page 12 - 2	
SF9	See page 12 - 2	
SF10	See page 12 - 2	
SF11	See page 12 - 2	
RF1	Variable Resistor	K1611 10K B
RF2	Variable Resistor	K12212 10K A
RF3	See page 12 - 2	
RF4	See page 12 - 2	

[FRONT UNIT]

REF. NO.	DESCRIPTION	PART NO.
RF5	See page 12 - 2	
RF6	See page 12 - 2	
RF7	See page 12 - 2	
RF8	See page 12 - 2	
RF9	See page 12 - 2	
RF10	See page 12 - 2	
RF11	See page 12 - 2	
RF12	See page 12 - 2	
RF13	See page 12 - 2	
BF1	P.C. Board	B-611B (42239)

[EF UNIT]

REF. NO.	DESCRIPTION	PART NO.
MC1	See page 12 - 2	

[DISPLAY UNIT]

REF. NO.	DESCRIPTION	PART NO.
ICD1	IC	μPD7225G
DSD1	See page 12 - 2	
DSD2	Lamp	HRS-3110A
DSD3	Lamp	HRS-3110A
RD1	Resistor	560K R10
BD1	PC. Board	B-612A (42240)
JD1	Connector	HBRB17S-1J
JD2	Connector	HBRB17S-1J
PD1	Connector	TL-25H-09-B1

[FRONT UNIT]

REF. NO.	DESCRIPTION	USA version (White)	USA version (Gray)	UK version	HOLLAND version	EUROPE version
DF3	Diode	1SS53	1SS53	1SS53	—	1SS53
DF4	Diode	1SS53	1SS53	1SS53	—	1SS53
DF7	Diode	1SS53	1SS53	1SS53	—	1SS53
DF8	Diode	1SS53	1SS53	1SS53	—	1SS53
DF14	Diode	1SS53	1SS53	1SS53	—	1SS53
DF16	Diode	1SS53	1SS53	1SS53	—	1SS53
DF18	Diode	1SS53	1SS53	—	—	—
DF19	Diode	1SS53	1SS53	—	—	—
DF21	Diode	—	—	1SS53	1SS53	1SS53
DF22	Diode	1SS53	1SS53	—	—	—
DF23	Diode	1SS53	1SS53	—	—	—
ICF1	IC	TC4011BP	TC4011PB	—	—	—
CF1	Electrolytic	1. 50V BP (5φ)	1. 50V BP (5φ)	—	—	—
CF2	Barrier Lay	0.01 25V	0.01 25V	—	—	—
CF3	Barrier Lay	0.047 25V	0.047 25V	—	—	—
CF4	Ceramic	0.001 50V B	0.001 50V B	—	—	—
CF5	Ceramic	0.001 50V B	0.001 50V B	—	—	—
CF6	Electrolytic	—	—	470 16V	—	—
SF6	Switch	SUT111A6 (SELF-LOCK)	SUT111A6 (S)	SUT111A6 (S)	—	SUT111A6 (S)
SF8	Switch	SUT111A7 (NON-LOCK)	SUT111A7 (N)	SUT111A7 (N)	KHH-10902	SUT111A7 (N)
SF9	Switch	SUT111A7 (NON-LOCK)	SUT111A7 (N)	SUT111A7 (N)	—	SUT111A7 (N)
SF10	Switch	SUT111A7 (NON-LOCK)	SUT111A7 (N)	SUT111A7 (N)	—	SUT111A7 (N)
SF11	Switch	SUT110C2 (SELF-LOCK)	SUT110C2 (S)	SUT110C2 (S)	—	SUT110C2 (S)
QF1	Transistor	2SC2458	2SC2458	2SC2458	—	2SC2458
QF2	Transistor	2SC1015	2SA1015	—	—	—
RF3	Resistor	100K ELR10	100K ELR10	—	—	—
RF4	Resistor	220K ELR10	220K ELR10	—	—	—
RF5	Resistor	47K R10	47K R10	—	—	—
RF6	Resistor	220K R10	220K R10	220K R10	—	220K R10
RF7	Resistor	22K R25	22K R25	22K R25	—	22K R25
RF8	Resistor	4.7K R25	4.7K R25	4.7K R25	—	4.7K R25
RF9	Resistor	100K ELR25	100K ELR25	—	—	—
RF10	Jumper	JPW-02A	JPW-02A	JPW-02A	—	JPW-02A
RF11	Resistor	47K ELR25	47K ELR25	—	—	—
RF12	Variable	—	—	—	VM10A528A- 10KB	—
PF6	Connector	SMF-01T-1.3	SMF-01T-1.3	—	—	—
PF7	Connector	—	—	SMF-01T-1.3	SMF-01T-1.3	SMF-0.1T-1.3

[EF UNIT]

REF. NO.	DESCRIPTION	USA version (White)	USA version (Gray)	UK version	HOLLAND version	EUROPE version
MC1	Microphone	MC-27	MC-29 (IC-HM18)	MC-29 (IC-HM18)	MC-29 (IC-HM18)	MC-27

[DISPLAY UNIT]

REF. NO.	DESCRIPTION	USA version (White)	USA version (Gray)	UK version	HOLLAND version	EUROPE version
DSD1	LCD	HLM9053-01- 030	HLM9053-01- 030	HLM9053-01- 030	HLM9053-01- 020	HLM9053-01- 030

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.
ICM1	IC	BA401
ICM2	IC	MJM4558D
ICM3	IC	μPC1181H
ICM4	IC	MB3756
ICM5	IC	μPC577H
QM1	Transistor	2SC2053
QM2	FET	3SK74
QM3	FET	2SK241Y
QM4	FET	2SK241Y
QM5	Transistor	2SC945P
QM6	Transistor	2SC945P
QM7	Transistor	2SC945P
QM8	Transistor	2SB596Y
QM9	Transistor	2SD468
QM10	Transistor	2SC945P
QM11	Transistor	2SC945P
QM12	Transistor	2SC945P
QM13	Transistor	2SC945P
QM14	Transistor	2SC3399
QM15	Transistor	2SC945P
QM16	Transistor	2SC945P
QM17	Transistor	2SC945P
QM18	Transistor	2SC945P
QM19	Transistor	2SC945P
QM20	Transistor	2SC945P
QM21	Transistor	2SC945P
QM22	FET	2SK49H2
QM23	FET	2SK49H2
QM24	FET	3SK48
QM25	FET	2SK241GR
QM26	Transistor	2SC3402
DM1	Diode	1S1555
DM2	Diode	1SS53
DM3	Varactor Diode	1S2688 ES
DM4	Diode	1SS53
DM5	Diode	1SS53
DM7	Diode	1N60
DM8	Diode	1N60
DM9	Diode	1S953
DM10	Diode	1N60
DM11	Diode	1N60
DM12	Varactor Diode	1S2090
DM13	Varactor Diode	1S2090
DM14	Varactor Diode	1S2090
DM17	Diode	1SS53
DM20	Diode	MC301
DM21	Diode	MC301
DM22	See page 12 - 6	
DM23	Diode	1SS53
(DM43)	Diode	1SS53
FIM1	MC	21M15B
FIM2	Ceramic	CFL-455E
FIM3	Ceramic	CFU455D2
DSM1	Ceramic Discriminator	455D
XM1	Crystal	21.40MHz HC-18/u
XM2	Crystal	20.945MHz HC-18/u
LM1	Coil	LA-71
LM2	Coil	LA-71

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.
LM3	Coil	LR-132
LM4	Coil	LS-73
LM5	Coil	LS-73
LM6	Coil	LS-73
LM7	Coil	LS-73
LM8	Coil	LR-134
LM9	Coil	LS-66
LM10	Choke	LB4 5R1 J
LM11	Choke	L4 1R2
LM12	Coil	LS-103
LM13	Choke	LW-15
LM14	Choke	L4 102
LM15	Coil	LS-116
LM16	Coil	LS-116
LM17	Coil	LS-73
LM18	Coil	LS-73
LM19	Coil	LS-73
LM20	Coil	LS-22
LM21	Coil	LS-22
LM22	Choke	LW-19
RM1	Resistor	47 ELR25
RM2	Resistor	1.8K ELR25
RM3	Resistor	47 ELR25
RM4	Resistor	22K ELR25
RM5	Resistor	22K R25
RM6	Resistor	100 R25
RM7	Trimmer	470 H0651A
RM8	Resistor	4.7K ELR25
RM10	Resistor	470 R25
RM11	Resistor	10 ELR25
RM12	Resistor	2.2K ELR25
RM13	Resistor	22K ELR25
RM14	Resistor	22K ELR25
RM15	Resistor	2.2K ELR25
RM16	Resistor	22K ELR25
RM17	Resistor	3.3K ELR25
RM18	Resistor	4.7K ELR25
RM19	Resistor	22K ELR25
RM20	Resistor	4.7K ELR25
RM21	Thermistor	23D29
RM22	Resistor	220K ELR25
RM23	See page 12 - 6	
RM24	Resistor	15K ELR25
RM25	Trimmer	1K H0651A
RM26	Thermistor	33D28
RM27	Resistor	100 ELR25
RM28	Resistor	47 ELR25
RM29	Resistor	5.6K ELR25
RM30	Resistor	5.6K ELR25
RM31	Resistor	2.2K ELR25
RM32	Resistor	22K ELR25
RM33	Resistor	220K ELR25
RM34	Resistor	4.7K ELR25
RM35	Resistor	10K ELR25
RM36	Resistor	47 ELR25
RM37	Resistor	470K ELR25
RM38	Resistor	47K ELR25
RM39	Resistor	10K ELR25
RM40	Resistor	3.3K H0651A
RM41	Resistor	270 R50
RM42	Resistor	10K ELR25
RM43	Resistor	4.7K ELR25
RM44	Resistor	100K ELR25

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.
RM45	Resistor	22K ELR25
RM46	Resistor	3.3K ELR25
RM47	Resistor	4.7K ELR25
RM48	Thermistor	35D45
RM49	Resistor	100 ELR25
RM50	Resistor	4.7K ELR25
RM51	Trimmer	1K H0651A
RM52	Trimmer	33K H0651A
RM53	Resistor	100K ELR25
RM56	Jumper	JPW-02H
RM57	Resistor	10K ELR25
RM58	Resistor	2.2 ELR25
RM59	Resistor	47K ELR25
RM60	Jumper	JPW-02H
RM61	Resistor	15K ELR25
RM62	Resistor	2.2K ELR25
RM63	Resistor	47K ELR25
RM64	Resistor	10K ELR25
RM67	Resistor	4.7K ELR25
RM68	Resistor	1K ELR25
RM69	Resistor	4.7K ELR25
RM70	Resistor	22K ELR25
RM72	Resistor	470 ELR25
RM73	Resistor	22K ELR25
RM74	Resistor	3.3K ELR25
RM75	Resistor	100 ELR25
RM76	Resistor	47K ELR25
RM77	Resistor	18K ELR25
RM78	Resistor	150K ELR25
RM79	Resistor	39K ELR25
RM80	Resistor	1K ELR25
RM81	Resistor	4.7K ELR25
RM82	Resistor	4.7K ELR25
RM83	Resistor	5.6K ELR25
RM84	Resistor	5.6K ELR25
RM85	Resistor	100 ELR25
RM86	Resistor	5.6K ELR25
RM87	Resistor	47K ELR25
RM88	Resistor	2.2K R25
RM89	Resistor	100K ELR25
RM90	Resistor	1K ELR25
RM91	Resistor	3.3K ELR25
RM92	Resistor	10K ELR25
RM93	Resistor	10K ELR25
RM94	Resistor	1K ELR25
RM95	Resistor	1.5K ELR25
RM96	Resistor	220 ELR25
RM97	Resistor	1.5K ELR25
RM98	Resistor	68K ELR25
RM99	Resistor	1.5K ELR25
RM100	Resistor	4.7K ELR25
RM101	Resistor	68K ELR25
RM102	Resistor	1.5K ELR25
RM103	Resistor	2.2K ELR25
RM104	Resistor	220 R25
RM105	Resistor	1K ELR25
RM106	Resistor	4.7K ELR25
RM107	Resistor	100 ELR25
RM108	Resistor	220 ELR25
RM109	Resistor	100 ELR25
RM110	Resistor	100K ELR25
RM111	Resistor	100K ELR25
RM112	Resistor	100K ELR25
RM115	Resistor	2.2 ELR25

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.
RM117	Resistor	4.7K ELR25
RM118	Resistor	10K ELR25
RM119	Resistor	4.7K ELR25
RM120	Jumper	JPW-02H
RM122	Resistor	100 ELR25
RM123	Resistor	4.7K ELR25
RM125	See page 12 - 6	
RM126	Resistor	220 R25
RM127	Resistor	1K ELR25
RM128	Resistor	2.2K R25
RM129	Resistor	2.2K ELR25
RM130	Resistor	2.7K ELR25
RM131	Thermistor	33D28
RM132	Resistor	470 ELR25
RM134	See page 12 - 6	
RM135	See page 12 - 6	
RM137	See page 12 - 6	
RM138	Jumper	JPW-02A
RM140	Jumper	JPW-02H
RM145	Jumper	JPW-02H
RM147	Resistor	47K ELR25
RM148	See page 12 - 6	
RM149	Resistor	22K ELR25
RM150	Resistor	2.2K ELR25
RM151	Jumper	JPW-02A
RM152	See page 12 - 6	
RM153	Jumper	JPW-02A
RM154	See page 12 - 6	
RM156	Resistor	1K ELR25
RM157	Resistor	220K ELR25
RM159	Resistor	15K ELR25
RM160	See page 12 - 6	
RM161	Resistor	22K R10
RM162	Resistor	470K R10
CM1	Ceramic	22P 50V SL
CM2	Trimmer	CV05D2001
CM3	Ceramic	0.0047 50V B
CM4	Ceramic	0.0047 50V B
CM5	Ceramic	100P 50V SL
CM6	Ceramic	7P 50V SL
CM7	Ceramic	0.0047 50V B
CM8	Electrolytic	22 10V
CM9	Ceramic	0.0047 50V B
CM10	Ceramic	0.001 50V B
CM11	Ceramic	7P 50V CH
CM12	Ceramic	1P 50V CH
CM13	Ceramic	1P 50V CH
CM14	Ceramic	7P 50V CH
CM15	Ceramic	7P 50V CH
CM16	Ceramic	10P 50V CH
CM17	Ceramic	0.0047 50V B
CM19	Ceramic	7P 50V CH
CM20	Ceramic	0.001 50V B
CM21	Ceramic	0.001 50V B
CM22	Ceramic	33P 50V SL
CM23	Ceramic	33P 50V SL
CM24	Ceramic	0.001 50V B
CM25	Ceramic	0.0047 50V B
CM26	Ceramic	22P 50V SL
CM27	Ceramic	0.0047 50V B
CM28	Ceramic	0.001 50V B
CM29	Ceramic	100P 50V XL
CM30	Ceramic	100P 50V XL

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.	
CM31	Electrolytic	10	16V
CM33	Ceramic	5P	50V CH
CM34	Mylar	0.01	50V K
CM35	Mylar	0.0047	50V K
CM36	Barrier Lay	0.1	25V
CM37	Barrier Lay	0.047	25V
CM38	Electrolytic	10	16V
CM39	Mylar	0.0033	50V K
CM40	Mylar	0.01	50V K
CM41	Mylar	0.01	50V K
CM42	Mylar	0.1	50V K
CM43	Electrolytic	4.7	10V
CM44	See page 12 - 6		
CM45	Electrolytic	10	16V
CM46	Mylar	0.01	50V K
CM48	Electrolytic	4.7	25V
CM49	Electrolytic	10	16V
CM50	Ceramic	0.001	50V B
CM51	Ceramic	0.001	50V B
CM52	Electrolytic	22	16V
CM53	Ceramic	0.001	50V B
CM54	Ceramic	0.0047	50V B
CM55	Ceramic	0.0047	50V B
CM57	Mylar	0.1	50V K
CM58	Electrolytic	470	10V MS
CM59	Electrolytic	47	10V
CM60	Electrolytic	10	16V MS7
CM61	Electrolytic	4.7	25V
CM62	Electrolytic	33	10V MS
CM63	Electrolytic	470	16V MS
CM64	Electrolytic	0.22	50V RC2
CM65	Electrolytic	2.2	50V
CM66	Electrolytic	4.7	25V
CM67	Electrolytic	10	16V
CM68	Electrolytic	2.2	50V
CM69	Electrolytic	10	16V
CM70	Electrolytic	4.7	25V
CM71	Barrier Lay	0.047	25V
CM72	Mylar	0.01	50V B
CM73	Electrolytic	47	10V
CM74	Mylar	0.056	50V K
CM75	Electrolytic	0.47	50V
CM77	Mylar	0.022	50V K
CM78	Mylar	0.001	50V K
CM79	Mylar	0.039	50V K
CM80	Electrolytic	0.22	50V RC2
CM81	Electrolytic	10	25V
CM82	Mylar	0.01	50V K
CM83	Mylar	0.01	50V K
CM84	Electrolytic	10	16V
CM85	Ceramic	0.0047	50V B
CM86	Trimmer	CV05D2001	
CM87	Dip Mica	15P	50V
CM88	Dip Mica	100P	50V
CM89	Dip Mica	47P	50V
CM90	Ceramic	3P	50V SL
CM91	Ceramic	0.0047	50V B
CM92	Mylar	0.001	50V K
CM93	Barrier Lay	0.1	25V
CM94	Electrolytic	10	16V
CM95	Barrier Lay	0.1	25V
CM96	Barrier Lay	0.1	25V
CM97	Barrier Lay	0.1	25V
CM98	Barrier Lay	0.1	25V

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.	
CM99	Electrolytic	22	10V MS9
CM100	Ceramic	0.001	50V B
CM101	Ceramic	8P	50V SL
CM102	Ceramic	0.0047	50V B
CM103	Ceramic	0.0047	50V B
CM104	Ceramic	0.001	50V
CM105	Cylinder	1P	50V
CM106	Cylinder	1P	50V
CM107	Ceramic	0.001	50V B
CM108	Ceramic	18P	50V CH
CM109	Ceramic	18P	50V CH
CM110	Ceramic	18P	50V CH
CM111	Ceramic	0.0047	50V B
CM113	Ceramic	13P	50V CH
CM115	Ceramic	13P	50V CH
CM116	Cylinder	2.2P	50V
CM117	Ceramic	0.001	50V
CM118	See page 12 - 6		
CM119	Ceramic	0.0047	50V B
CM120	Barrier Lay	0.1	25V
CM124	See page 12 - 6		
CM125	Ceramic	0.001	50V B
CM126	Ceramic	220P	50V SL
CM127	Ceramic	0.0047	50V B
CM129	Ceramic	0.0047	50V B
CM131	Ceramic	0.0047	50V
CM132	Barrier Lay	0.047	25V
CM133	Ceramic	0.0047	50V B
CM134	Ceramic	5P	50V
CM135	See page 12 - 6		
CM136	See page 12 - 6		
CM137	Ceramic	0.0047	50V
CM138	Ceramic	0.0047	50V
CM139	Ceramic	0.0047	50V
CM140	Ceramic	0.0047	50V
CM141	Ceramic	0.0047	50V
CM143	Ceramic	6P	50V
CM144	Barrier Lay	0.1	25V
CM145	Barrier Lay	0.1	25V
CM146	Barrier Lay	0.1	25V
CM146	Ceramic	15P	50V
CM147	Ceramic	220P	50V
RLM1	See page 12 - 6		
JM1	Connector	TMP-J01X-V1	
JM2	Connector	TMP-J01X-V1	
JM4	See page 12 - 6		
JM5	Connector	TL-25P-12-V1	
JM6	Connector	TL-25P-04-V1	
JM7	Connector	TL-25P-07-V1	
JM8	Connector	TL-25P-09-V1	
PM1	Connector	TMP-P01X-A1	
PM2	Connector	TL-25H-02-B1	
CPM1	Check point	RT-01T-1.0B	
BM1	PC. Board	B-602E (42196)	

[MAIN UNIT]

REF. NO.	DESCRIPTION	USA version (White)	USA version (Gray)	UK version	HOLLAND version	EUROPE version
DM22	Diode	1N60	1N60	_____	_____	_____
RM23	Resistor	_____	_____	10 R25	10 R25	10 R25
RM125	Resistor	4.7K ELR25	4.7K ELR25	_____	_____	_____
RM134	Resistor	22K ELR25	22K ELR25	_____	_____	_____
RM135	Trimmer	10K H0651A	10K H0651A	_____	_____	_____
RM137	Resistor	3.3K R25	3.3K R25	3.3K R25	3.3K R25	3.3K R25
RM148	Resistor	22K ELR25	22K ELR25	_____	_____	_____
RM152	Jumper	JPW-02A	JPW-02A	_____	_____	_____
RM154	Jumper	JPW-02A	JPW-02A	_____	_____	_____
RM160	Resistor	_____	1K R25	1K R25	1K R25	_____
CM44	Barrier Lay	0.033 25V	0.033 25V	_____	_____	_____
CM118	Ceramic	0.001 50V B	0.001 50V B	_____	_____	_____
CM124	Ceramic	470P 50V SL	470P 50V SL	_____	_____	_____
CM135	Ceramic	0.0047 50V B	0.0047 50V B	_____	_____	_____
CM136	Ceramic	0.0047 50V B	0.0047 50V B	_____	_____	_____
RLM1	Relay	FBR221D009	FBR221D009	_____	_____	_____
JM4	Connector	TL-25P-06-V1	TL-25P-06-V1	_____	_____	_____

[PLL-LOGIC UNIT] (PLL)

REF. NO.	DESCRIPTION	PART NO.
ICP1	IC	TC9123P
ICP2	IC	78L09
QP1	Transistor	2SC1815 GR
QP3	Transistor	2SC763 C
QP4	FET	3SK74 M
QP5	FET	2SK30A Y
QP6	Transistor	2SC1815 GR
QP7	FET	2SK192A GR
QP8	Transistor	2SC763 C
QP9	Transistor	2SC763 C
QP10	Transistor	2SC763 C
QP11	Transistor	2SC383 TM
QP12	FET	2SK30A Y
DP1	Varactor Diode	1SV50 (1) E
DP2	Zener Diode	XZ072
XP1	Crystal	6.40MHz HC-18/u
XP2	Crystal	43.0875MHz HC-43/u
LP1	Choke	EL0810SKI 101K
LP2	Choke	EL0810SKI 5R6K
LP3	Choke	L4 100J
LP4	Coil	LB-132
LP5	Choke	LW-19
LP6	Choke	LW-19
LP7	Coil	LS-145
LP8	Coil	LS-134
LP9	Coil	LS-145
LP10	Coil	LS-145
RP1	Resistor	100 R25
RP2	Resistor	1K ELR25
RP3	Resistor	47K ELR25

[PLL-LOGIC UNIT] (PLL)

REF. NO.	DESCRIPTION	PART NO.
RP4	Resistor	100 ELR25
RP5	Resistor	1K ELR25
RP6	Jumper	JPW-02H
RP8	Resistor	470 ELR25
RP9	Resistor	47 ELR25
RP10	Resistor	68K ELR25
RP11	Resistor	100 ELR25
RP12	Resistor	470 ELR25
RP13	Resistor	220 ELR25
RP14	Resistor	1K ELR25
RP15	Resistor	10K ELR25
RP16	Resistor	680 ELR25
RP17	Resistor	2.2K ELR25
RP18	Resistor	1K ELR25
RP19	Resistor	100 ELR25
RP20	Resistor	10K ELR25
RP21	Resistor	100 ELR25
RP22	Resistor	470K ELR25
RP23	Resistor	470K R25
RP24	Resistor	100 ELR25
RP25	Resistor	220 ELR25
RP26	Resistor	220 ELR25
RP27	Resistor	5.6K ELR25
RP28	Resistor	1.2K ELR25
RP29	Resistor	100 ELR25
RP30	Resistor	1.2K ELR25
RP31	Resistor	5.6K ELR25
RP32	Resistor	100 ELR25
RP33	Resistor	1K ELR25
RP34	Resistor	220 ELR25
RP35	Resistor	5.6K ELR25
RP36	Resistor	470 ELR25
RP37	Resistor	22K ELR25
RP38	Resistor	100 ELR25
RP39	Resistor	1K ELR25

[PLL-LOGIC UNIT] (PLL)

REF. NO.	DESCRIPTION	PART NO.	
RP40	Resistor	3.9K	R25
RP41	Resistor	22K	R10
RP42	Resistor	4.7K	ELR25
RP43	Resistor	1.2K	ELR25
RP44	Resistor	10K	ELR25
RP45	Resistor	220	R25
RP46	Resistor	1K	ELR25
RP48	Jumper	JPW-02A	
RP49	Jumper	JPW-02A	
CP1	Barrier Lay	0.1	25V
CP2	Ceramic	0.0047	50V B
CP3	Electrolytic	220	10V
CP4	Barrier Lay	0.1	25V
CP5	Electrolytic	100	10V
CP7	Barrier Lay	0.1	25V
CP8	Electrolytic	47	10V
CP10	Dip Mica	47P	50V
CP11	Dip Mica	47P	50V
CP12	Trimmer	CV05E3001	
CP13	Ceramic	0.001	50V B
CP14	Electrolytic	10	16V
CP15	Ceramic	220P	50V SL
CP16	Ceramic	0.0047	50V B
CP17	Ceramic	33P	50V SL
CP18	Ceramic	0.0047	50V B
CP19	Ceramic	33P	50V SL
CP20	Ceramic	0.0047	50V B
CP21	Electrolytic	1	50V BP
CP22	Ceramic	0.0047	50V B
CP23	Electrolytic	10	16V
CP24	Ceramic	0.0047	50V B
CP25	Electrolytic	100	10V
CP26	Barrier Lay	0.047	25V
CP27	Barrier Lay	0.047	25V
CP28	Ceramic	15P	50V SH
CP29	Ceramic	6P	50V UJ
CP30	Trimmer	CV05A0601	
CP31	Ceramic	4P	50V UJ
CP32	Ceramic	4P	50V UJ
CP33	Ceramic	10P	50V CH
CP34	Ceramic	3P	50V CH
CP35	Ceramic	5P	50V CH
CP36	Electrolytic	100	10V
CP37	Ceramic	0.0047	50V B
CP38	Ceramic	1P	50V SL
CP39	Ceramic	0.0047	50V B
CP40	Ceramic	0.0047	50V B
CP41	Ceramic	47P	50V SL
CP42	Ceramic	0.0047	50V B
CP43	Ceramic	3P	50V SL
CP44	Ceramic	0.0047	50V B
CP45	Cylinder	0.001	50V B
CP46	Ceramic	47P	50V SL
CP47	Ceramic	10P	50V SL
CP48	Ceramic	0.0047	50V B
CP49	Ceramic	0.0047	50V B
CP50	Ceramic	0.0022	50V B
CP51	Ceramic	20P	50V CH
CP52	Ceramic	0.0047	50V B
CP53	Ceramic	22P	50V SL
CP54	Ceramic	47P	50V SL
CP55	Ceramic	6P	50V SL

[PLL-LOGIC UNIT] (PLL)

REF. NO.	DESCRIPTION	PART NO.	
CP56	Ceramic	0.5P	50V SL
CP57	Ceramic	6P	50V SL
CP58	Barrier Lay	0.1	25V
CP60	Barrier Lay	0.1	25V
CP61	Ceramic	0.0047	50V B
CP62	Ceramic	0.0047	50V B
CP63	Barrier Lay	0.1	25V
CP64	Barrier Lay	0.1	16V
JP1	Connector	TMP-J01X-V1	

[PLL-LOGIC UNIT] (LOGIC)

REF. NO.	DESCRIPTION	PART NO.
ICL1	IC	TC4081 BP
ICL2	See page 12 - 9	
ICL3	IC	TC4069UBP
ICL4	See page 12 - 9	
ICL5	See page 12 - 9	
ICL6	See page 12 - 9	
ICL7	IC	MP5019
ICL8	IC	μA78L62AWC
QL1	Transistor	2SC1815GR
QL2	Transistor	2SC1815GR
QL3	Tranistor	2SD468
QL4	See page 12 - 9	
QL5	See page 12 - 9	
QL6	See page 12 - 9	
QL7	See page 12 - 9	
DL1	Diode	1SS53
DL2	Diode	1SS53
DL3	Diode	1SS53
DL4	Diode	1SS53
DL5	Diode	1SS53
DL6	Diode	1SS53
DL7	Diode	1SS53
DL8	Diode	1SS53
DL9	Diode	1SS53
DL10	Diode	1SS53
DL11	Diode	1SS53
DL12	Diode	1SS53
DL13	Diode	1SS53
DL14	Diode	1SS53
DL15	Diode	1SS53
DL16	See page 12 - 9	
DL17	Diode	1SS53
DL18	Diode	1SS53
DL19	Diode	1SS53
DL20	Diode	1SS53
DL21	Diode	1SS53
DL22	See page 12 - 9	
DL23	See page 12 - 9	
DL24	Diode	1SS53
DL25	Diode	1SS53
DL26	LED	TLR123
DL27	See page 12 - 9	

[PLL-LOGIC UNIT] (LOGIC)

REF. NO.	DESCRIPTION	PART NO.	
DL28	Zener Diode	YZ045B	
DL29	Diode	1SS53	
DL30	See page 12 - 9		
DL31	Diode	1SS53	
DL32	Zener Diode	XZ055	
DL33	Diode	1SS53	
DL36	See page 12 - 9		
DL37	See page 12 - 9		
DL38	See page 12 - 9		
RL1	Resistor	100K	ELR25
RL2	Resistor	100K	ELR25
RL3	Resistor	10K	ELR25
RL4	Resistor	10K	ELR25
RL5	See page 12 - 9		
RL6	See page 12 - 9		
RL7	See page 12 - 9		
RL8	See page 12 - 9		
RL9	See page 12 - 9		
RL10	Resistor	47K	ELR25
RL11	See page 12 - 9		
RL12	See page 12 - 9		
RL13	See page 12 - 9		
RL14	See page 12 - 9		
RL15	Resistor	100K	ELR25
RL16	See page 12 - 9		
RL17	See page 12 - 9		
RL18	See page 12 - 9		
RL19	Resistor	47K	ELR25
RL20	See page 12 - 9		
RL21	See page 12 - 9		
RL22	See page 12 - 9		
RL23	Resistor	33K	ELR25
RL24	Resistor	470K	ELR25
RL25	Resistor	10K	ELR25
RL27	See page 12 - 9		
RL28	See page 12 - 9		
RL29	See page 12 - 9		
RL30	See page 12 - 9		
RL31	See page 12 - 9		
RL32	See page 12 - 9		
RL33	Resistor	470K	ELR25
RL34	See page 12 - 9		
RL35	See page 12 - 9		
RL36	See page 12 - 9		
RL37	Resistor	220	ELR25
RL38	Resistor	22K	ELR25
RL39	Resistor	8.2K	ELR25
RL40	Resistor	10K	ELR25
RL42	Resistor	56K	ELR25
RL43	Array	47K	RM4
RL44	Resistor	15K	ELR25
RL45	Resistor	100K	ELR25
RL46	Resistor	4.7K	ELR25
RL47	Resistor	470	ELR25
RL48	See page 12 - 9		
RL49	See page 12 - 9		
RL50	See page 12 - 9		
RL51	See page 12 - 9		
RL53	See page 12 - 9		
RL55	See page 12 - 9		
RL56	Resistor	470K	ELR25

[PLL-LOGIC UNIT] (LOGIC)

REF. NO.	DESCRIPTION	PART NO.	
RL57	See page 12 - 9		
RL58	See page 12 - 9		
RL59	See page 12 - 9		
RL60	See page 12 - 9		
RL61	See page 12 - 9		
RL62	See page 12 - 9		
RL65	See page 12 - 9		
RL66	See page 12 - 9		
RL68	See page 12 - 9		
RL69	See page 12 - 9		
RL70	See page 12 - 9		
RL71	See page 12 - 9		
RL72	See page 12 - 9		
CL1	Mylar	0.056	50V
CL2	See page 12 - 9		
CL3	See page 12 - 9		
CL4	See page 12 - 10		
CL5	See page 12 - 10		
CL6	Electrolytic	0.22	50V RC2
CL7	Electrolytic	2.2	50V
CL8	See page 12 - 10		
CL9	See page 12 - 10		
CL10	See page 12 - 10		
CL11	See page 12 - 10		
CL12	See page 12 - 10		
CL13	Electrolytic	2.2	50V
CL14	Electrolytic	10	16V
CL15	Barrier Lay	0.1	25V
CL16	Ceramic	33P	50V SL
CL17	Electrolytic	47	10V
CL18	Electrolytic	100	10V
CL19	Barrier Lay	0.1	16V
CL20	See page 12 - 10		
JL1	Connector	TL-25P-10-V1	
JL2	Connector	TL-25P-08-V1	
JL3	Connector	TL-25P-05-V1	
JL4	Connector	TL-25P-02-V1	
JL5	Connector	TL-25P-09-V1	
JL6	See page 12 - 10		
JL7	See page 12 - 10		
JL8	See page 12 - 10		
JL9	See page 12 - 10		
JL10	See page 12 - 10		
BTL1	Battery	BR2325-2P	
B1	See page 12 - 10		

[PLL-LOGIC UNIT]

REF. NO.	DESCRIPTION	USA version (White)	USA version (Gray)	UK version	HOLLAND version	EUROPE version
ICL2	IC	TC4081BP	TC4081BP	TC4081BP	TC4073BP	TC4081BP
ICL4	IC	TC4069UBP	TC4069UBP	TC4069UBP	_____	TC4069UBP
ICL6	IC	TC4011UBP	TC4011UBP	TC4011UBP	TC4013BP	TC4011UBP
QL4	Transistor	_____	_____	_____	2SA1015	_____
QL5	Transistor	_____	_____	_____	2SC1815CR	_____
QL6	Transistor	_____	_____	_____	2SA1345	_____
QL7	Transistor	_____	_____	_____	2SC3399	_____
DL16	Diode	1SS53	1SS53	1SS53	_____	1SS53
DL22	Diode	1SS53	1SS53	1SS53	_____	1SS53
DL23	Diode	1SS53	1SS53	1SS53	_____	1SS53
DL27	Diode	1SS53	1SS53	1SS53	_____	1SS53
DL30	Diode	_____	_____	1SS53	1SS53	1SS53
DL36	Diode	1SS53	1SS53	1SS53	_____	1SS53
DL37	Diode	1SS53	1SS53	1SS53	_____	1SS53
DL38	Diode	1SS53	1SS53	1SS53	_____	1SS53
RL5	Resistor	1M ELR25	1M ELR25	1M ELR25	_____	1M ELR25
RL6	Resistor	10K ELR25	10K ELR25	10K ELR25	_____	10K ELR25
RL7	Resistor	100K ELR25	100K ELR25	100K ELR25	47K ELR25	100K ELR25
RL8	Resistor	10K ELR25	10K ELR25	10K ELR25	47K ELR25	10K ELR25
RL9	Resistor	22K ELR25	22K ELR25	22K ELR25	47K ELR25	22K ELR25
RL11	Resistor	47K ELR25	47K ELR25	47K ELR25	22K ELR25	47K ELR25
RL12	Jumper	JPW-02H	JPW-02H	JPW-02H	47K ELR25	JPW-02H
RL13	Resistor	220K ELR25	220K ELR25	220K ELR25	22K R25	220K ELR25
RL14	Resistor	100K ELR25	100K ELR25	100K ELR25	_____	100K ELR25
RL16	Resistor	820K ELR25	820K ELR25	820K ELR25	_____	820K ELR25
RL17	Resistor	82K ELR25	82K ELR25	82K ELR25	_____	82K ELR25
RL18	Resistor	1M ELR25	1M ELR25	1M ELR25	22K ELR25	1M ELR25
RL20	Resistor	10K ELR25	10K ELR25	10K ELR25	_____	10K ELR25
RL21	Resistor	100K ELR25	100K ELR25	100K ELR25	_____	100K ELR25
RL22	Resistor	2.2K ELR25	2.2K ELR25	2.2K ELR25	2.2K R25	2.2K ELR25
RL27	Resistor	220K ELR25	220K ELR25	220K ELR25	_____	220K ELR25
RL28	Resistor	47K ELR25	47K ELR25	47K ELR25	_____	47K ELR25
RL29	Resistor	1M ELR25	1M ELR25	1M ELR25	_____	1M ELR25
RL30	Trimmer	220K H0651A	220K H0651A	220K H0651A	_____	220K H0651A
RL31	Resistor	100K ELR25	100K ELR25	100K ELR25	_____	100K ELR25
RL32	Resistor	47K ELR25	47K ELR25	47K ELR25	_____	47K ELR25
RL34	Resistor	22K ELR25	22K ELR25	22K ELR25	_____	22K ELR25
RL35	Resistor	10K ELR25	10K ELR25	10K ELR25	_____	10K ELR25
RL36	Resistor	47K ELR25	47K ELR25	47K ELR25	_____	47K ELR25
RL48	Resistor	2.2K ELR25	2.2K ELR25	2.2K ELR25	_____	2.2K ELR25
RL49	Trimmer	2.2K ELR25	2.2K ELR25	2.2K ELR25	_____	2.2K ELR25
RL50	Resistor	680 ELR25	680 ELR25	680 ELR25	1K ELR25	680 ELR25
RL51	Thermistor	33D45	33D45	33D45	_____	33D45
RL53	Resistor	10K ELR25	10K ELR25	10K ELR25	_____	10K ELR25
RL55	Resistor	2.2K ELR25	2.2K ELR25	2.2K ELR25	_____	2.2K ELR25
RL57	Resistor	2.2K ELR25	2.2K ELR25	2.2K ELR25	_____	2.2K ELR25
RL58	Jumper	JPW-02H	JPW-02H	JPW-02H	_____	JPW-02H
RL59	Jumper	JPW-02A	JPW-02A	JPW-02A	_____	JPW-02A
RL60	Jumper	JPW-02A	JPW-02A	JPW-02A	_____	JPW-02A
RL61	Jumper	JPW-02A	JPW-02A	JPW-02A	_____	JPW-02A
RL62	Jumper	JPW-02A	JPW-02A	JPW-02A	_____	JPW-02A
RL65	Jumper	JPW-02H	JPW-02H	JPW-02H	_____	JPW-02H
RL66	Jumper	JPW-02A	JPW-02A	JPW-02A	_____	JPW-02A
RL68	Jumper	JPW-02A	JPW-02A	JPW-02A	_____	JPW-02A
RL69	Jumper	JPW-02A	JPW-02A	JPW-02A	_____	JPW-02A
RL70	Jumper	JPW-02A	JPW-02A	JPW-02A	_____	JPW-02A
RL71	Jumper	JPW-02A	JPW-02A	JPW-02A	_____	JPW-02A
RL72	Jumper	JPW-02A	JPW-02A	JPW-02A	_____	JPW-02A
CL2	Ceramic	0.001 50V B	0.001 50V B	0.001 50V B	_____	0.001 50V B
CL3	Electrolytic	10 16V	10 16V	10 16V	_____	10 16V

[PLL-LOGIC UNIT]

REF. NO.	DESCRIPTION	USA version (White)	USA version (Gray)	UK version	HOLLAND version	EUROPE version
CL4	Electrolytic	10 16V	10 16V	10 16V	_____	10 16V
CL4	Electrolytic	1 50V BP	1 50V BP	1 50V BP	_____	1 50V BP
CL5	Electrolytic	4.7 25V	4.7 25V	4.7 25V	_____	4.7 25V
CL8	Electrolytic	10 16V	10 16V	10 16V	_____	10 16V
CL9	Barrier Lay	_____	_____	_____	0.1 16V	_____
CL10	Electrolytic	1 50V BP	1 50V BP	1 50V BP	_____	1 50V BP
CL11	Ceramic	0.001 50V B	0.001 50V B	0.001 50V B	_____	0.001 50V B
CL12	Barrier Lay	0.047 25V	0.047 25V	0.047 25V	_____	0.047 25V
CL20	Ceramic	_____	_____	_____	0.0047 50V	_____
JL6	Connector	TL-25P-07-V1	TL-25P-07-V1	_____	_____	_____
JL7	Connector	TL-25P-04-V1	TL-25P-04-V1	_____	_____	_____
JL8	Connector	TL-25P-12-V1	TL-25P-12-V1	_____	_____	_____
JL9	Connector Pin	RT-01T-1.3B(1)	RT-0.1T-1.3B(1)	_____	_____	RT-0.1T-1.3B(1)
JL10	Connector Pin	_____	_____	RT-0.1T-1.3B(1)	_____	RT-0.1T-1.3B(1)
B1	PC. Board	B-607C	B-607C	B-607C	B-795	B-607C

[PA UNIT]

REF. NO. DESCRIPTION PART NO.

ICB1 IC M57710-A

DB1 Diode MI402
DB2 Diode MI402
DB3 Diode MI301
DB4 Diode 1N60
DB5 Diode 1N60
DB6 Diode 15CD11

LB1 Choke LW-19
LB2 Coil LA-121
LB3 Coil LA-71
LB4 Coil LA-71
LB5 Choke LW-7

RB1 Resistor 1.5K R25
RB2 Resistor 220 R25
RB3 Resistor 1K R25
RB4 Resistor 220 R25
RB5 Resistor 330 R25
RB6 Trimmer 100 H0651A

CB1 Ceramic 22P 500V SL
CB2 Ceramic 39P 500V SL
CB3 Ceramic 3P 500V SL
CB4 Ceramic 6P 500V SL
CB5 Ceramic 0.5P 500V SL
CB6 Ceramic 33P 500V SL

[PA UNIT]

REF. NO. DESCRIPTION PART NO.

CB7 Ceramic 0.0047 50V B
CB8 Ceramic 0.0047 50V B
CB9 Ceramic 220P 50V SL
CB10 Ceramic 15P 500V SL
CB11 Ceramic 220P 50V
CB12 Ceramic 220P 50V SL
CB13 Ceramic 0.0047 50V B
CB14 Electrolytic 47 16V
CB15 Ceramic 0.0047 50V
CB16 Ceramic 0.0047 50V B
CB17 Ceramic 220P 50V SL
CB18 Ceramic 0.0047 50V B
CB19 Ceramic 0.0047 50V B
CB20 Ceramic 220P 50V
CB21 See below table
CB22 See below table
CB23 See below table
CB24 See below table

JB1 Connector 1261P 6P
JB2 Connector F.M-MDRmi

PB1 Connector TL25H-09-B1
PB2 Connector TMP-P01X-A1
PB3 Connector TMP-P01X-A1

BB1 PC. Board B-613B (42237)

[PA UNIT]

REF. NO.	DESCRIPTION	USA version (White)	USA version (Gray)	UK version	HOLLAND version	EUROPE version
CB21	Ceramic	_____	_____	470P 500V B	470P 500V B	470P 500V B
CB22	Ceramic	_____	_____	470P 500V B	470P 500V B	470P 500V B
CB23	Ceramic	_____	_____	470P 500V B	470P 500V B	470P 500V B
CB24	Electrolytic	_____	_____	470 16V	_____	_____

13-2 PARTS LIST FOR TYPE 370

[FRONT UNIT]

REF. NO.	DESCRIPTION	PART NO.
D1	Diode	1SS53
D2	Diode	1SS53
D3	Diode	1SS53
D4	See below table	
D5	Diode	1SS53
D6	Diode	1SS53
D7	Diode	1SS53
D8	See below table	
D9	See below table	
D10	See below table	
D11	See below table	
R1	Variable	VM10A528A 10KB
R2	Variable	K1221200V5N2111 10KA
C1	Barrier Lay	0.1 25V
C2	See below table	
P1	Connector	TL-25H-10-B1
P2	Connector	TL-25H-12-B1
P3	Connector	TL-25H-04-B1
P4	Connector	TL-25H-04-B1
P5	Connector	TL-25H-06-B1
S1	Switch	SRB181-0025KC
S2	Switch	SUT111A7 NON LOCK
S3	Switch	SUT111A7 NON LOCK
S4	Switch	SUT111A7 NON LOCK
S5	Switch	SUT111A6 SELF LOCK
S6	See below table	
S7	Switch	SUT111A7 NON LOCK
S8	Switch	SUT111A7 NON LOCK
S9	See below table	

[FRONT UNIT]

REF. NO.	DESCRIPTION	PART NO.
S10	See below table	
S11	See below table	
SP1	Speaker	66F09N-7 4Ω
B1	PC. Board	B-922 (42239)

[EF UNIT]

REF. NO.	DESCRIPTION	PART NO.
MC1	See page 12 – 12	

[DISPLAY UNIT]

REF. NO.	DESCRIPTION	PART NO.
ICD1	IC	μPD7225G
DSD1	See page 12 – 12	
DSD2	Lamp	HRS-3110A
DSD3	Lamp	HRS-3110A
RD1	Resistor	560K R10
BD1	PC. Board	B-612A (42240)
JD1	Connector	HBRB17S-1J
JD2	Connector	HBRB17S-1J
PD1	Connector	TL-25H-09-B1

[FRONT UNIT]

REF. NO.	DESCRIPTION	USA version (White)	USA version (Gray)	EUROPE version	HOLLAND version	INTERNA- TIONAL version	FRANCE version
D4	Diode	1SS53	1SS53	1SS53	_____	1SS53	_____
D8	Diode	1SS53	1SS53	1SS53	_____	1SS53	_____
D9	Diode	1SS53	1SS53	1SS53	_____	1SS53	_____
D10	Diode	_____	_____	_____	1SS53	_____	1SS53
D11	Diode	_____	_____	1SS53	_____	1SS53	_____
C2	Electrolytic	_____	_____	470 16V	_____	_____	_____
S6	Switch	SUT111A6 (SELF LOCK)	SUT111A6 (SELF LOCK)	SUT111A7 (NON LOCK)	_____	SUT111A7 (NON LOCK)	_____
S9	Switch	SUT111A7 (NON LOCK)	SUT111A7 (NON LOCK)	SUT111A7 (NON LOCK)	_____	SUT111A7 (NON LOCK)	_____
S10	Switch	SUT111A7 (NON LOCK)	SUT111A7 (NON LOCK)	SUT111A7 (NON LOCK)	_____	SUT111A7 (NON LOCK)	_____
S11	Switch	SUT110C2 (SELF LOCK)	SUT110C2 (SELF LOCK)	SUT110C2 (SELF LOCK)	_____	SUT111A7 (SELF LOCK)	_____

[EF UNIT]

REF. NO.	DESCRIPTION	USA version (White)	USA version (Gray)	EUROPE version	HOLLAND version	INTERNA- TINAL version	FRANCE version
MC1	Microphone	IC-HM29	IC-HM30	IC-HM30	IC-HM30	IC-HM29	IC-HS2

[DISPLAY UNIT]

REF. NO.	DESCRIPTION	USA version (White)	USA version (Gray)	EUROPE version	HOLLAND version	INTERNA- TINAL version	FRANCE version
DSD1	LCD	HLM9053-01-030	HLM9053-01-030	HLM9053-01-030	HLM9053-01-030	HLM9053-01-030	HLM9053-01-020

[MAIN UNIT]

REF. NO. DESCRIPTION PART NO.

ICM1 IC BA401
ICM2 IC MJM4558D
ICM3 IC μ PC1181H
ICM4 IC MB3756
ICM5 IC μ PC577H

QM1 Transistor 2SC2053
QM2 FET 3SK74K
QM3 FET 2SK241Y
QM4 FET 2SK241Y
QM5 Transistor 2SC945P
QM6 Transistor 2SC945P
QM7 Transistor 2SC945P
QM8 Transistor 2SB596Y
QM9 Transistor 2SD468
QM10 Transistor 2SC945P
QM11 Transistor 2SC945P
QM12 Transistor 2SC945P
QM13 Transistor 2SC945P
QM14 Transistor 2SC3399
QM15 Transistor 2SC945P
QM16 Transistor 2SC945P
QM17 Transistor 2SC945P
QM18 Transistor 2SC945P
QM19 Transistor 2SC945P
QM20 Transistor 2SC945P
QM21 Transistor 2SC945P
QM22 FET 2SK49H2
QM23 FET 2SK49H2
QM24 FET 3SK48
QM25 FET 2SK241GR
QM26 Transistor 2SC3402

DM1 Diode 1S1555
DM2 Diode 1SS53
DM3 Varactor Diode 1S2688ES
DM4 Diode 1SS53
DM5 Diode 1SS53
DM7 Diode 1N60
DM8 Diode 1N60
DM9 Diode 1S953
DM10 Diode 1K60
DM11 Diode 1K60
DM12 Varactor Diode 1S2090

[MAIN UNIT]

REF. NO. DESCRIPTION PART NO.

DM13 Varactor Diode 1S2090
DM14 Varactor Diode 1S2090
DM17 Diode 1SS53
DM20 Diode MC301
DM21 Diode MC301
DM23 Diode 1SS53
(DM42)

FIM1 Crystal Filter 21M15B
FIM2 Ceramic Filter CFL455E
FIM3 Ceramic Filter CFU455D2

DSM1 Ceramic Discriminator 455D
XM1 Crystal 21.40MHz HC-18/u
XM2 Crystal 20.945MHz HC-18/u

LM1 Coil LA-71
LM2 Coil LA-71
LM3 Coil LR-132
LM4 Coil LS-73
LM5 Coil LS-73
LM6 Coil LS-73
LM7 Coil LS-73
LM8 Coil LR-134
LM9 Coil LS-66
LM10 Choke LB4 1R2 J
LM11 Choke L4 1R2
LM12 Coil LS-103
LM13 Choke LW-15
LM14 Choke L4 102
LM15 Coil LS-116
LM16 Coil LS-116
LM17 Coil LS-73
LM18 Coil LS-73
LM19 Coil LS-73
LM20 Coil LS-22
LM21 Coil LS-22
LM22 Choke LW-19

RM1 Resistor 47 ELR25
RM2 Resistor 1.8K ELR25
RM3 Resistor 47 ELR25

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.
RM4	Resistor	22K ELR25
RM5	Resistor	22K R25
RM6	Resistor	100 R25
RM7	Trimmer	470 H0651A
RM8	Resistor	4.7K ELR25
RM10	Resistor	470 R25
RM11	Resistor	10 ELR25
RM12	Resistor	2.2K ELR25
RM13	Resistor	22K ELR25
RM14	Resistor	22K ELR25
RM15	Resistor	2.2K ELR25
RM16	Resistor	22K ELR25
RM17	Resistor	2.2K ELR25
RM18	Resistor	4.7K ELR25
RM19	Resistor	22K ELR25
RM20	Resistor	4.7K ELR25
RM21	Thermistor	23D29
RM22	Resistor	220K ELR25
RM23	See page 12 - 15	
RM24	Resistor	15K ELR25
RM25	Trimmer	1K H0651A
RM26	Thermistor	33D28
RM27	Resistor	100 ELR25
RM28	Resistor	47 ELR25
RM29	Resistor	3.9K ELR25
RM30	Resistor	3.9K ELR25
RM31	Resistor	2.2K ELR25
RM32	Resistor	22K ELR25
RM33	Resistor	150K ELR25
RM34	Resistor	4.7K ELR25
RM35	Resistor	10K ELR25
RM36	Resistor	47 ELR25
RM37	Resistor	220K ELR25
RM38	Resistor	4.7K ELR25
RM39	Resistor	10K ELR25
RM40	Trimmer	3.3K H0651A
RM41	Resistor	270 R50
RM42	Resistor	10K ELR25
RM43	Resistor	4.7K ELR25
RM44	Resistor	100K ELR25
RM45	Resistor	22K ELR25
RM46	Resistor	3.3K ELR25
RM47	Resistor	4.7K ELR25
RM48	Thermistor	35D45
RM49	Resistor	100 ELR25
RM50	Resistor	4.7K ELR25
RM51	Trimmer	1K H0651A
RM52	Trimmer	33K H0651A
RM53	Resistor	100K ELR25
RM56	Jumper	JPW-02H
RM57	Resistor	10K ELR25
RM58	Resistor	2.2 ELR25
RM59	Resistor	47K R25
RM60	Jumper	JPW-02H
RM61	Resistor	15K ELR25
RM62	Resistor	2.2K ELR25
RM63	Resistor	47K ELR25
RM64	Resistor	10K ELR25
RM65	Jumper	JPW-02H
RM67	Resistor	4.7K ELR25
RM68	Resistor	1K ELR25
RM69	Resistor	4.7K ELR25
RM70	Resistor	22K ELR25
RM72	Resistor	1K ELR25

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.
RM73	Resistor	22K ELR25
RM74	Resistor	3.3K ELR25
RM75	Resistor	100 ELR25
RM76	Resistor	47K ELR25
RM77	Resistor	33K ELR25
RM78	Resistor	150K ELR25
RM79	Resistor	39K ELR25
RM80	Resistor	1K ELR25
RM81	Resistor	4.7K ELR25
RM82	Resistor	4.7K ELR25
RM83	Resistor	4.7K ELR25
RM84	Resistor	4.7K ELR25
RM85	Resistor	100 ELR25
RM86	Resistor	5.6K ELR25
RM87	Resistor	47K ELR25
RM88	Resistor	2.2K R25
RM89	Resistor	100K ELR25
RM90	Resistor	1K ELR25
RM91	Resistor	3.3K ELR25
RM92	Resistor	10K ELR25
RM93	Resistor	10K ELR25
RM94	Resistor	1K ELR25
RM95	Resistor	1.5K ELR25
RM96	Resistor	220 ELR25
RM97	Resistor	1.5K ELR25
RM98	Resistor	68K ELR25
RM99	Resistor	1.5K ELR25
RM100	Resistor	4.7K ELR25
RM101	Resistor	68K ELR25
RM102	Resistor	1.5K ELR25
RM103	Resistor	2.2K ELR25
RM104	Resistor	220 R25
RM105	Resistor	1K ELR25
RM106	Resistor	4.7K ELR25
RM107	Resistor	100 ELR25
RM108	Resistor	220 ELR25
RM109	Resistor	100 ELR25
RM110	Resistor	100K ELR25
RM111	Resistor	100K ELR25
RM112	Resistor	100K ELR25
RM115	Resistor	2.2 ELR25
RM117	Resistor	4.7K ELR25
RM118	Resistor	10K ELR25
RM119	Resistor	4.7K ELR25
RM122	Resistor	100 ELR25
RM123	Resistor	4.7K ELR25
RM126	Resistor	220 R25
RM127	Resistor	1K ELR25
RM128	Resistor	2.2K R25
RM129	Resistor	2.2K ELR25
RM130	Resistor	2.7K ELR25
RM131	Thermistor	33D28
RM132	Resistor	470 ELR25
RM134	See page 12 - 15	
RM135	See page 12 - 15	
RM137	See page 12 - 15	
RM138	Jumper	JPW-02A
RM140	Jumper	JPW-02H
RM145	Jumper	JPW-02H
RM147	Resistor	47K ELR25
RM150	Resistor	2.2K ELR25
RM151	Jumper	JPW-02A
RM152	See page 12 - 15	
RM153	Jumper	JPW-02A

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.	
RM154	See page 12 – 15		
RM156	Resistor	1K	ELR25
RM157	Resistor	220K	ELR25
RM159	Resistor	15K	ELR25
RM160	See page 12 – 15		
RM161	Resistor	22K	R10
RM162	Resistor	470K	R10
RM163	See page 12 – 15		
CM1	Ceramic	22P	50V SL
CM2	Trimmer	CV05D2001	
CM3	Ceramic	0.0047	50V B
CM4	Ceramic	0.0047	50V B
CM5	Ceramic	100P	50V SL
CM6	Ceramic	7P	50V SL
CM7	Ceramic	0.0047	50V B
CM8	Electrolytic	22	10V
CM9	Ceramic	0.0047	50V B
CM10	Ceramic	0.001	50V B
CM11	Ceramic	7P	50V CH
CM12	Ceramic	1P	50V CH
CM13	Ceramic	1P	50V CH
CM14	Ceramic	7P	50V CH
CM15	Ceramic	7P	50V CH
CM16	Ceramic	10P	50V CH
CM17	Ceramic	0.0047	50V B
CM19	Ceramic	7P	50V CH
CM20	Ceramic	0.001	50V B
CM21	Ceramic	0.001	50V B
CM22	Ceramic	33P	50V SL
CM23	Ceramic	33P	50V SL
CM24	Ceramic	0.001	50V B
CM25	Ceramic	0.0047	50V B
CM26	Ceramic	22P	50V SL
CM27	Ceramic	0.0047	50V B
CM28	Ceramic	0.001	50V B
CM29	Ceramic	100P	50V XL
CM30	Ceramic	100P	50V XL
CM31	Electrolytic	10	16V
CM33	Ceramic	5P	50V CH
CM34	Mylar	0.01	50V K
CM35	Mylar	0.0047	50V K
CM36	Barrier Lay	0.1	25V
CM37	Barrier Lay	0.047	25V
CM38	Electrolytic	10	16V
CM39	Mylar	0.0027	50V K
CM40	Mylar	0.01	50V K
CM41	Mylar	0.01	50V K
CM42	Mylar	0.01	50V K
CM43	Electrolytic	4.7	10V
CM44	See page 12 – 15		
CM45	Electrolytic	10	16V
CM46	Electrolytic	0.47	50V BP
CM48	Electrolytic	4.7	25V
CM49	Electrolytic	10	16V
CM50	Ceramic	0.001	50V B
CM51	Ceramic	0.001	50V B
CM52	Electrolytic	22	16V
CM53	Ceramic	0.001	50V B
CM54	Ceramic	0.0047	50V B
CM55	Ceramic	0.0047	50V B
CM57	Mylar	0.1	50V K
CM58	Electrolytic	470	10V MS

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.	
CM59	Electrolytic	47	10V
CM60	Electrolytic	10	16V MS7
CM61	Electrolytic	4.7	25V
CM62	Electrolytic	33	10V MS
CM63	Electrolytic	470	16V MS
CM64	Electrolytic	0.22	50V RC2
CM65	Electrolytic	2.2	50V
CM66	Electrolytic	4.7	25V
CM67	Electrolytic	10	16V
CM68	Electrolytic	2.2	50V
CM69	Electrolytic	10	16V
CM70	Electrolytic	4.7	25V
CM71	Barrier Lay	0.047	25V
CM72	Mylar	0.01	50V B
CM73	Electrolytic	47	10V
CM74	Mylar	0.056	50V K
CM75	Electrolytic	0.47	50V
CM77	Mylar	0.022	50V K
CM78	Mylar	0.001	50V K
CM79	Mylar	0.039	50V K
CM80	Electrolytic	0.22	50V RC2
CM81	Electrolytic	10	16V
CM82	Mylar	0.01	50V K
CM83	Mylar	0.01	50V K
CM84	Electrolytic	10	16V
CM85	Ceramic	0.0047	50V B
CM86	Trimmer	CV05D2001	
CM87	Dip Mica	15P	50V
CM88	Dip Mica	100P	50V
CM89	Dip Mica	47P	50V
CM90	Ceramic	3P	50V SL
CM91	Ceramic	0.0047	50V B
CM92	Mylar	0.001	50V K
CM93	Barrier Lay	0.1	25V
CM94	Electrolytic	10	16V
CM95	Barrier Lay	0.1	25V
CM96	Barrier Lay	0.1	25V
CM97	Barrier Lay	0.1	25V
CM98	Barrier Lay	0.1	25V
CM99	Electrolytic	22	10V MS9
CM100	Ceramic	0.001	50V B
CM101	Ceramic	8P	50V SL
CM102	Ceramic	0.0047	50V B
CM103	Ceramic	0.0047	50V B
CM104	Ceramic	0.001	50V
CM105	Cylinder	1P	50V
CM106	Cylinder	1P	50V
CM107	Ceramic	0.001	50V B
CM108	Ceramic	18P	50V CH
CM109	Ceramic	18P	50V CH
CM110	Ceramic	18P	50V CH
CM111	Ceramic	0.0047	50V B
CM113	Ceramic	13P	50V CH
CM115	Ceramic	13P	50V CH
CM116	Cylinder	2.2P	50V
CM117	Ceramic	0.001	50V SL
CM119	Ceramic	0.0047	50V B
CM120	Barrier Lay	0.1	25V
CM125	Ceramic	0.001	50V B
CM126	Ceramic	220P	50V SL
CM127	Ceramic	0.0047	50V B
CM129	Ceramic	0.0047	50V B
CM131	Ceramic	0.0047	50V

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.	
CM132	Barrier Lay	0.047	25V
CM133	Ceramic	0.0047	50V B
CM134	Ceramic	5P	50V
CM137	Ceramic	0.0047	50V
CM138	Ceramic	0.0047	50V
CM139	Ceramic	0.0047	50V
CM140	Ceramic	0.0047	50V
CM141	Ceramic	0.0047	50V
CM143	Ceramic	6P	50V
CM144	Barrier Lay	0.1	25V
CM145	Barrier Lay	0.1	25V
CM146	Ceramic	15P	50V
CM147	Ceramic	220P	50V

RLM1 See below table

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.
JM1	Connector	TMP-J01X-V1
JM2	Connector	TMP-J01X-V1
JM5	Connector	TL-25P-12-V1
JM6	Connector	TL-25P-04-V1
JM7	Connector	TL-25P-07-V1
JM8	Connector	TL-25P-09-V1
PM1	Connector	TMP-P01X-A1
PM2	Connector	TL-25H-02-B1
CPM1	Checkpoint	RT-01T-1.0B
BM1	PC. Board	B-602E (42196)

[MAIN UNIT]

REF. NO.	DESCRIPTION	USA version (White)	USA version (Gray)	EUROPE version	HOLLAND version	INTERNA- TINAL version	FRANCE version
RM23	Resistor	_____	_____	_____	10 R25	_____	10 R25
RM134	Resistor	22K ELR25	22K ELR25	22K ELR25	_____	22K ELR25	_____
RM135	Trimmer	10K H0651A	10K H0651A	10K H0651A	_____	10K H0651A	_____
RM137	Resistor	4.7K R25	4.7K R25	4.7K R25	4.7K R25	4.7K R25	4.7K R25
RM152	Jumper	JPW-02A	JPW-02A	JPW-02A	_____	JPW-02A	_____
RM154	Jumper	JPW-02A	JPW-02A	JPW-02A	_____	JPW-02A	_____
RM160	Resistor	_____	1K R25	1K R25	1K R25	_____	1K R25
RM163	Resistor	33K R25	33K R25	33K R25	_____	33K R25	_____
CM44	Barrier Lay	0.033 25V	0.033 25V	0.033 25V	_____	0.033 25V	_____
RLM1	Relay	FBR221D009	FBR221D009	FBR221D009	_____	FBR221D009	_____

[PLL-LOGIC UNIT]

REF. NO.	DESCRIPTION	PART NO.
IC1	IC	MC146805G2PSC82087P
IC2	IC	78L05A
IC3	IC	78L09A
IC4	IC	μPD2834C
IC5	IC	μPB571C
IC6	IC	BA4558
Q1	Transistor	2SC3402
Q2	Transistor	2SC3402
Q3	Transistor	2SC3402
Q4	Transistor	2SA1015Y
Q5	Transistor	2SA1015Y
Q6	Transistor	2SA1015Y
Q7	Transistor	2SC945 ANY RANK
Q8	Transistor	2SC945 ANY RANK
Q9	FET	2SK192 A or Y
Q10	Transistor	2SC763C
Q11	Transistor	2SC763C
Q12	Transistor	2SC763C
Q13	Transistor	2SC763C
Q14	Transistor	2SC945P
Q15	Transistor	2SC945P

[PLL-LOGIC UNIT]

REF. NO.	DESCRIPTION	PART NO.
Q16	FET	2SK30A
Q17	Transistor	2SC3399
D1	Diode	1SS53
D2	See page 12 - 17	
D3	Diode	1SS53
D4	Diode	1SS53
D5	Diode	1SS53
D6	Diode	1SS53
D7	Diode	1SS53
D8	Diode	1SS53
D9	Diode	1SS53
D10	Zener Diode	RD9.1E B3
D11	Diode	1S953
D12	Diode	1SS53
D13	Diode	1SS53
D15	Diode	1SS53
D16	Diode	1SS53
D17	Diode	1S953
D18	Varactor Diode	1T25
D20	See page 12 - 17	
D21	See page 12 - 17	

[PLL-LOGIC UNIT]

REF. NO.	DESCRIPTION	PART NO.
X1	Crystal	CR69 (12.8MHz HC43/U)
X2	Ceralock	CSA1.000MK 1MHz
L1	Coil	FL-4H 100
L2	Coil	LB-132
L3	Coil	LW-19
L4	Coil	LW-19
L5	Coil	LS-145
L6	Coil	LAL03NA1R2
L7	Coil	LAL03NA1R2
R1	Array	47K RM4
R2	Array	47K RM3
R4	Resistor	10M 1/4W
R5	Resistor	68K ELR25
R6	Resistor	100K ELR25
R7	Resistor	47K ELR25
R8	Resistor	47K ELR25
R10	Resistor	470 ELR25
R11	Resistor	4.7K ELR25
R12	Resistor	10K R25
R13	Resistor	10K R25
R14	Resistor	10K R25
R15	Resistor	220 ELR25
R16	Resistor	100 ELR25
R17	Resistor	47 ELR50X
R18	Resistor	47K ELR25
R19	Resistor	47K ELR25
R20	Resistor	22K ELR25
R23	Resistor	100K ELR25
R24	Resistor	100K ELR25
R25	Resistor	10K ELR25
R26	Resistor	47K ELR25
R27	Resistor	47K H0651A
R28	Resistor	15K ELR25
R29	Resistor	1K ELR25
R30	Resistor	47K R25
R31	Resistor	3.3M R25
R32	Resistor	100 R25
R33	Resistor	47 R25
R34	Resistor	470K R20
R35	Resistor	220 R20
R36	Resistor	470K R20
R37	Resistor	47 ELR25
R38	Resistor	220 R25
R39	Resistor	1.2K ELR25
R40	Resistor	5.6K ELR25
R41	Resistor	100 ELR25
R42	Resistor	1.2K ELR25
R43	Resistor	5.6K R25
R44	Resistor	100 ELR25
R45	Resistor	82 ELR25
R46	Resistor	1K ELR25
R47	Resistor	100 ELR25
R48	Resistor	470 ELR25
R49	Resistor	47K ELR25
R50	Resistor	470 ELR25
R51	Resistor	47 ELR25
R52	Resistor	100 ELR25
R53	Resistor	47K ELR25
R54	Resistor	5.6K ELR25
R55	Resistor	220K ELR25
R56	Posistor	PTH60T222M

[PLL-LOGIC UNIT]

REF. NO.	DESCRIPTION	PART NO.
R57	Resistor	100 ELR25
R58	Resistor	2.2K R25
R59	Resistor	82K ELR25
R60	Resistor	47K ELR25
R61	Resistor	47K ELR25
R62	Resistor	10K ELR25
R63	Resistor	10K R25
R64	Resistor	47K ELR25
R65	Resistor	2.7K ELR25
R66	Resistor	470 ELR25
R67	Resistor	100K R25
C1	Barrier Lay	0.1 16V
C2	Barrier Lay	0.1 16V
C3	Barrier Lay	0.1 16V
C4	Electrolytic	33 10V
C5	Electrolytic	1 50V
C6	Electrolytic	3.3 50V
C7	Electrolytic	4.7 50V
C8	Barrier Lay	0.1 16V
C9	Tantalum	1 35V
C10	Ceramic	0.0047 50V B
C11	Ceramic	0.0047 50V B
C12	Electrolytic	470 16V MS16
C13	Barrier Lay	0.0047 50V X
C14	Ceramic	DD105SH390J50V
C15	Trimmer	CV05A0601
C16	Ceramic	5P 50V CH
C19	Cylinder	UP125CH220J NA
C20	Ceramic	2P 50V CH
C21	Ceramic	10P 50V CH
C22	Ceramic	2P 50V SL
C23	Electrolytic	220 10V
C24	Ceramic	0.0047 50V B
C25	Ceramic	0.0047 50V B
C26	Ceramic	0.0047 50V B
C27	Ceramic	47P 50V SL
C28	Ceramic	0.0047 50V B
C29	Ceramic	3P 50V SL
C30	Ceramic	0.0047 50V B
C31	Ceramic	10P 50V SL
C32	Ceramic	0.001 50V B
C33	Ceramic	47P 50V SL
C34	Electrolytic	220 10V
C35	Ceramic	0.0047 50V B
C36	Ceramic	0.001 50V B
C37	Ceramic	0.0047 50V B
C38	Ceramic	0.0047 50V B
C39	Ceramic	0.0047 50V B
C40	Cylinder	UP125CH4R7J NA
C41	Ceramic	0.0047 50V B
C42	Ceramic	68P 50V CH
C43	Ceramic	220P 50V SL
C44	Ceramic	22P 50V CH
C45	Trimmer	CV05C1201
C46	Ceramic	0.0047 50V B
C47	Cylinder	UP125CH100J NA
C48	Electrolytic	1 50V
C49	Ceramic	0.001 50V B
C50	Ceramic	0.0047 50V B
C51	Barrier	0.1 16V
C52	Barrier	0.1 16V
C54	Ceramic	0.001 50V

[PLL-LOGIC UNIT]

REF. NO.	DESCRIPTION	PART NO.	
C55	Electrolytic	22	16V
C57	Electrolytic	47	10V
C58	Ceramic	22P	50V SL
C59	Ceramic	22P	50V SL
C60	Barrier Lay	0.1	16V
C61	Barrier Lay	0.1	16V
C62	Ceramic	0.0047	50V
C63	Electrolytic	2.2	50V
J1	Connector	TL-25P-10-V1	
J2	Connector	TL-25P-06-V1	
J3	Connector	TL-25P-04-V1	

[PLL-LOGIC UNIT]

REF. NO.	DESCRIPTION	PART NO.	
J4	Connector	TL-25P-02-V1	
J5	Connector	TL-25P-09-V1	
J7	Connector	TMP-J01X-V1	
S1	See below table		
S2	See below table		
S3	See below table		
S5	See below table		
BT1	Lithium	BR2325-1HC	
B1	PC. Board	B-913C	

[PLL-LOGIC UNIT]

REF. NO.	DESCRIPTION	USA version (White)	USA version (Gray)	EUROPE version	HOLLAND version	INTERNA- TINAL version	FRANCE version
D2	Diode	1SS53	1SS53	_____	_____	_____	_____
D20	Diode	_____	_____	_____	1SS53	_____	_____
D21	Diode	_____	_____	1SS53	_____	1SS53	1SS53
S1	Switch	KHH10902	KHH10902	KHH10902	_____	KHH10902	_____
S2	Switch	KHH10902	KHH10902	KHH10902	_____	KHH10902	_____
S3	Switch	SSS-312	SSS-312	SSS-312	_____	SSS-312	_____
S5	Switch	SSS-312	SSS-312	SSS-312	_____	SSS-312	_____

[PA UNIT]

REF. NO.	DESCRIPTION	PART NO.	
ICB1	IC	M57710-A	
DB1	Diode	MI402	
DB2	Diode	MI402	
DB3	Diode	MI301	
DB4	Diode	1SS97	
DB5	Diode	1SS97	
DB6	Diode	15CD11	
LB1	Choke	LW-19	
LB2	Coil	LA-121	
LB3	Coil	LA-71	
LB4	Coil	LA-71	
LB5	Choke	LW-7	
RB1	Resistor	1.5K	R25
RB2	Resistor	220	R25
RB3	Resistor	1K	R25
RB4	Resistor	220	R25
RB5	Resistor	330	R25
RB6	Trimmer	100	H0651A
CB1	Ceramic	22P	500V SL
CB2	Ceramic	39P	500V SL
CB3	Ceramic	3P	500V SL
CB4	Ceramic	6P	500V SL
CB5	Ceramic	0.5P	500V SL
CB6	Ceramic	33P	500V SL
CB7	Ceramic	0.0047	50V B
CB8	Ceramic	0.0047	50V B

[PA UNIT]

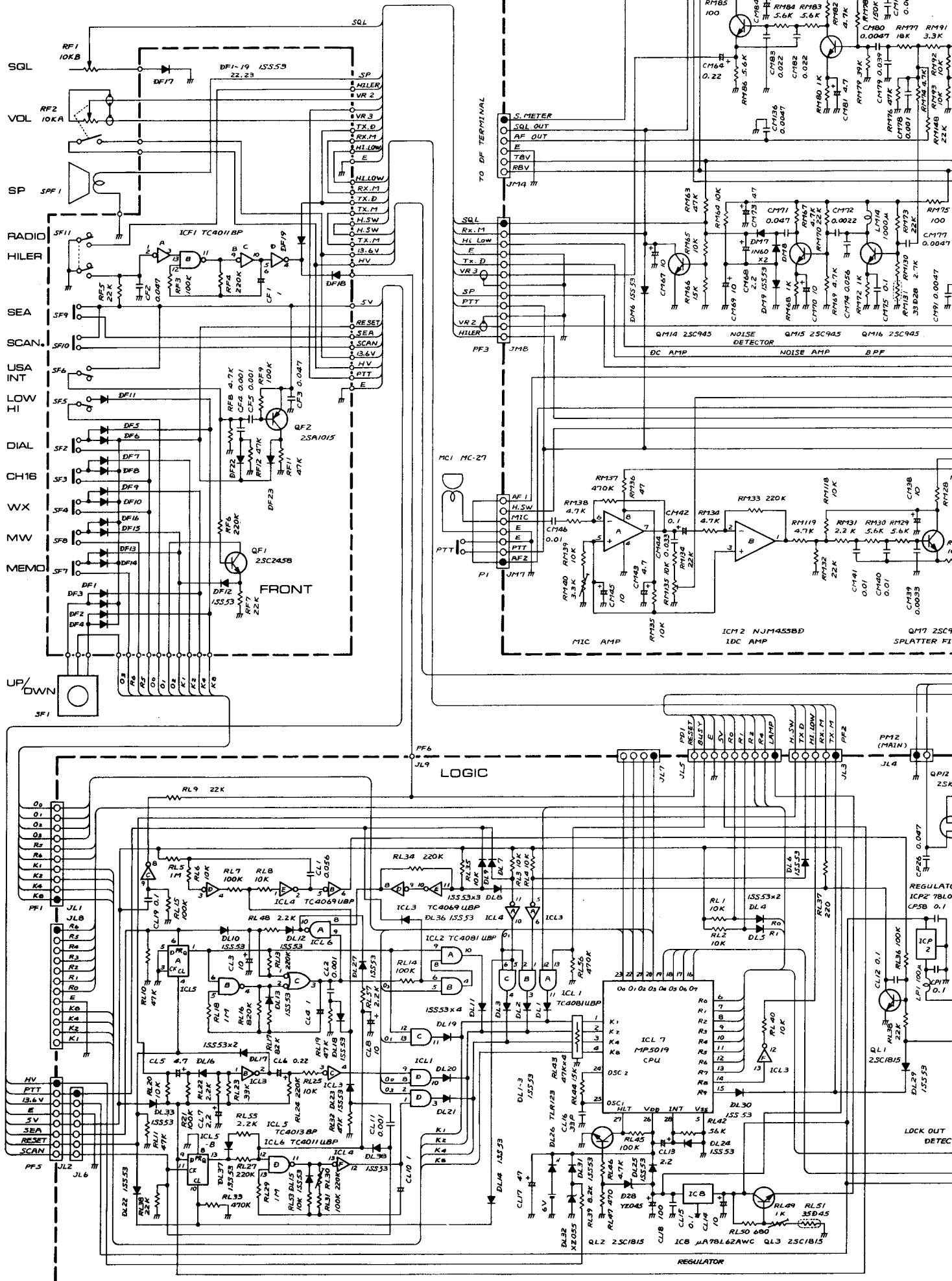
REF. NO.	DESCRIPTION	PART NO.	
CB9	Ceramic	220P	50V SL
CB10	Ceramic	15P	500V SL
CB11	Ceramic	220P	50V
CB12	Ceramic	220P	50V SL
CB13	Ceramic	0.0047	50V B
CB14	Electrolytic	47	16V
CB15	Ceramic	0.0047	50V
CB16	Ceramic	0.0047	50V B
CB17	Ceramic	220P	50V SL
CB18	Ceramic	0.0047	50V B
CB19	Ceramic	0.0047	50V B
CB20	Ceramic	220P	50V
CB21	Ceramic	470P	500VB*
CB22	Ceramic	470P	500VB*
CB23	Ceramic	470P	500VB*
CB24	Electrolytic	470	16V **
JB1	Connector	1261P	6P
JB2	Connector	F.M-MDRmi	
PB1	Connector	TL-25H-09-B1	
PB2	Connector	TMP-P01X-A1	
PB3	Connector	TMP-P01X-A1	
BB1	PC. Board	B-613B (42237)	

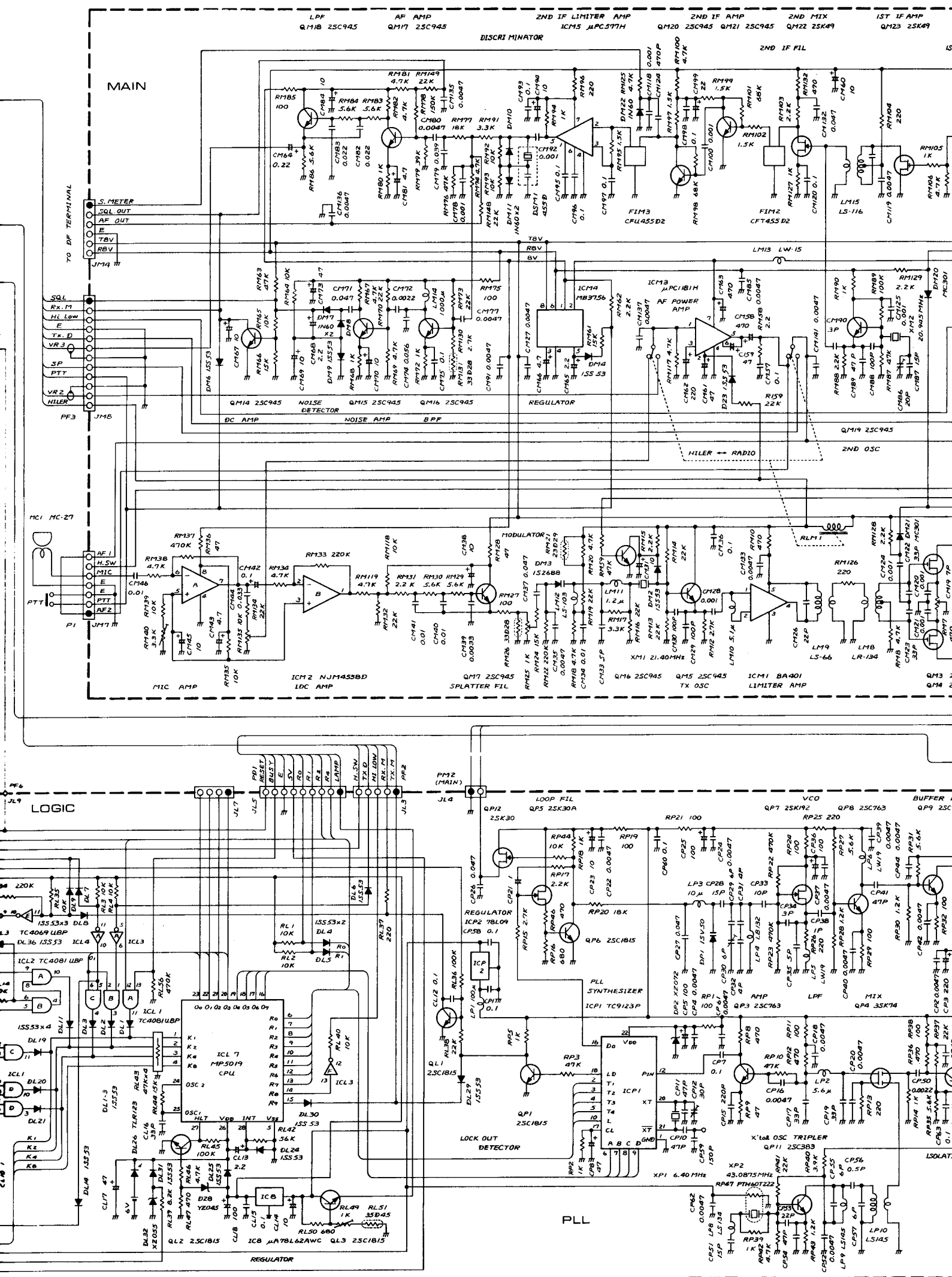
* EUROPE, HOLLAND and FRANCE versions only

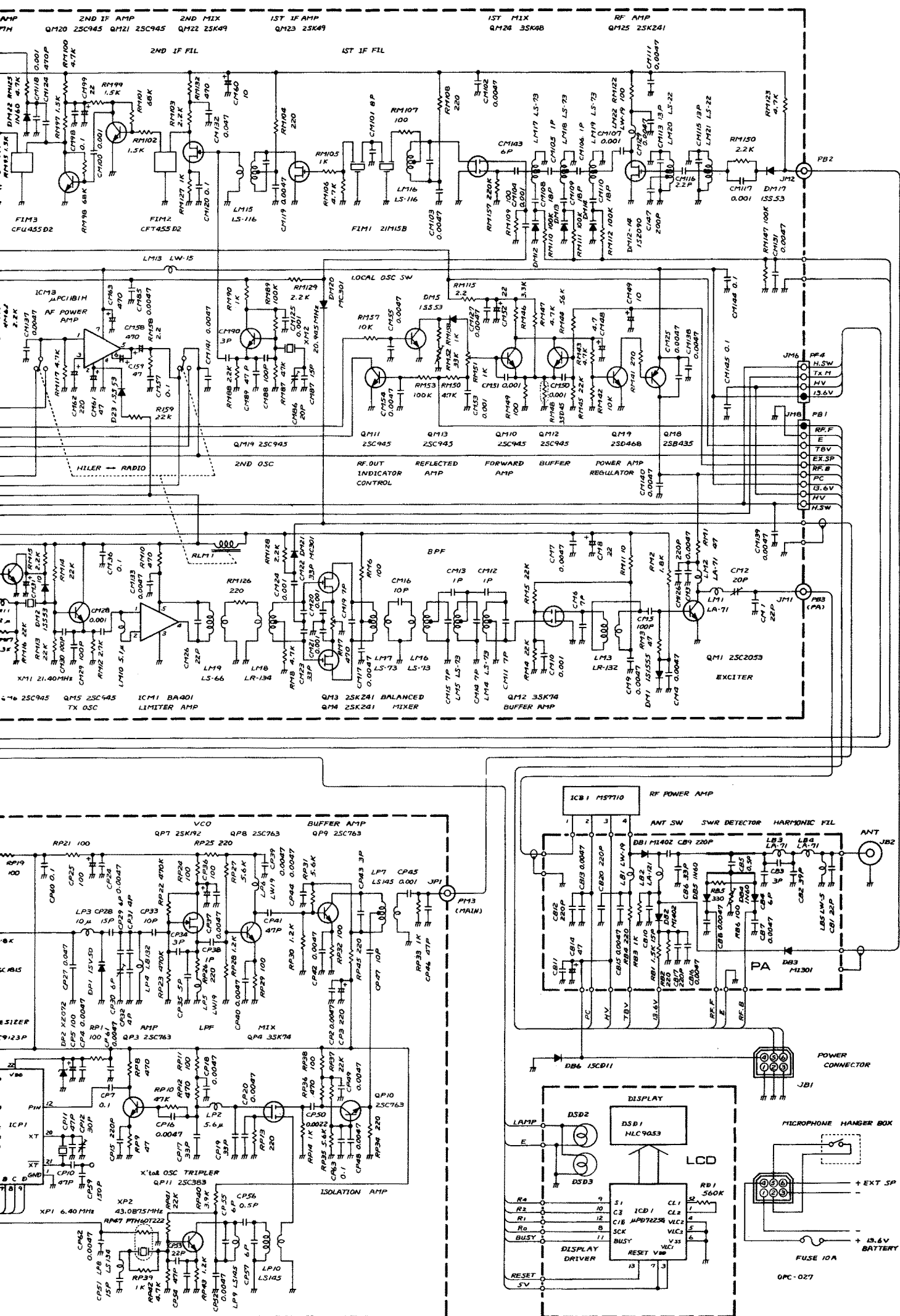
** EUROPE version only

IC-M80

SCHEMATIC DIAGRAM



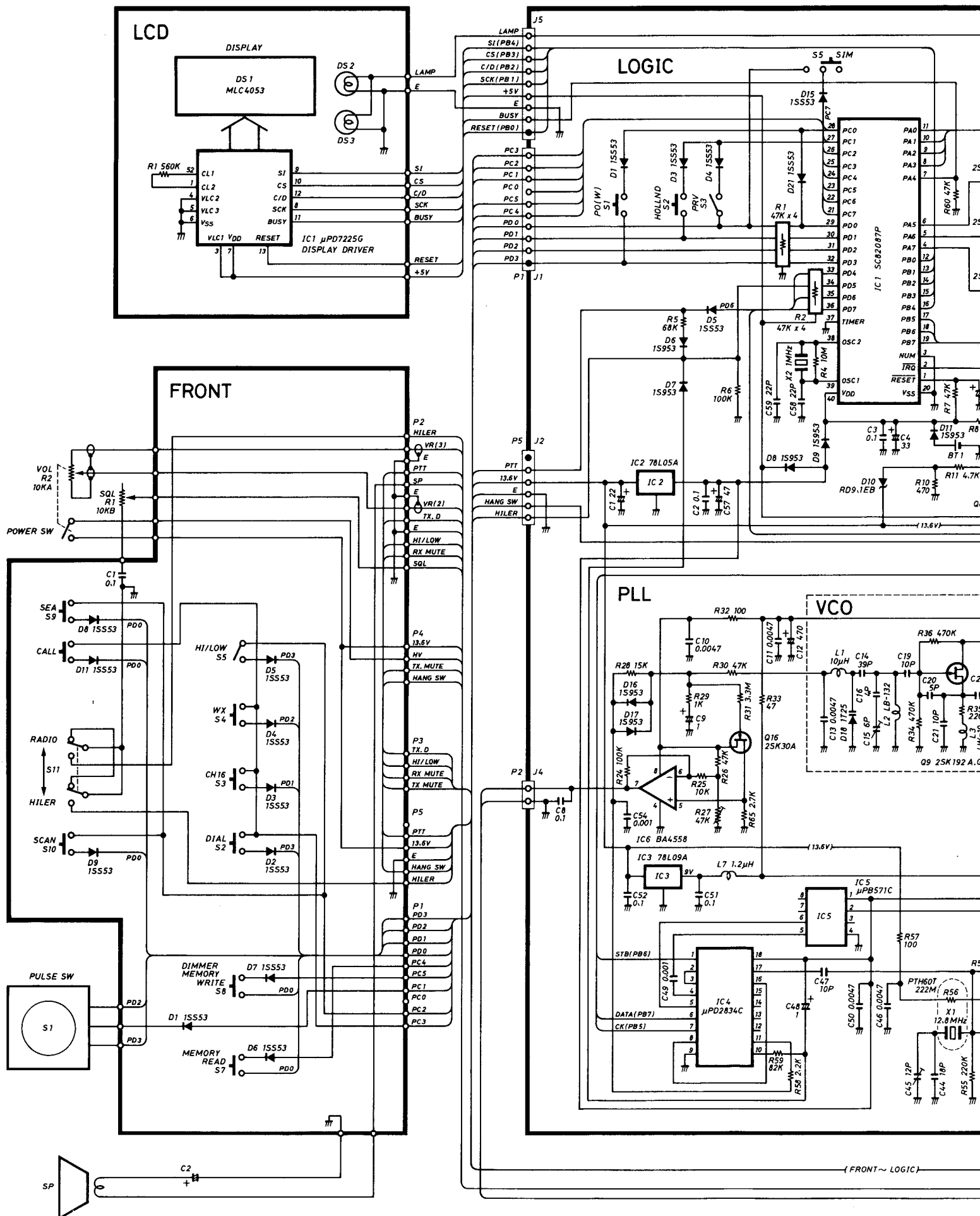




IC-M80

INTERNATIONAL

SCHEM



IC1 SC82087P

PA0 11
PA1 10
PA2 9
PA3 8
PA4 7
PA5 6
PA6 5
PA7 4
PB1 13
PB2 12
PB3 11
PB4 10
PB5 9
PB6 8
PB7 7
TR0 3
RESET 2
VSS 1

R60 47K
Q1 25C3402
Q2 25C3402
Q3 25C3402
Q4 25A1015Y
Q5 25A1015Y
Q6 25A1015Y
Q7 25C945 ALL LANK
Q8 25C945 ALL LANK
Q9 25K192 A,GR
Q10 25C763C
Q11 25C763C
Q12 25C763C
Q13 25C763C
Q14 25C945P
Q15 25C945P
Q17 25C3399
Q20 22K
Q21 15953
Q22 1P
Q23 220
Q24 1.2K
Q25 0.0047
Q26 0.0047
Q27 47P
Q28 0.0047
Q29 3P
Q30 0.0047
Q31 10P
Q32 0.001
Q33 1P
Q34 10P
Q35 220
Q36 470K
Q37 47
Q38 0.0047
Q39 0.0047
Q40 4P
Q41 470
Q42 1.2K
Q43 5.6K
Q44 100
Q45 47
Q46 1K
Q47 100
Q48 470
Q49 47K
Q50 470
Q51 47
Q52 100
Q53 47K
Q54 5.6K
Q55 220K
Q56 222M
Q57 100

R1 10K
R2 10K
R3 10K
R4 10K
R5 10K
R6 10K
R7 10K
R8 47K
R9 47K
R10 470
R11 4.7K
R12 10K
R13 10K
R14 10K
R15 220
R16 100
R17 47
R18 47K
R19 47K
R20 22K
R21 47K
R22 47K
R23 100K
R24 100K
R25 100K
R26 100K
R27 100K
R28 100K
R29 100K
R30 100K
R31 100K
R32 100K
R33 100K
R34 100K
R35 100K
R36 470K
R37 47
R38 220
R39 1.2K
R40 5.6K
R41 100
R42 1.2K
R43 5.6K
R44 100
R45 47
R46 1K
R47 100
R48 470
R49 47K
R50 470
R51 47
R52 100
R53 47K
R54 5.6K
R55 220K
R56 222M
R57 100

C1 0.1
C2 33
C3 0.1
C4 33
C5 1
C6 3.3
C7 4.7
C8 0.1
C9 0.1
C10 0.1
C11 0.1
C12 0.1
C13 0.1
C14 0.1
C15 12P
C16 18P
C17 220K
C18 12P
C19 10P
C20 5P
C21 10P
C22 1P
C23 220
C24 1.2K
C25 0.0047
C26 0.0047
C27 47P
C28 0.0047
C29 3P
C30 0.0047
C31 10P
C32 0.001
C33 1P
C34 10P
C35 220
C36 0.0047
C37 0.0047
C38 0.0047
C39 0.0047
C40 4P
C41 470
C42 88P
C43 220P
C44 18P
C45 12P
C46 0.0047
C47 0.0047

D1 15953
D2 15953
D3 15953
D4 15953
D5 15953
D6 15953
D7 15953
D8 15953
D9 15953
D10 15953
D11 15953
D12 15953
D13 15953

BT1
L1 1.2uH
L2 1.2uH
L3 1.2uH
L4 1.2uH
L5 1.2uH
L6 1.2uH
L7 1.2uH

TX.D
POW CON
RX MUTE
TX MUTE (PA2)

J3 P3

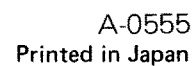
PC5 P8571C

PTH60T 222M

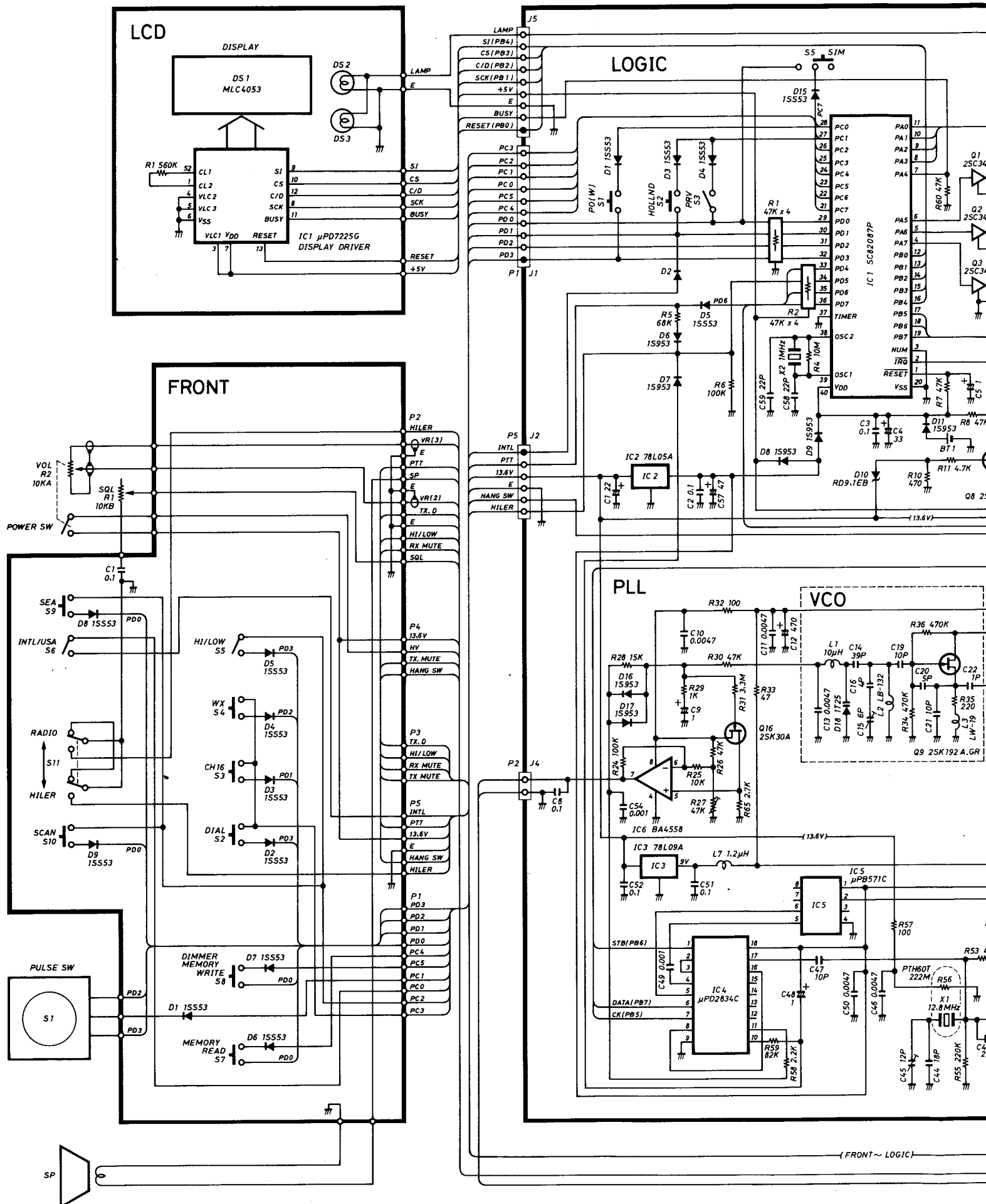
X1 12.6MHz

POINT ~ LOGIC

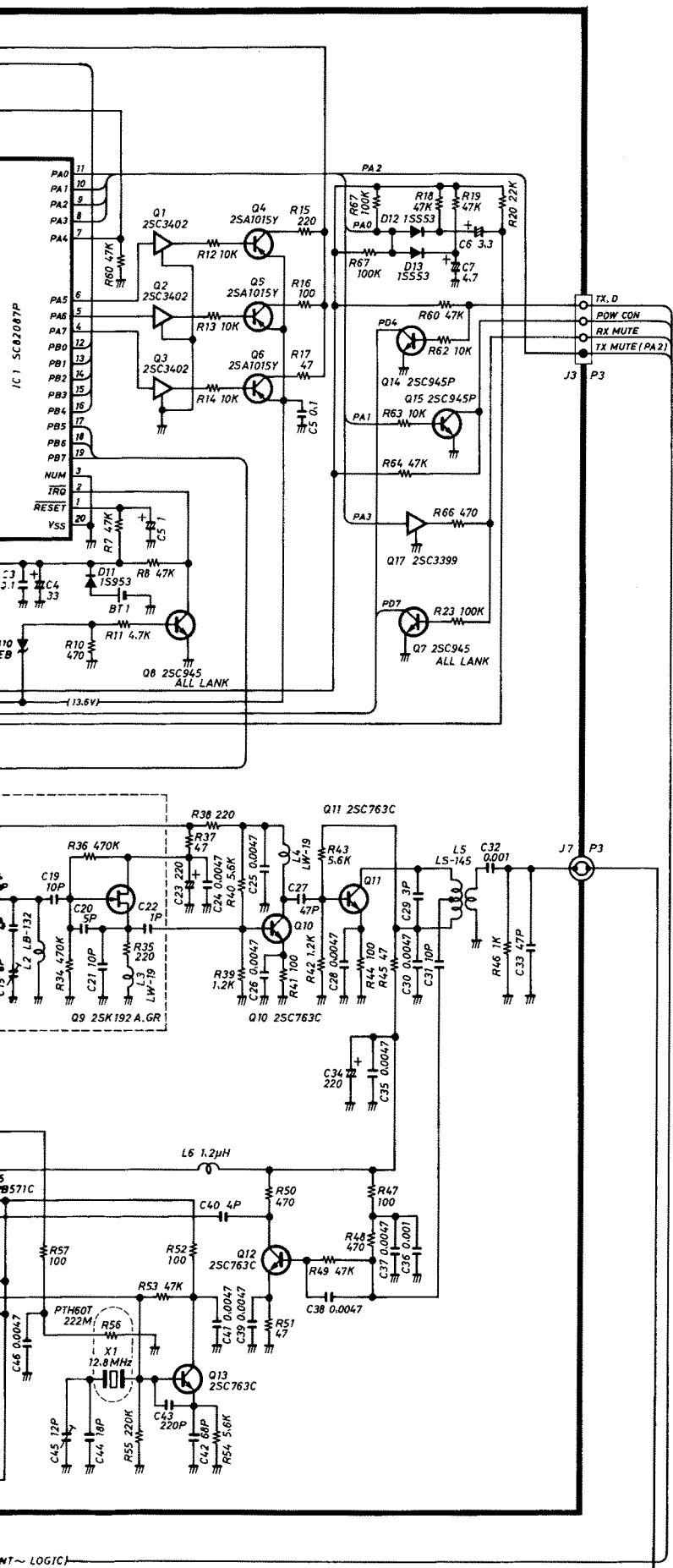
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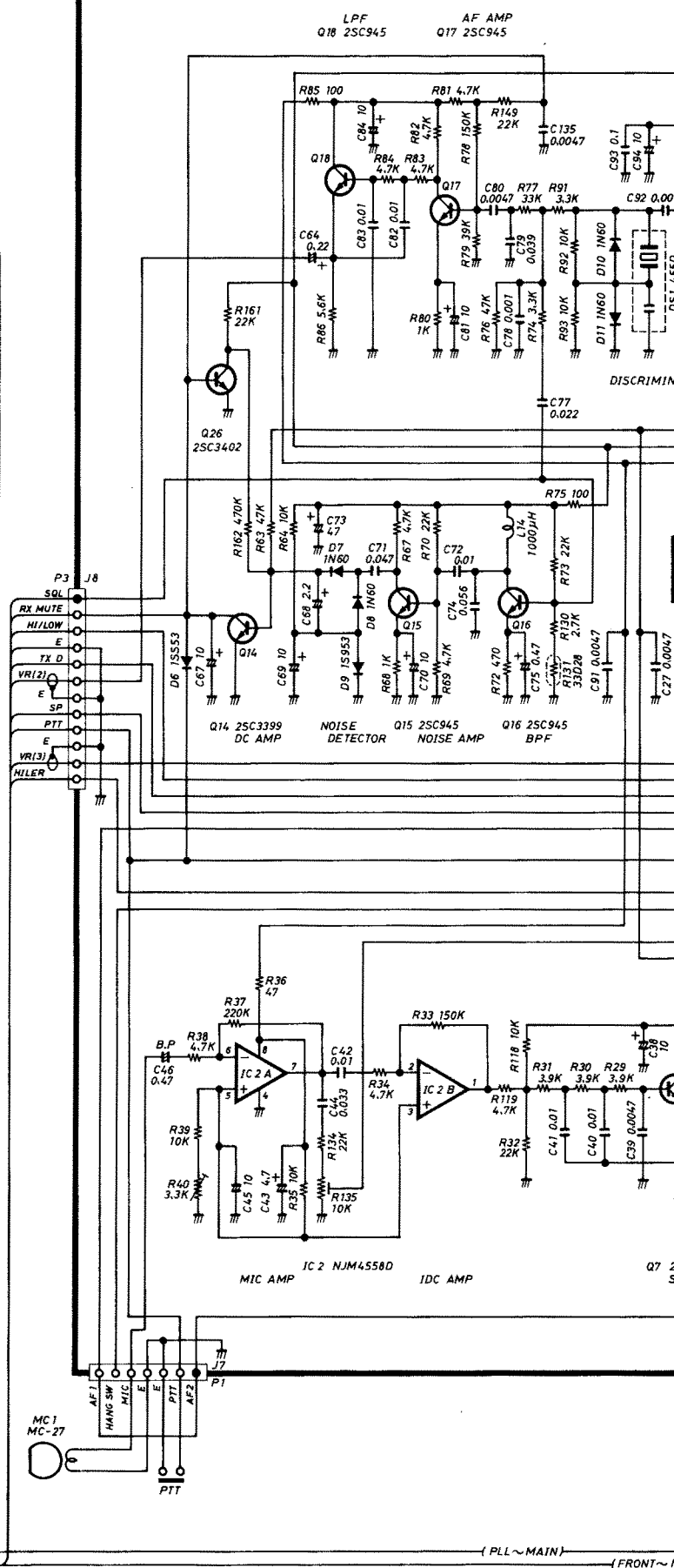
IC-M80 USA SCHEMATIC D

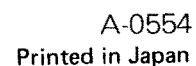


TIC DIAGRAM



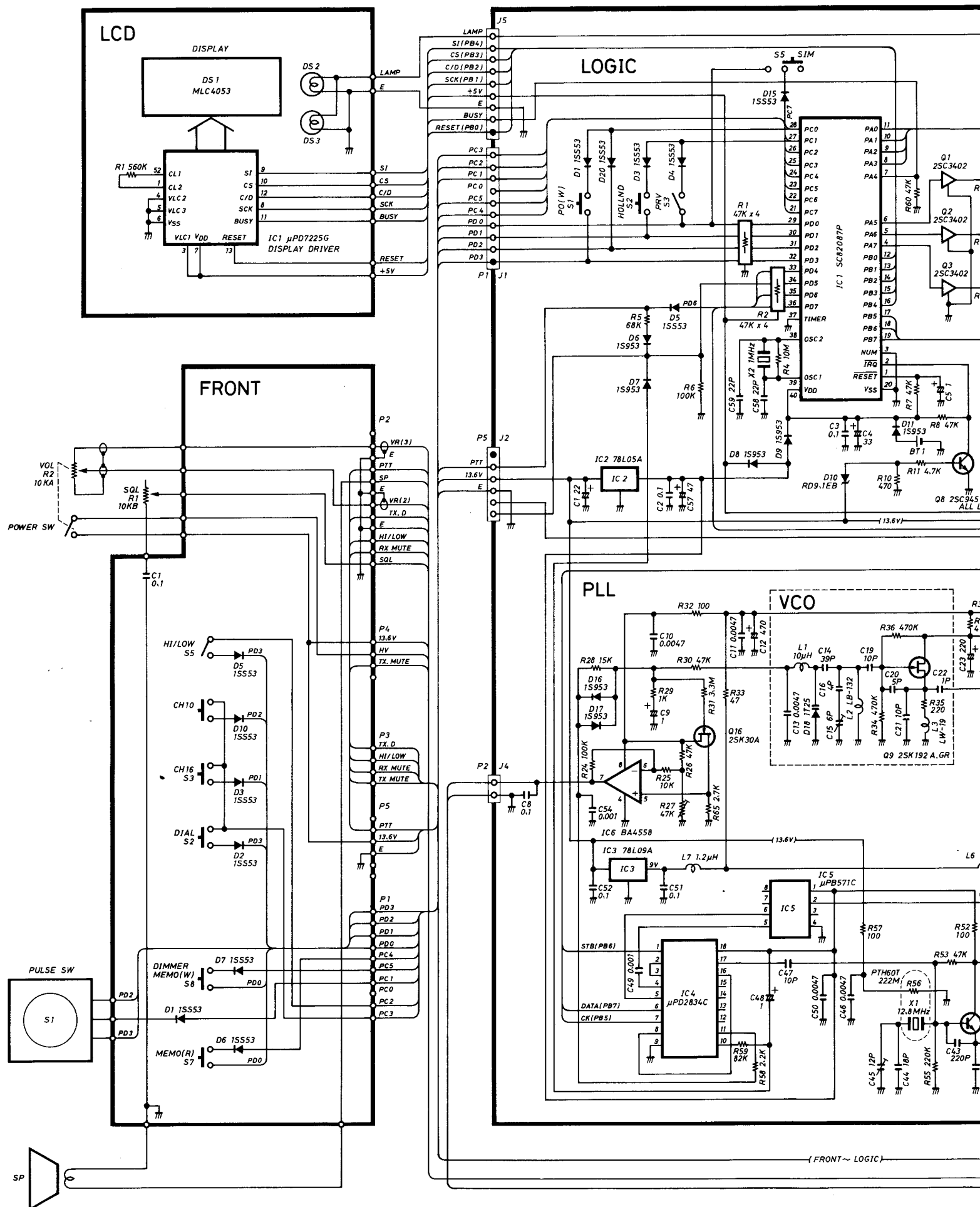
MAIN



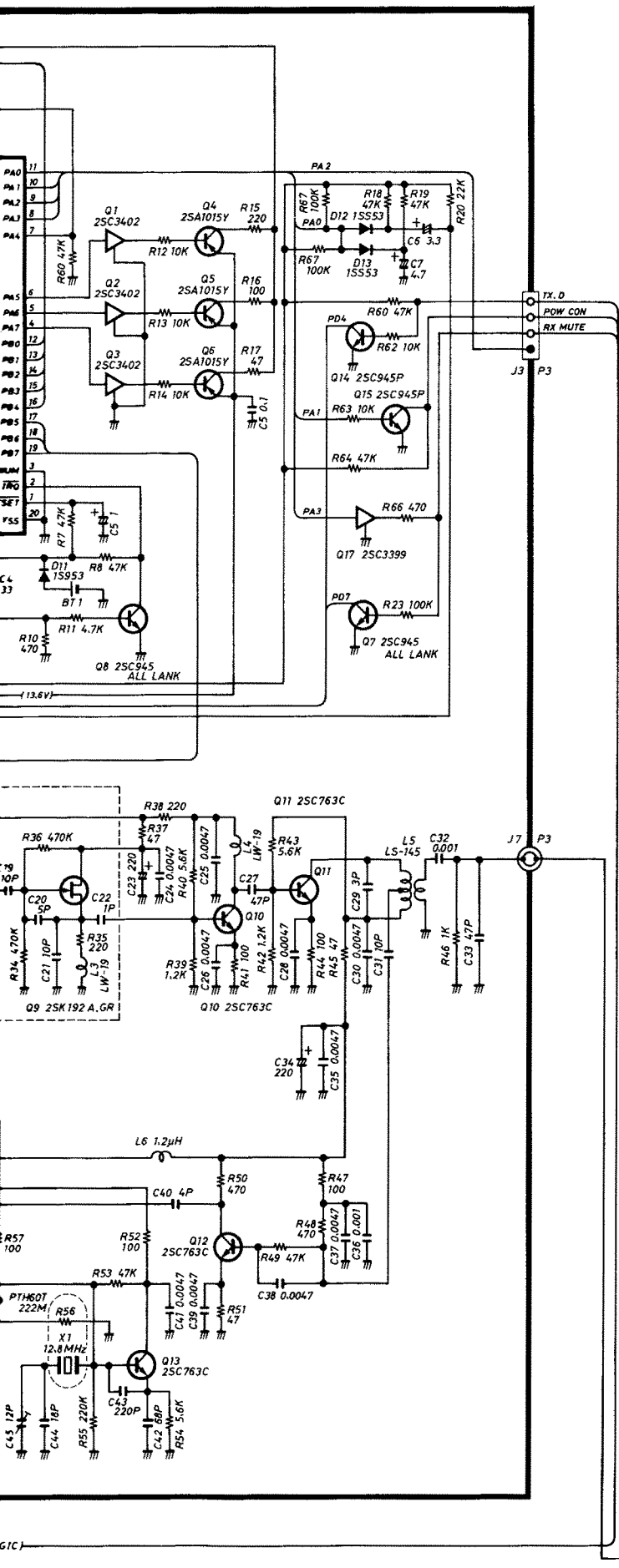


IC-M80H

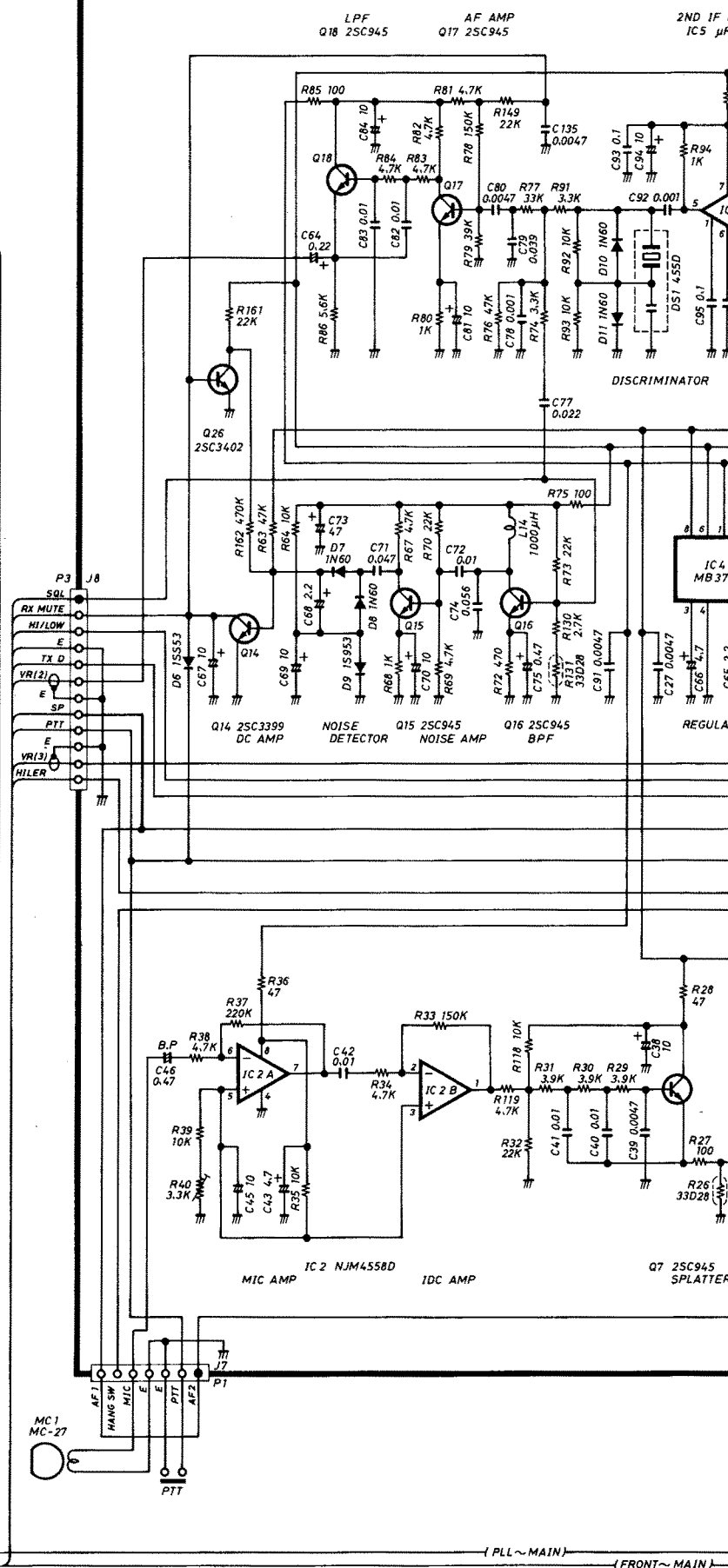
SCHEMATIC D

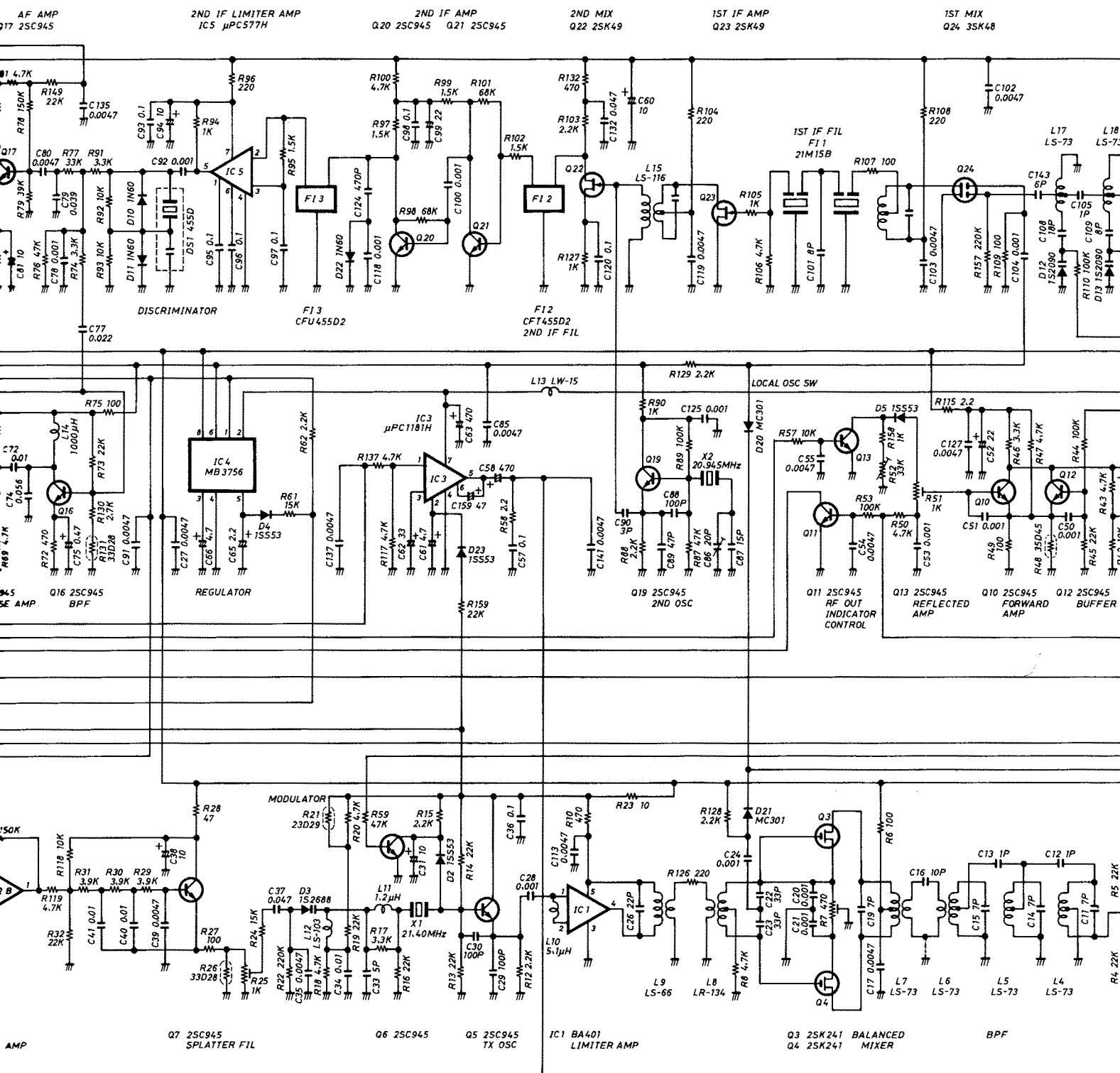


TIC DIAGRAM



MAIN





(PLL~MAIN)

(FRONT~MAIN)

(PLL~MAIN)

