

VHF MARINE RADIOTELEPHONE

IC-M80

MAINTENANCE MANUAL



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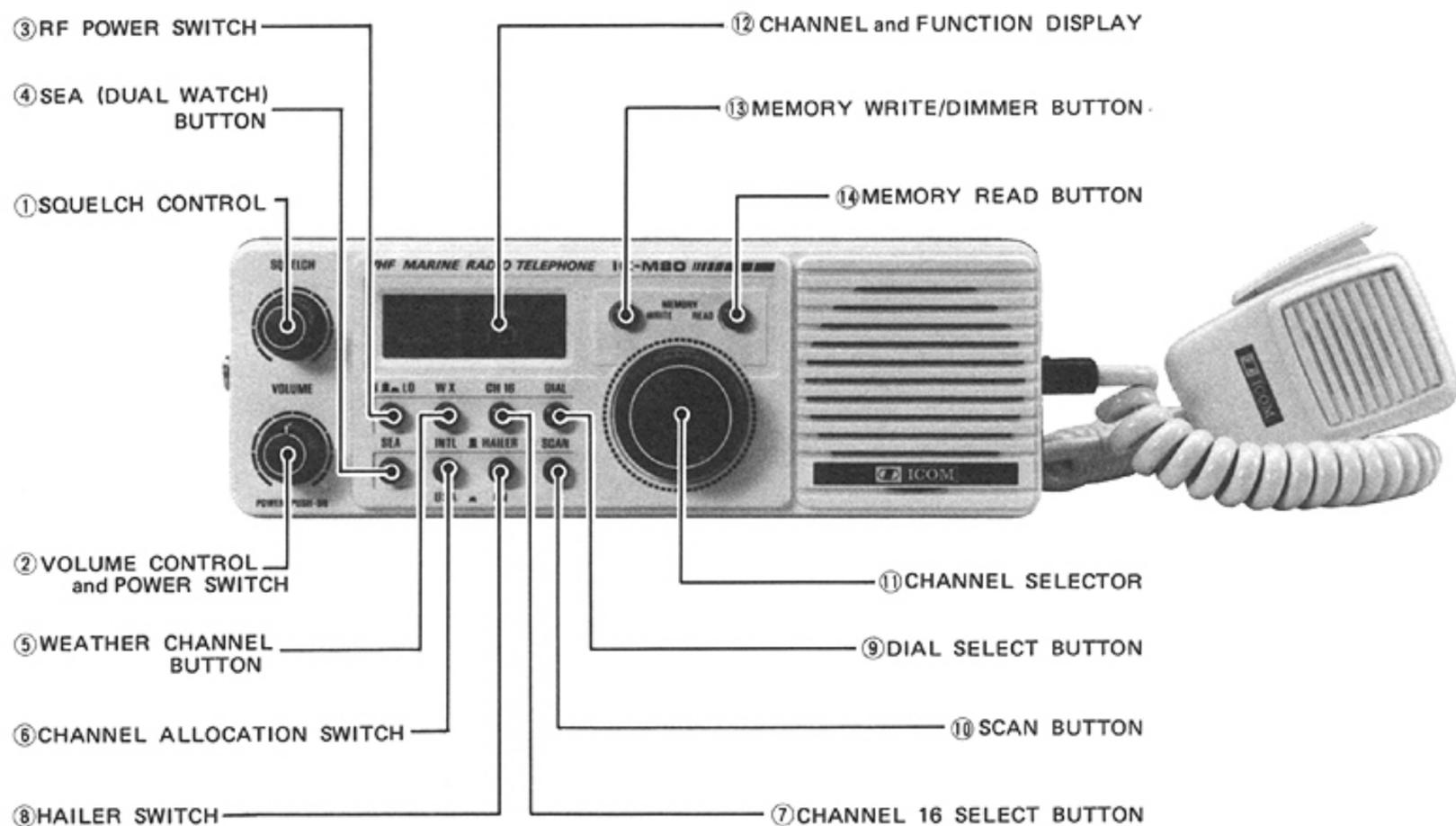
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SECTION 2 OPERATING CONTROLS

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.

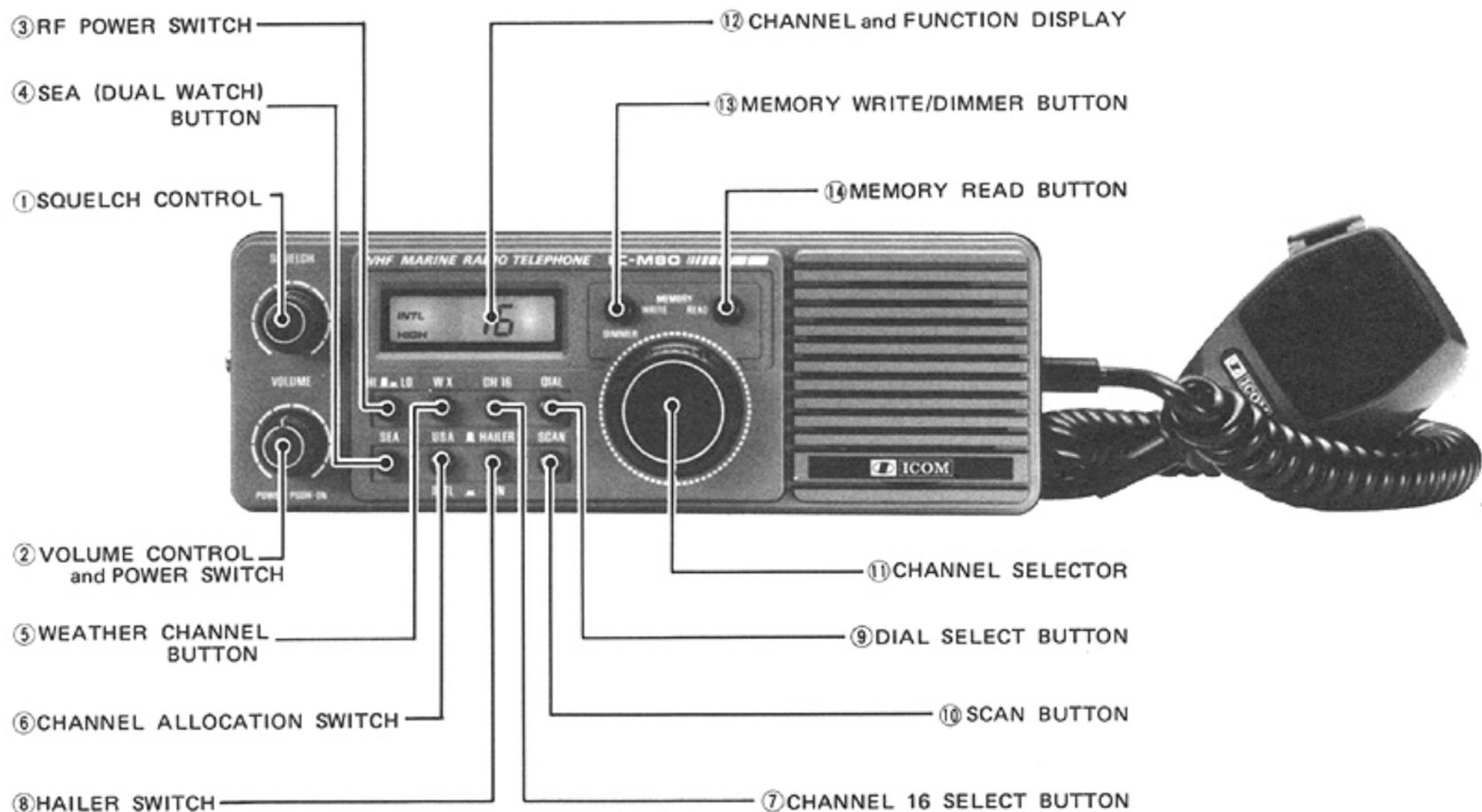
13. MEMORY WRITE BUTTON

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.

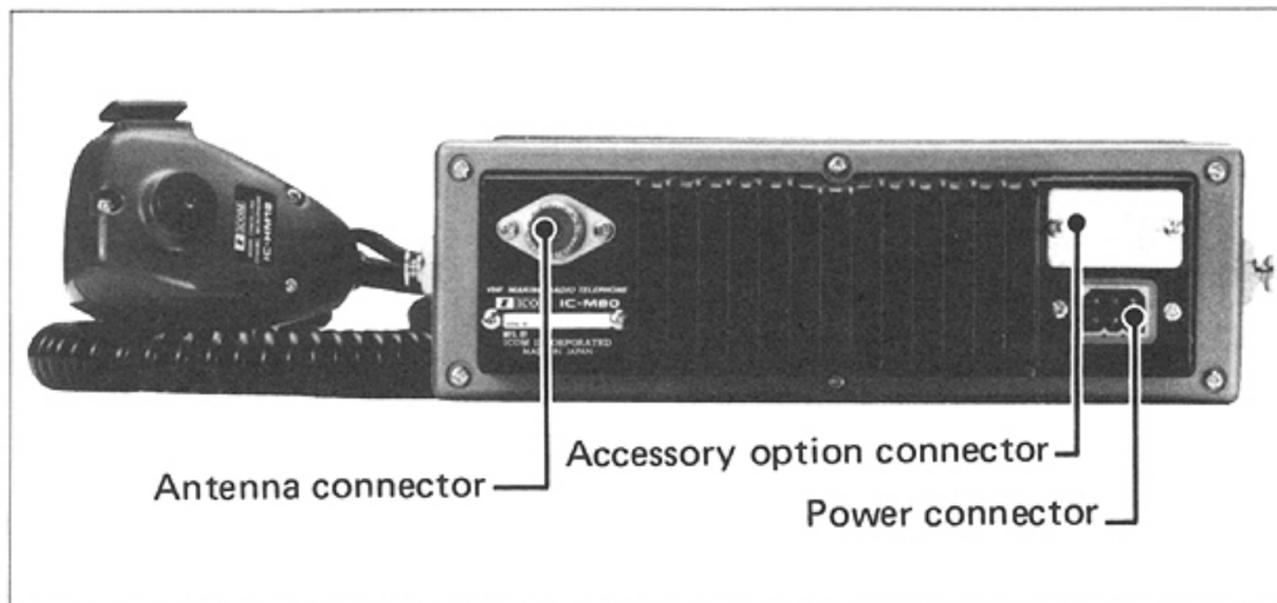
13. MEMORY WRITE/DIMMER BUTTON

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

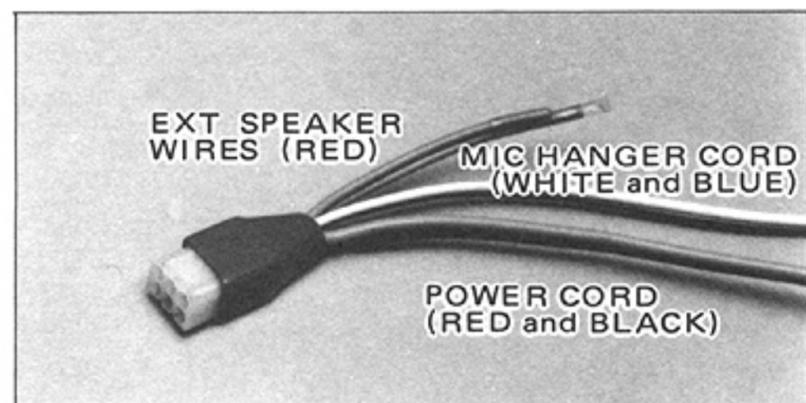
This is used to connect an antenna to the set. Its impedance is 50 ohms and connects with a PL-259 connector.

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.



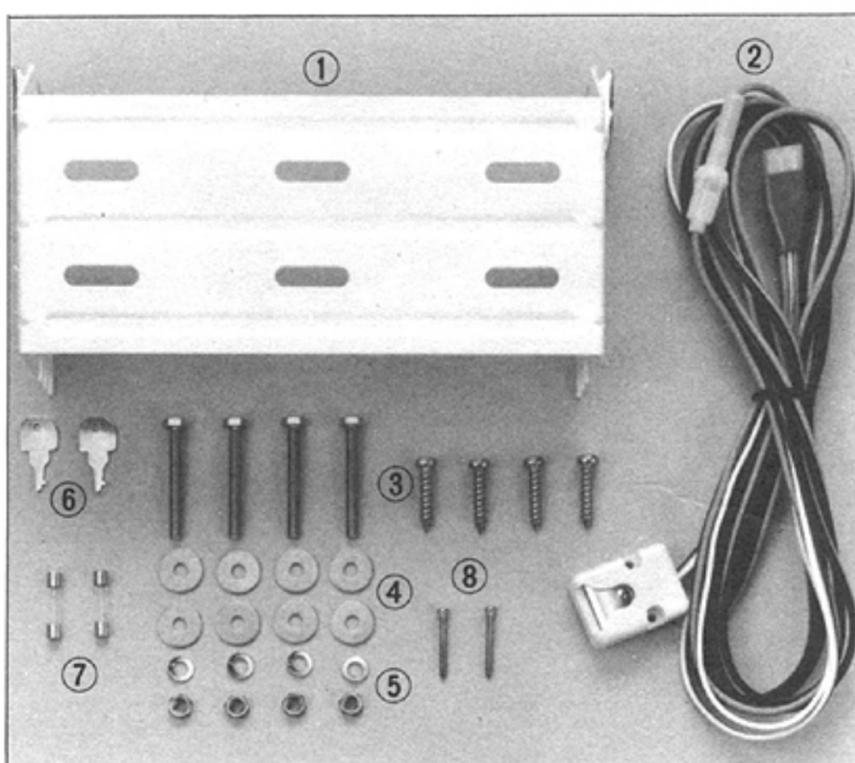
2-3 ADDITIONAL CONTROLS

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 ⑭ 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 Splat 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.

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

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;

$$N = \frac{\text{Desired operating frequency} - \text{Intermediate freq.} - \text{Local oscillator freq.}}{\text{Reference frequency}} \text{ (MHz)} - 107$$

$$= \frac{(\text{Desired operating frequency} - 21.4) - 129.2625}{0.0125} \text{ (MHz)} - 107$$

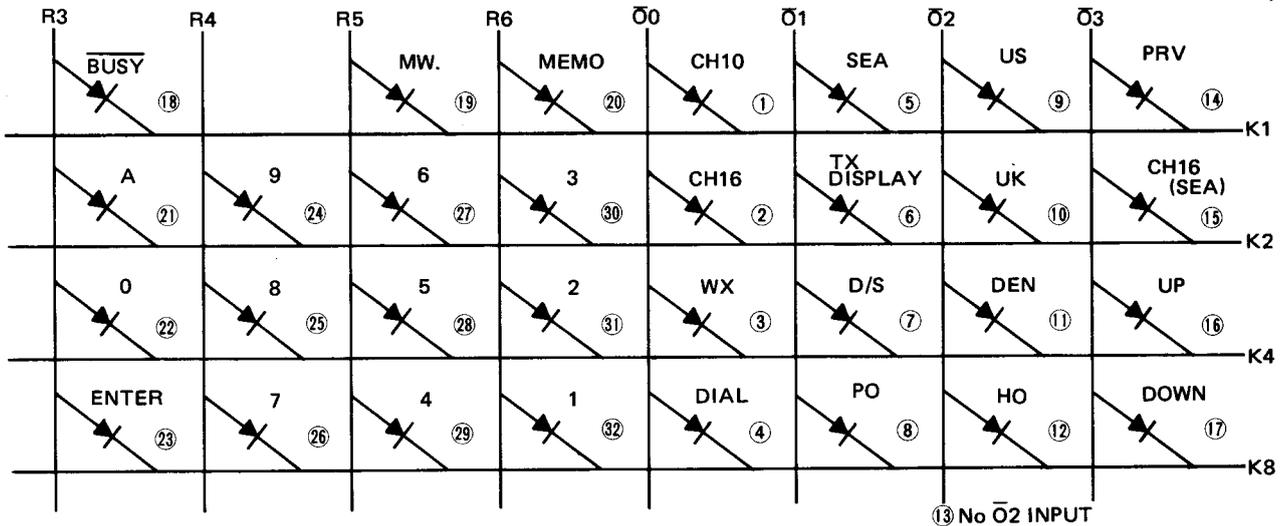
4 - 5 LOGIC UNIT (For Type 225)

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.

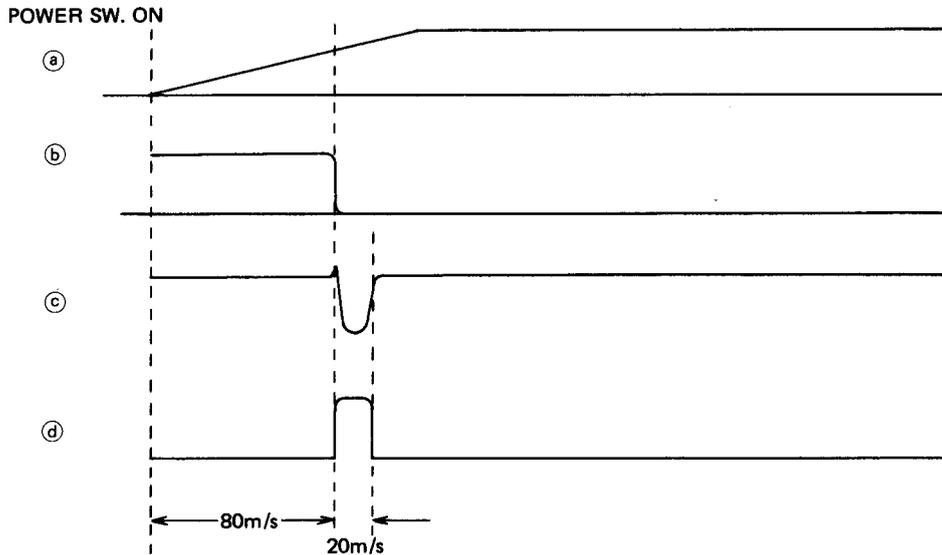
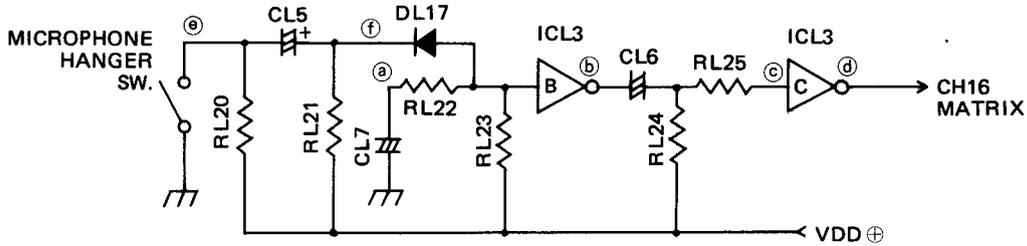
21 ~ 32. R3, 4, 5, 6 - K2, 4, 8 (TEN KEY INPUT)

These matrices are provided for an external ten key controller.

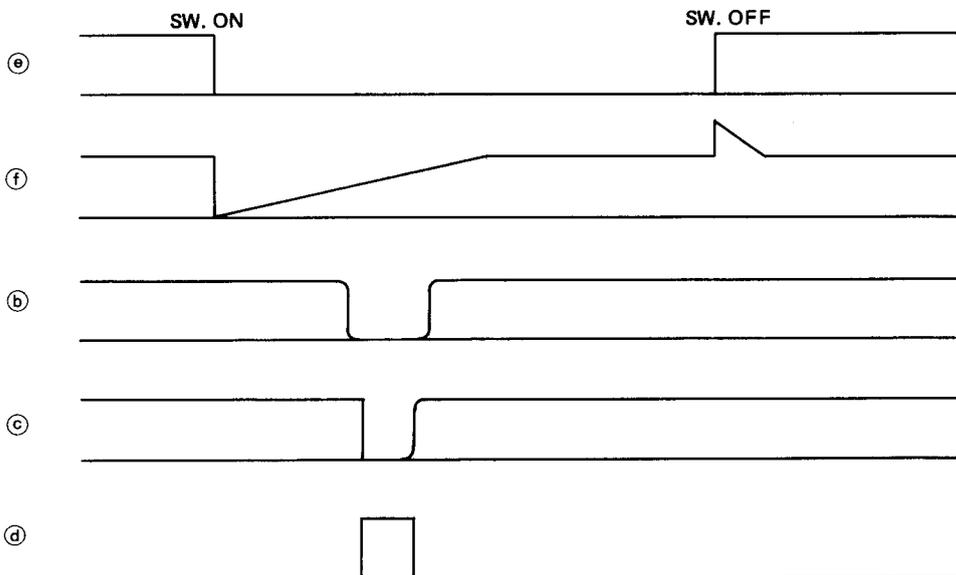
2. OTHER CONTROL CIRCUITS

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.

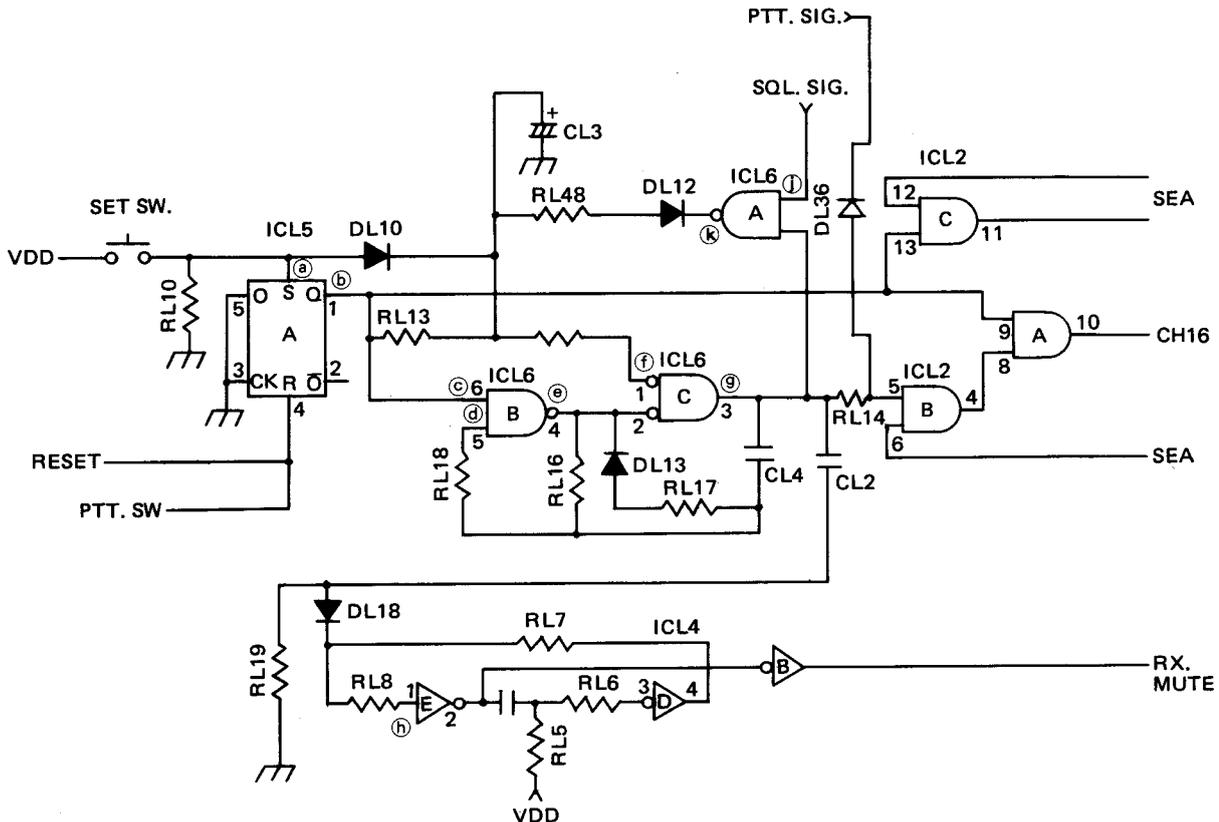
When a signal is received on channel 16, the output terminal(k) of ICL6(A), 2-input NAND gate, becomes LOW-level and one of input terminal of ICL6(C) becomes LOW-level too. Therefore the multivibrator stops to oscillate and ICL6(C) puts out HIGH-level continuously while the signal on channel 16 is present.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

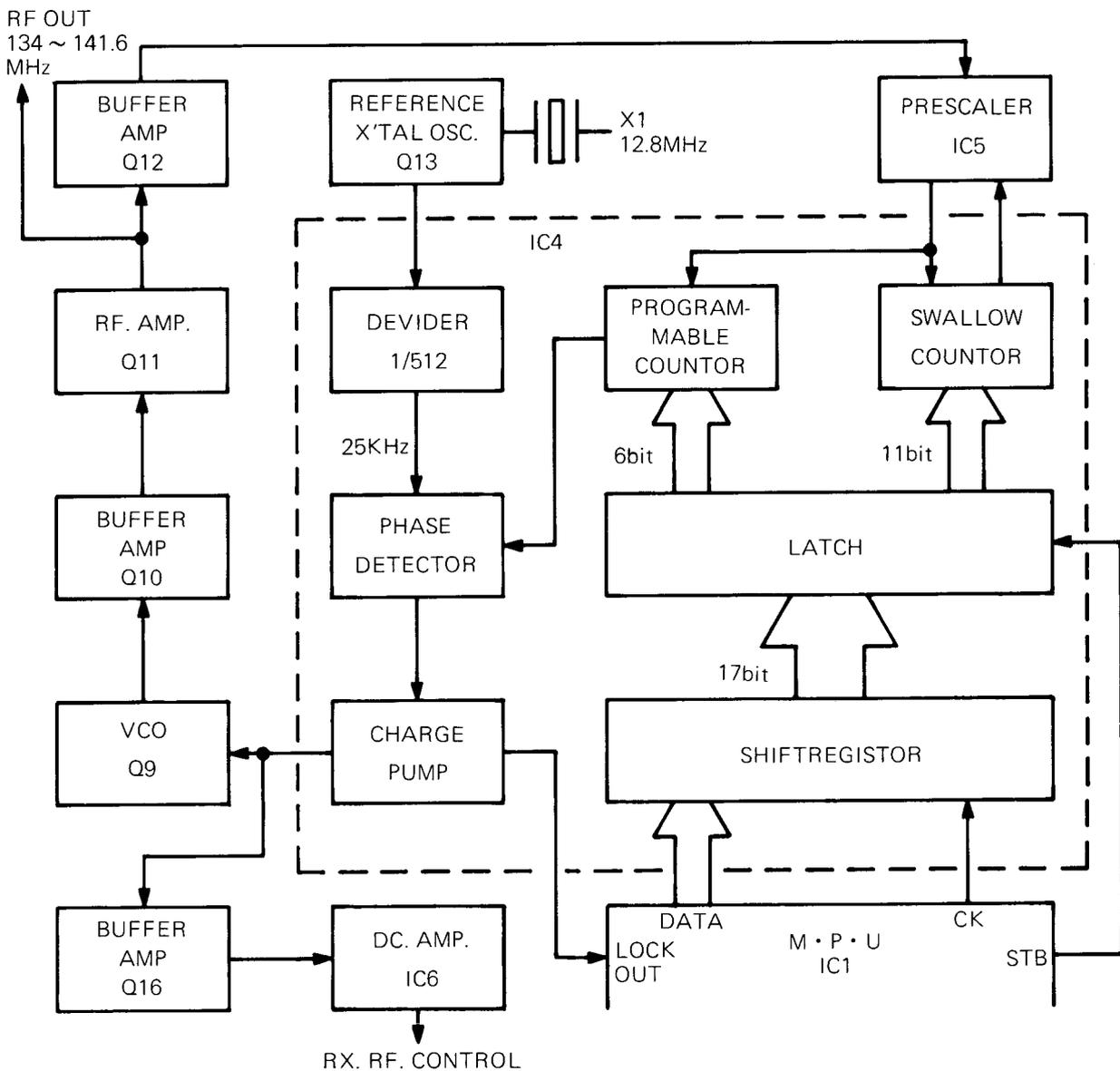
$$N = \frac{\text{1st L.O. frequency}}{\text{Reference frequency}}$$

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

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.

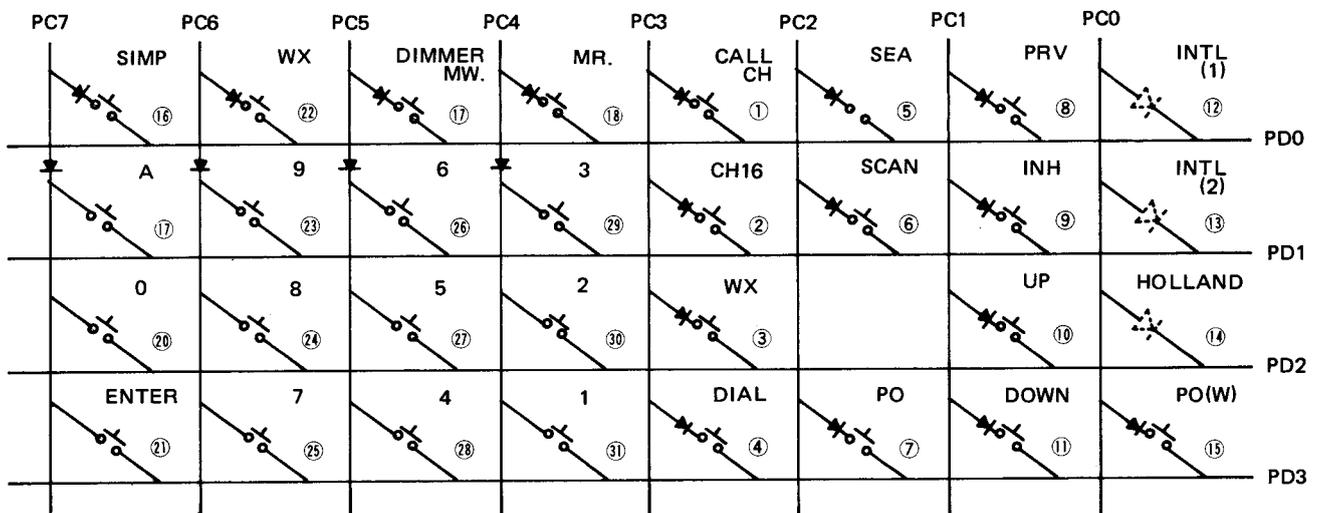
| | | | |
|-----|----------------|----------|------------------------------------|
| PA0 | (pin 11) | in: | CH 16 (hanger switch and power ON) |
| PA1 | (pin 10) | out: | RF OUT (HI/LOW control) |
| PA2 | (pin 9) | out: | Tx MUTE |
| PA3 | (pin 8) | out: | Rx MUTE |
| PA4 | (pin 7) | in: | LCD DRIVER - 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.

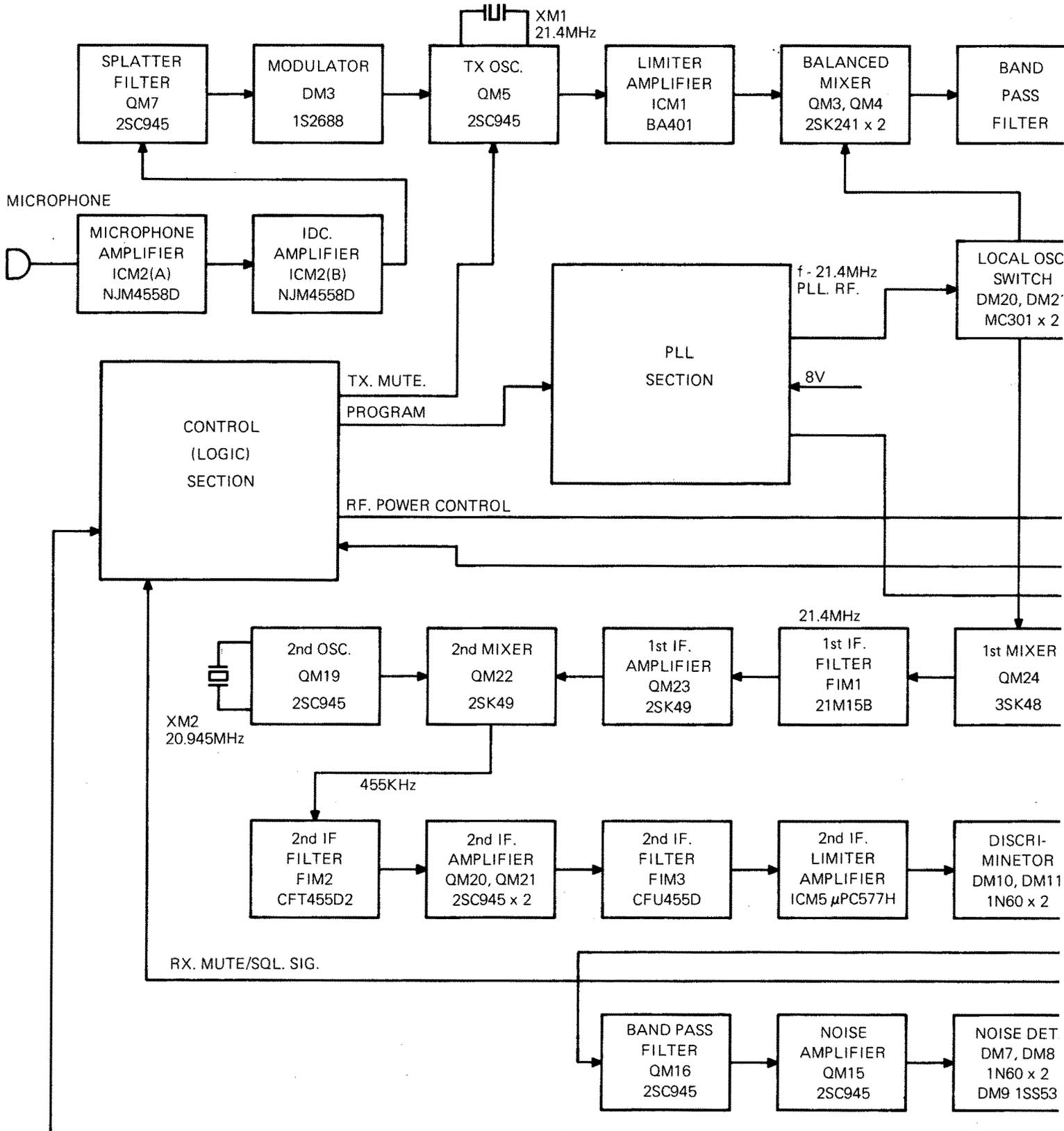
4. DISPLAY CIRCUIT

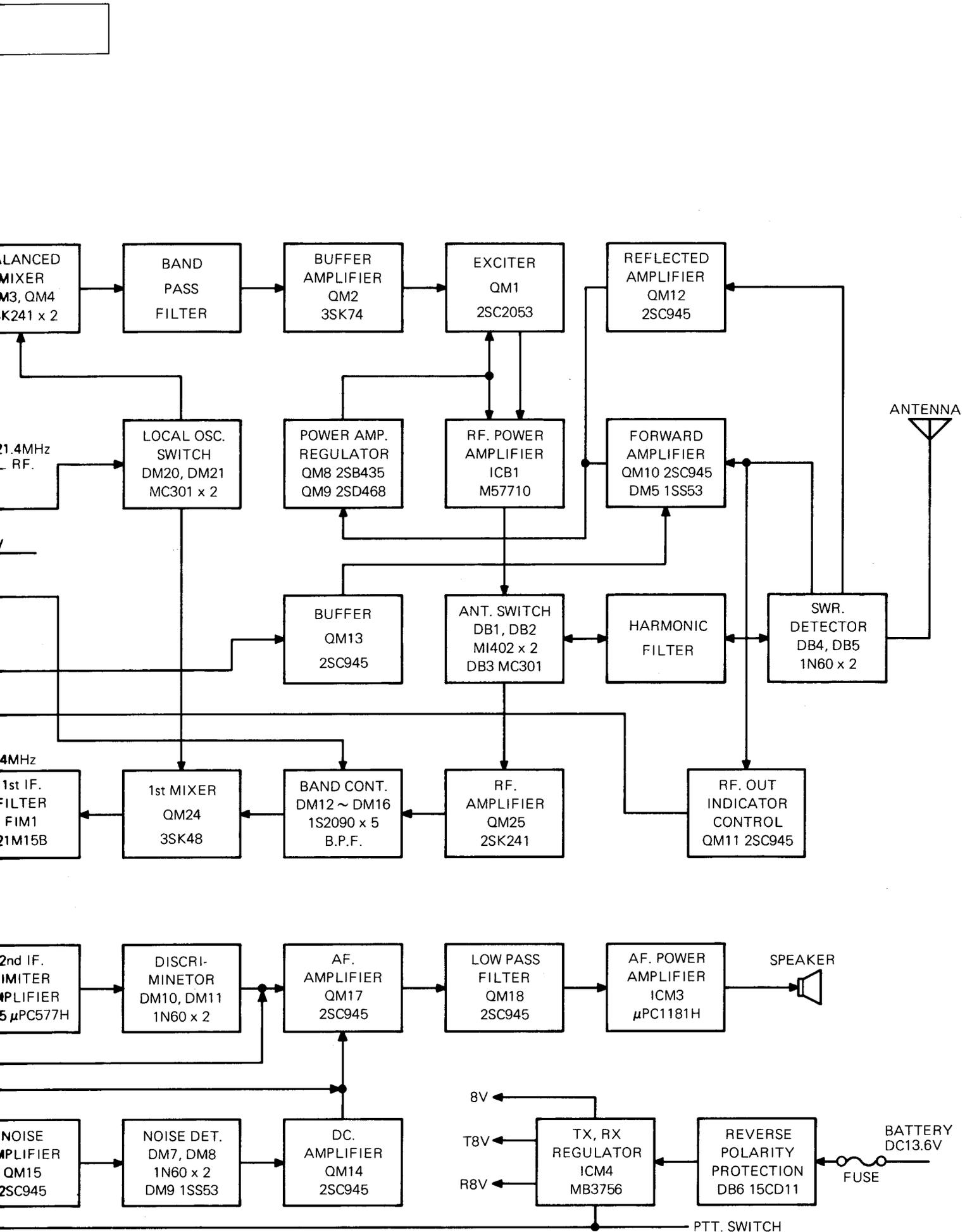
The display employs a Liquid Crystal Display (LCD) which is lighted from the back to make it easy-to-read in the dark.

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.

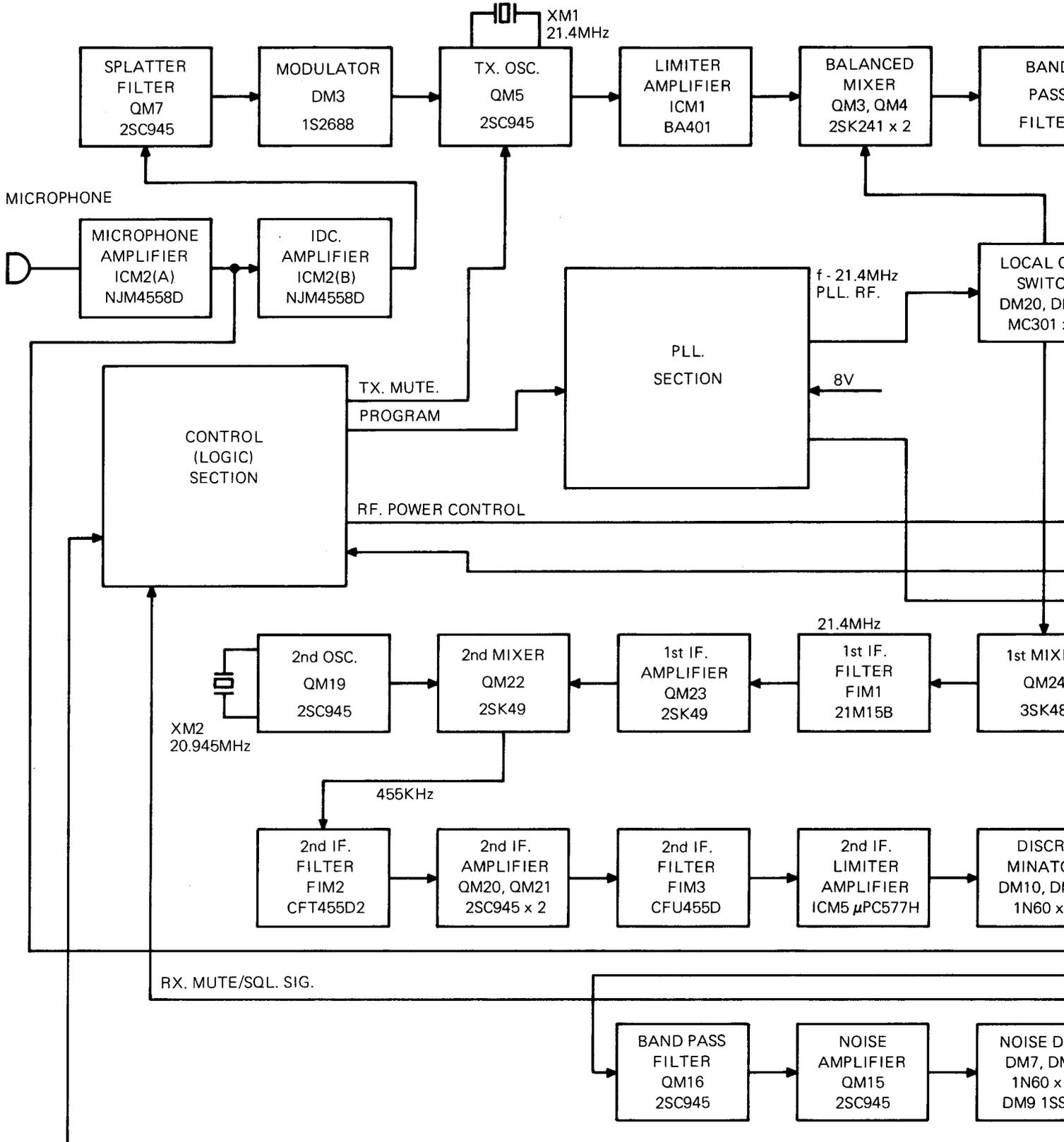
SECTION 5 BLOCK DIAGRAM

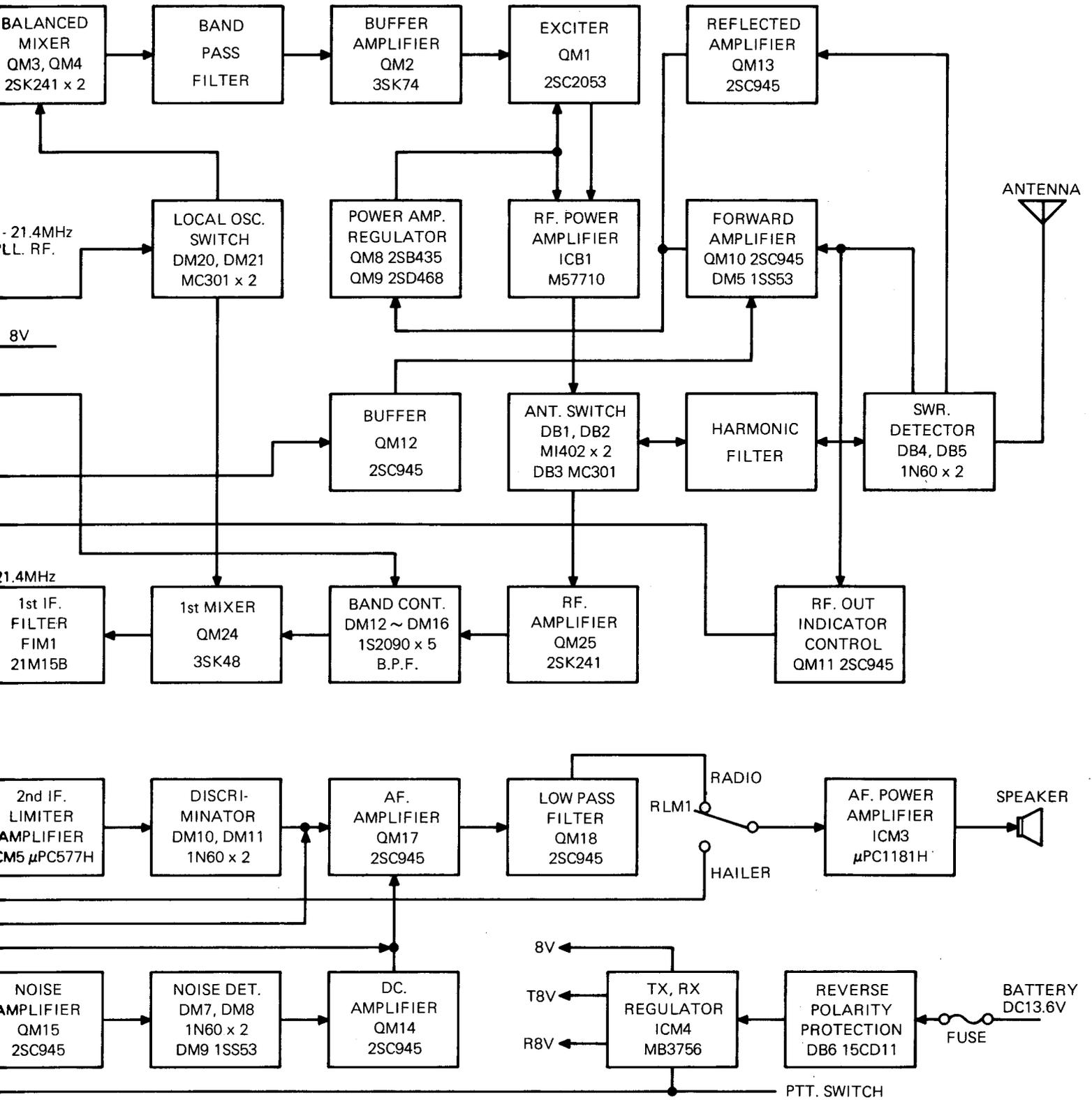
MAIN UNIT (U.S.A. Version)



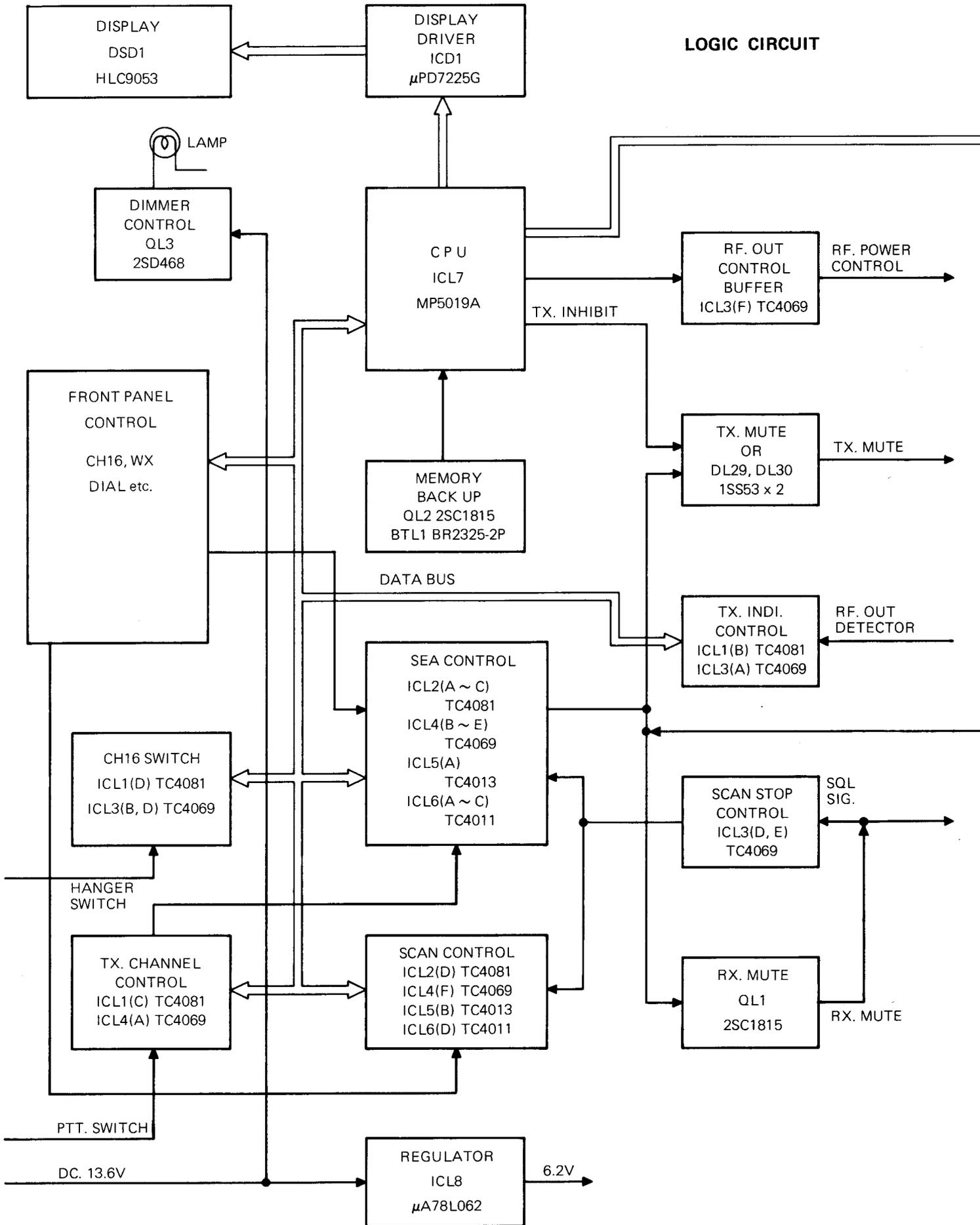


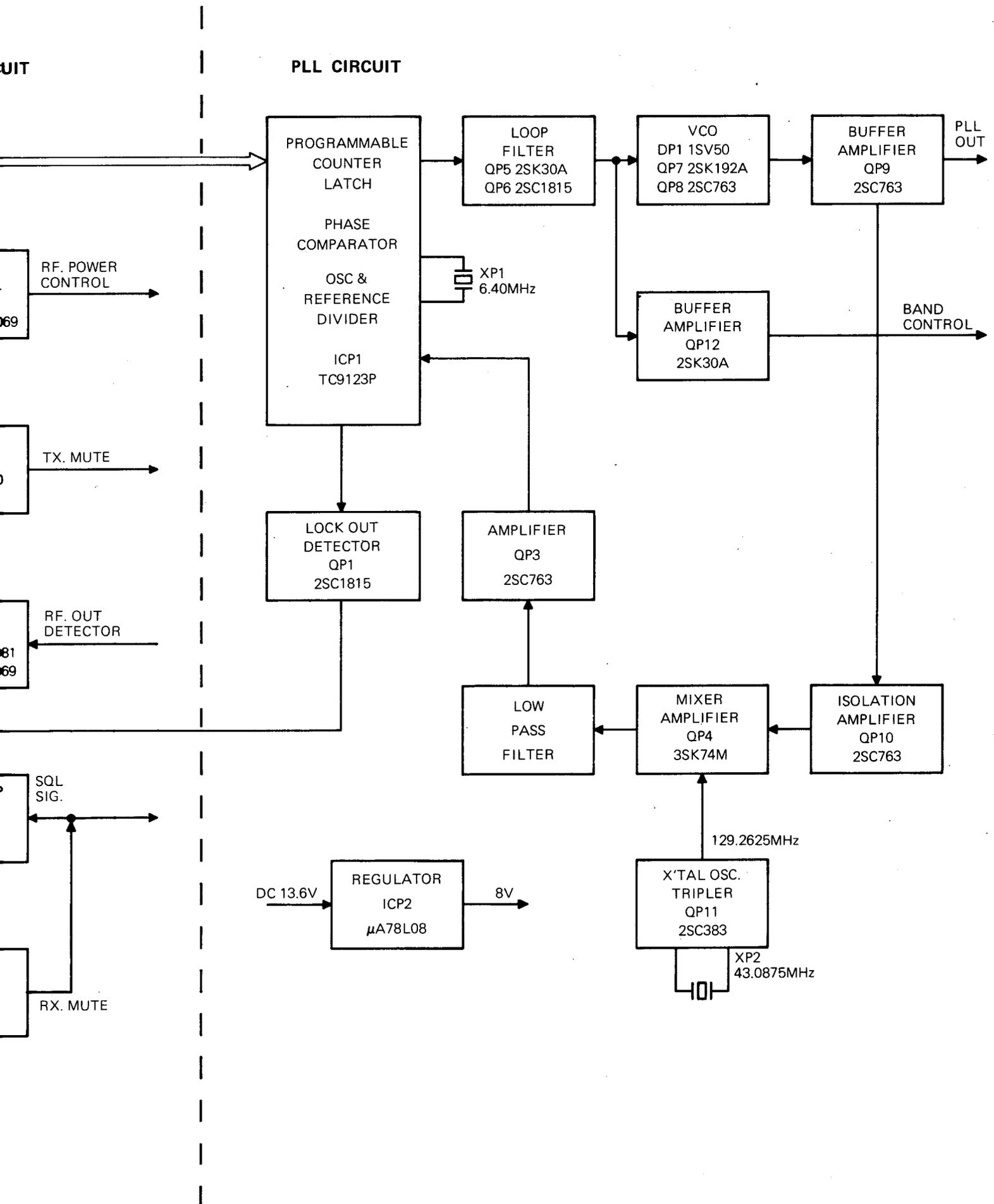
MAIN UNIT (European Version)



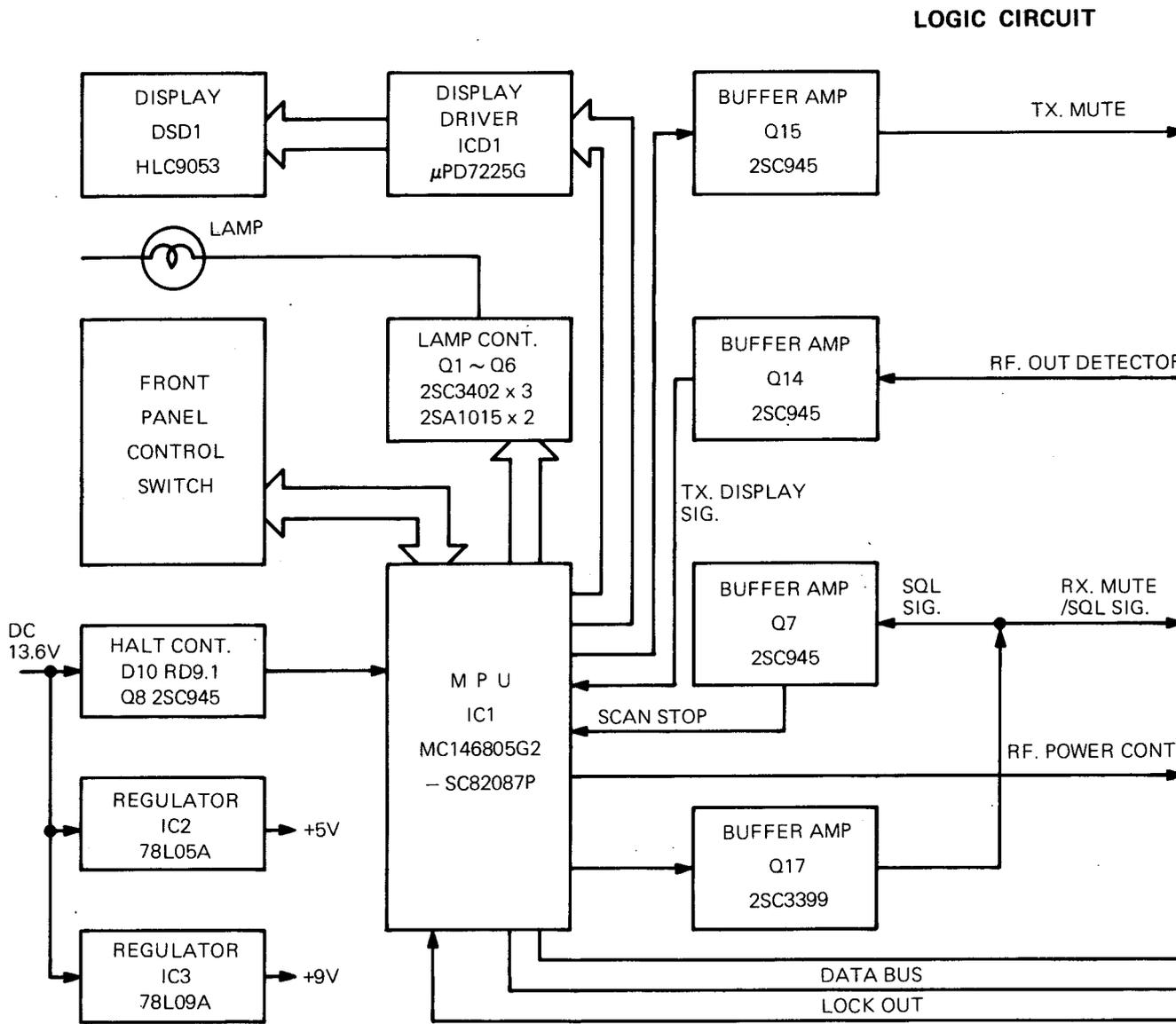


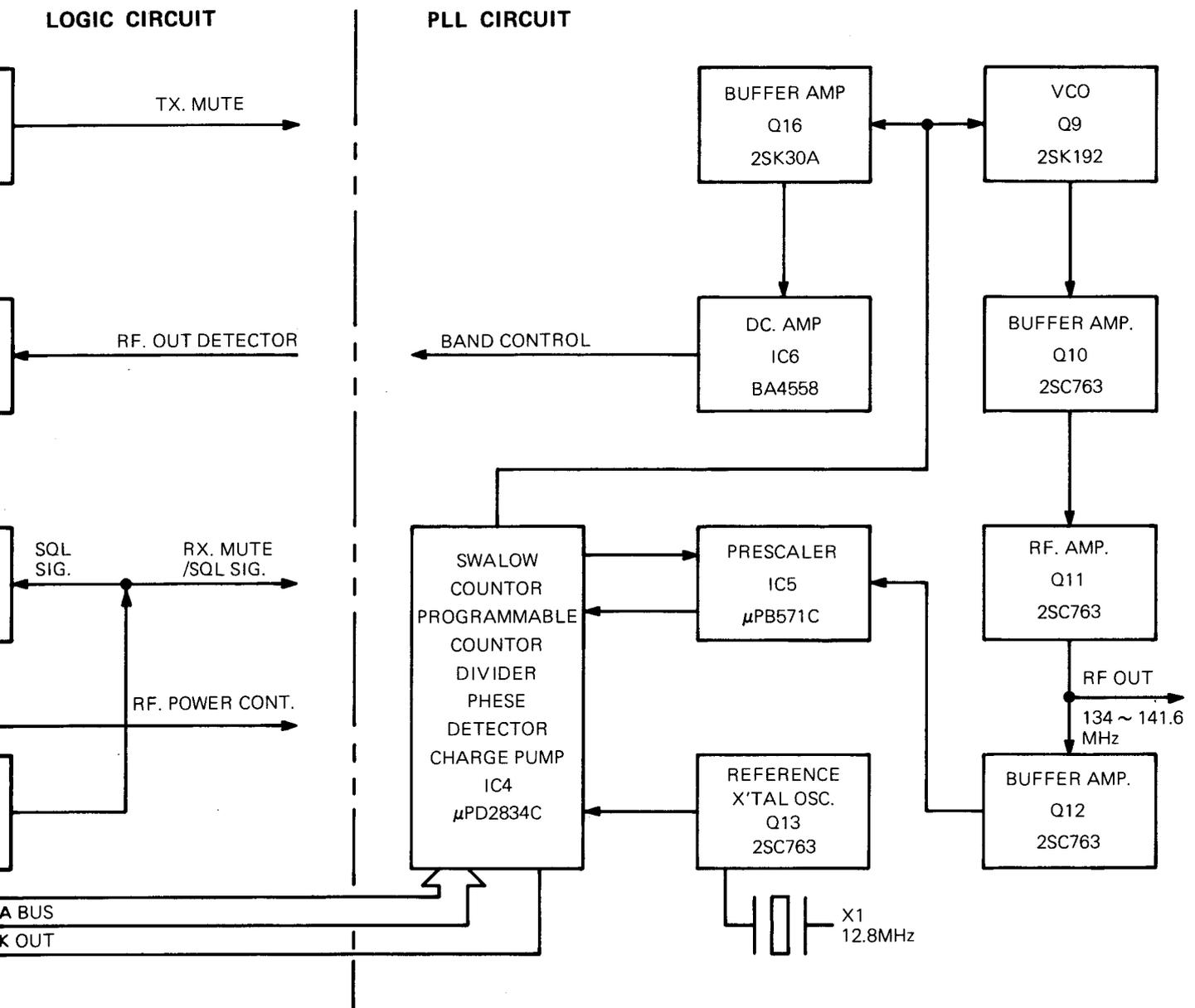
PLL-LOGIC UNIT (Type 225)





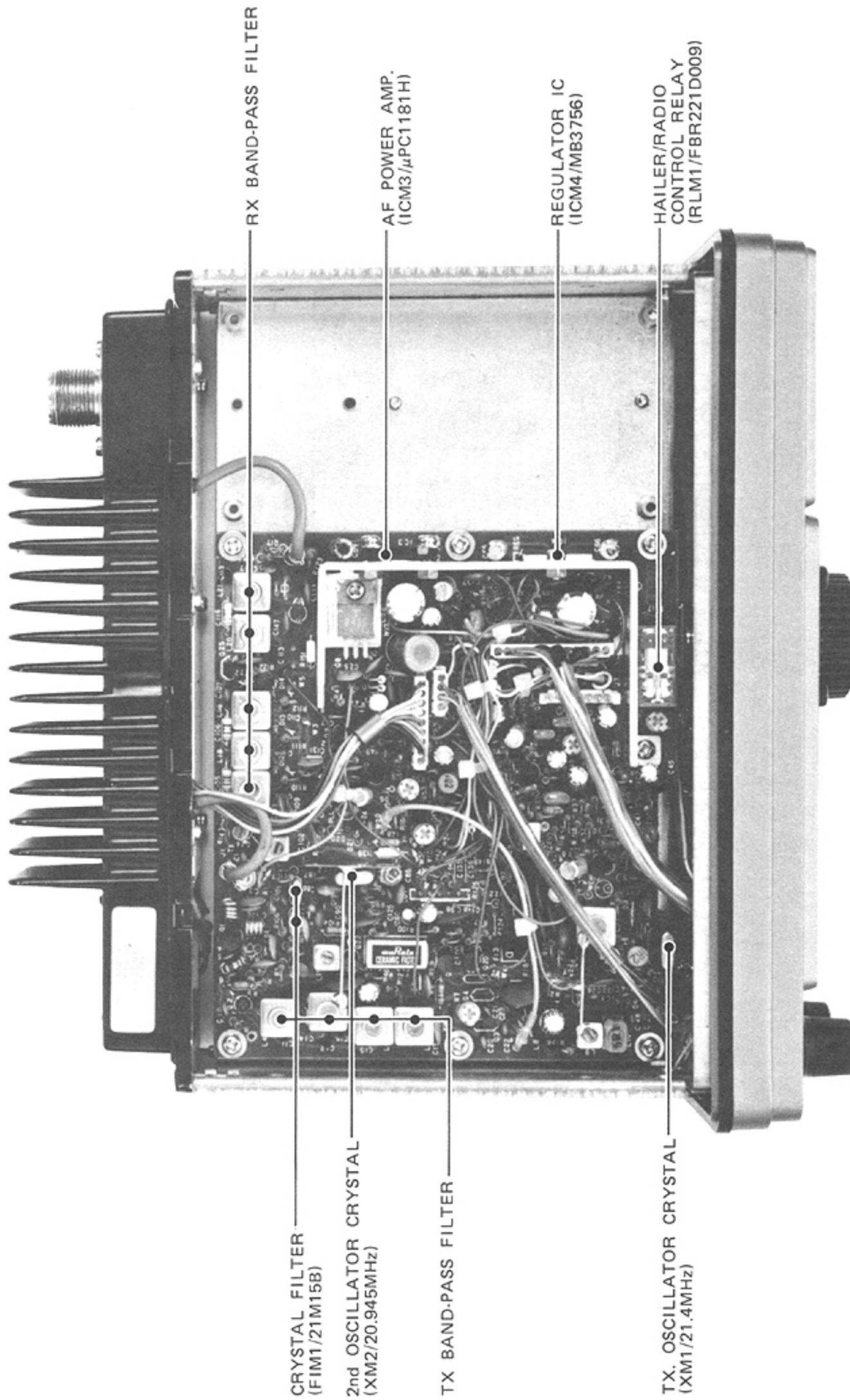
PLL-LOGIC UNIT (Type 370)



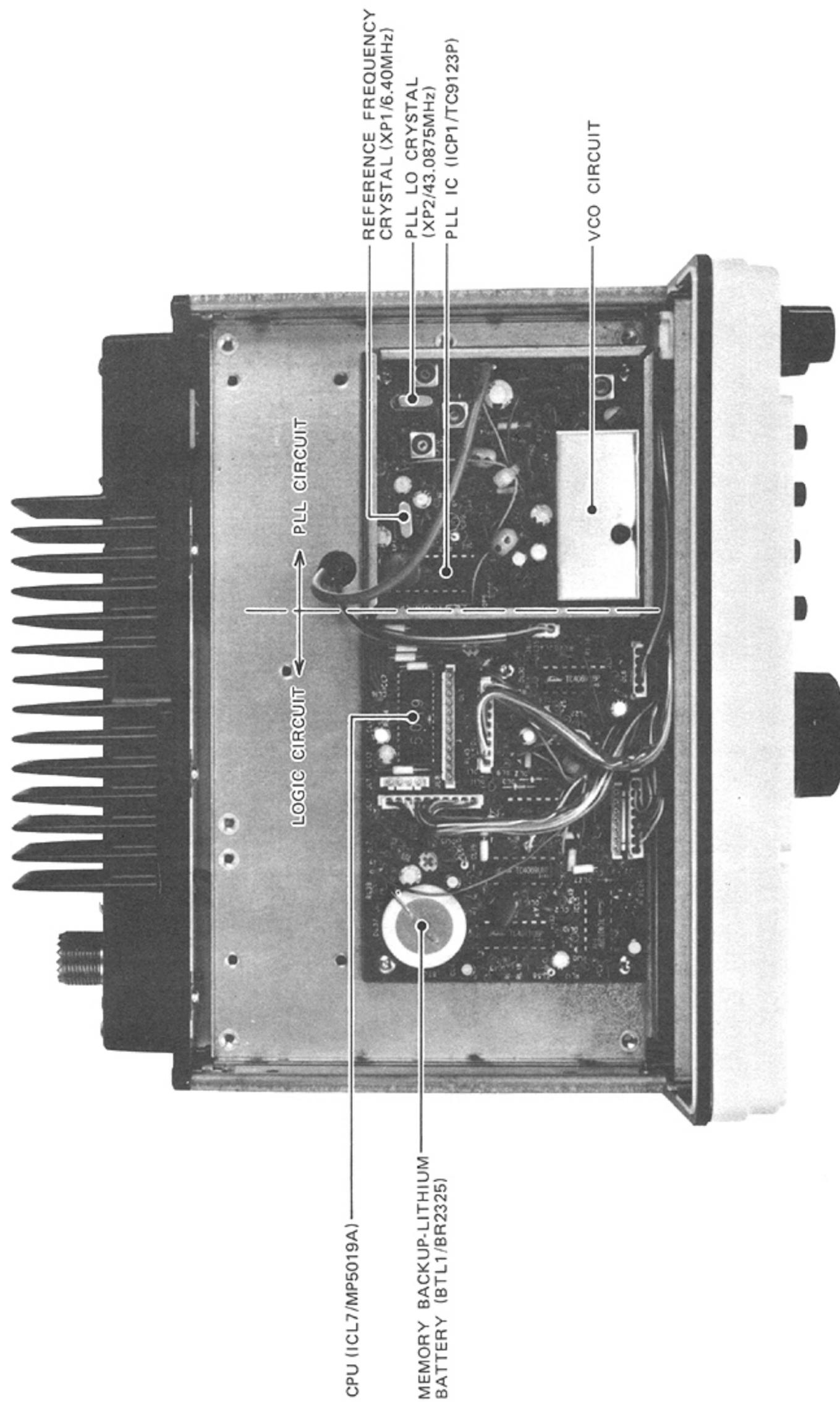


SECTION 6 INSIDE VIEWS

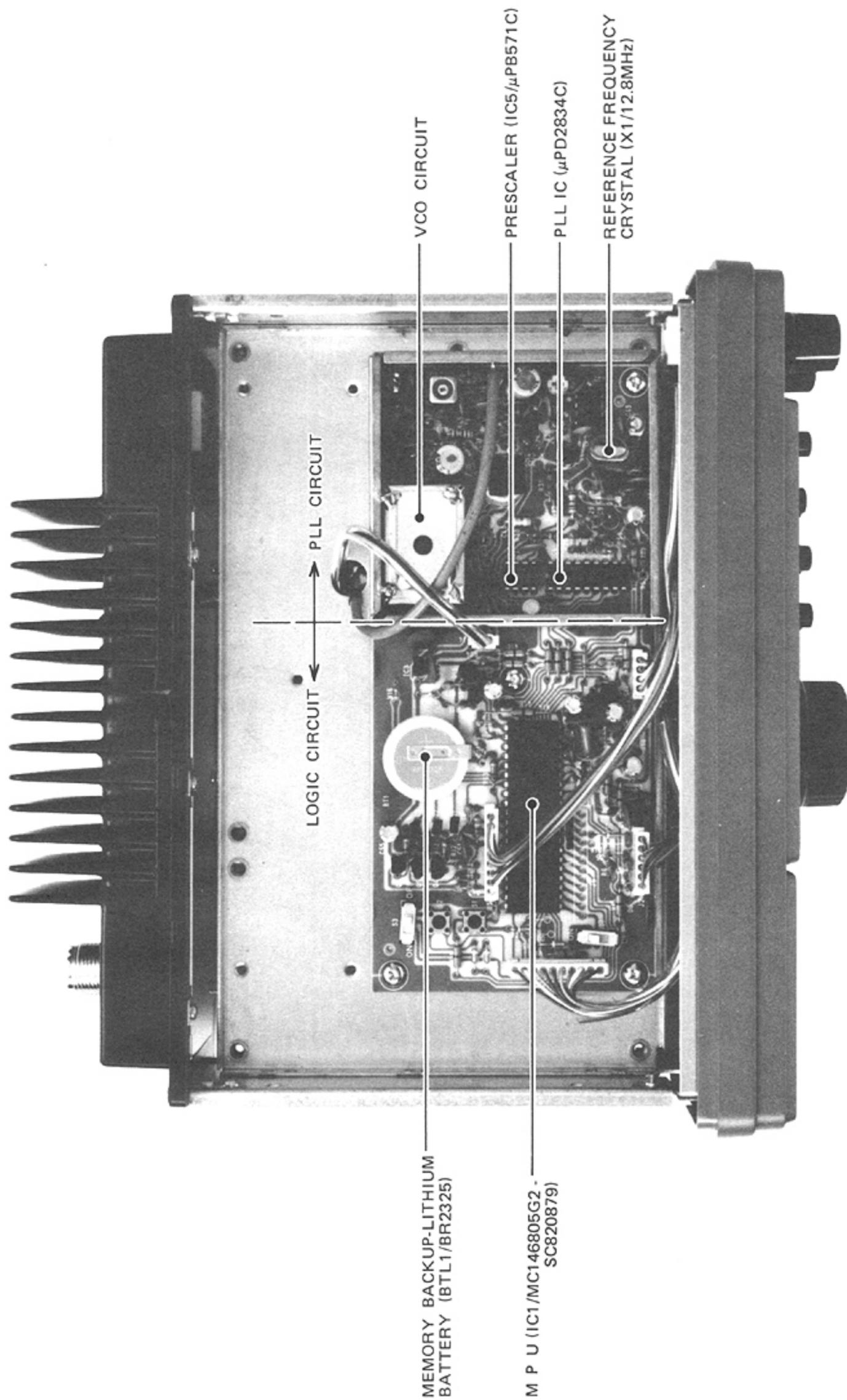
MAIN UNIT



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 |
| | | | |

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)

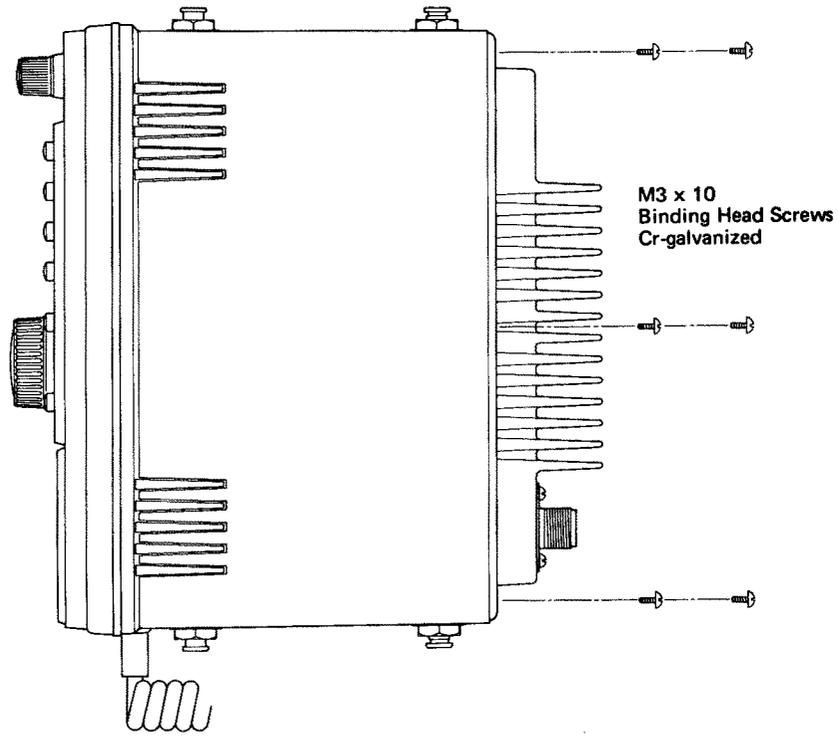
| Channel No. | Frequency (MHz) | | Transmitter RF Power |
|-------------|-----------------|----------|----------------------|
| | Transmitter | Receiver | |
| 01 | 156.050 | 160.650 | 1W only |
| 02 | 156.100 | 160.700 | 1W only |
| 03 | 156.150 | 160.750 | 1W only |
| 04 | 156.200 | 160.800 | 1W only |
| 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 |

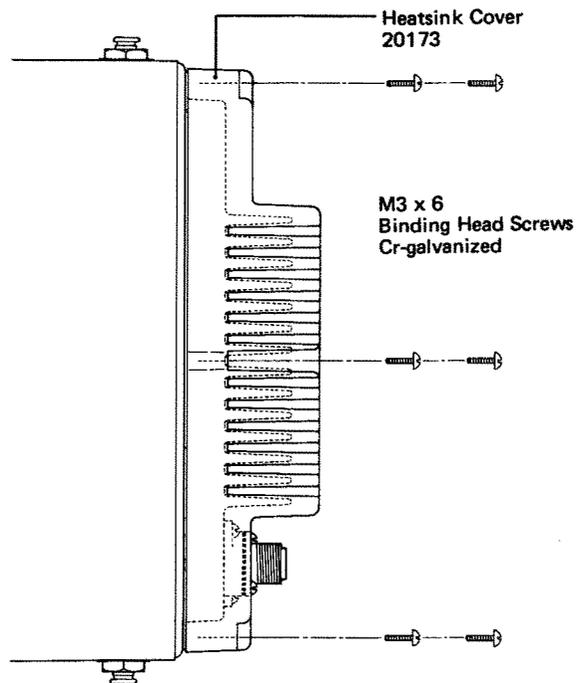
SECTION 8 MECHANICAL PARTS AND DISASSEMBLY

8 - 1 COVER DISASSEMBLY

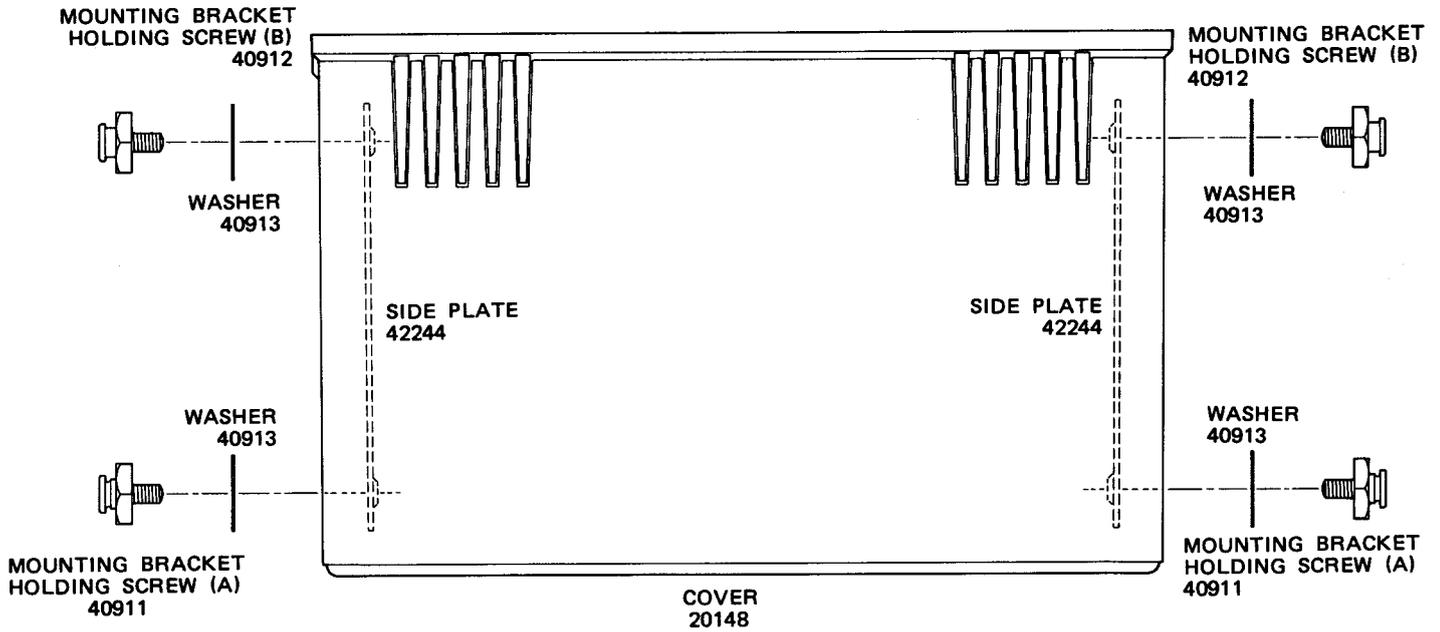
- **Standard (Negative grounded) Type**



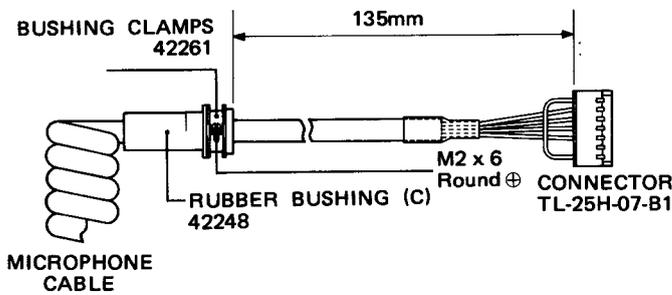
- **Floating Type**



8 - 1 COVER DISASSEMBLY (Continued)

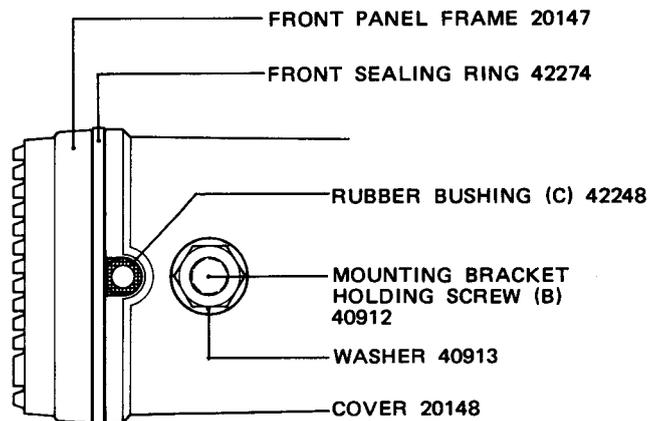
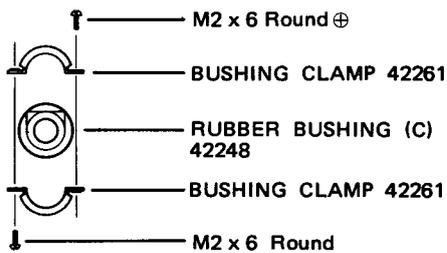


8 - 2 MICROPHONE CORD DISASSEMBLY



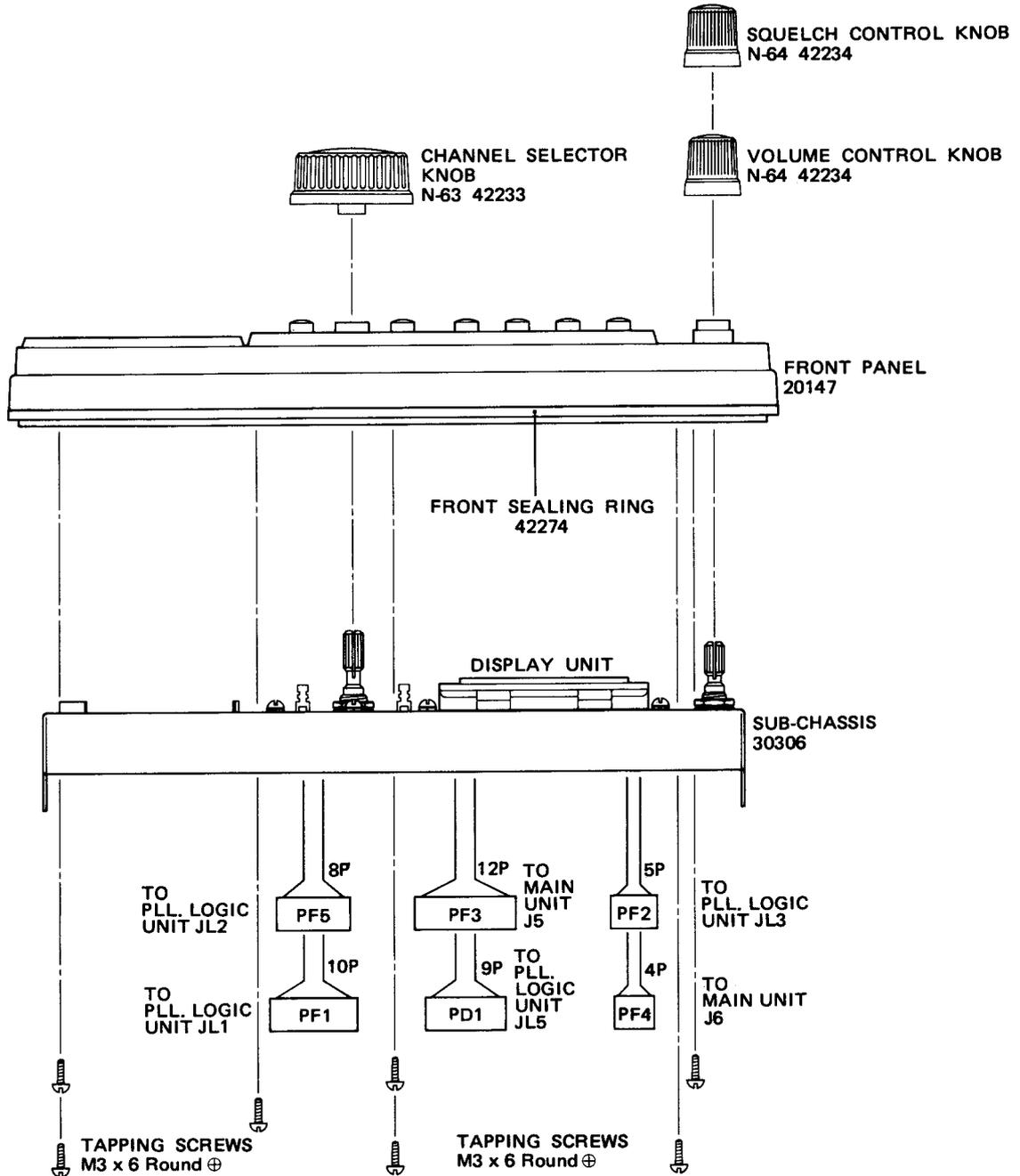
PIN CONNECTION

| PIN NO. | DESCRIPTION |
|---------|-------------|
| 1. ↔ 7 | JUMPED |
| 2. | RED WIRE |
| 3. | BLACK WIRE |
| 4. | BROWN WIRE |
| 5. | WHITE WIRE |
| 6. | NC |



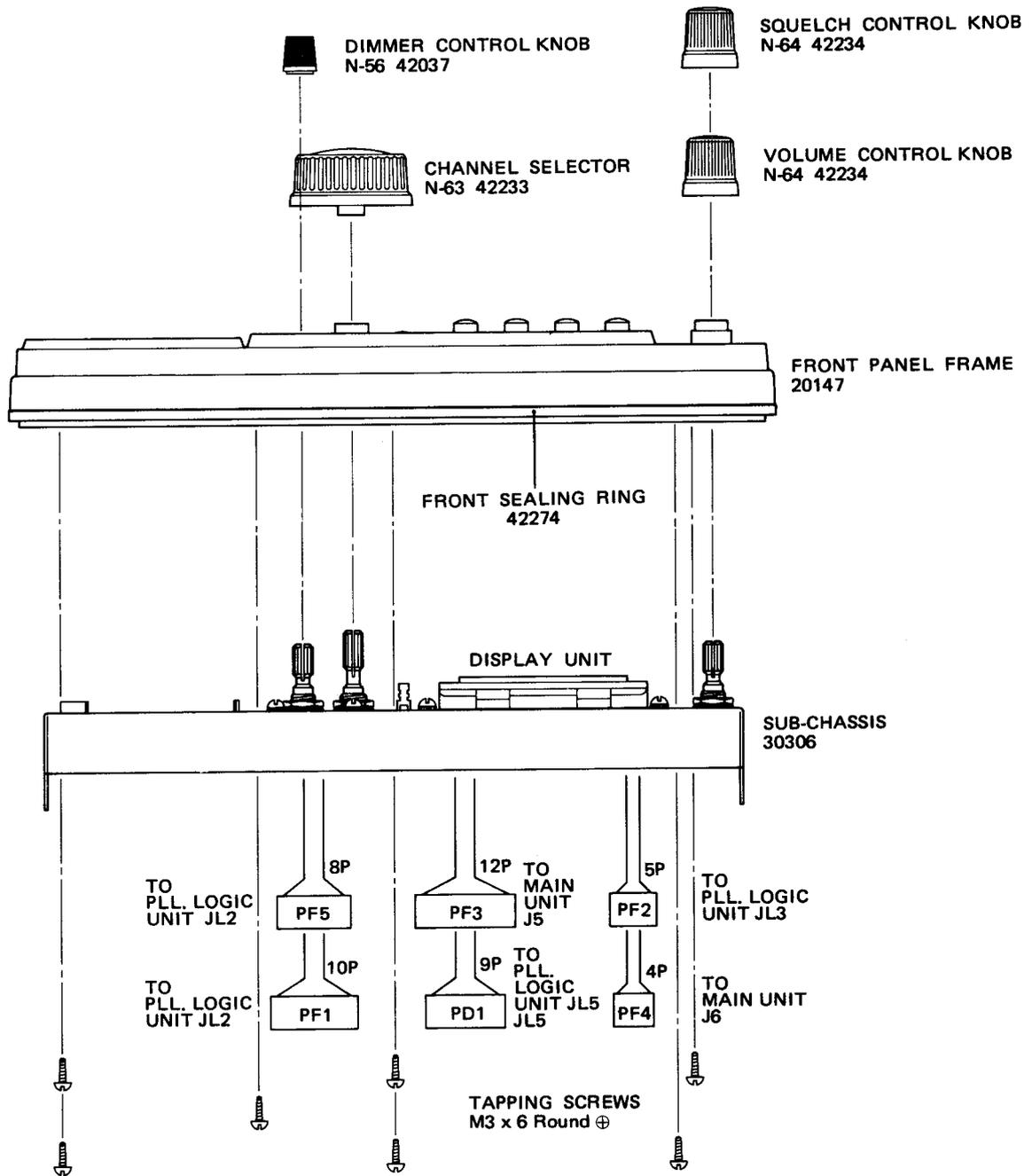
8-3 FRONT PANEL DISASSEMBLY

• USA/EUROPE Version



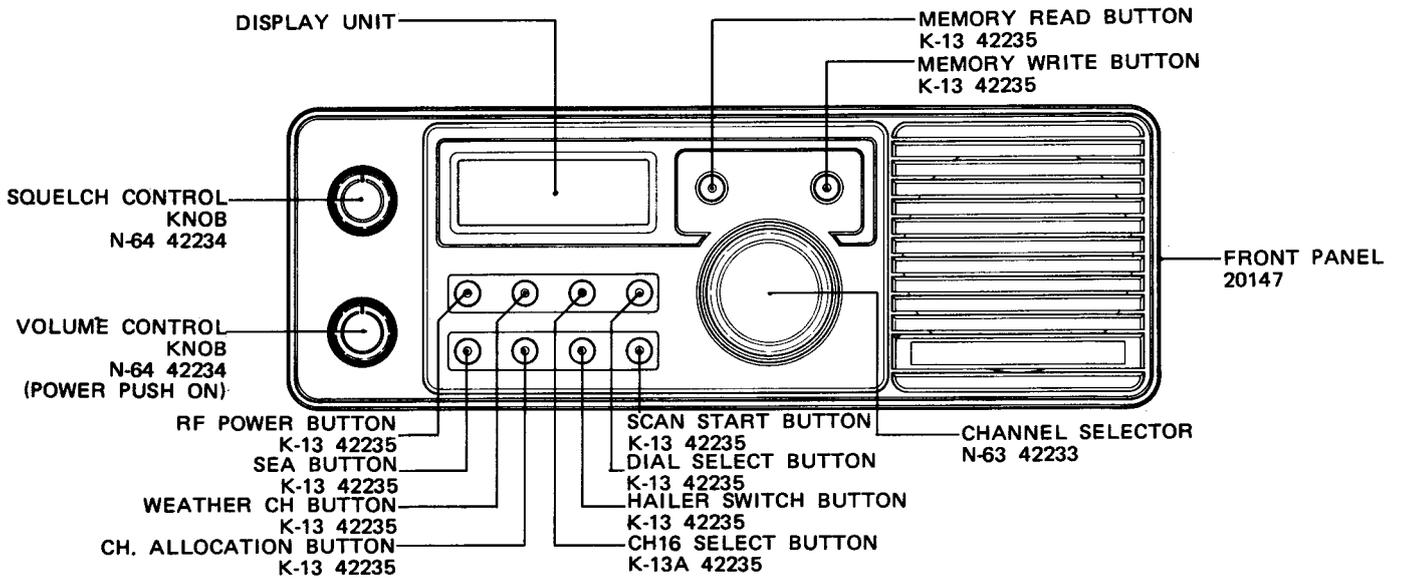
8-3 FRONT PANEL DISASSEMBLY (Continued)

- HOLLAND Version

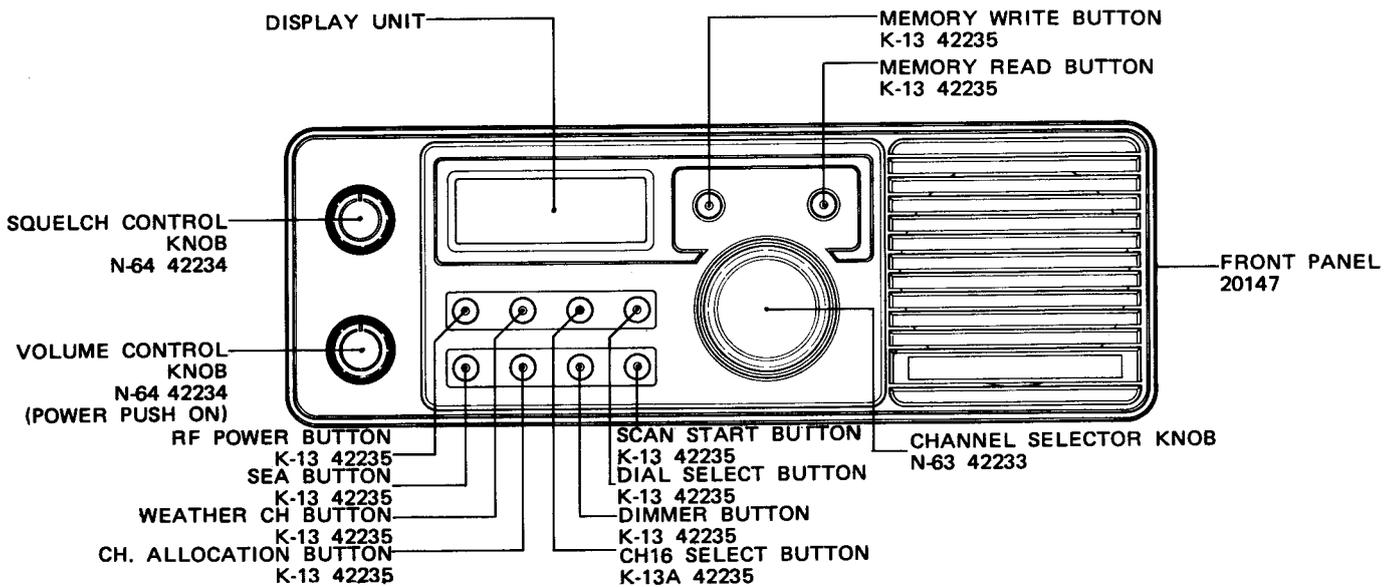


8 - 3 FRONT PANEL DISASSEMBLY (Continued)

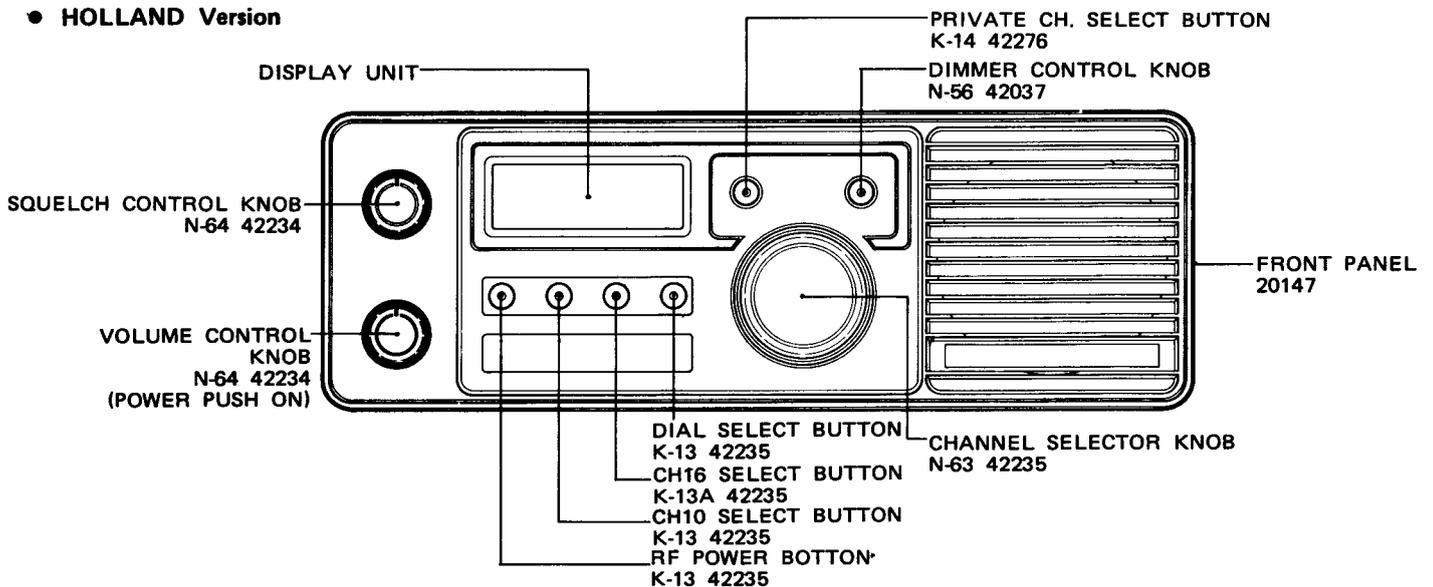
● USA Version



● EUROPE Version

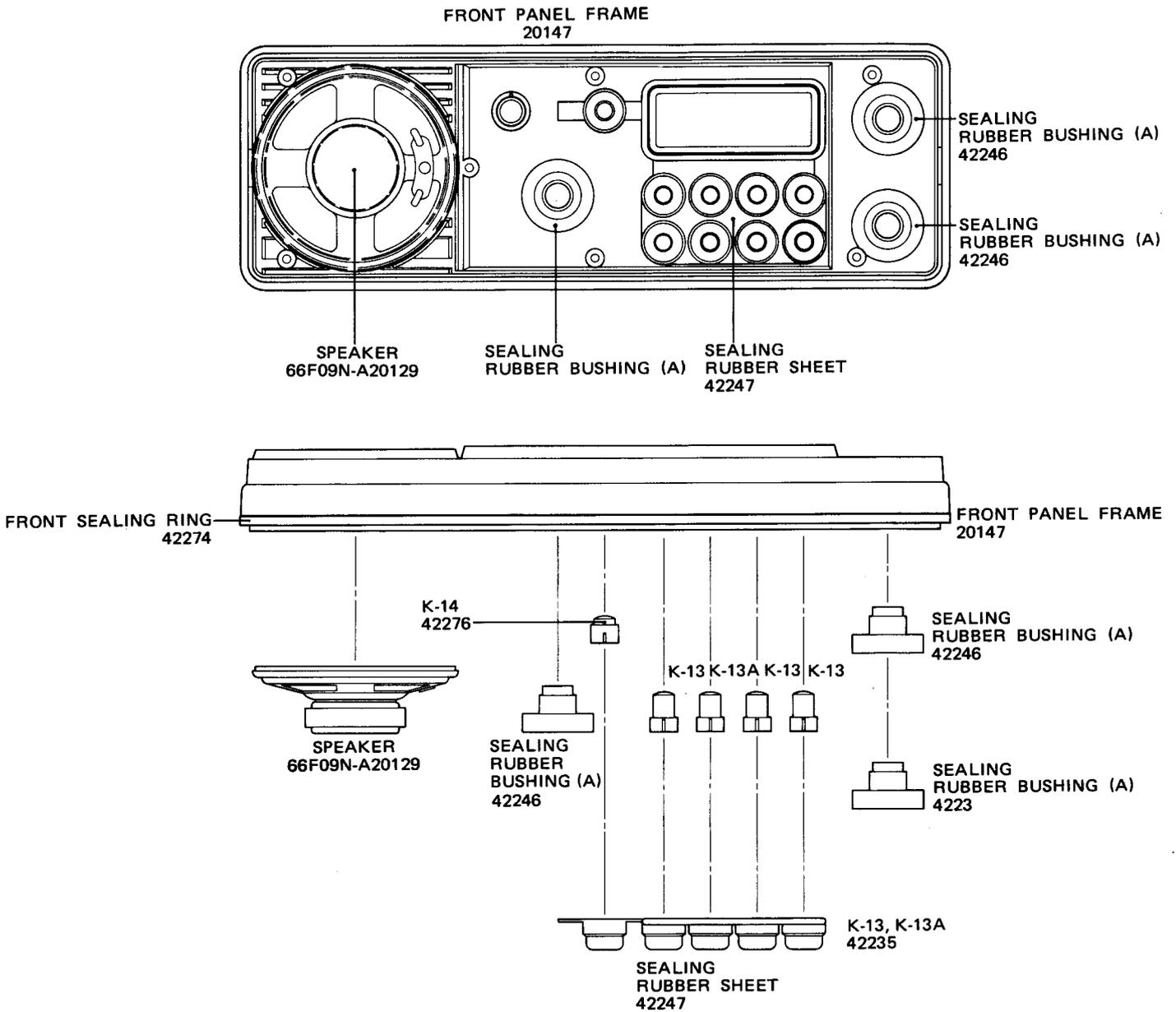


● HOLLAND Version

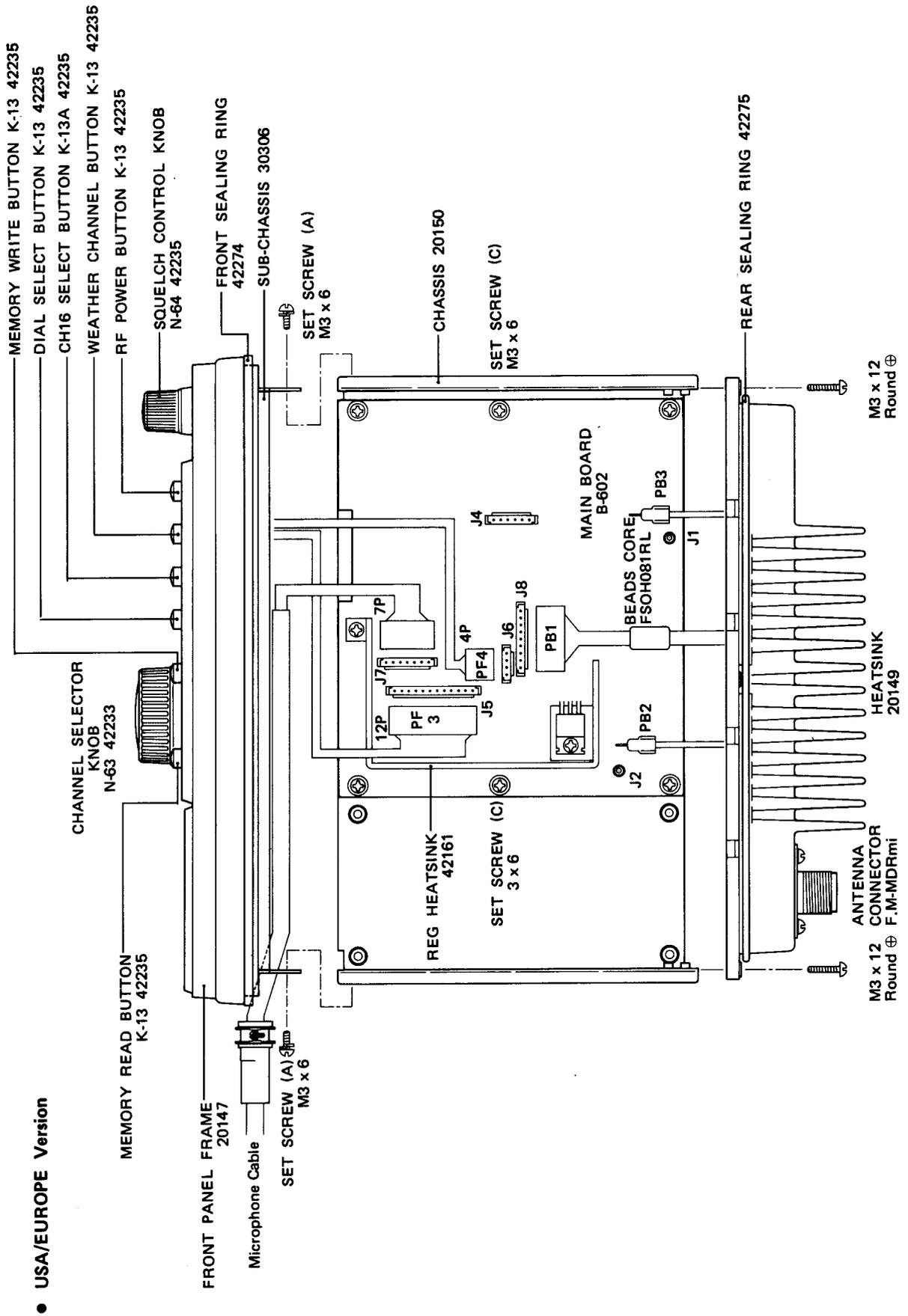


8 - 3 FRONT PANEL DISASSEMBLY (Continued)

- HOLLAND Version

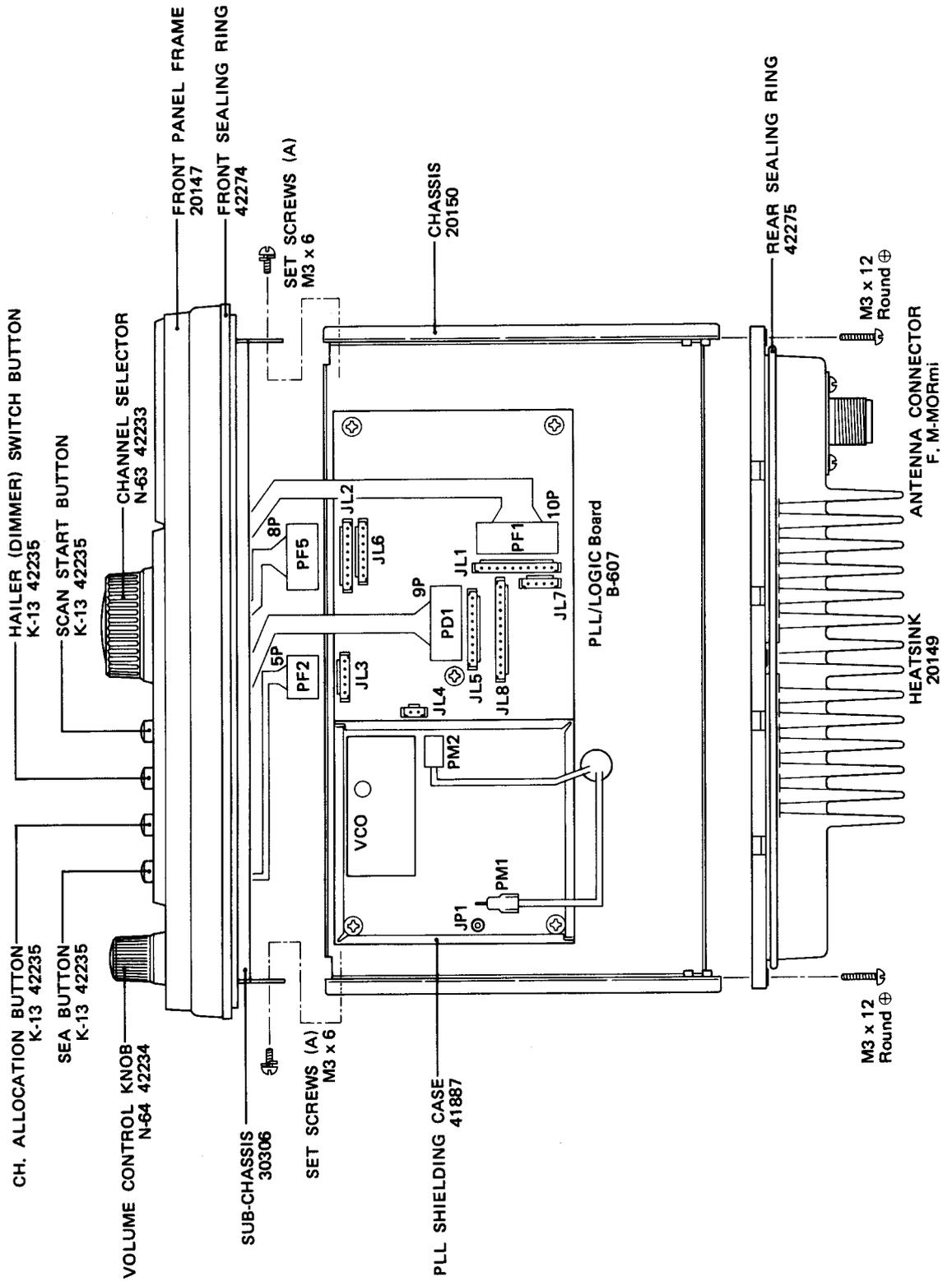


8 - 4 FRAME DISASSEMBLY and MAIN UNIT WIRING



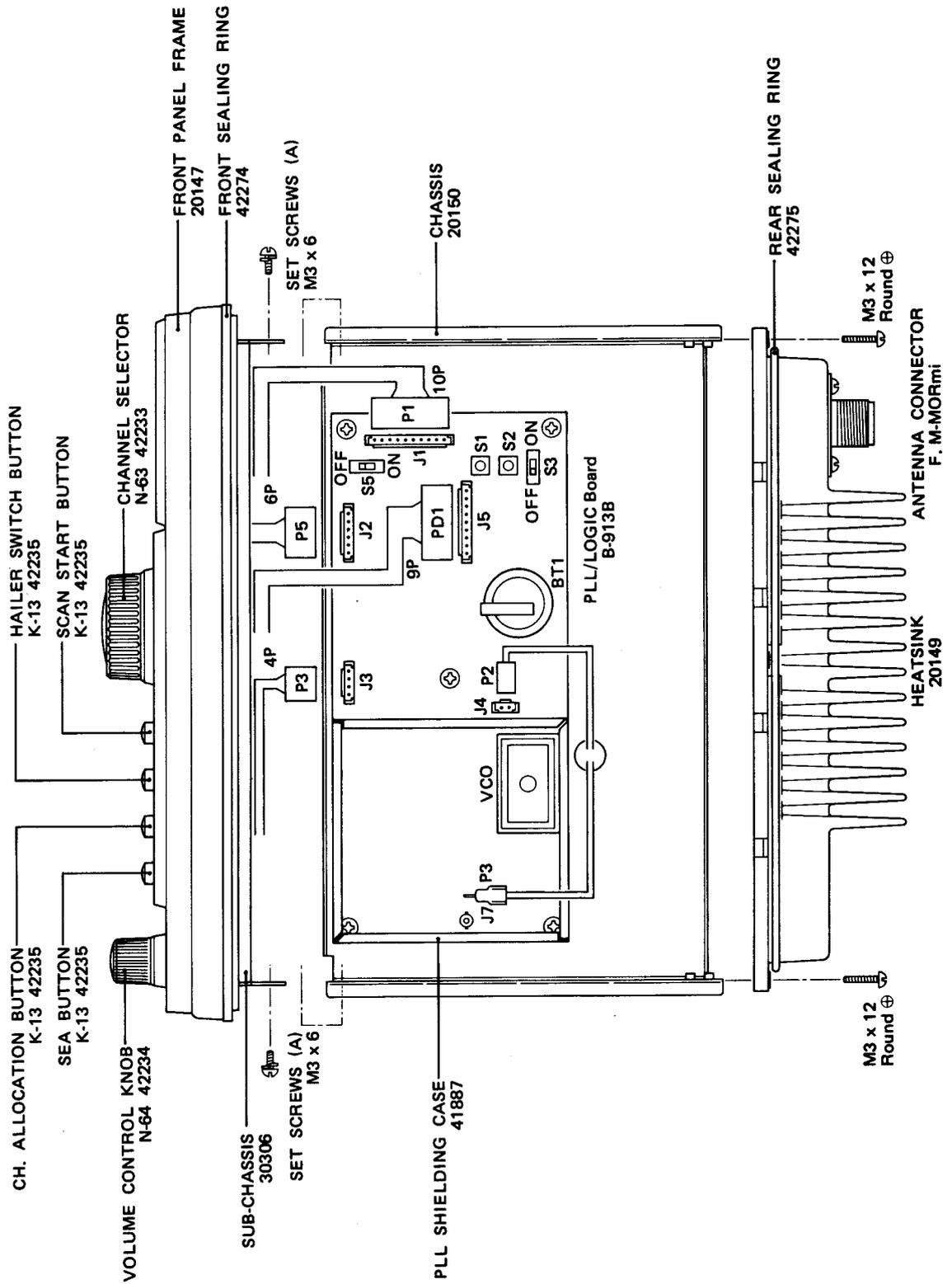
8 - 5 FRAME DISASSEMBLY and PLL/LOGIC UNITS WIRING (Type 225)

● USA/EUROPE Version



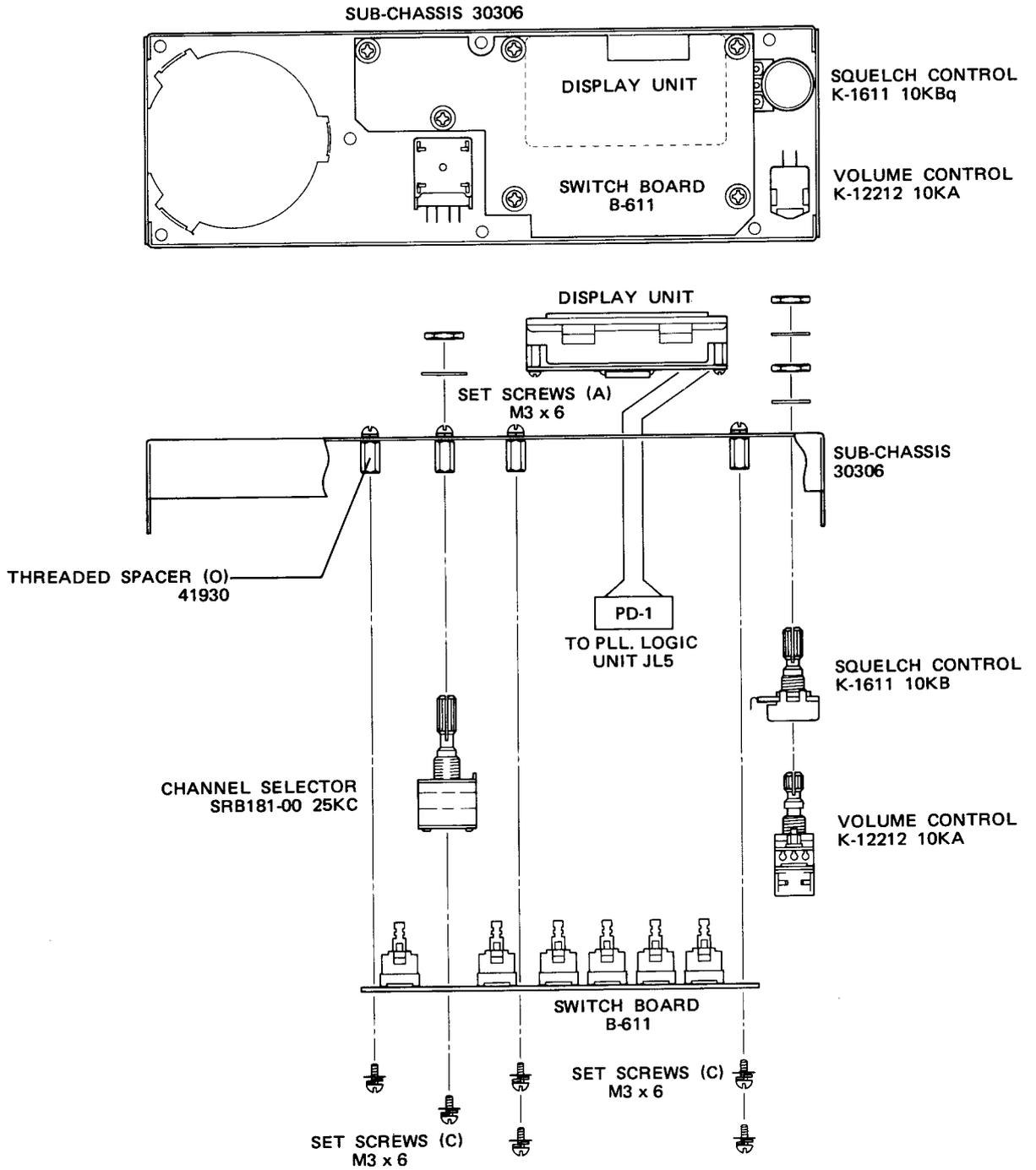
8 - 5 FRAME DISASSEMBLY and PLL/LOGIC UNITS WIRING (Type 370)

● USA/EUROPE Version



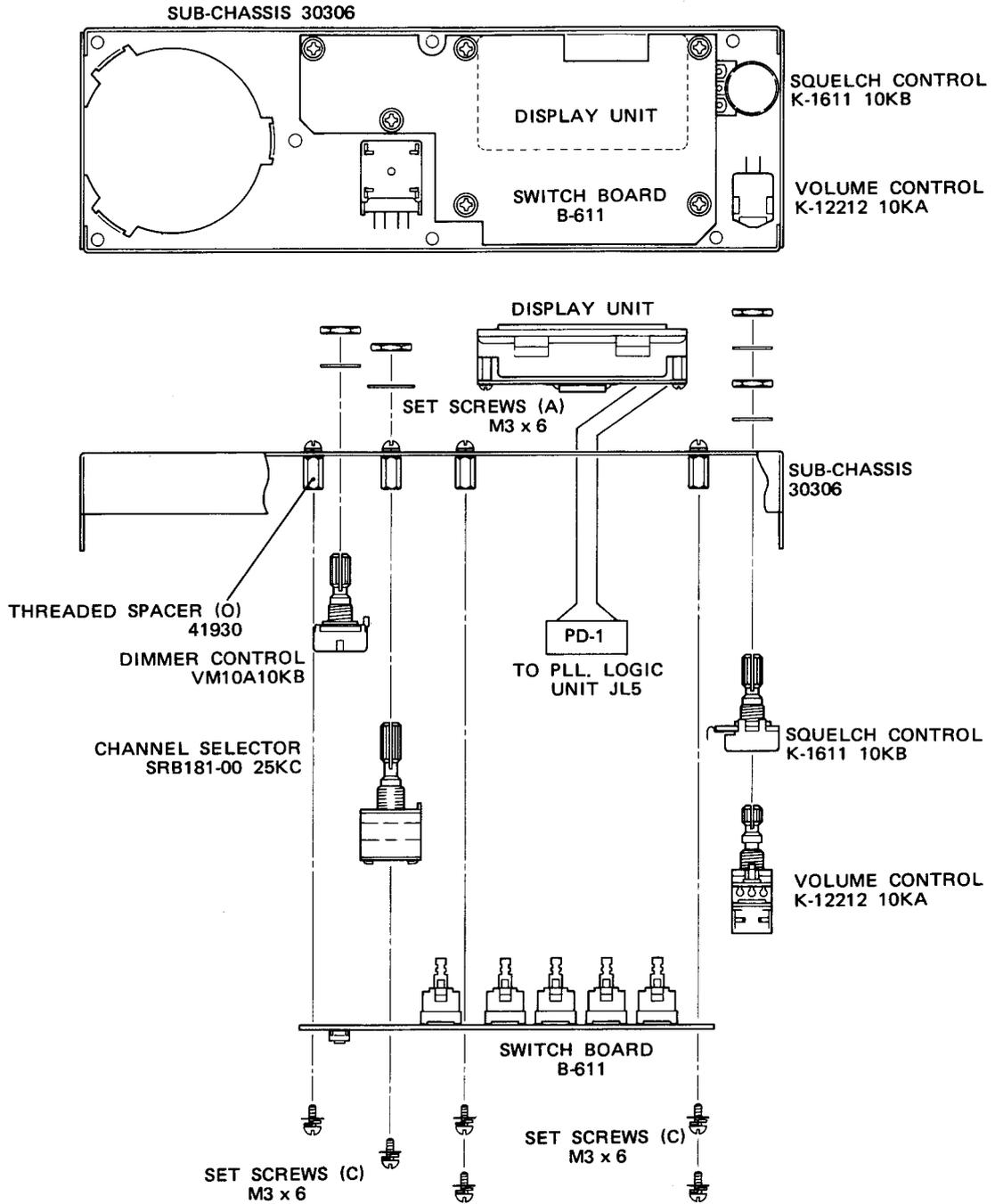
8 - 6 SUB-CHASSIS DISASSEMBLY

- USA/EUROPE Version



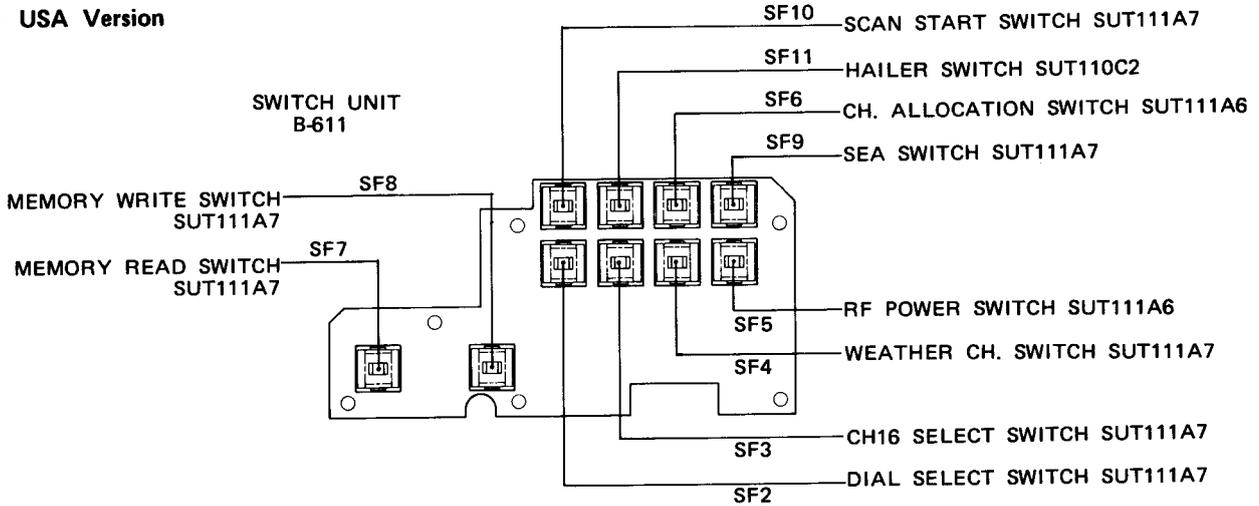
8 - 6 SUB-CHASSIS DISASSEMBLY (Continued)

- HOLLAND Version

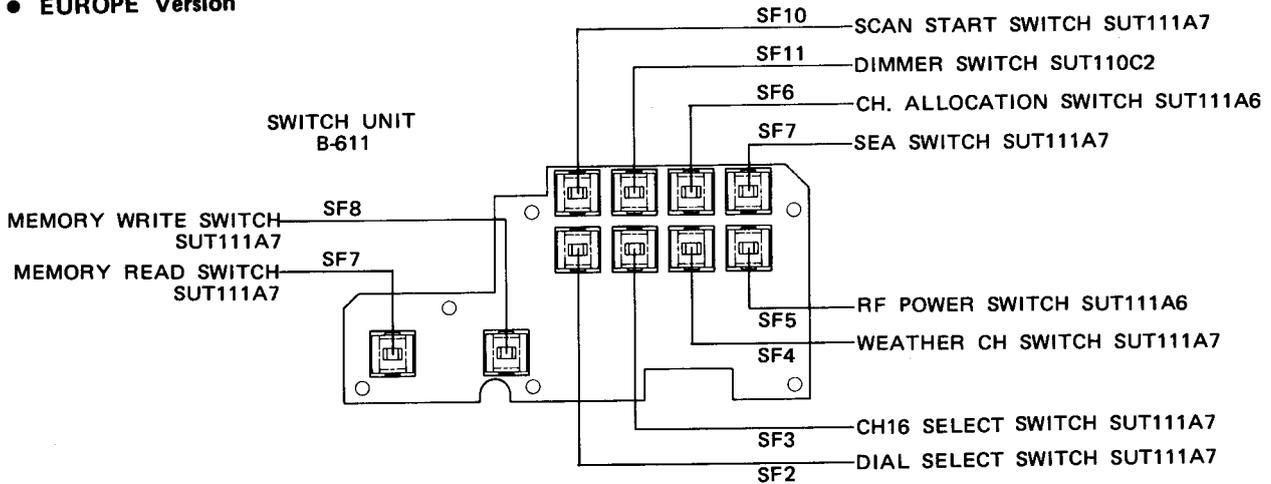


8 - 7 SWITCH UNIT DISASSEMBLY

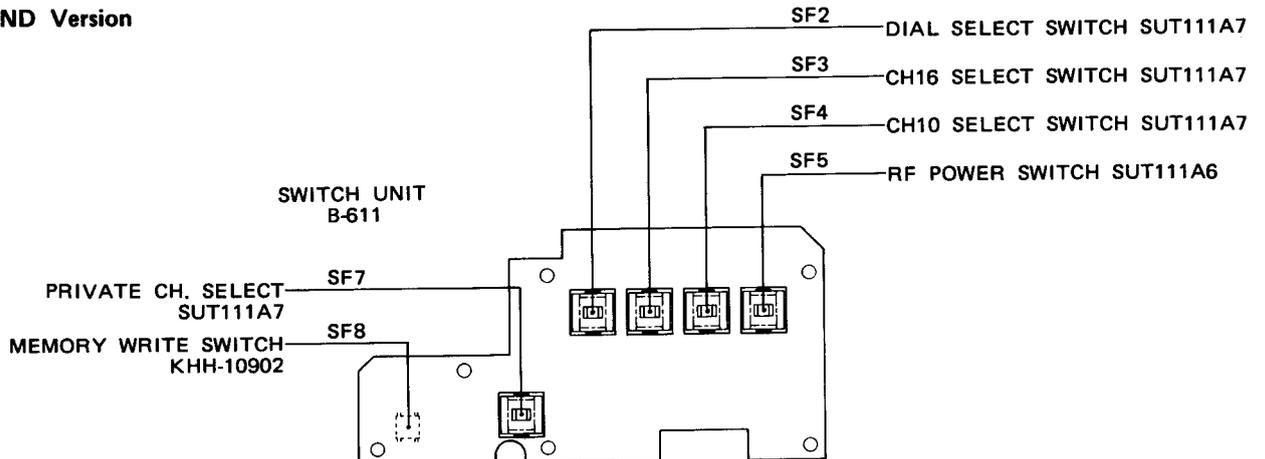
● USA Version



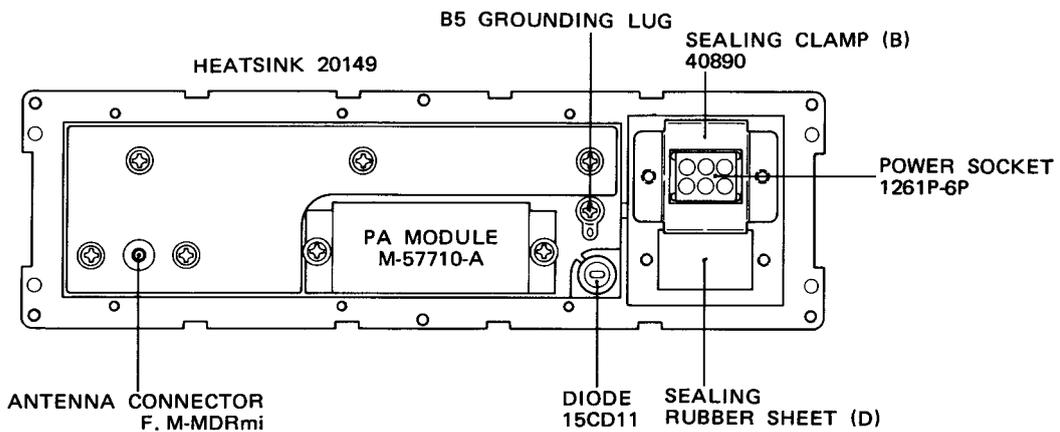
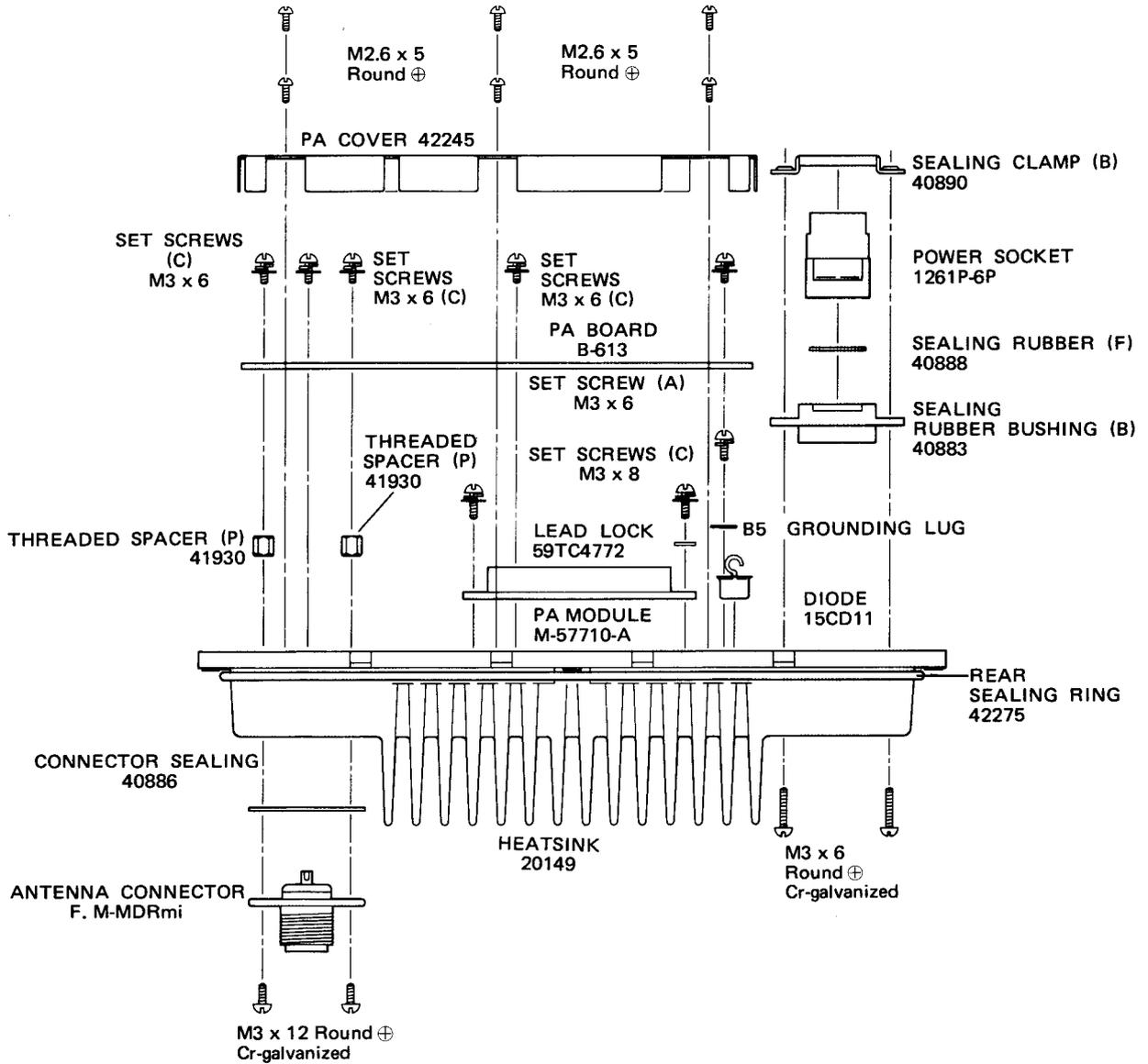
● EUROPE Version



● HOLLAND Version

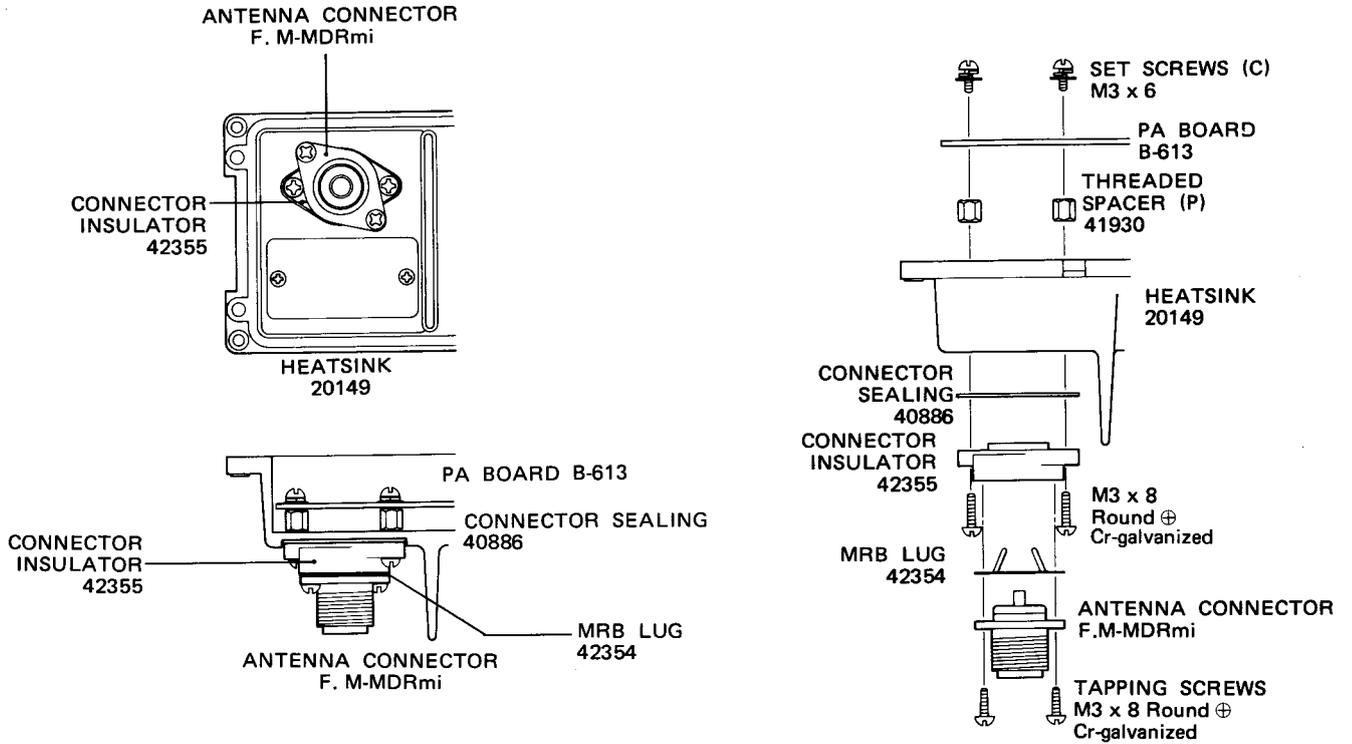


8 - 8 REAR PANEL DISASSEMBLY

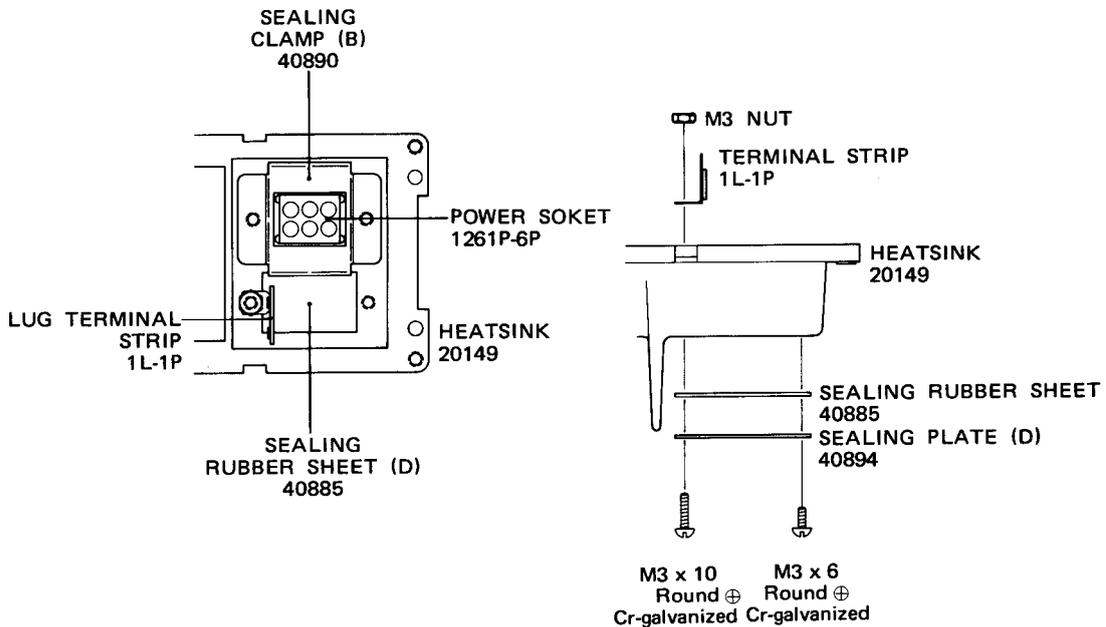


8 - 8 REAR PANEL DISASSEMBLY (Continued)

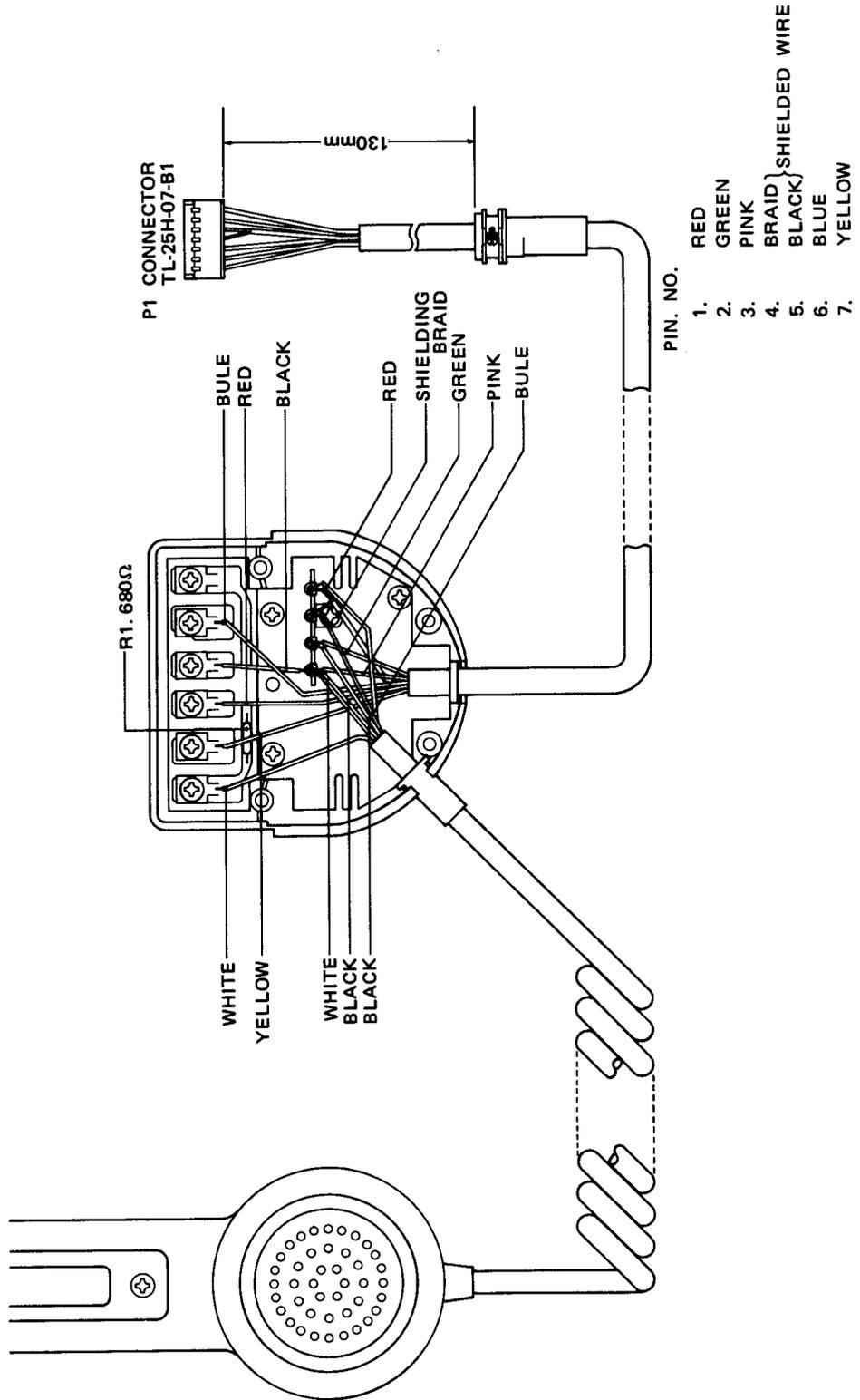
● FLOATING Version



● UK Version



8-9 OPTIONAL HEADSET WIRING

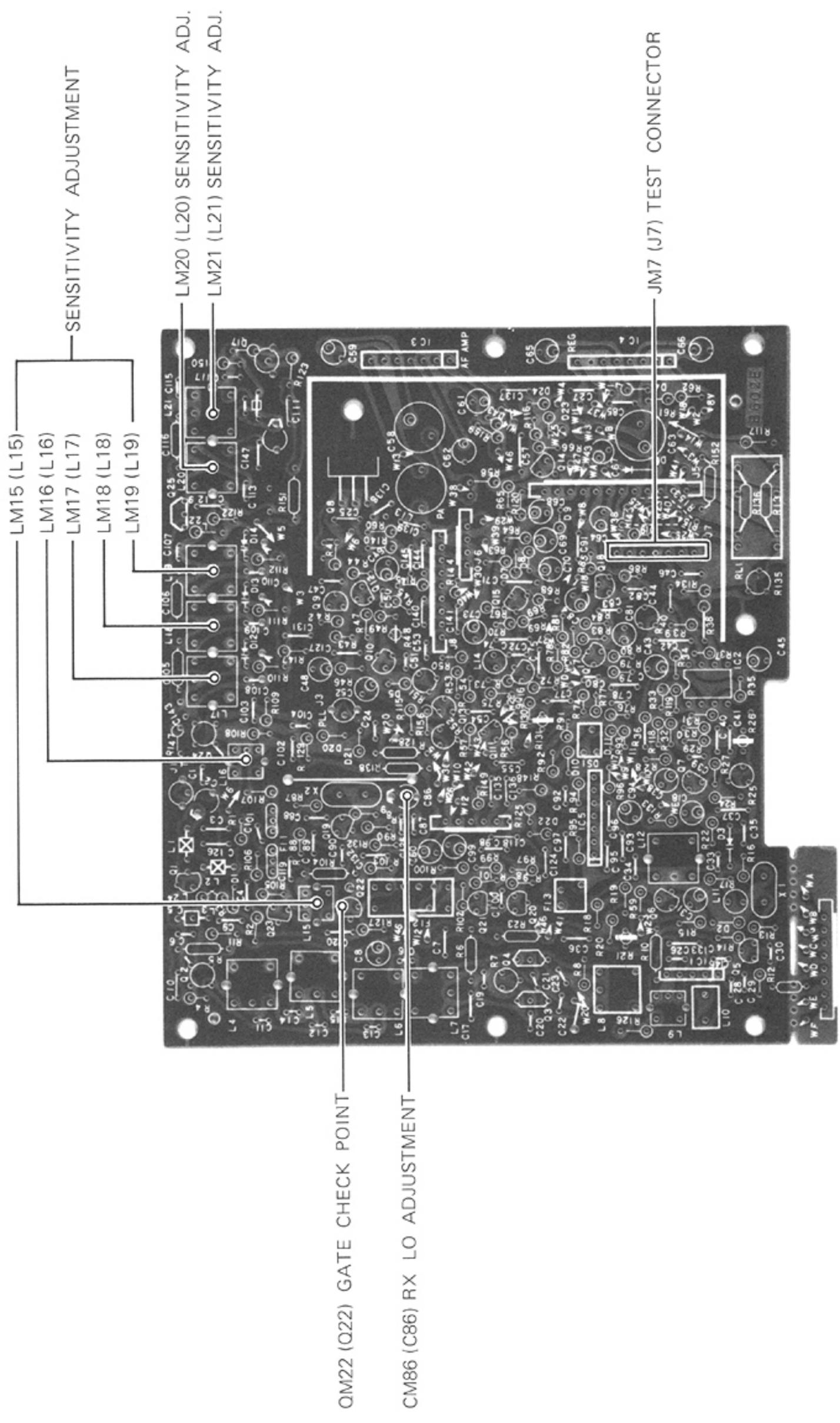


SECTION 9 MAINTENANCE AND ADJUSTMENT

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. <ul style="list-style-type: none"> ● CH16 : ON ● DISP.CH. : 16 | MAIN | Connect the frequency counter to the gate of QM22 | 20.945MHz | MAIN | CM86 |
| SENSITIVITY | 1. <ul style="list-style-type: none"> ● 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 millivoltmeter 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. | <ul style="list-style-type: none"> ● DIAL : ON ● DISP. CH. : 06 Set the frequency of the Signal Generator to 156.300 MHz. | MAIN | Connect the AC millivoltmeter to JM7. | Maximum noise quieting | MAIN |
| 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 | <ul style="list-style-type: none"> ● 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. | | | | | |

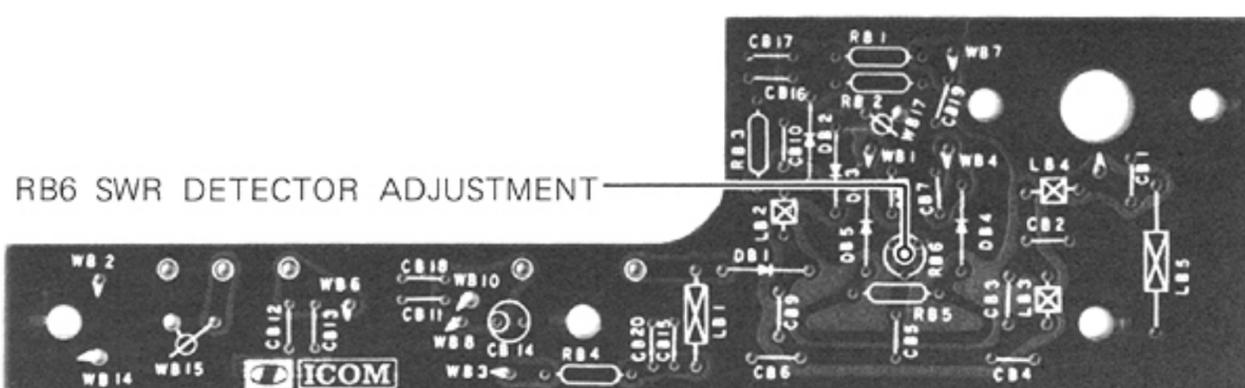
MAIN UNIT



9-2 TRANSMITTER ADJUSTMENT

| INSTRUMENTS REQUIRED | | | CONNECTIONS | | | | |
|---|---|--|--------------------------------------|---|--|--------------|-----------|
| (1) VARIABLE VOLTAGE REGULATED POWER SUPPLY : OUTPUT VOLTAGE 13.6V DC \pm 15% : CAPACITY 6A or MORE (2) MULTIMETER 50K Ω /Volt or BETTER (3) FREQUENCY COUNTER : FREQUENCY RANGE 0.1 ~ 170MHz : ACCURACY BETTER THAN \pm 1ppm : SENSITIVITY 100mV or BETTER (4) RF WATTMETER (Terminated Type) : MEASURING RANGE 35W : FREQUENCY RANGE 140 ~ 170MHz : IMPEDANCE 50 Ω : 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 ~ \pm 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. | <ul style="list-style-type: none"> ● 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. | <ul style="list-style-type: none"> ● CH16 : ON ● DISP.CH. : 16 ● RM7 (MAIN UNIT) : Center | MAIN | Connect the frequency counter to RM126. | 21.400MHz | MAIN | LM12 |
| | 2. | <ul style="list-style-type: none"> ● 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 |
| | 3. | | | Connect the RF POWER METER to the ANT connector. | Maximum (More than 30W) | | CM2 |
| POWER SET | 1. | <ul style="list-style-type: none"> ● 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 |
| | 2. | <ul style="list-style-type: none"> ● HI/LO : LO | | | 1W (Current should be less than 1.7A) | | RM52 |
| CHECK | <ul style="list-style-type: none"> ● 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. | | | | | | |

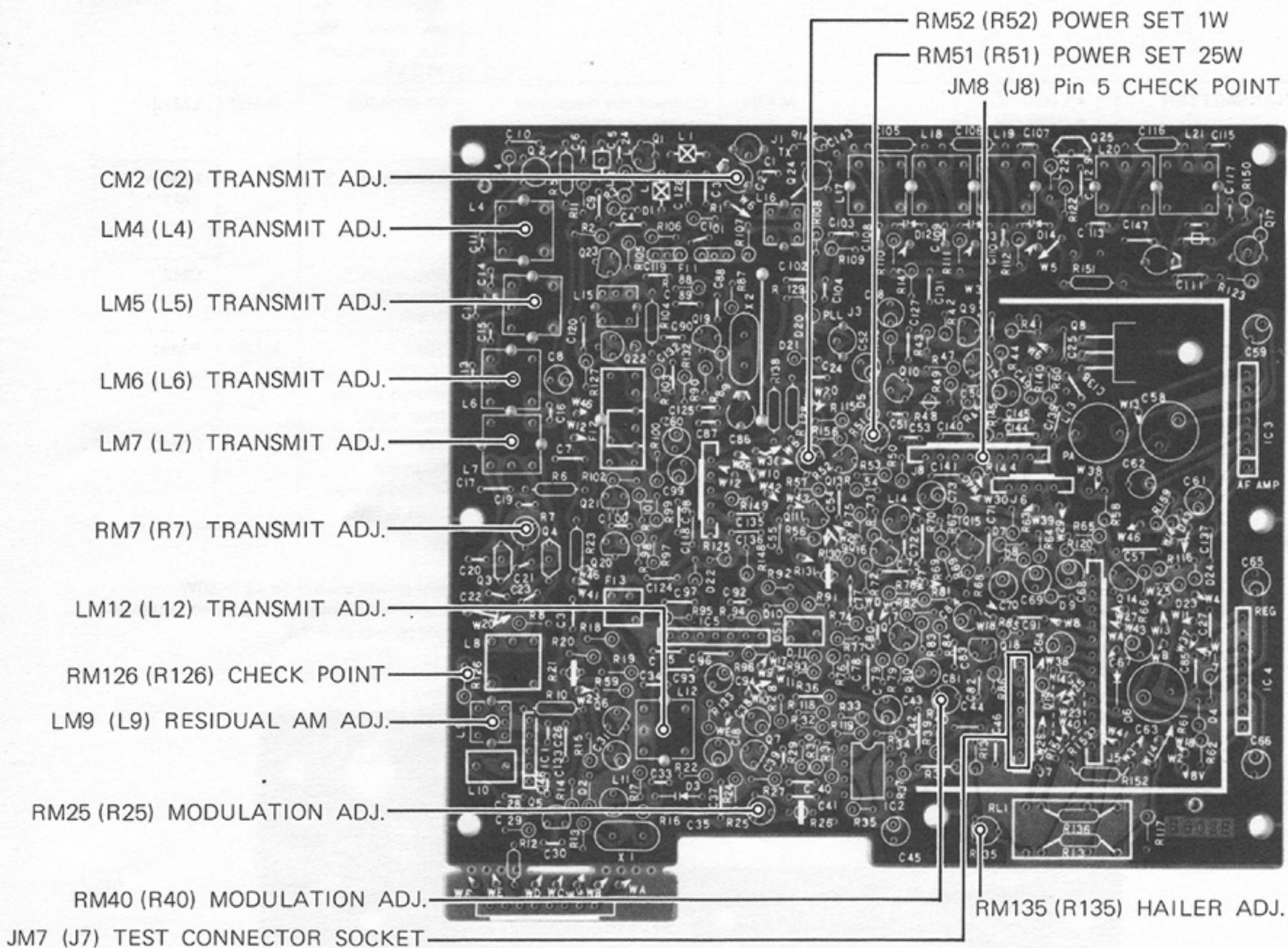
PA UNIT



TRANSMITTER ADJUSTMENT (Continued)

| Adjustment | Adjustment Condition | Unit | Measurement Location | Adjust Value | Unit | Adjust Point | | |
|------------|---|------------|--|---|------|---------------------------------------|--------|------|
| MODULATION | 1. <ul style="list-style-type: none"> ● 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. <ul style="list-style-type: none"> ● FM Deviation meter DEVIATION SENSE : P-P/2 | | | | | Read the meter of the deviation meter | 4.5KHz | RM25 |
| | 3. <ul style="list-style-type: none"> ● 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. | | | | | | | |

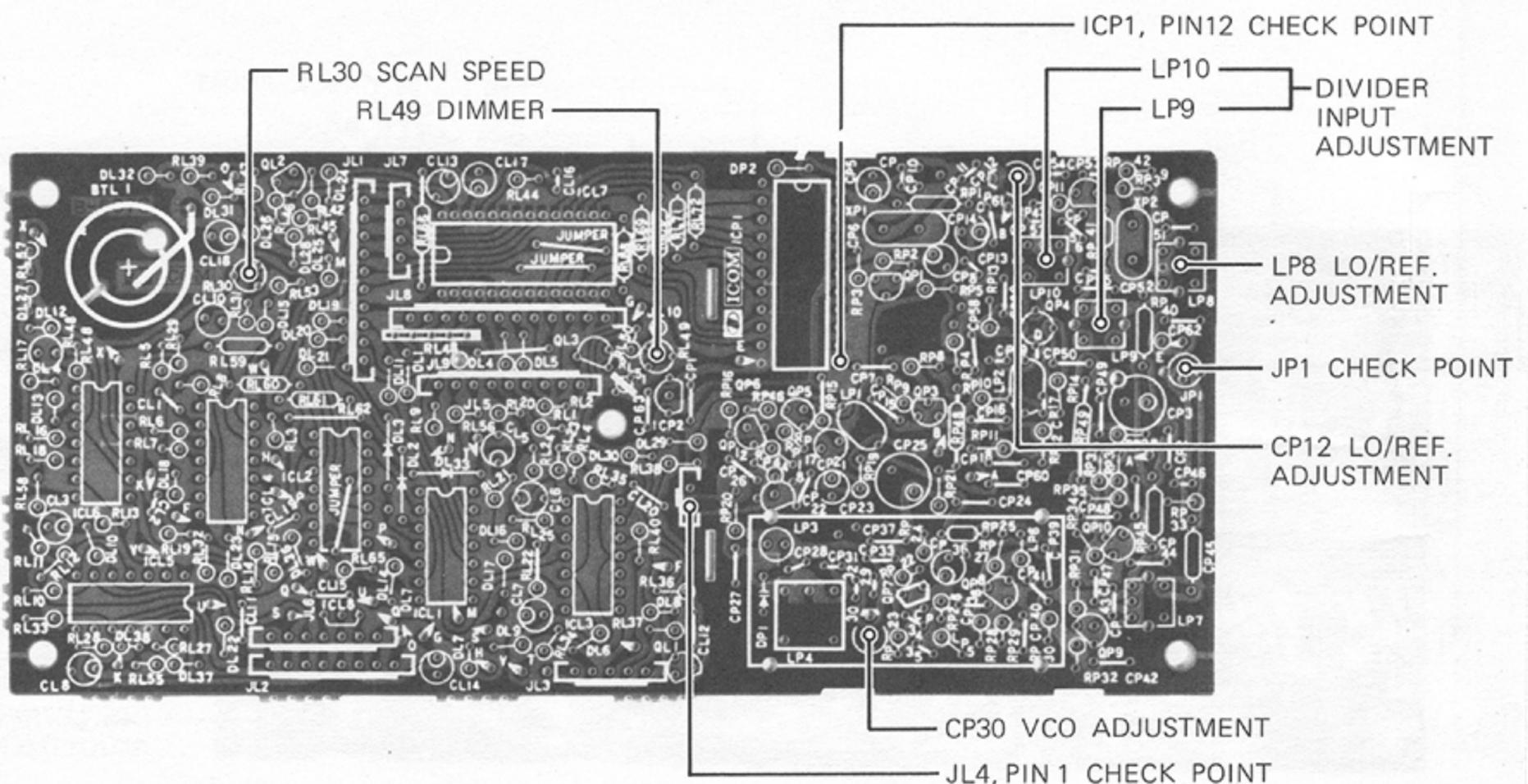
MAIN UNIT



9-3 PLL ADJUSTMENT (Type 225)

| INSTRUMENTS REQUIRED | | | CONNECTIONS | | | |
|---|---|-------|--|------------------------------|------|--------------|
| (1) VARIABLE VOLTAGE REGULATED POWER SUPPLY : OUTPUT VOLTAGE 13.6V DC \pm 15% : CAPACITY 6A or MORE (2) FREQUENCY COUNTER : FREQUENCY RANGE 0.1 ~ 170MHz : ACCURACY BETTER THAN \pm 1ppm : SENSITIVITY 100mV or BETTER (3) OSCILLOSCOPE : FREQUENCY RANGE DC ~ 15MHz : MEASURING RANGE 0.01 ~ 10V (4) MULTIMETER 50K Ω /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 \pm 300Hz | PLL | LP8 |
| | 2. ● DIAL : ON ● DISP.CH. : 18 | | | 140.100MHz \pm 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. | | | | | | |

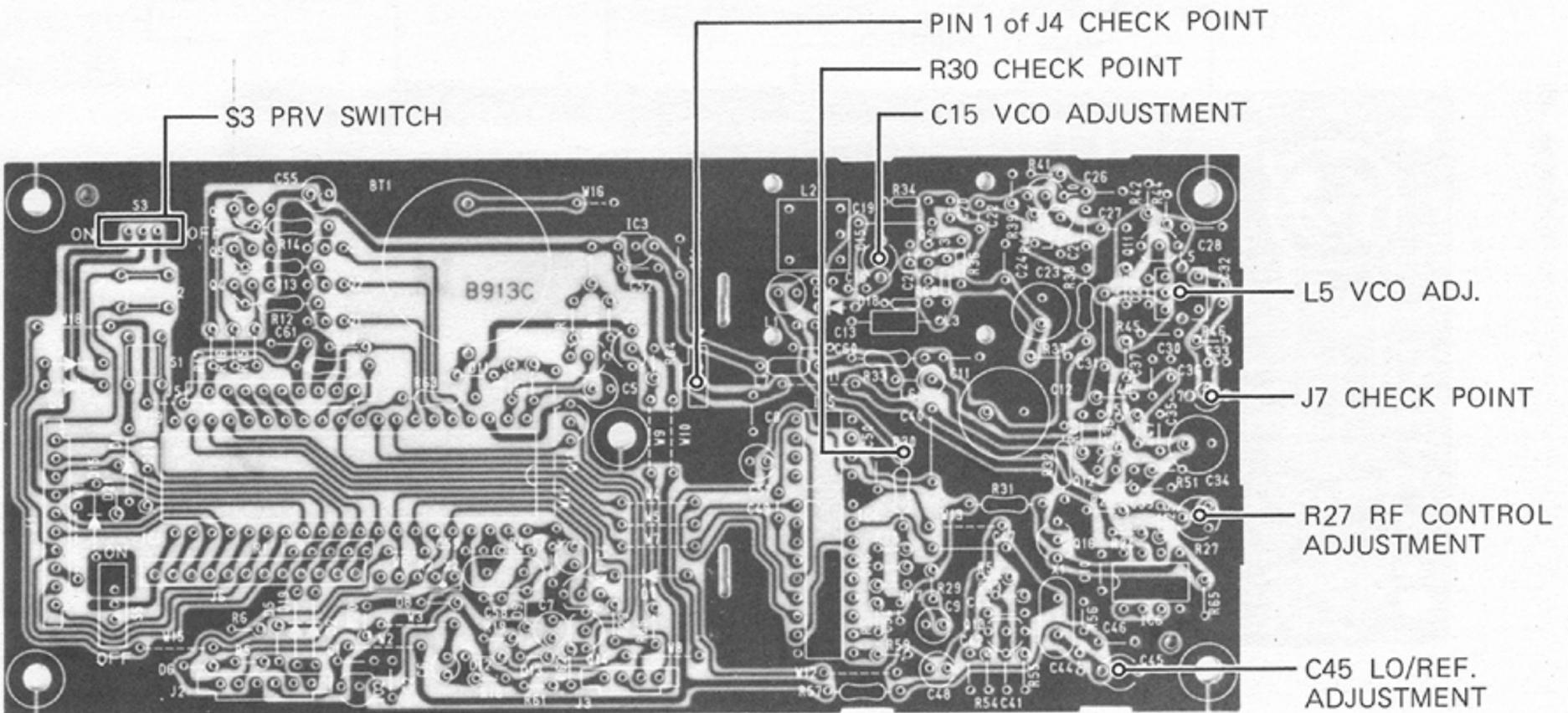
PLL UNIT



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). Unplug PM1 (from MAIN unit) inserted to J7, and connect the frequency counter to J7. | Approx 4V | PLL | C15 |
| | 2. ● DISP.CH. : PRV F6 | | | Approx 2V | | Confirming |
| | 3. ● CH16 : ON | | | 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. | | | | | | |

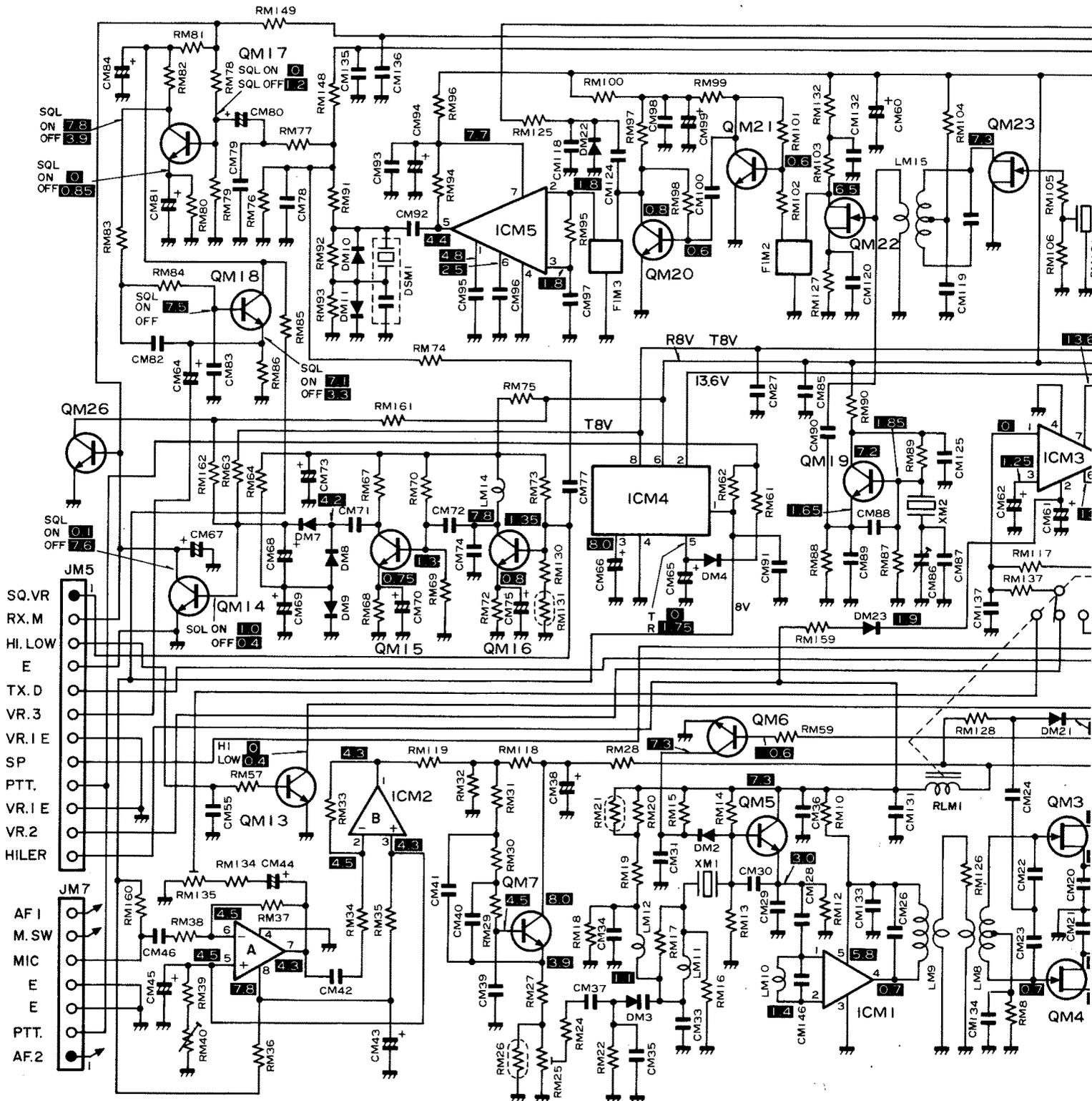
PLL UNIT

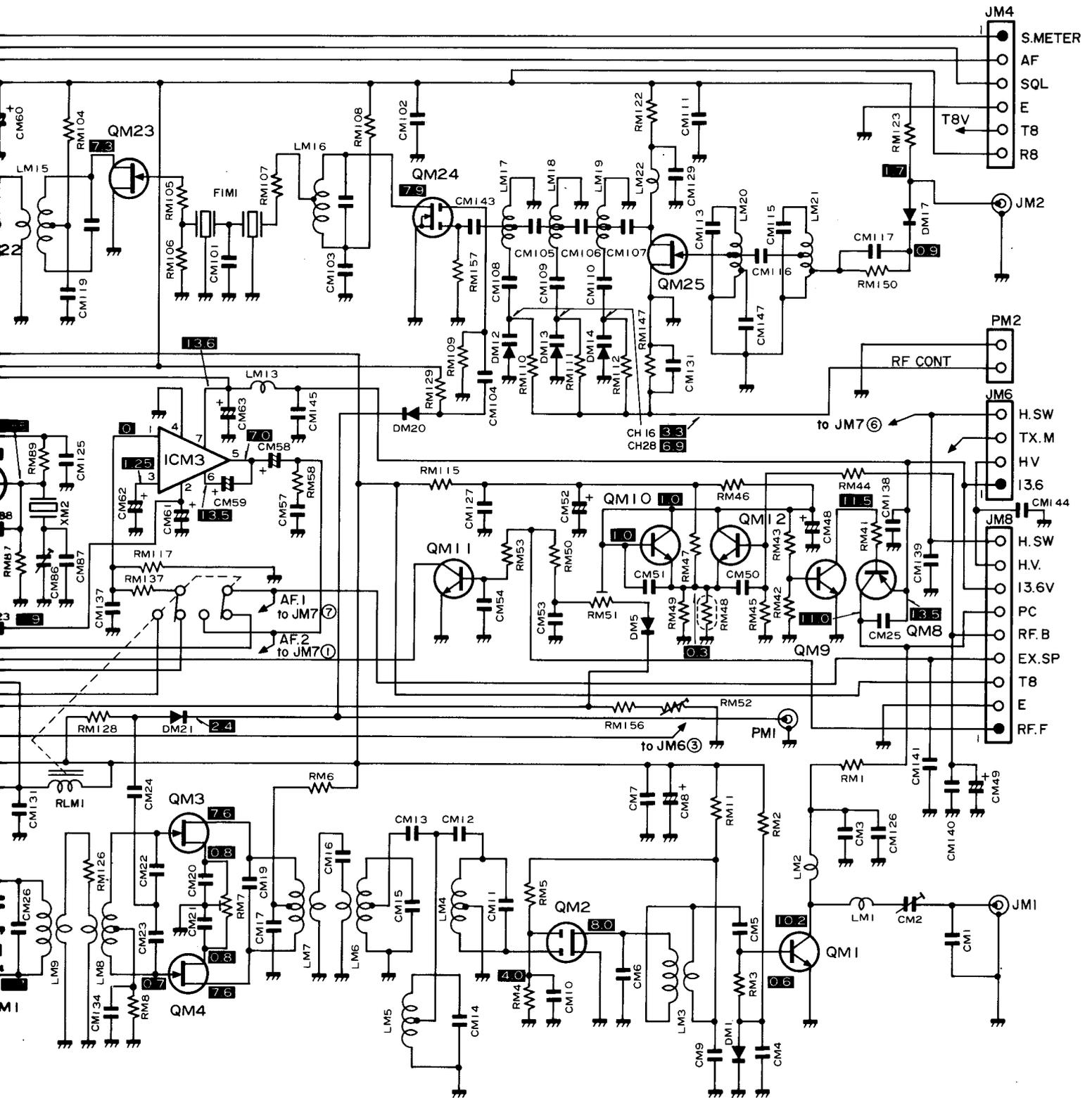


SECTION 10 VOLTAGE (CIRCUIT) DIAGRAMS

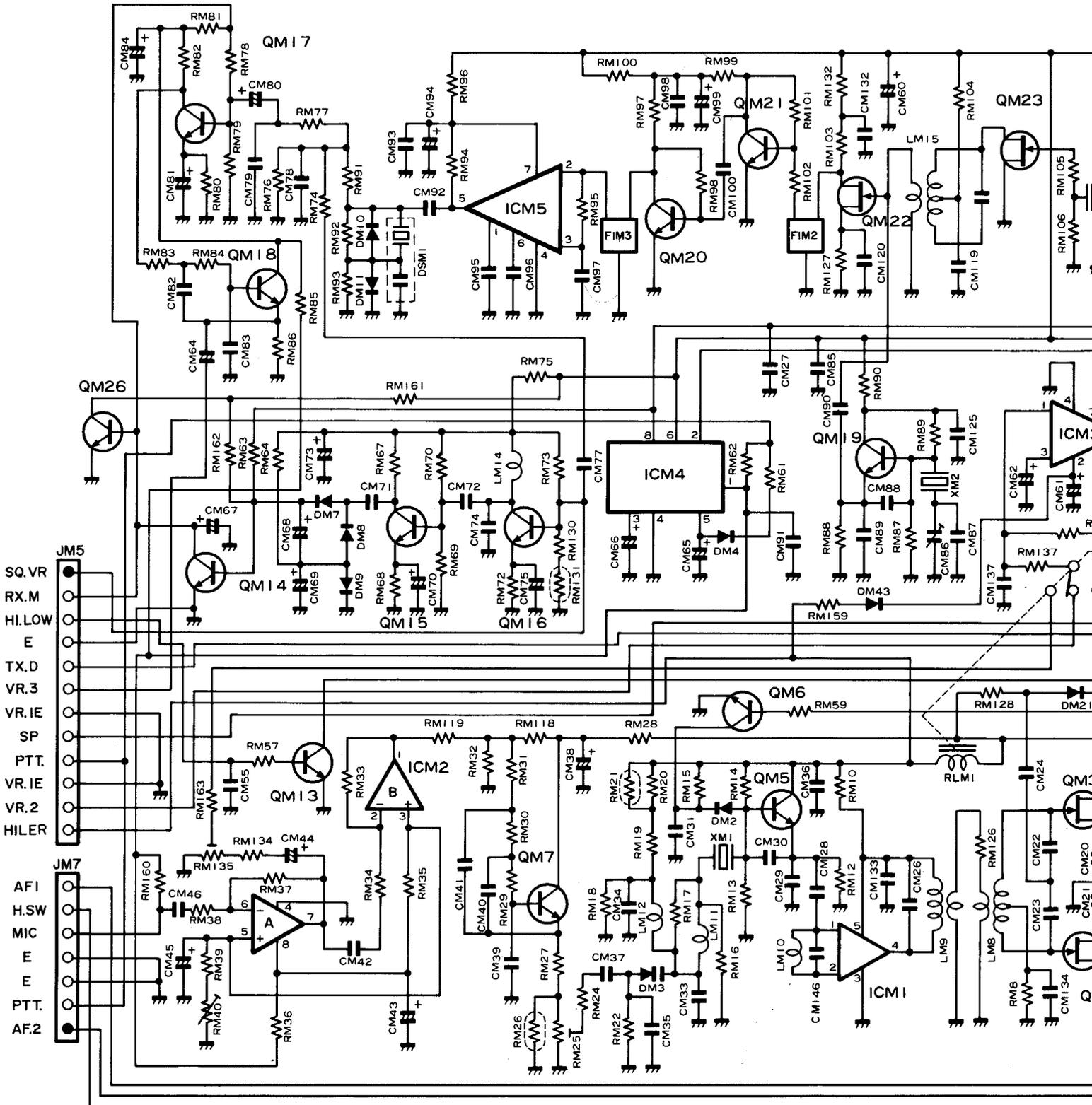
10 - 1 MAIN UNIT

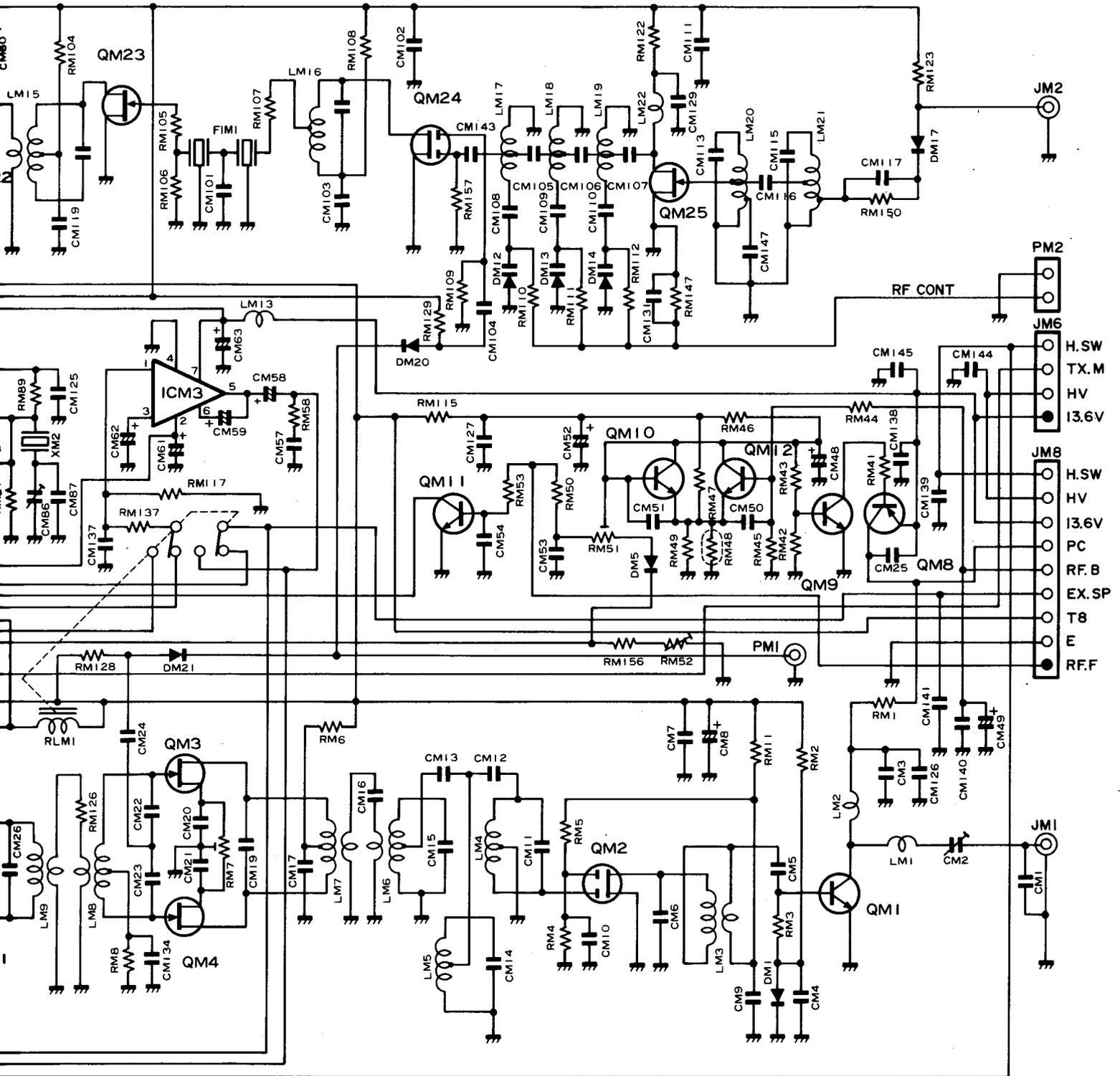
10 - 1 - 1 MAIN UNIT VOLTAGE AND CIRCUIT DIAGRAM (Type 225)



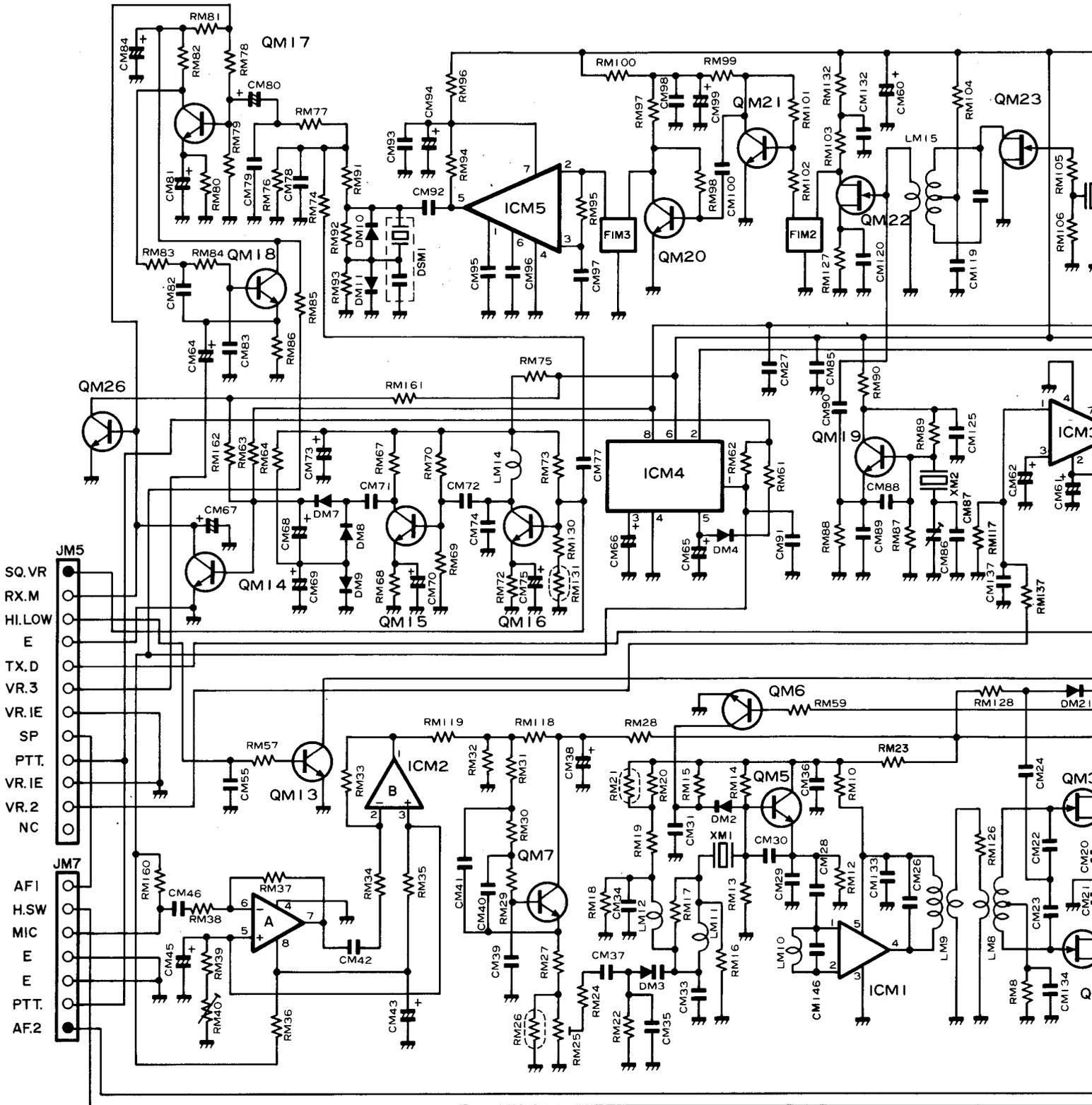


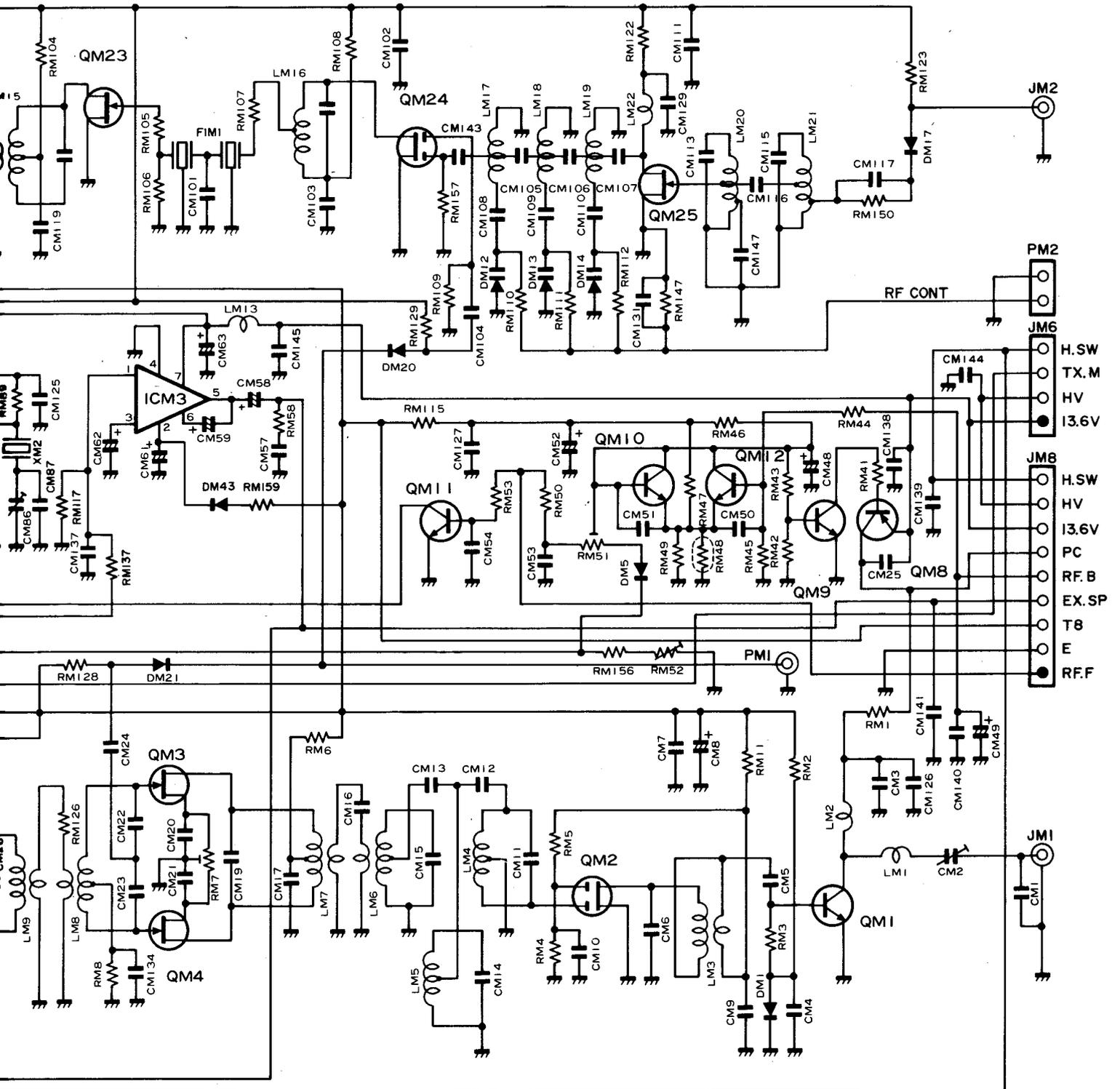
10 - 1 - 2 MAIN UNIT CIRCUIT DIAGRAM (Type 370)



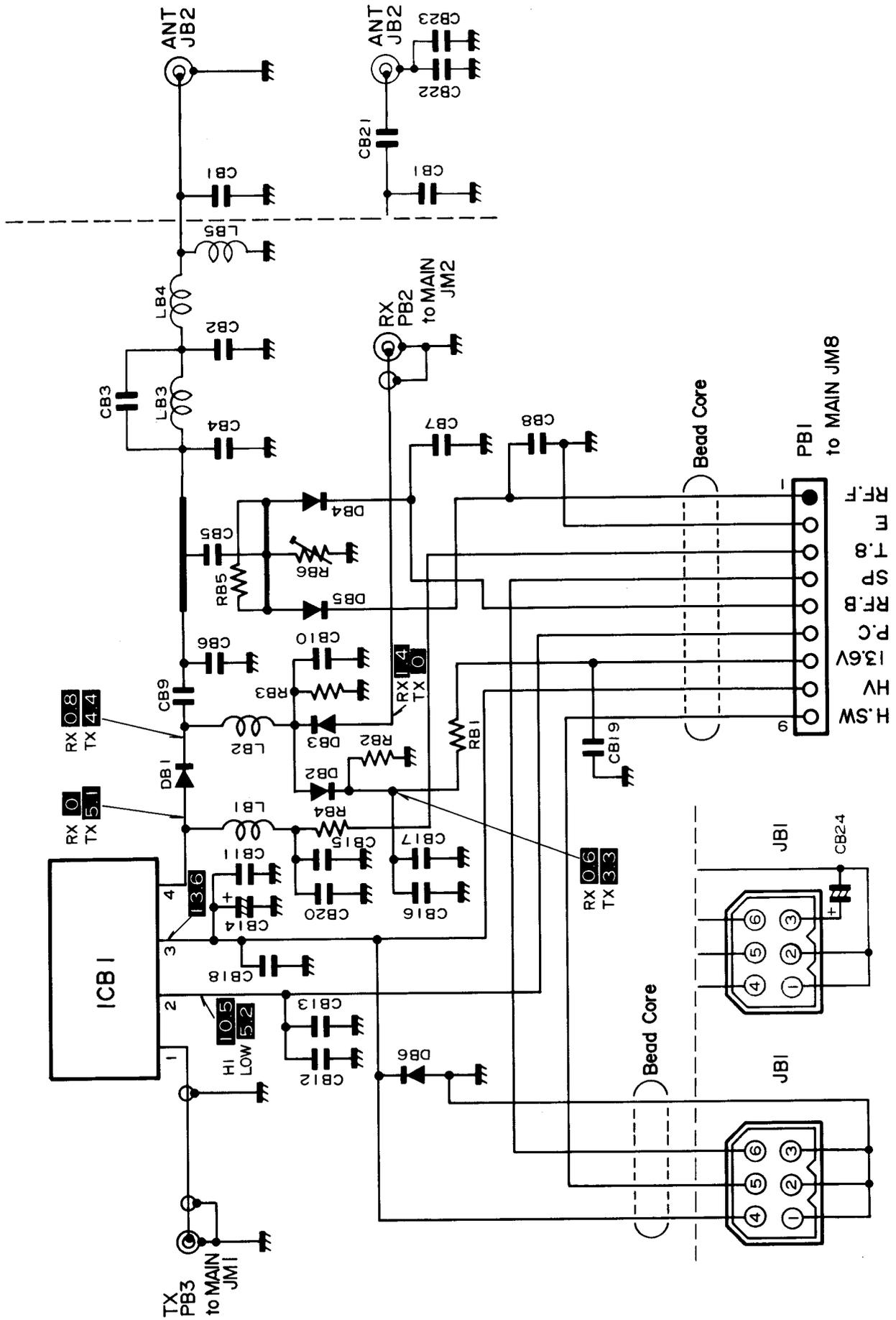


10 - 1 - 3 MAIN UNIT CIRCUIT DIAGRAM (HOLLAND and FRANCE versions) (Type 225 and 370)





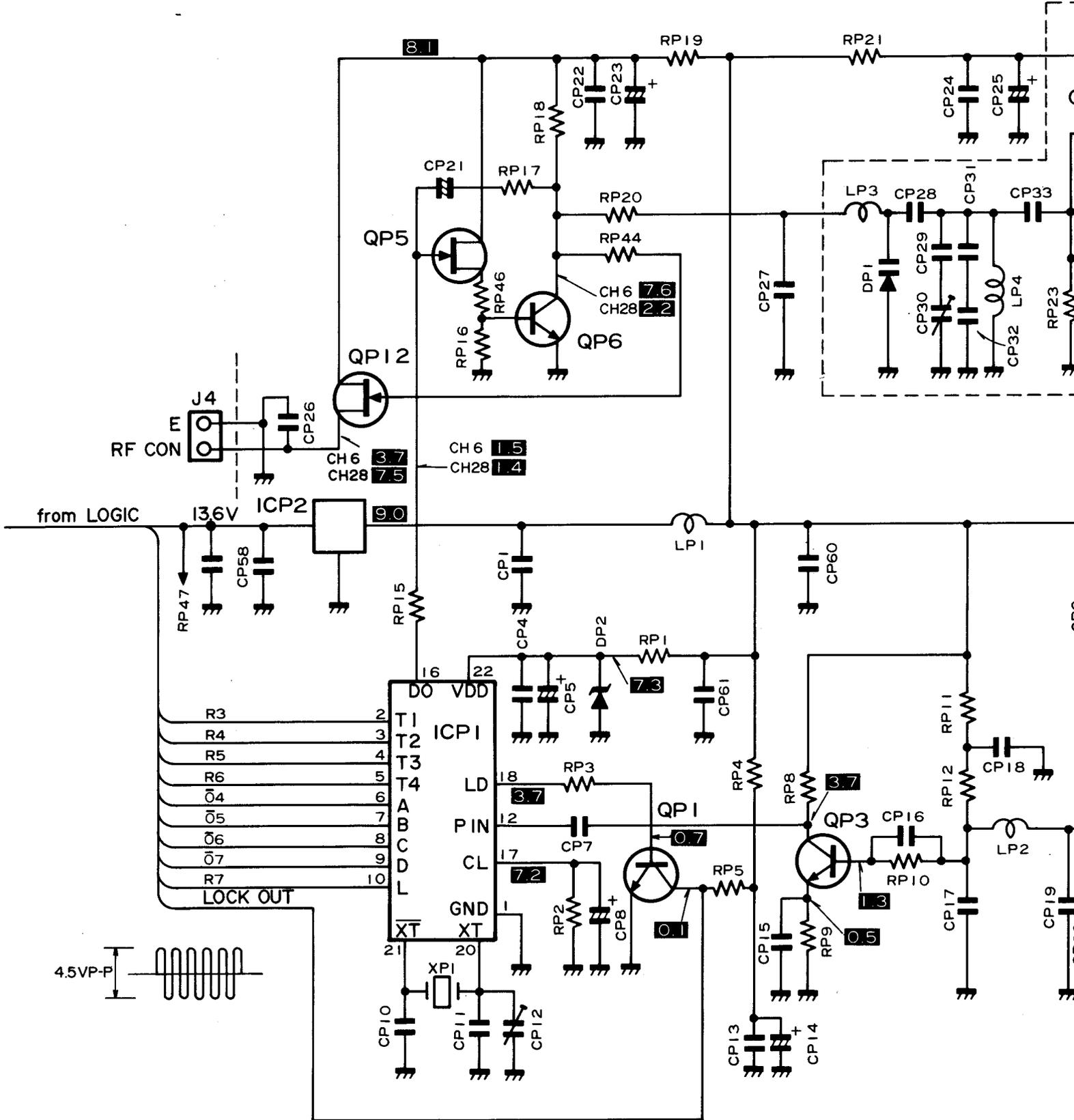
10-2 PA UNIT VOLTAGE (CIRCUIT) DIAGRAM

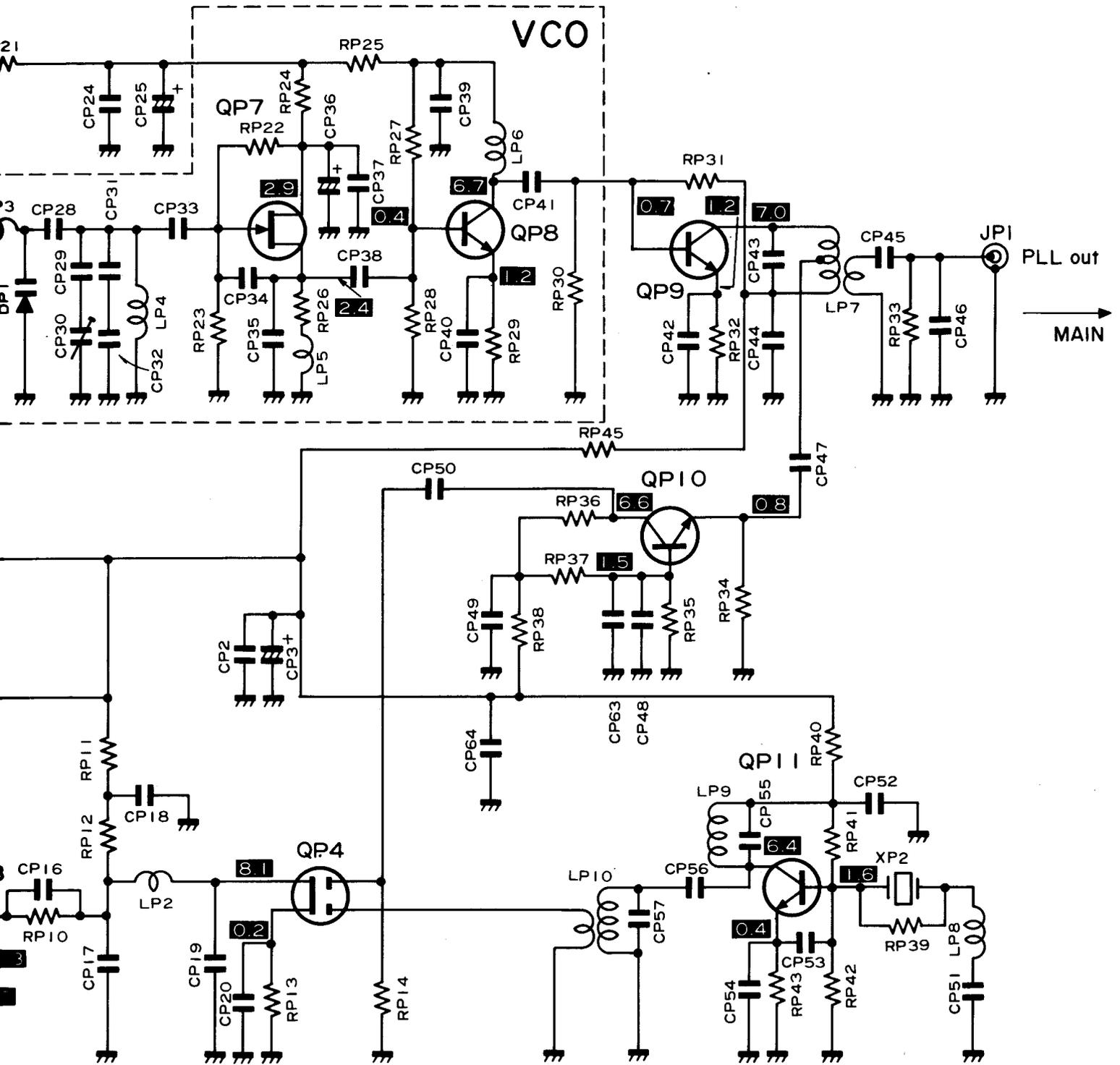


PA UNIT

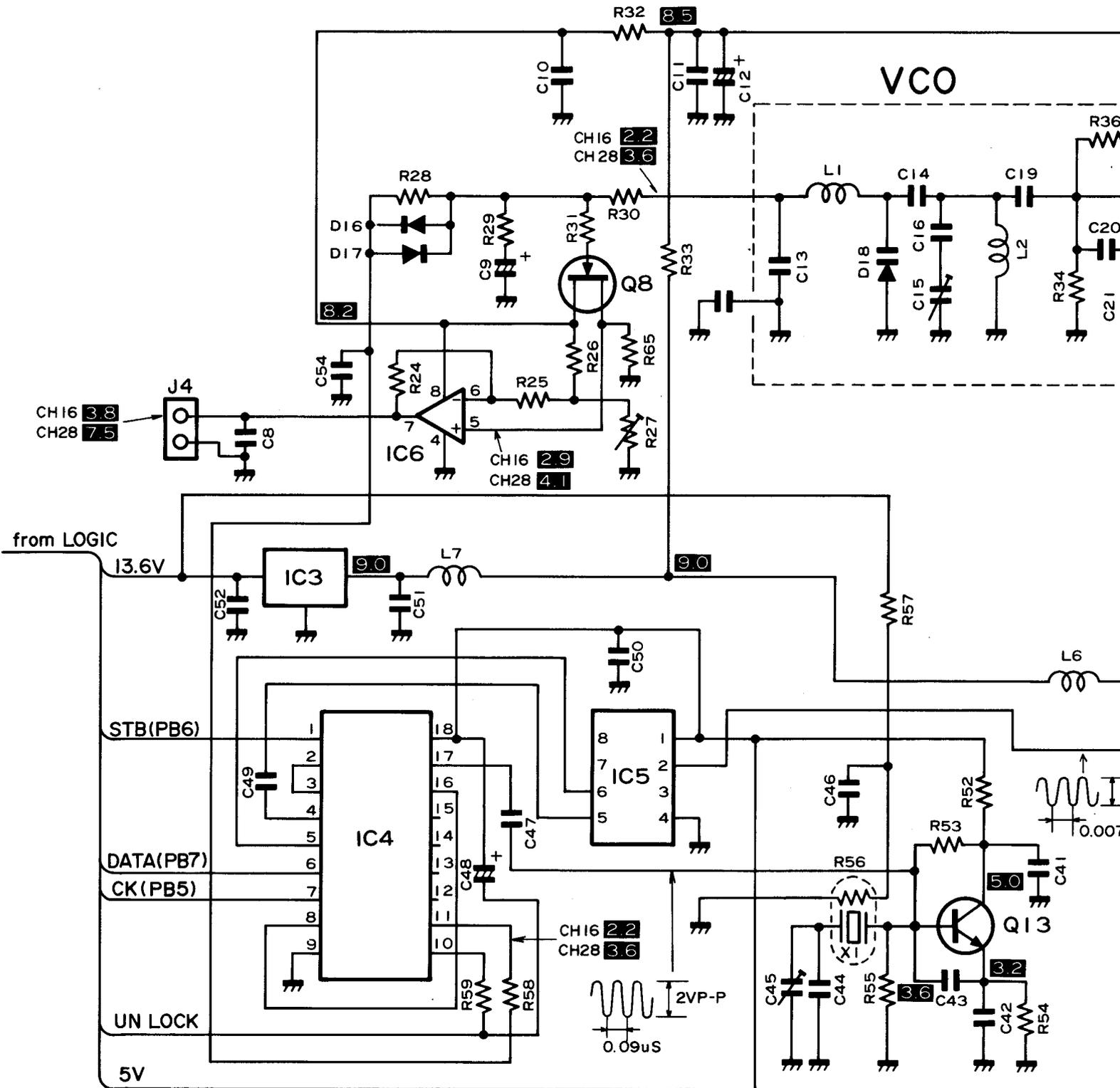
10-3 PLL UNIT

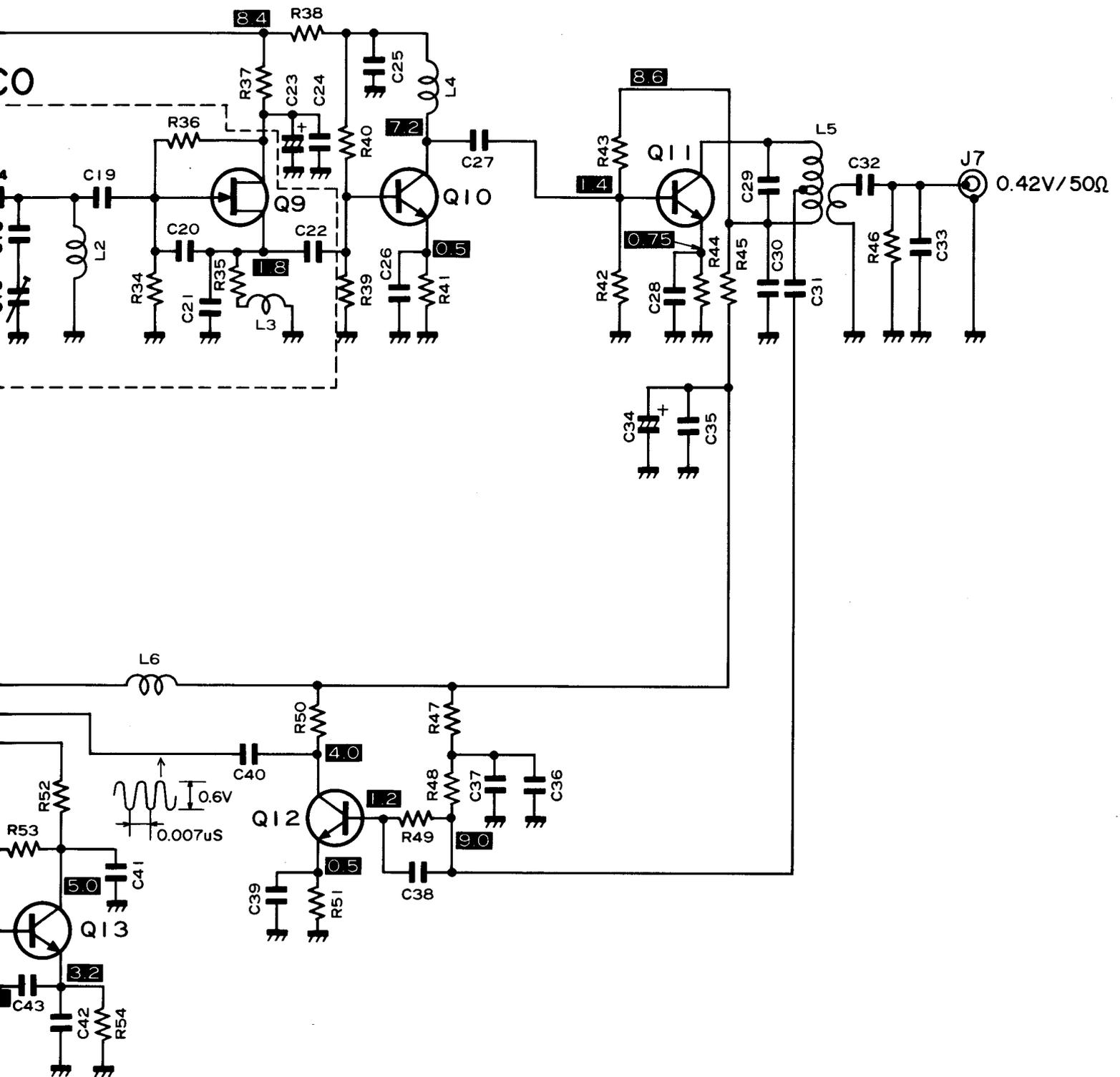
10-3-1 PLL UNIT VOLTAGE (CIRCUIT) DIAGRAM (Type 225)





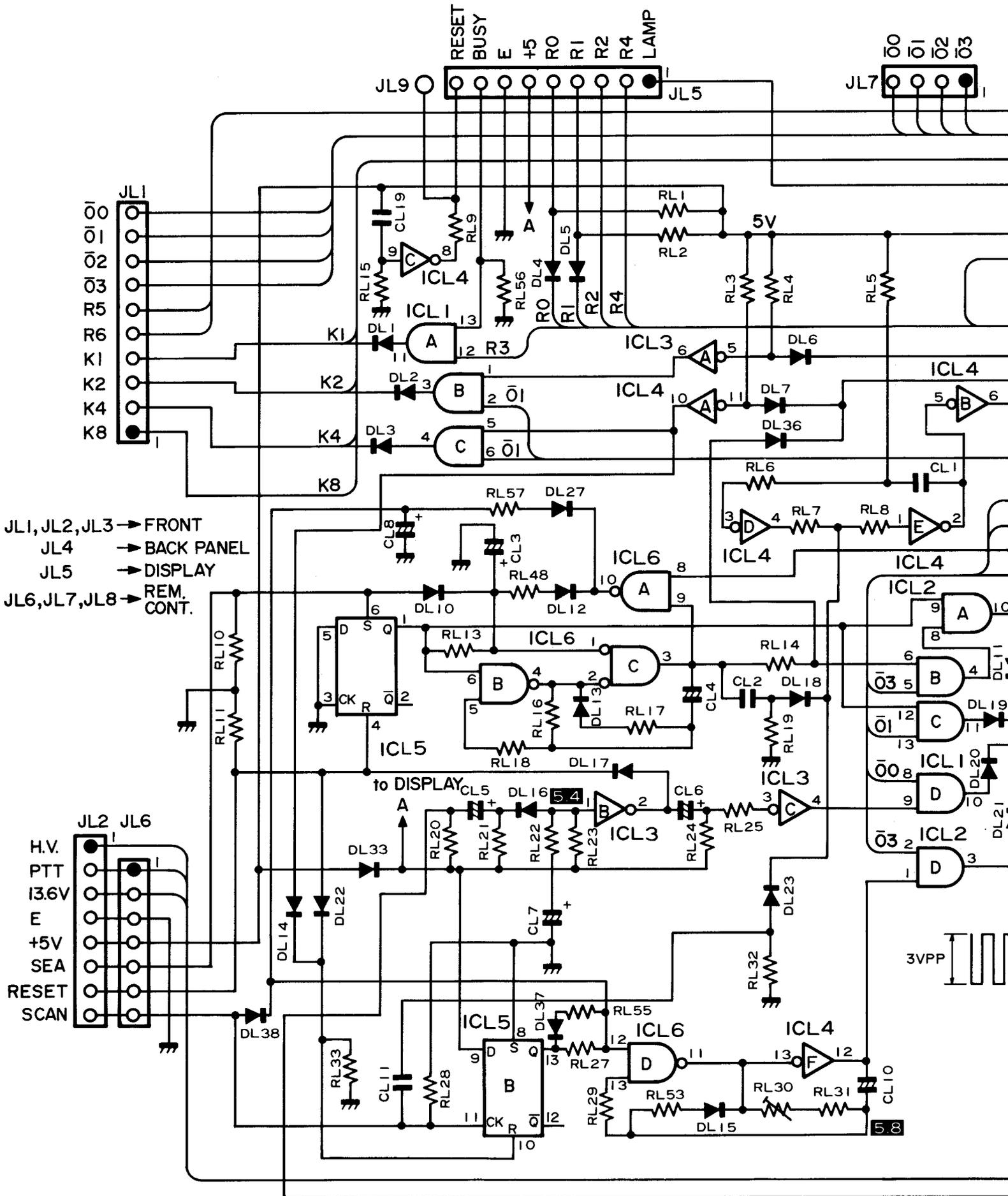
10-3-2 PLL UNIT VOLTAGE (CIRCUIT) DIAGRAM (Type 370)





10-4 LOGIC UNIT

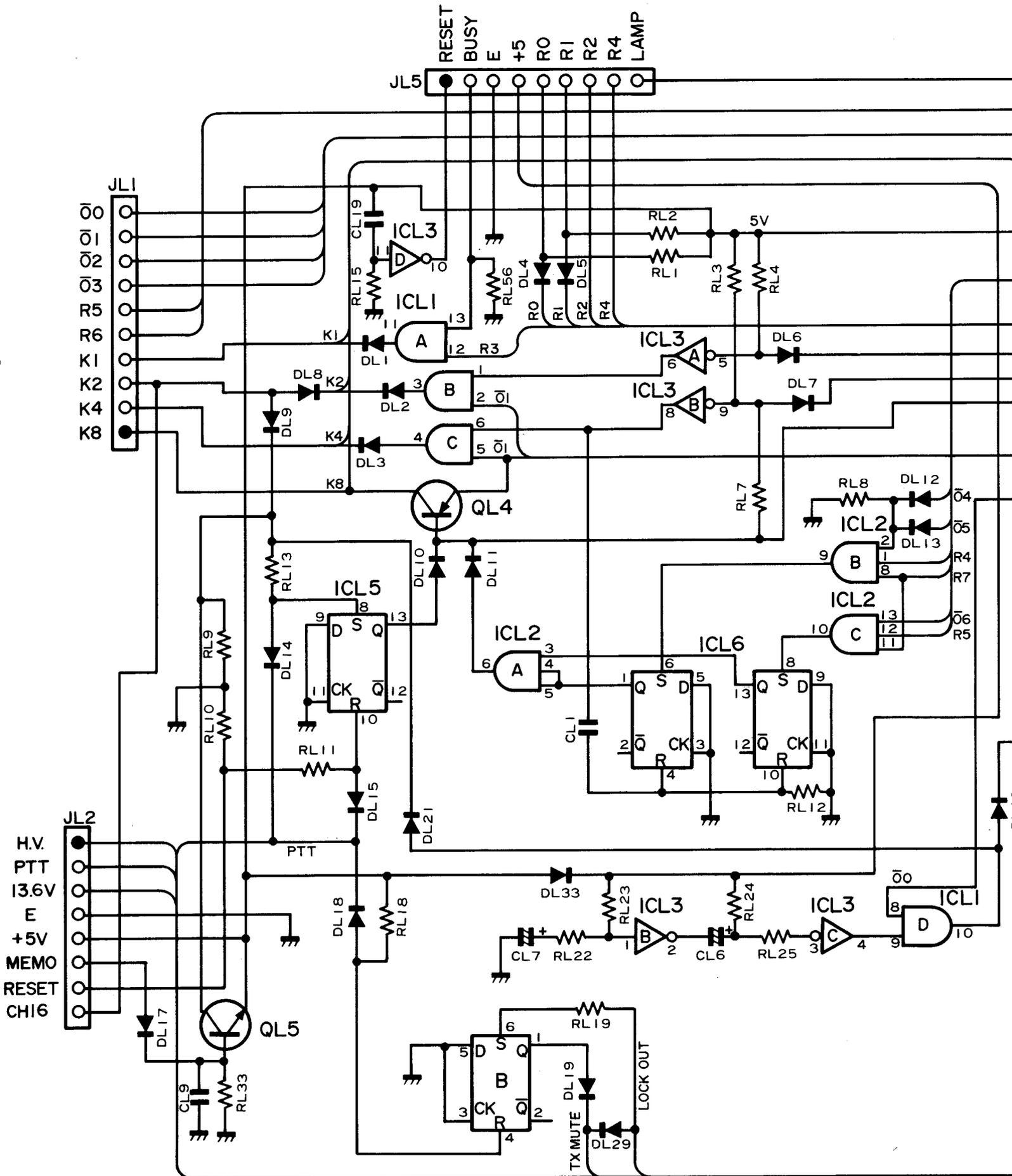
10-4-1 LOGIC UNIT VOLTAGE (CIRCUIT) DIAGRAM (Type 225)

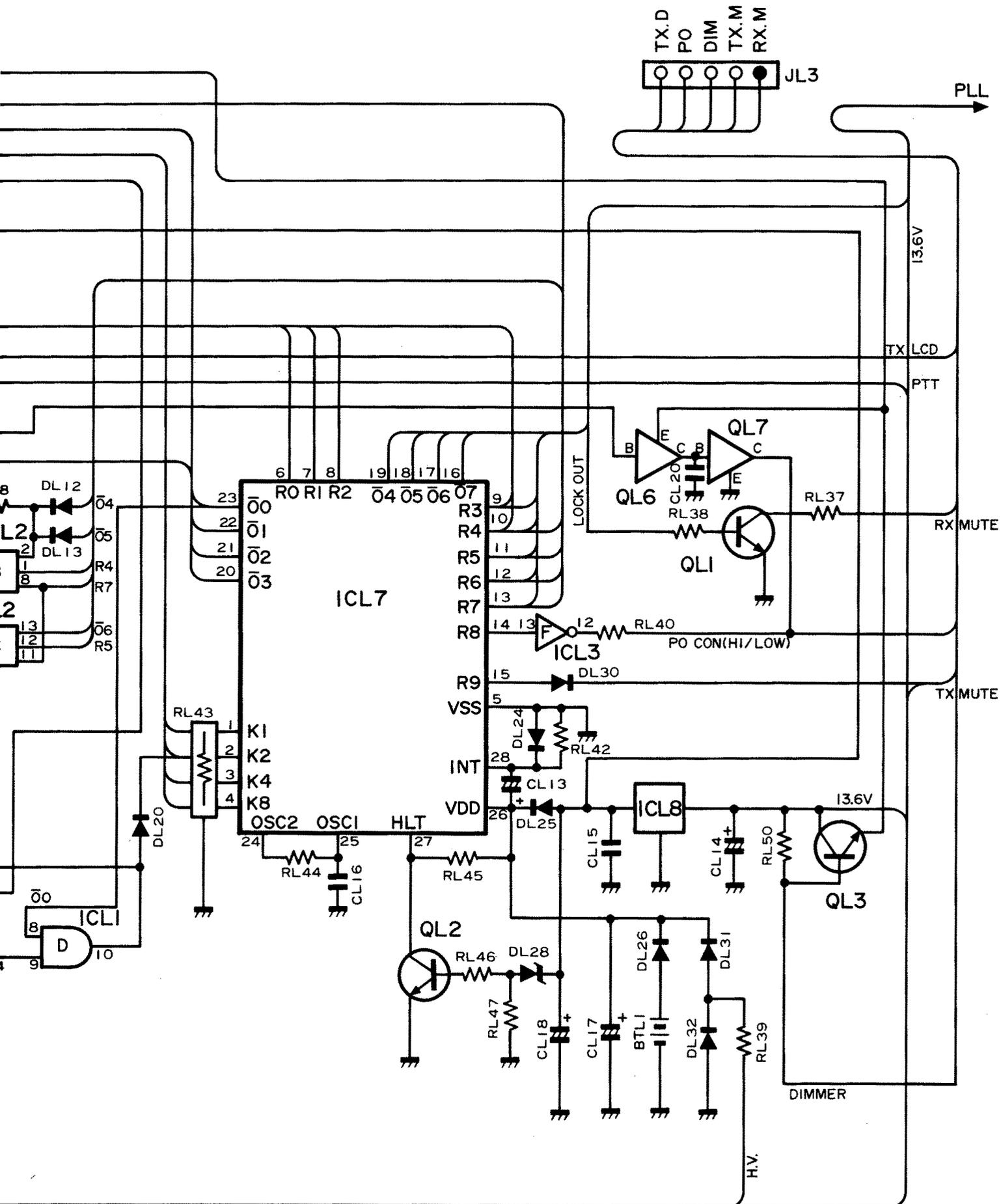


JL1, JL2, JL3 → FRONT
 JL4 → BACK PANEL
 JL5 → DISPLAY
 JL6, JL7, JL8 → REM. CONT.

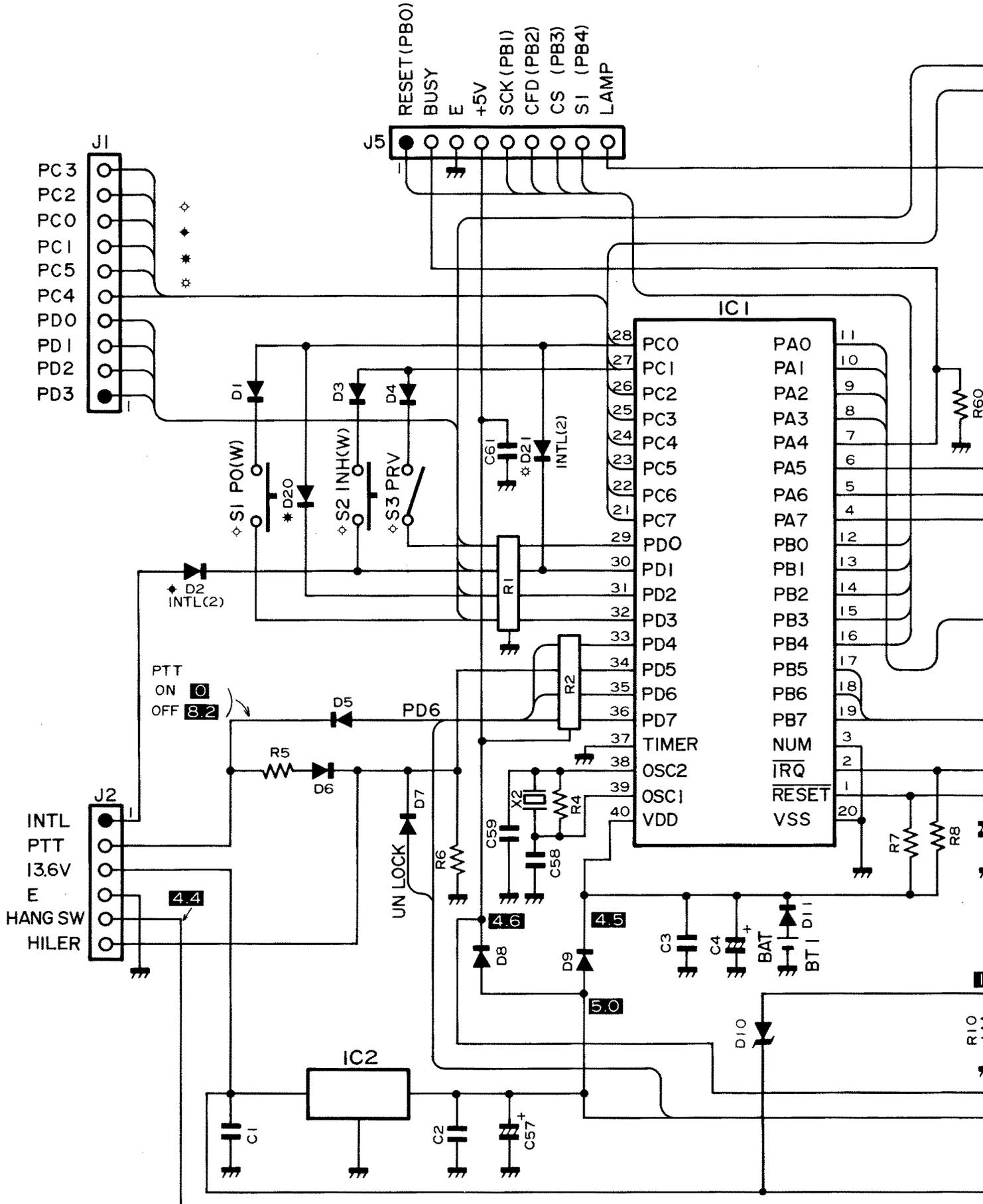
JL2 JL6
 H.V.
 PTT
 13.6V
 E
 +5V
 SEA
 RESET
 SCAN

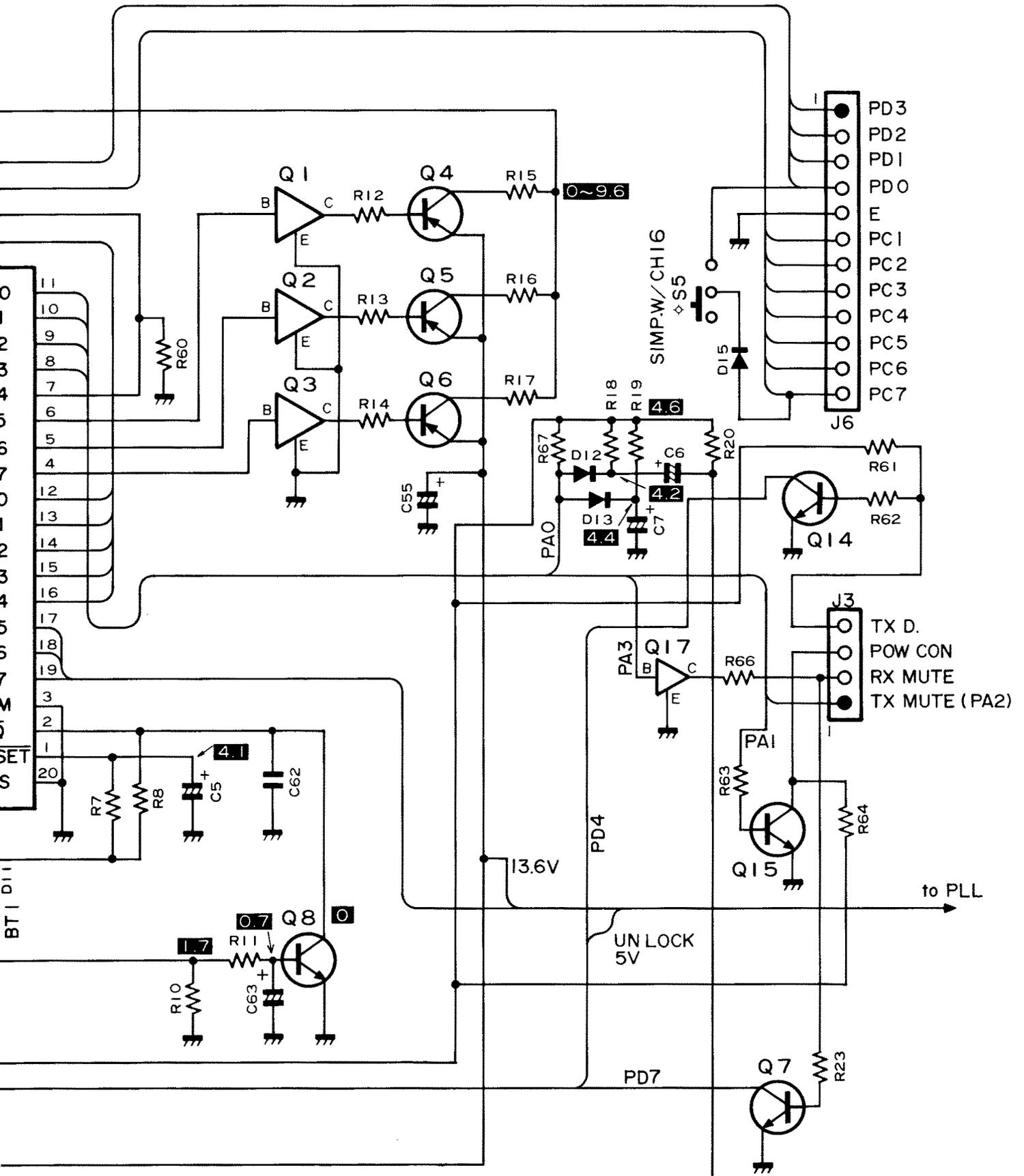
10 - 4 - 2 LOGIC UNIT CIRCUIT DIAGRAM (Type 225 HOLLAND version)





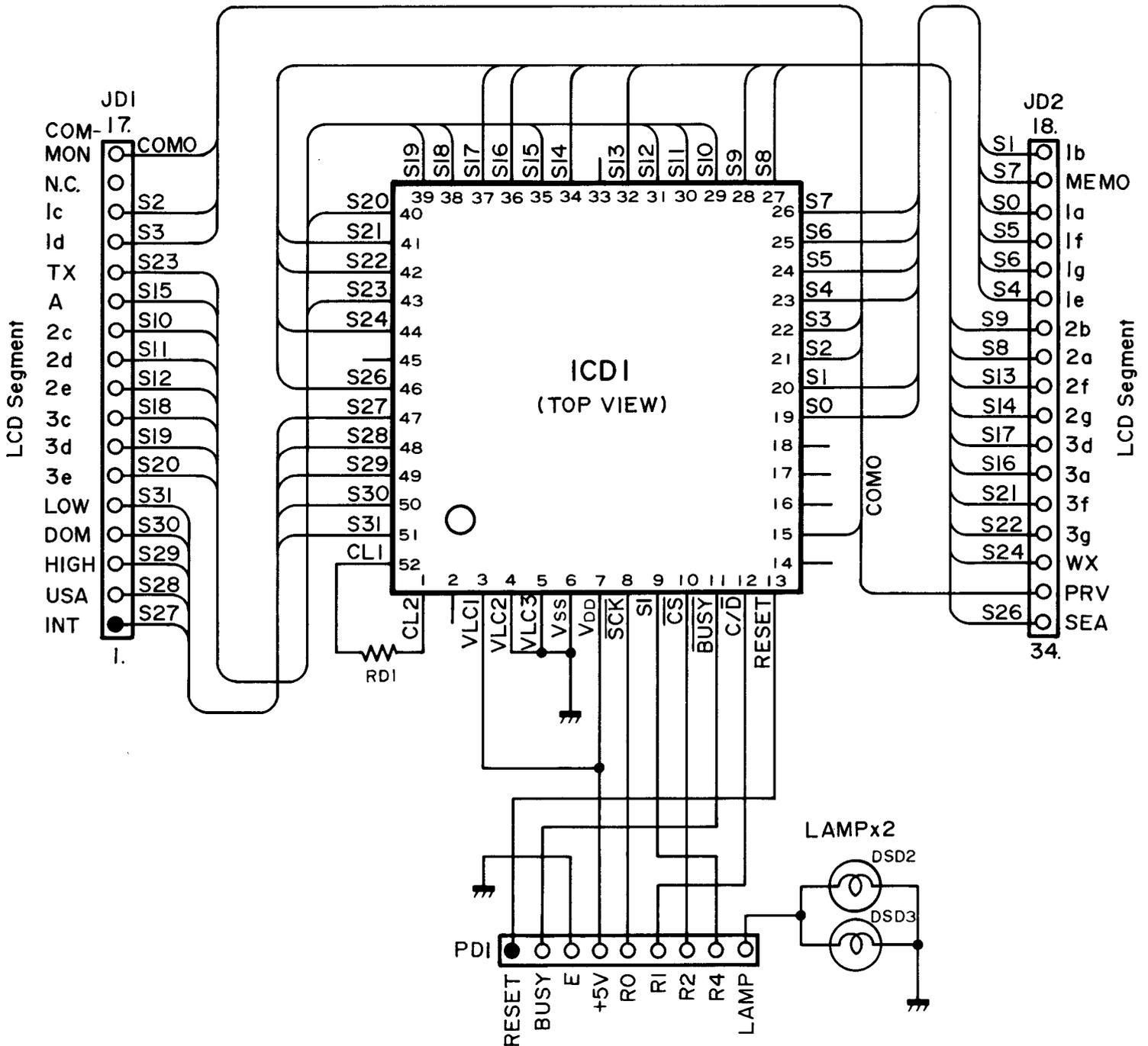
10-4-3 LOGIC UNIT VOLTAGE (CIRCUIT) DIAGRAM (Type 370)



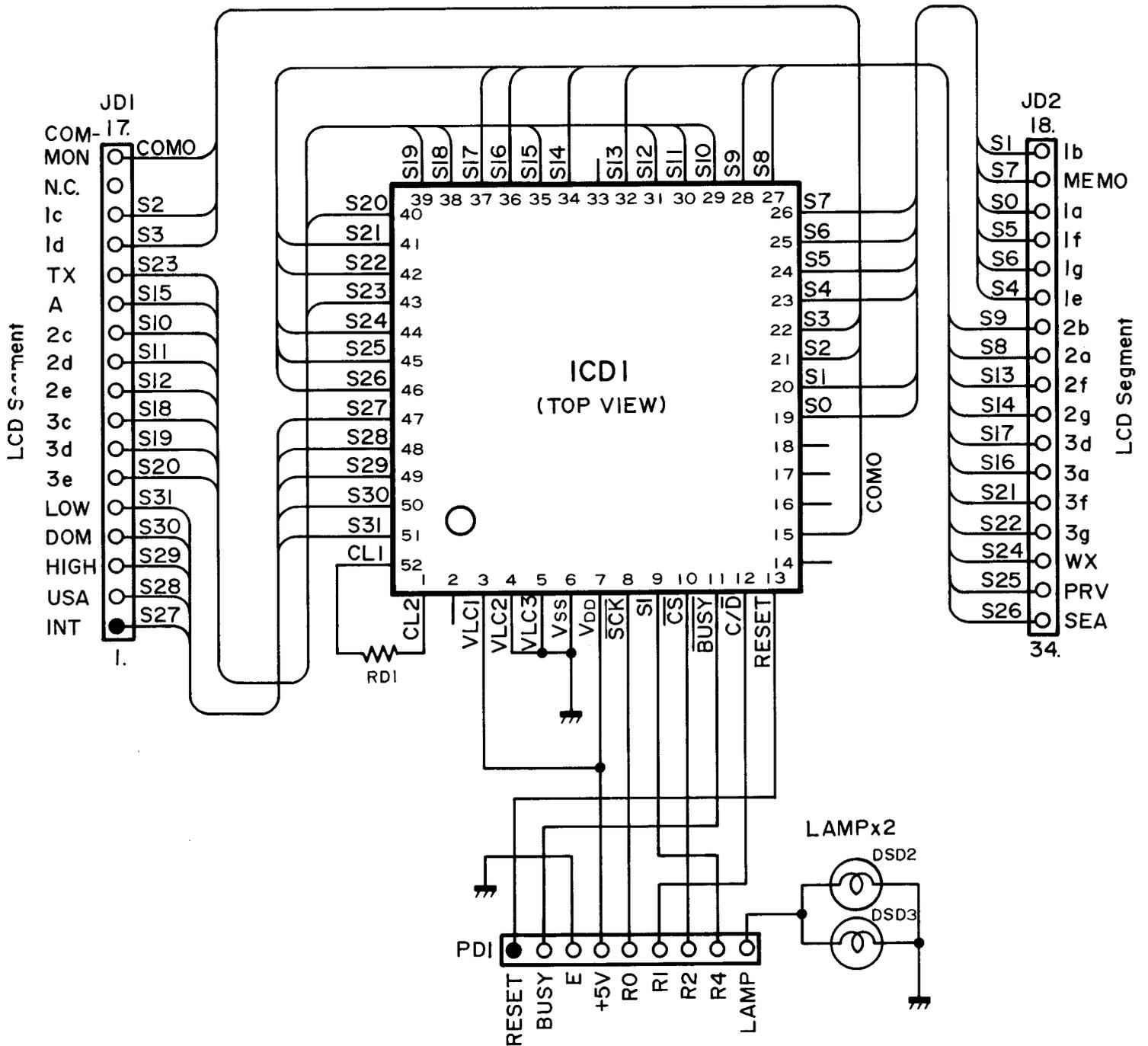


10-5 DISPLAY UNIT

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

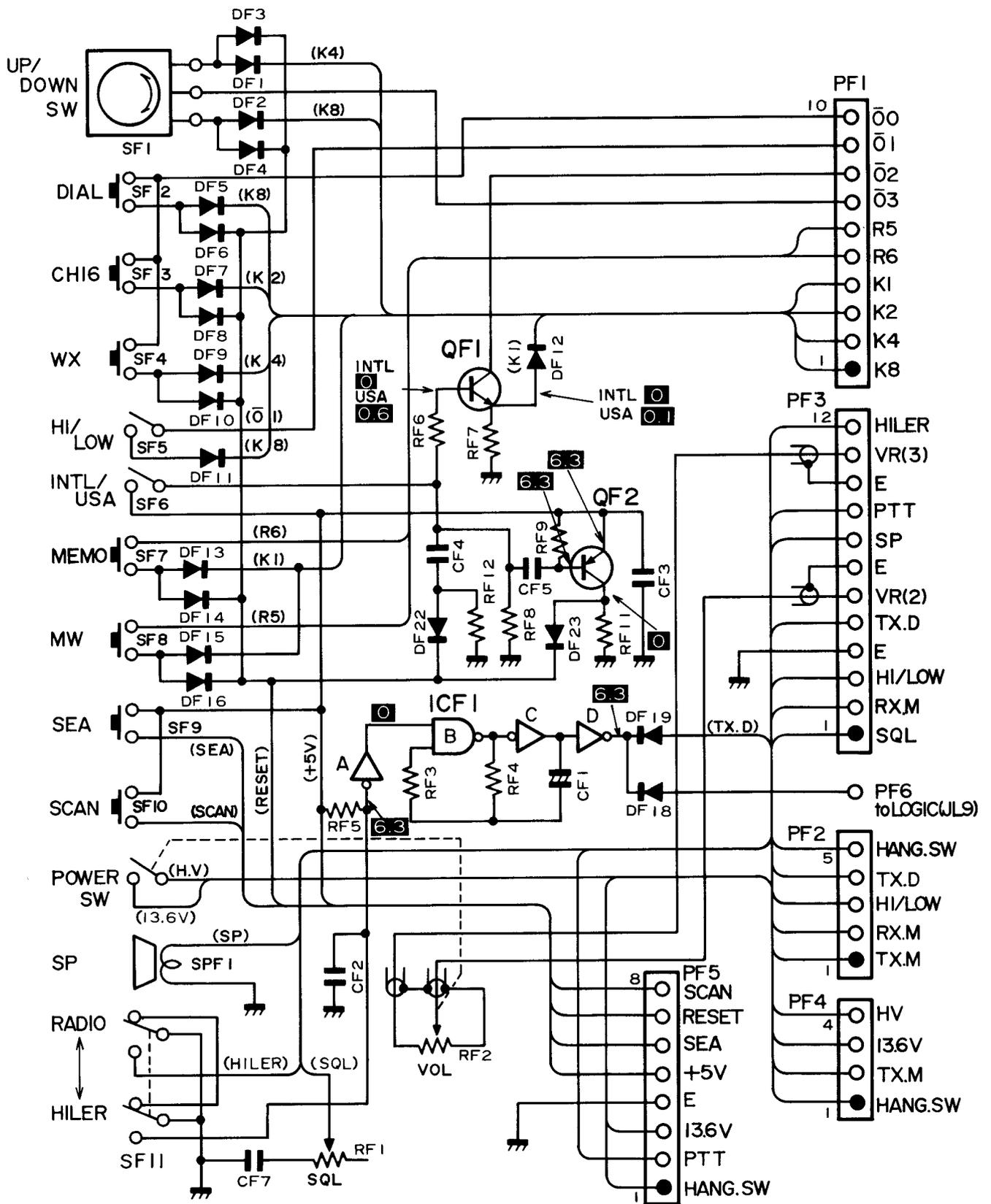


10 - 5 - 2 DISPLAY UNIT CIRCUIT DIAGRAM (Type 370)

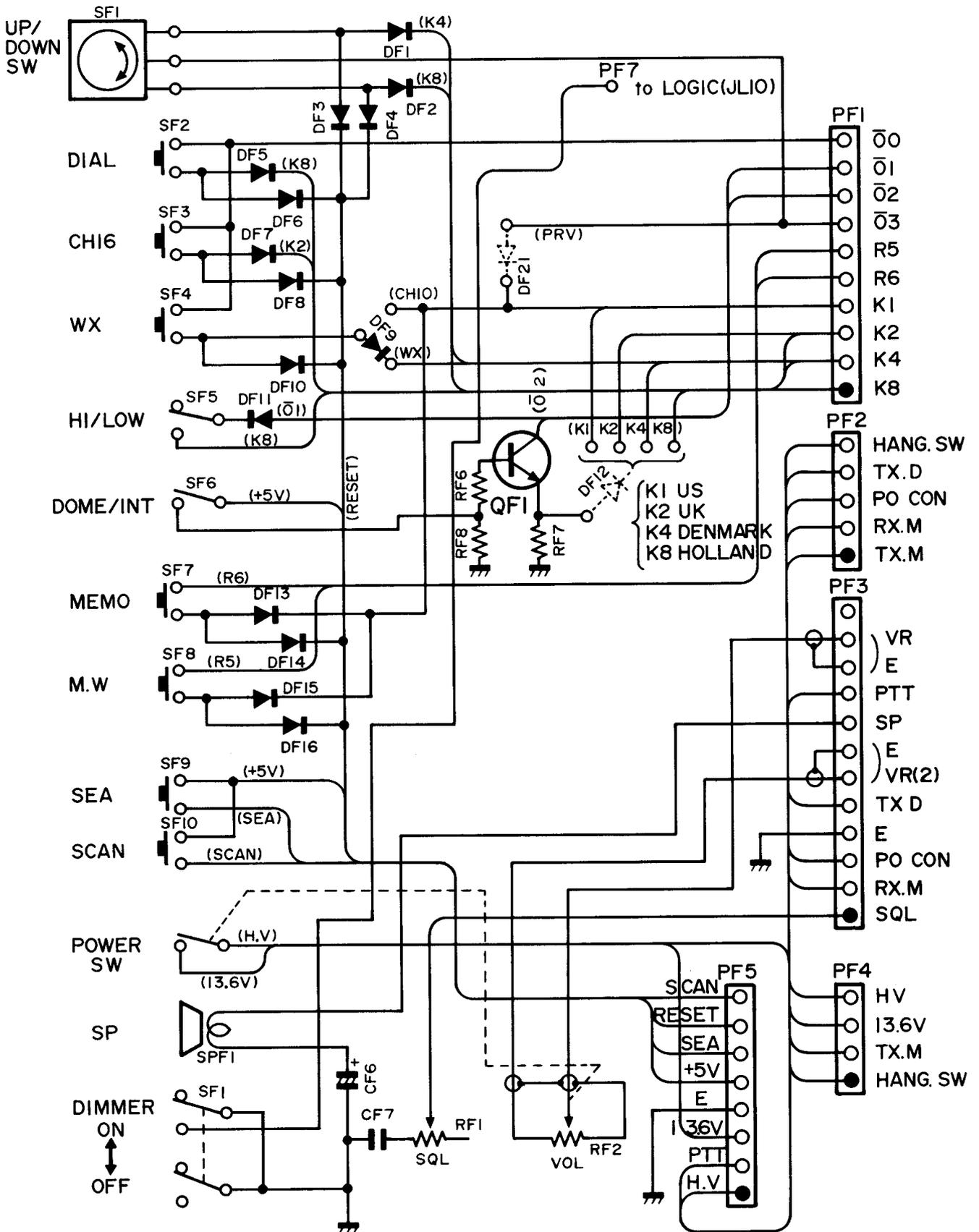


10 - 6 FRONT UNIT

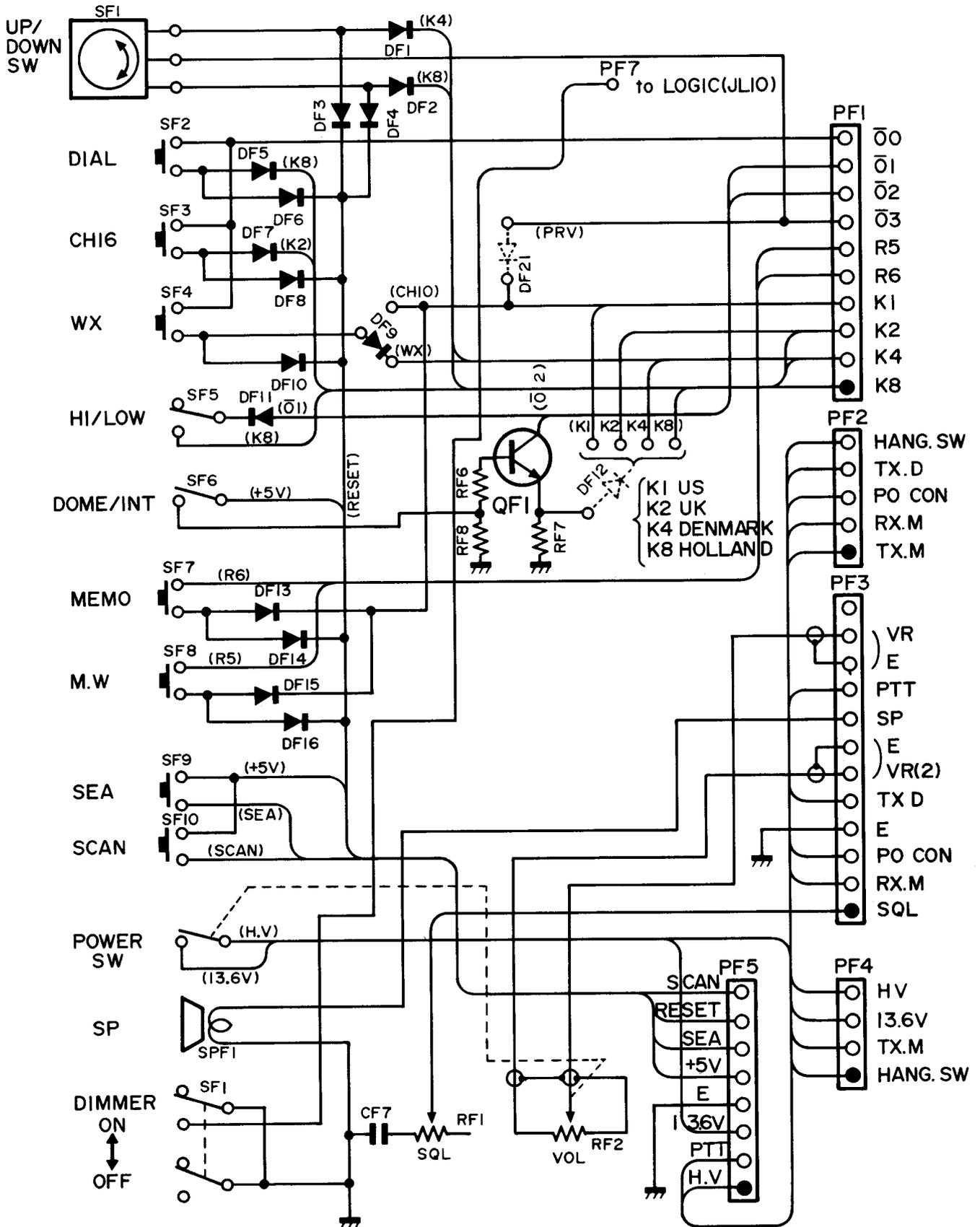
10 - 6 - 1 FRONT UNIT VOLTAGE (CIRCUIT) DIAGRAM (Type 225 USA version)



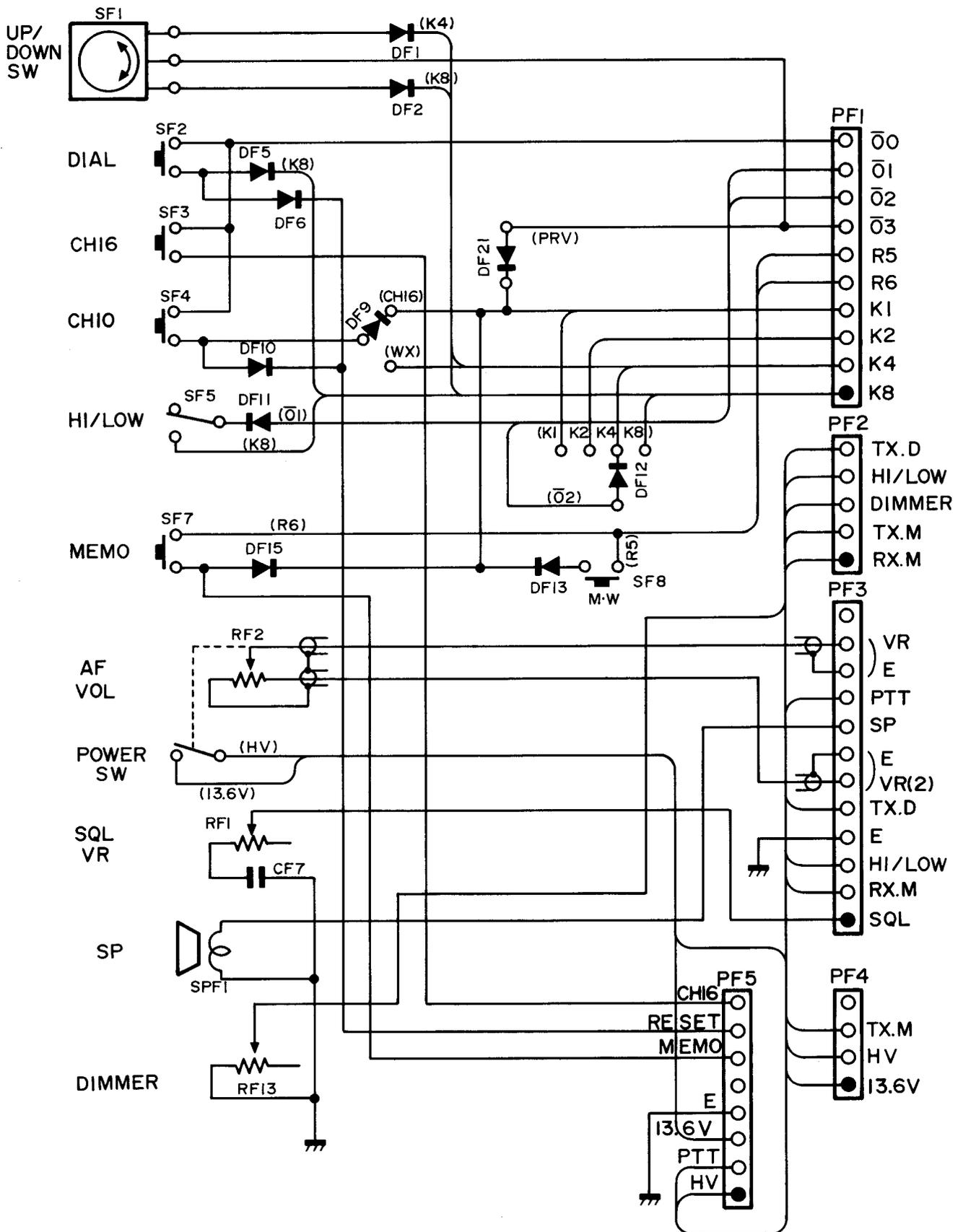
10 - 6 - 2 FRONT UNIT CIRCUIT DIAGRAM (Type 225 Europe version)



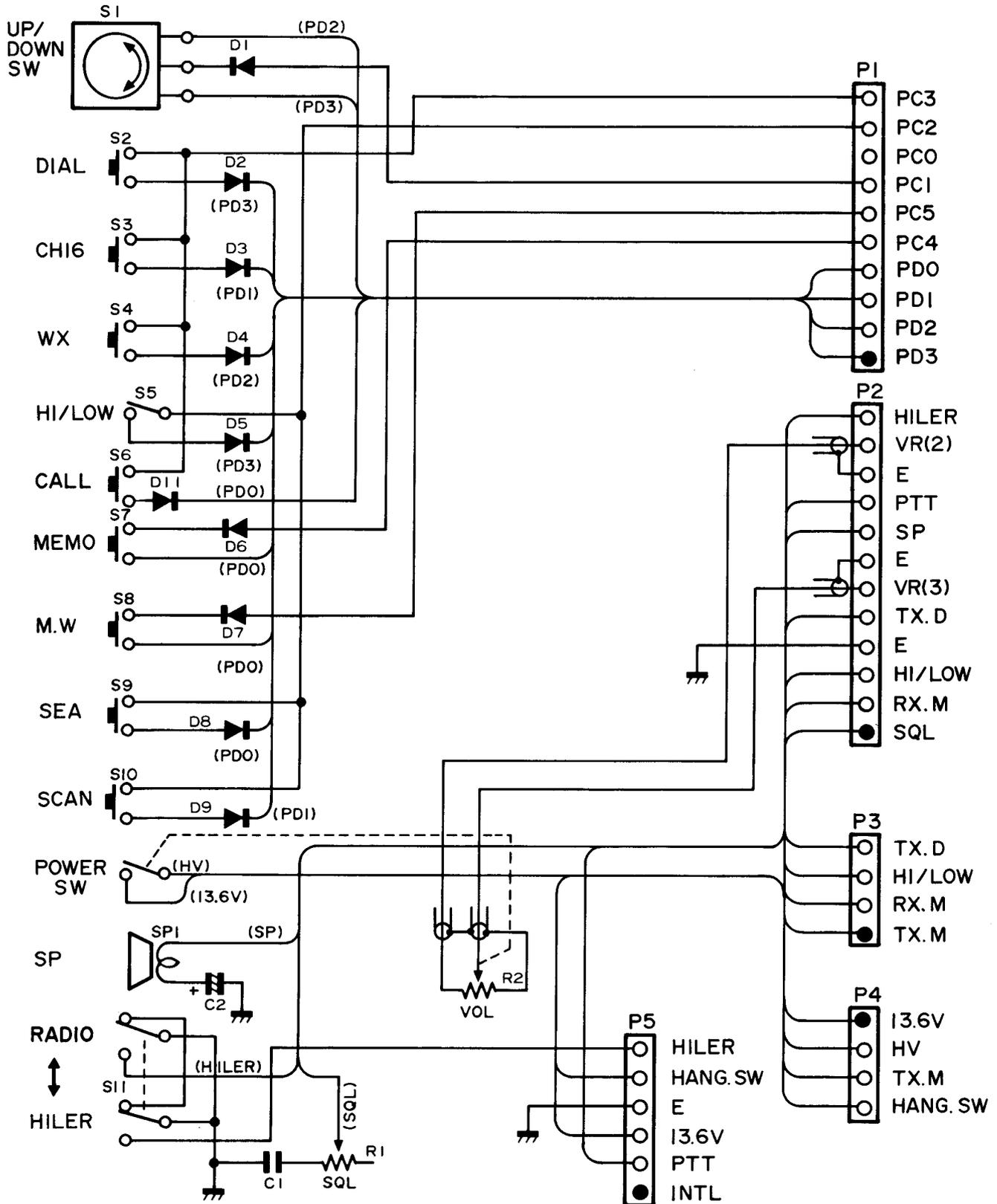
10 - 6 - 3 FRONT UNIT CIRCUIT DIAGRAM (Type 225 UK version)



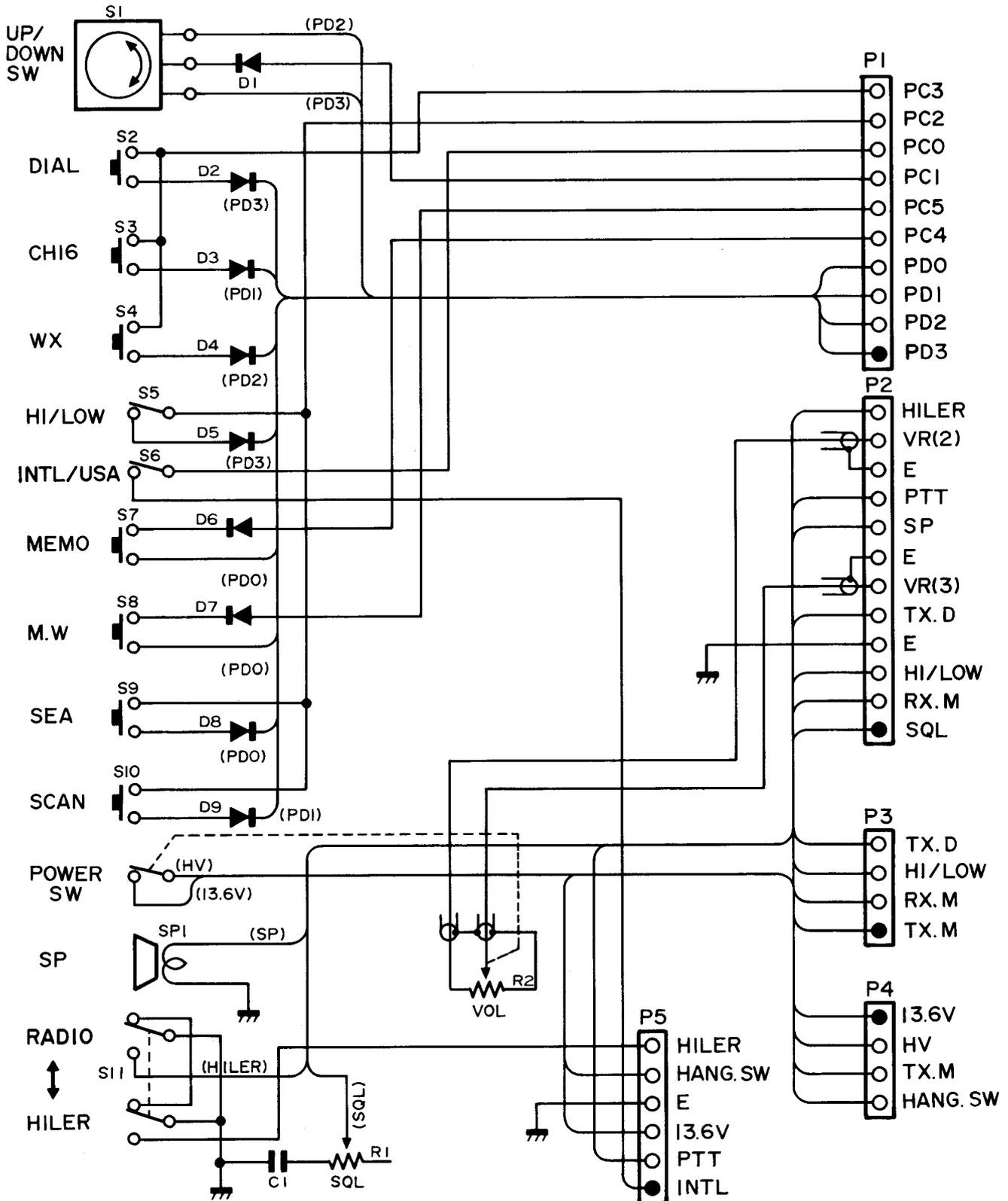
10 - 6 - 4 FRONT UNIT CIRCUIT DIAGRAM (Type 225 Holland version)



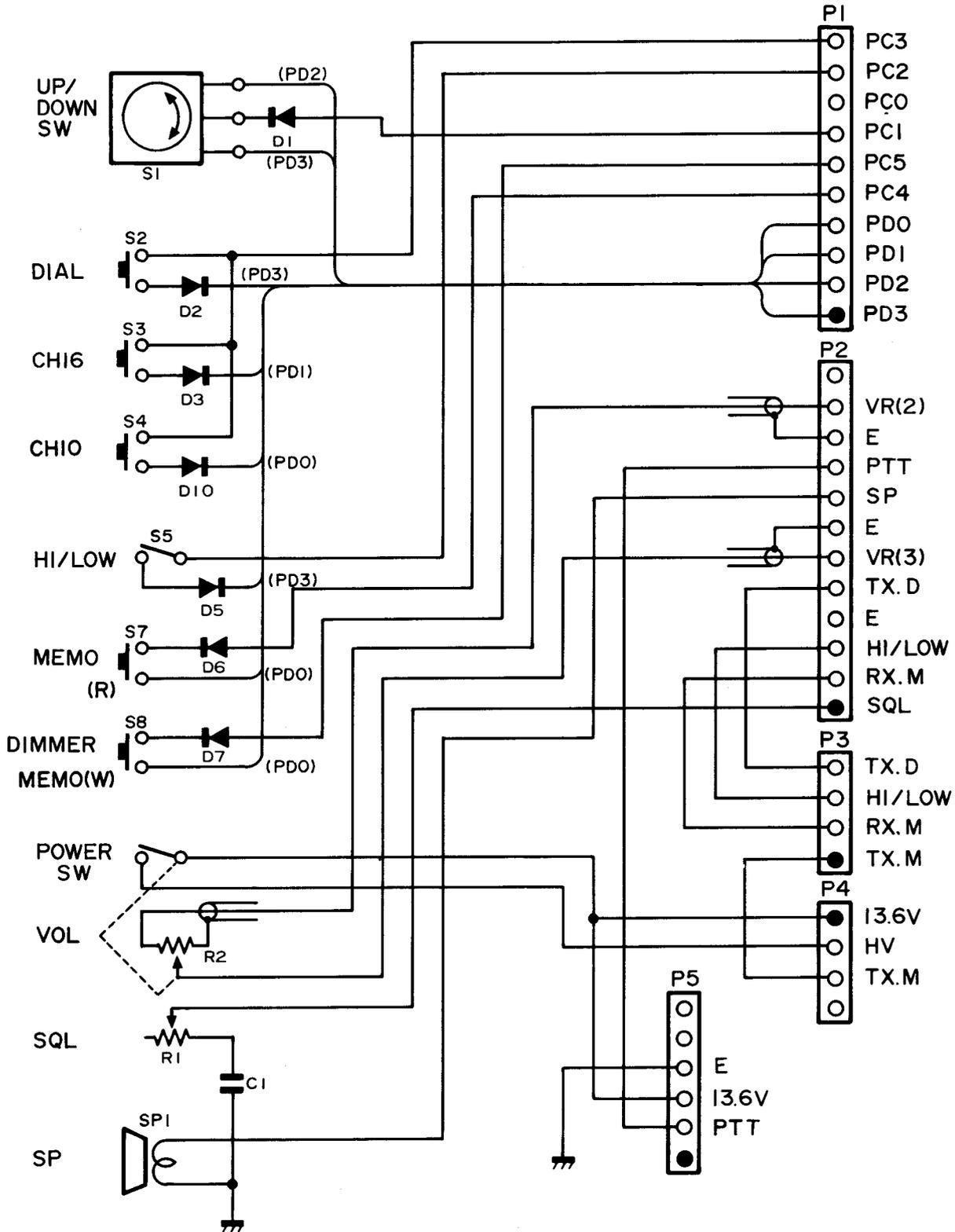
10-6-5 FRONT UNIT CIRCUIT DIAGRAM (Type 370 USA version)



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



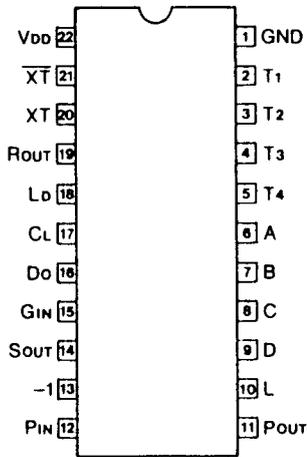
10 - 6 - 7 FRONT UNIT CIRCUIT DIAGRAM (Type 370 Holland/France version)



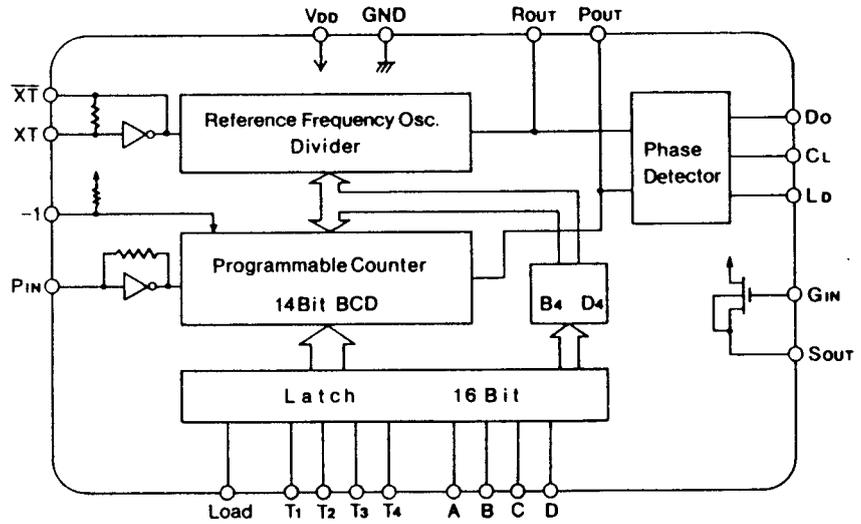
SECTION 11 IC RATINGS

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 |

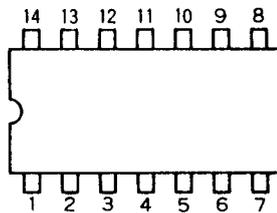
TC4011 (QUAD 2-INPUT POSITIVE NAND GATE)

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 | V _{SS} -0.5 ~ V _{SS} +20 | V |
| Input Voltage | VIN | V _{SS} -0.5 ~ VDD +0.5 | V |
| Output Voltage | VOUT | V _{SS} -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. | |

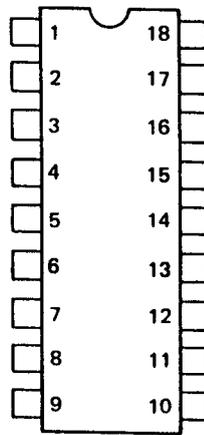
μPD2834C (PLL FREQUENCY SYNTHESIZER)

MAXIMUM RATINGS (Ta = 25°C)

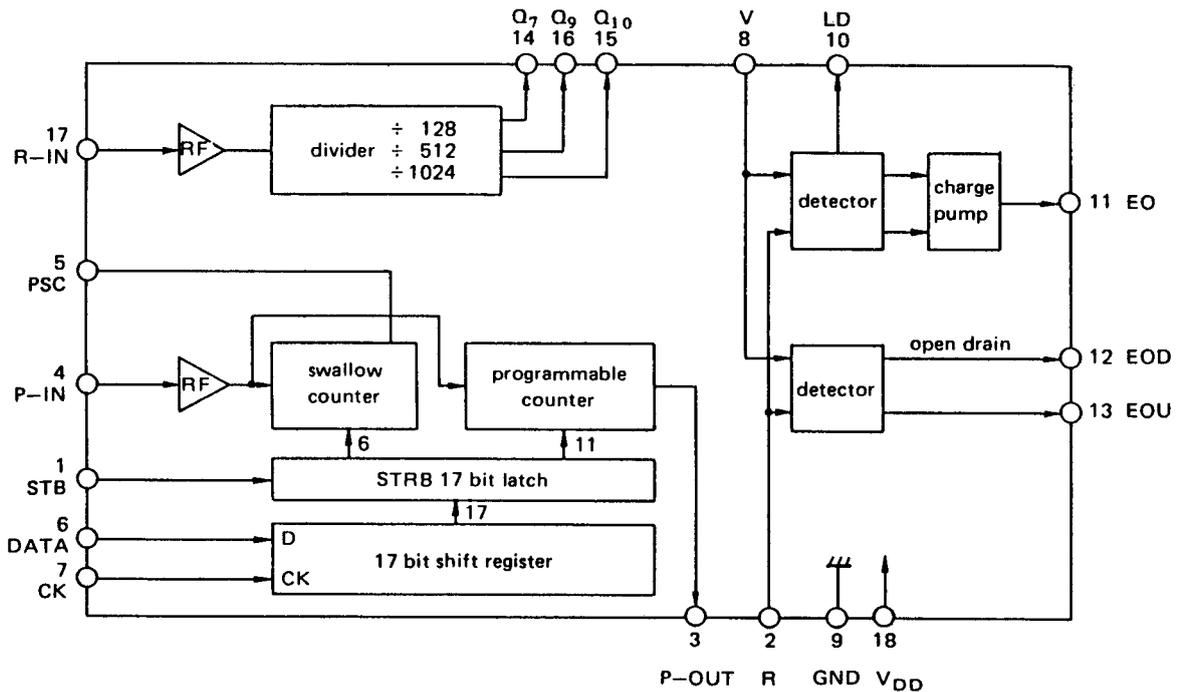
| ITEM | SYMBOL | RATING | UNIT |
|-----------------------|--------|------------------|------|
| Supply Voltage | VDD | -0.3 ~ +7.0 | V |
| Input Voltage | VIN | -0.5 ~ +VDD +0.5 | V |
| Output Voltage | VOUT | -0.5 ~ +VDD +0.5 | V |
| Output Voltage * | VOUT | -0.5 ~ +VDD +3.0 | V |
| Operating Temperature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

* EOU pin only

PIN CONNECTION



BLOCK DIAGRAM

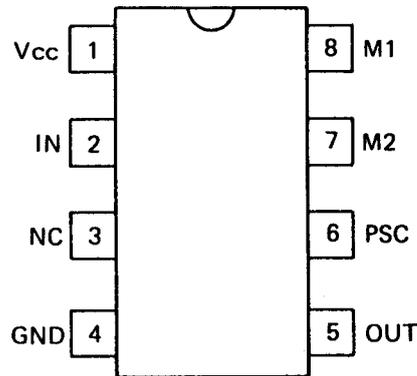


μPB571C (LOW POWER PRESCALER)

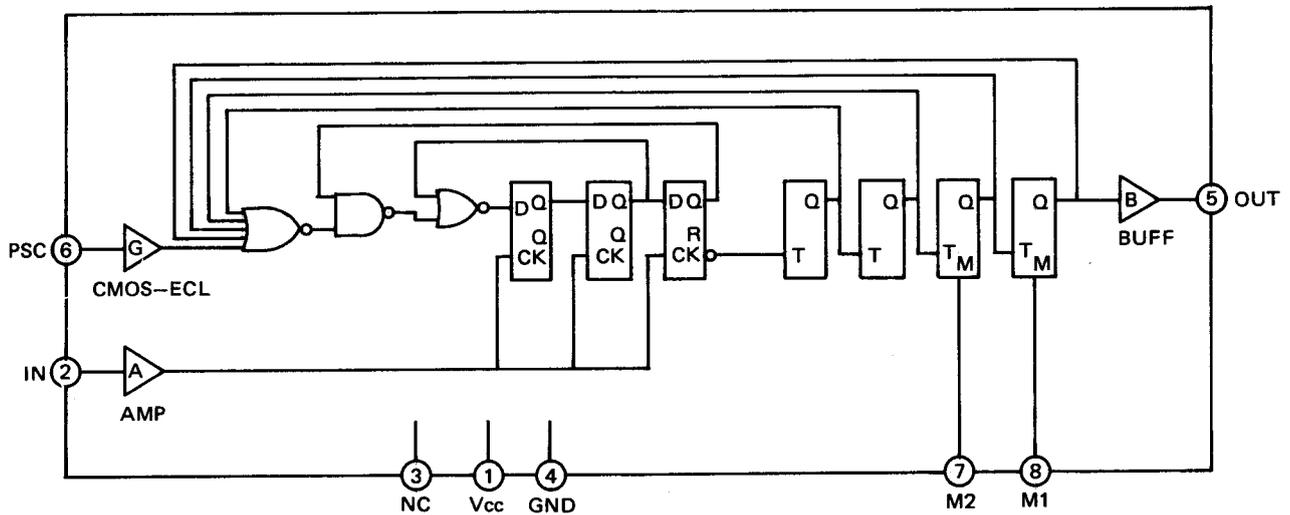
MAXIMUM RATINGS (Ta = 25°C)

| 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.

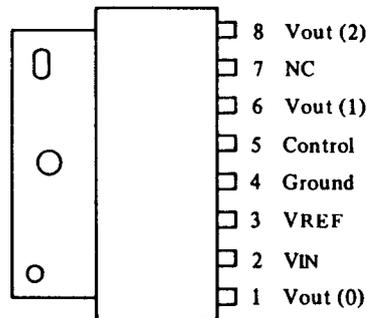
MB3756 (VOLTAGE REGULATOR W/OUTPUT-SELECTOR)

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



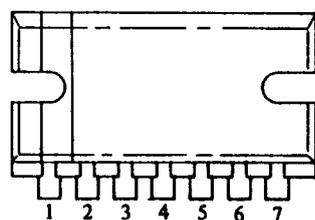
μPC1181H3 (5.8W AF POWER AMPLIFIER)

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



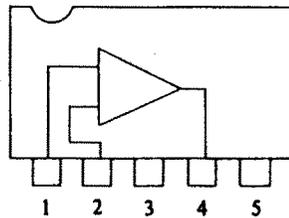
1. Input
2. Ripple filter
3. N. F. B.
4. Ground
5. Output
6. Bootstrap
7. V_{cc}

BA401 (FM/IF LIMITER)

MAXIMUM RATINGS

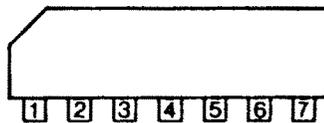
| ITEM | SYMBOL | RATING | UNIT |
|-----------------------------|------------------|------------|------|
| Power Supply Voltage | V _{cc} | 15 | V |
| Output Voltage | V _{OUT} | 24 | V |
| Input Voltage | V _{IN} | ±3 | V |
| Operation Temperature Range | TOPR | -25 ~ +75 | °C |
| Storage Temperature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

BLOCK DIAGRAM



μPC577H (FM-IF AMPLIFIER)

PIN CONNECTION

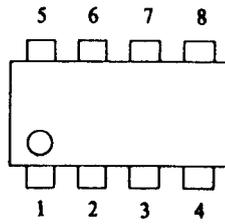


MAXIMUM RATINGS

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

NJM4558D (DUAL LOW NOISE AMP.)

PIN CONNECTION

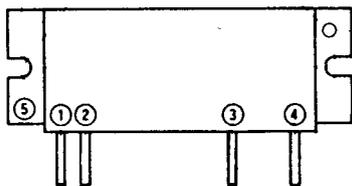


MAXIMUM RATINGS

| 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 |

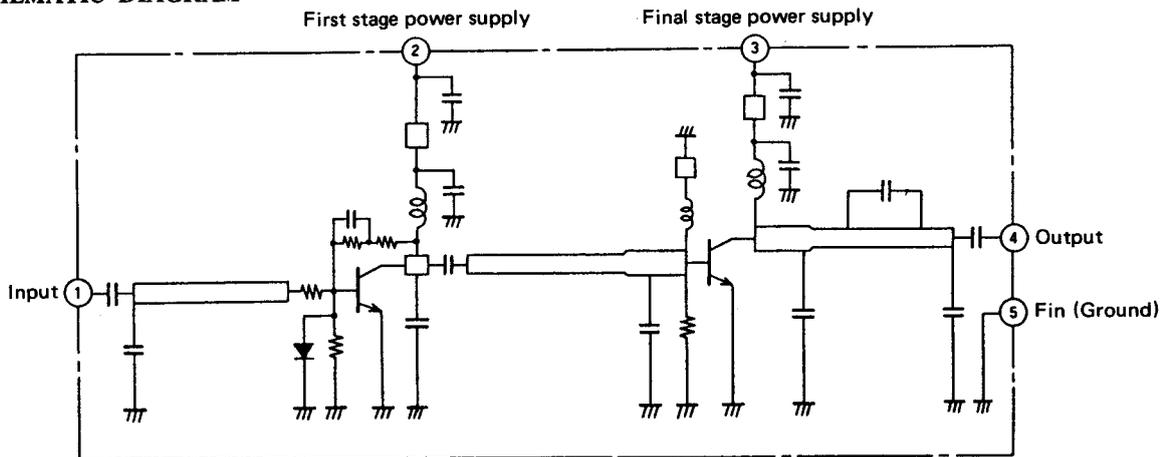
M57710-A (156 ~ 160MHz 25W FM POWER MODULE)

PIN CONNECTION



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

SCHEMATIC DIAGRAM

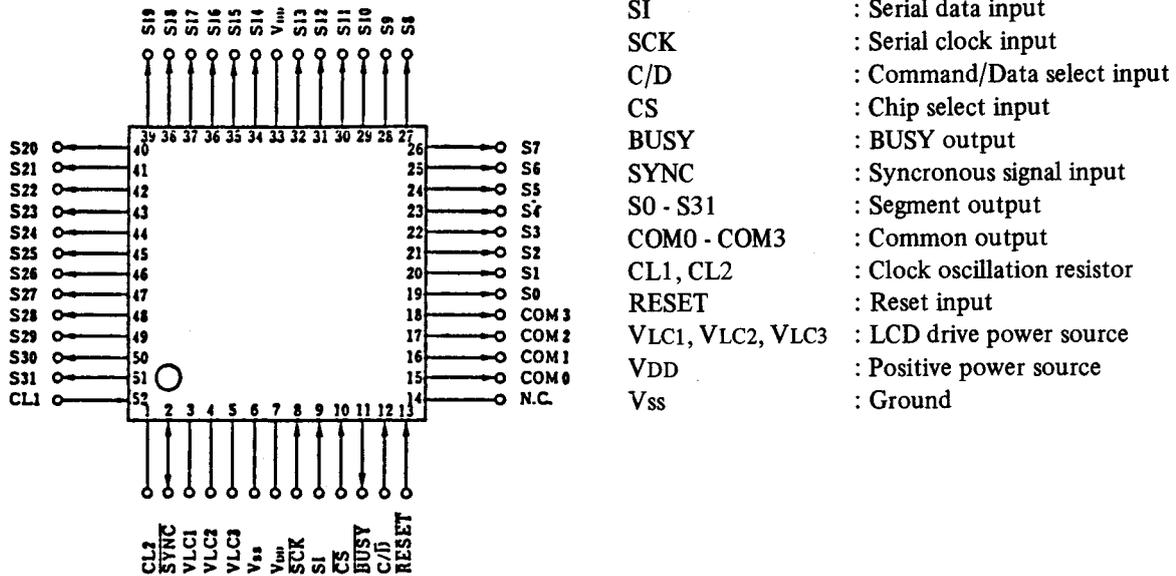


MAXIMUM RATINGS

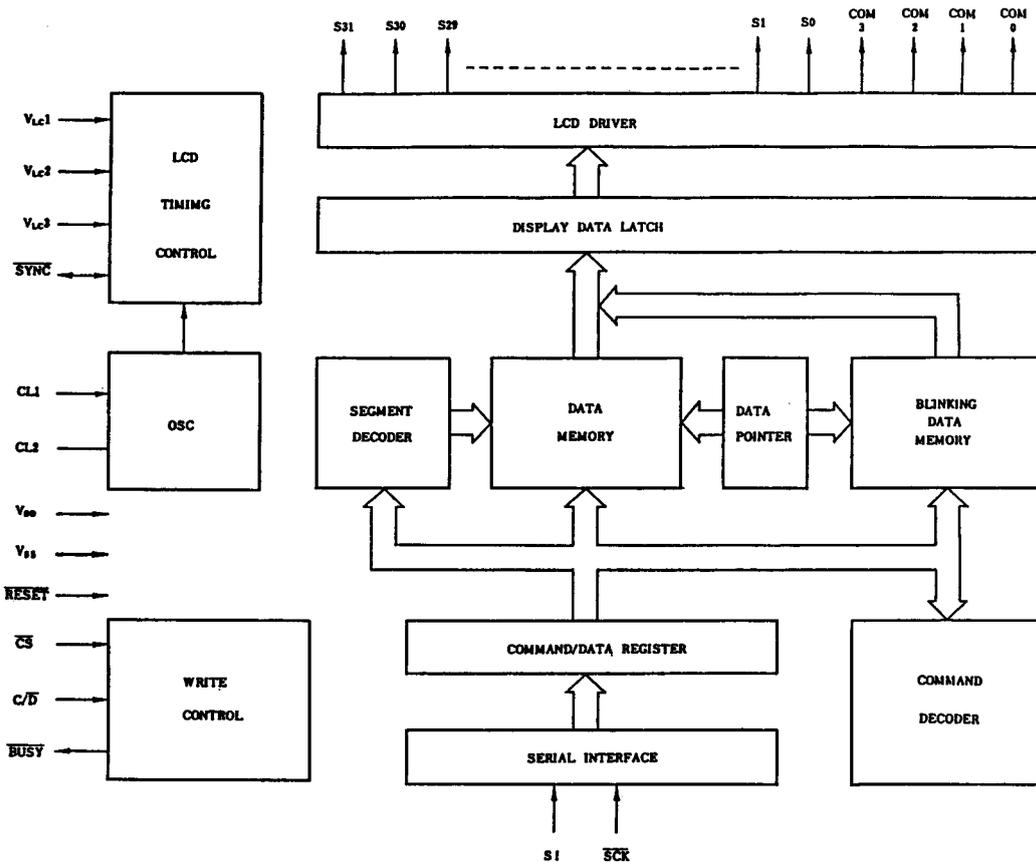
| ITEM | SYMBOL | RATING | UNIT |
|-----------------------|----------------------|------------|------|
| Power Supply Voltage | V _{cc} | 17 | V |
| Consumption Current | I _{cc} | 7 | A |
| Power Output | P _{o(max)} | 40 | W |
| Power Input | P _{in(max)} | 0.4 | W |
| Operation Temperature | T _{o(op)} | -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 |

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 | μ PC1181H |
| ICM4 | IC | MB3756 |
| ICM5 | IC | μ PC577H |
| 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-01T-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- TINAL 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 HC43U) | |
| 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 |

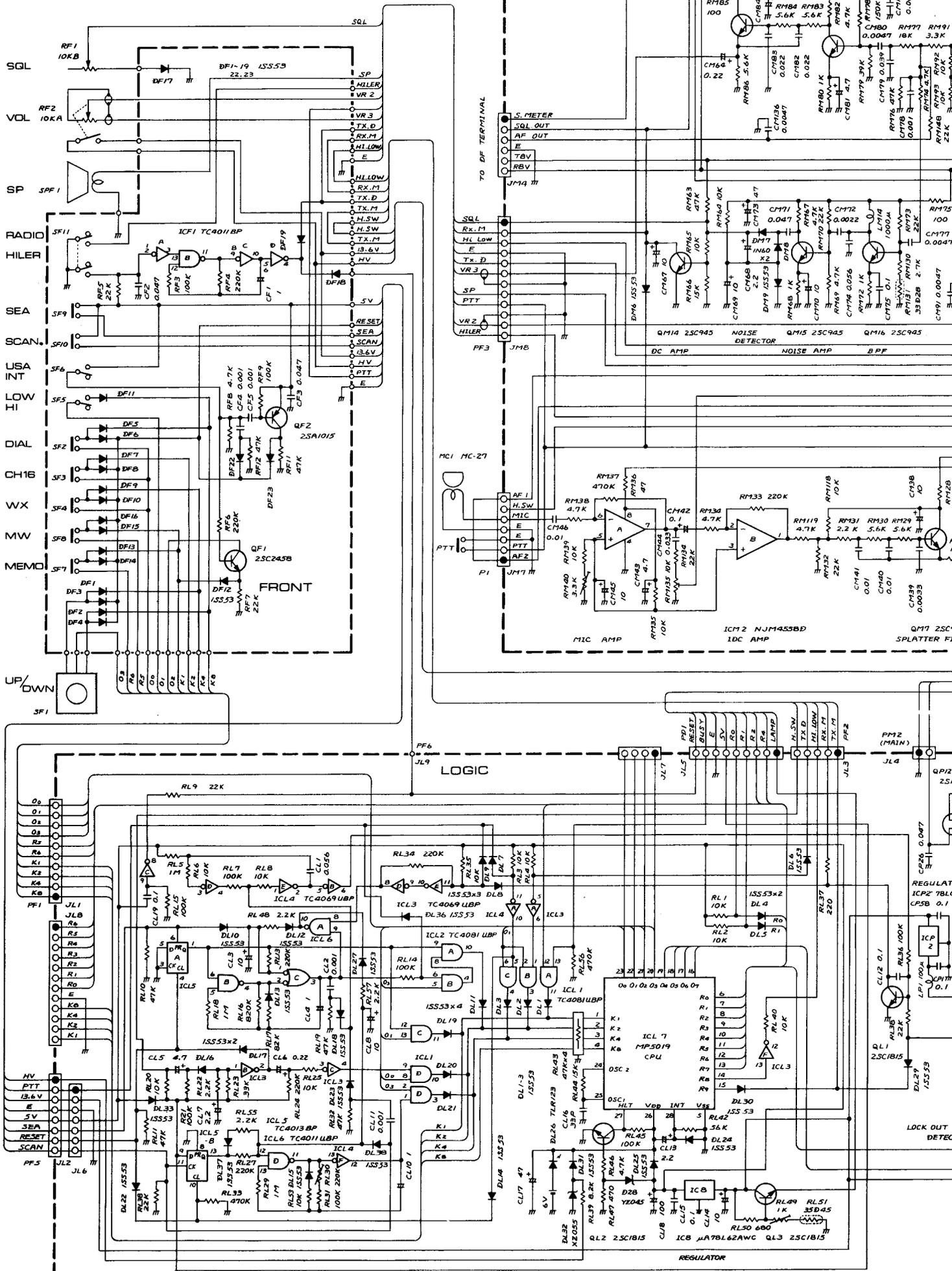
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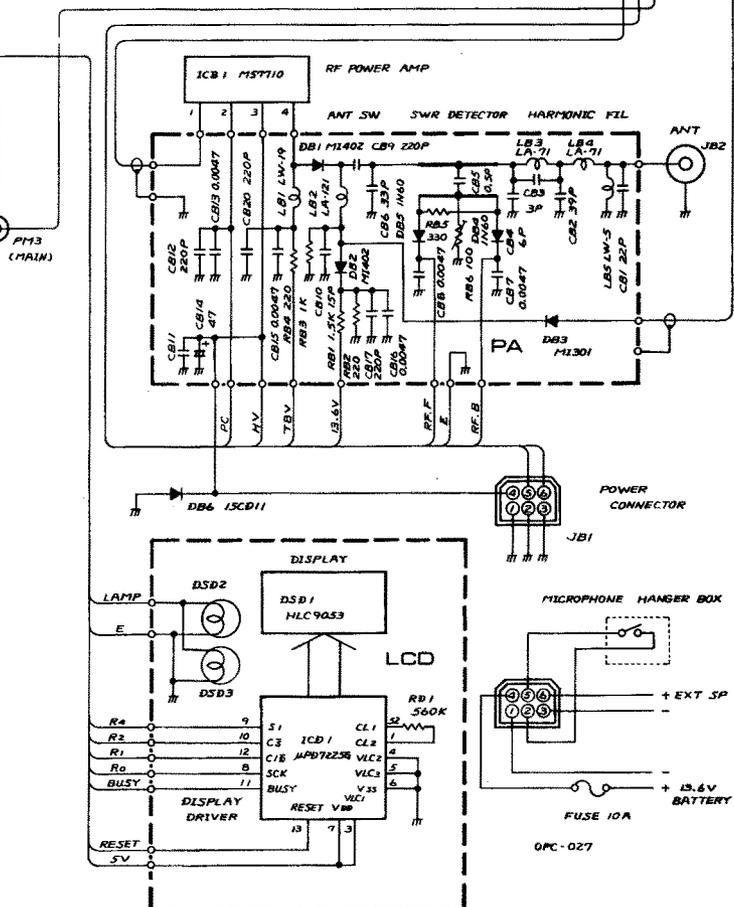
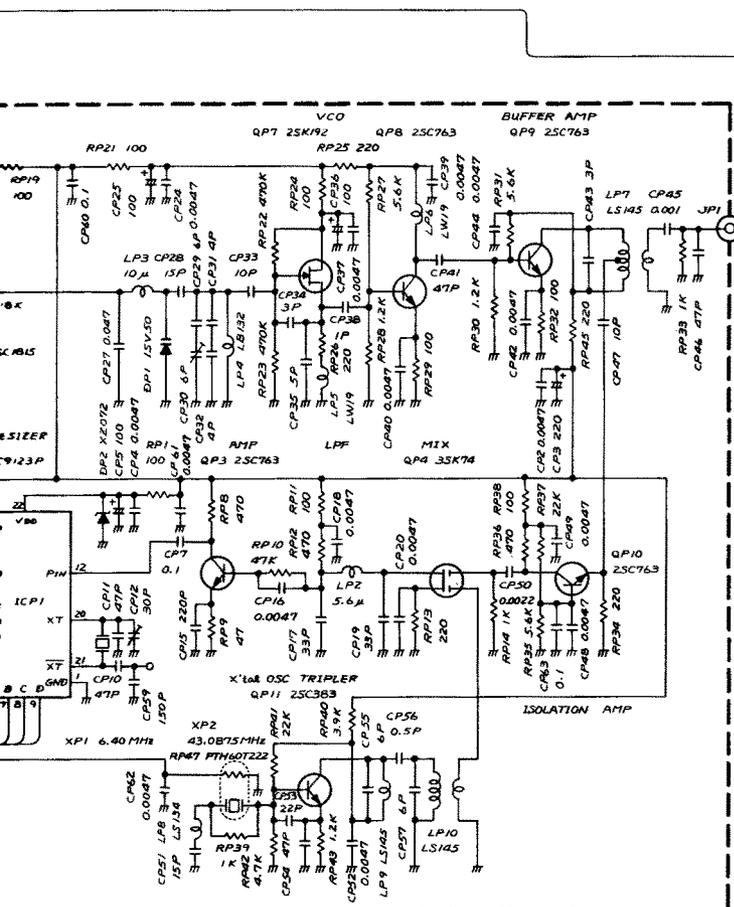
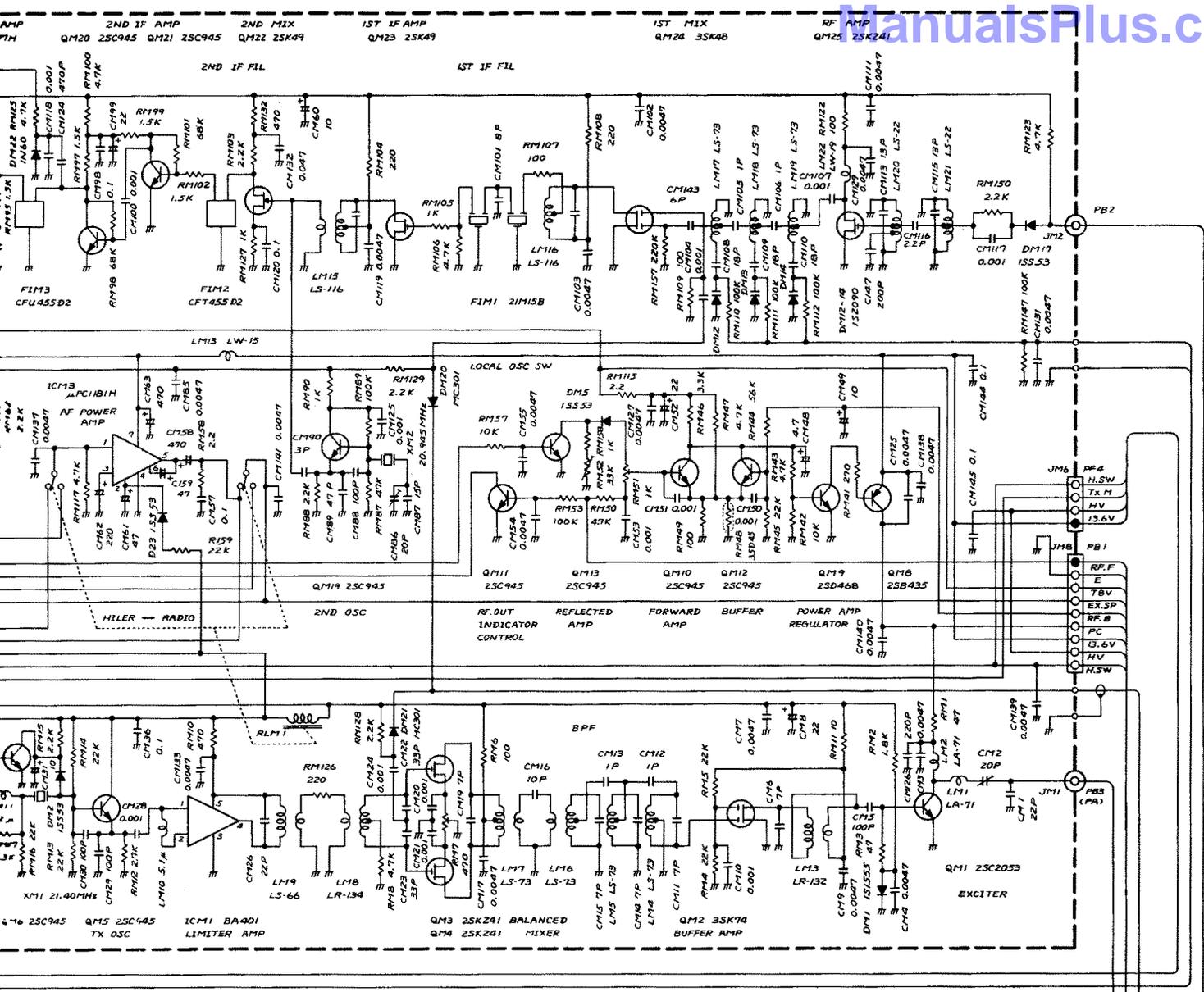
| REF. NO. | DESCRIPTION | PART NO. | |
|----------|--------------|----------------|---------|
| CB9 | Ceramic | 220P | 50V SL |
| CB10 | Ceramic | 15P | 500V SL |
| CB11 | Ceramic | 220P | 50V |
| CB12 | Ceramic | 220P | 50V SL |
| CB13 | Ceramic | 0.0047 | 50V B |
| CB14 | Electrolytic | 47 | 16V |
| 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

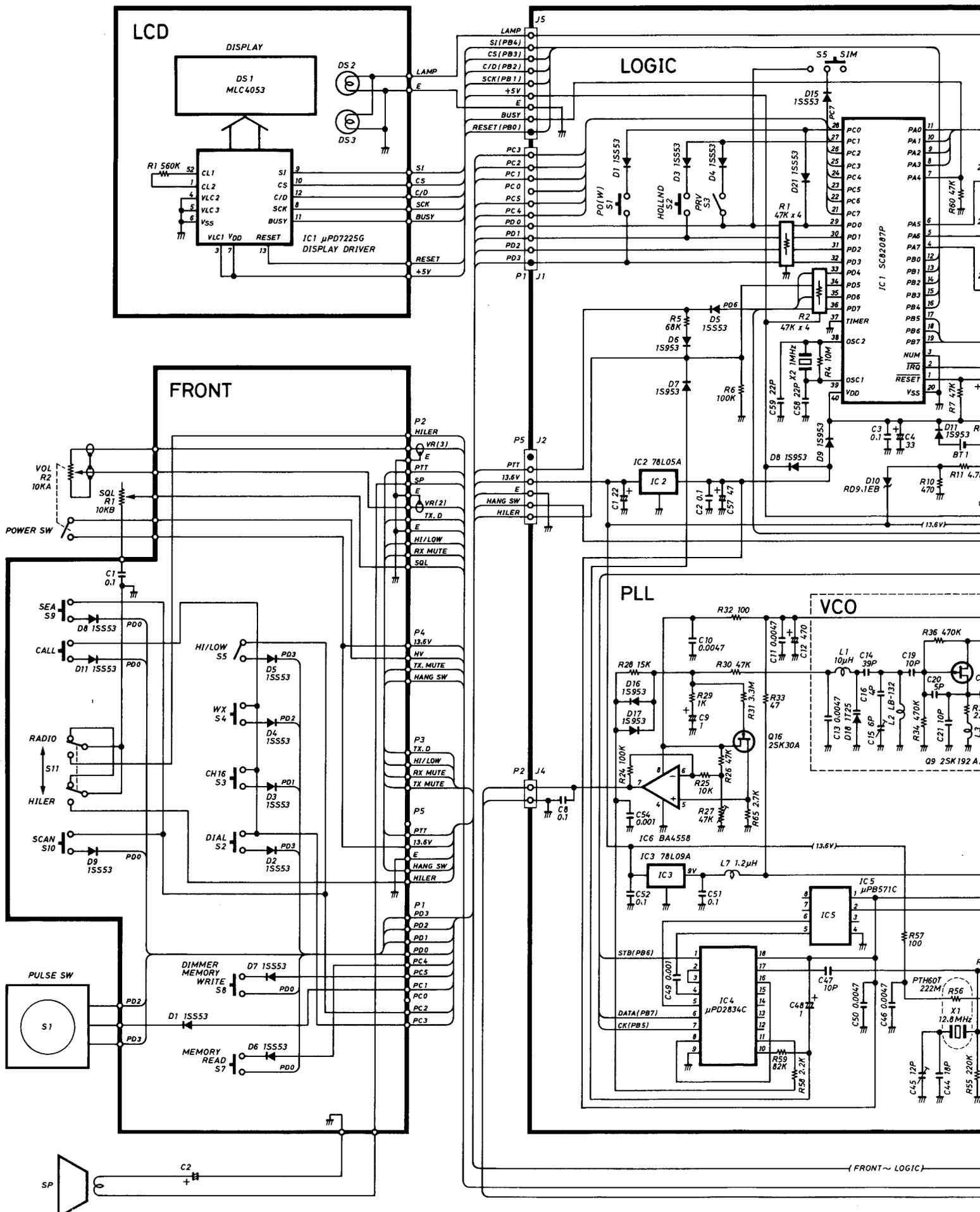
SCHEMATIC DIAGRAM





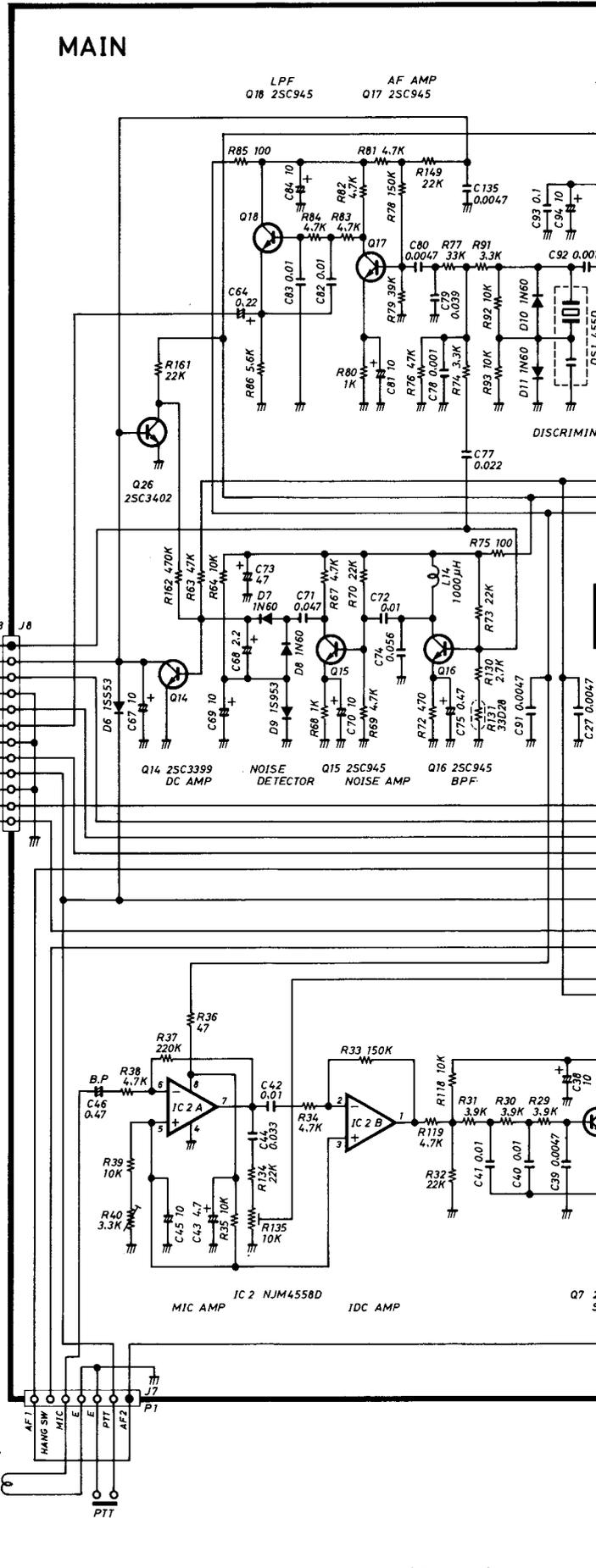
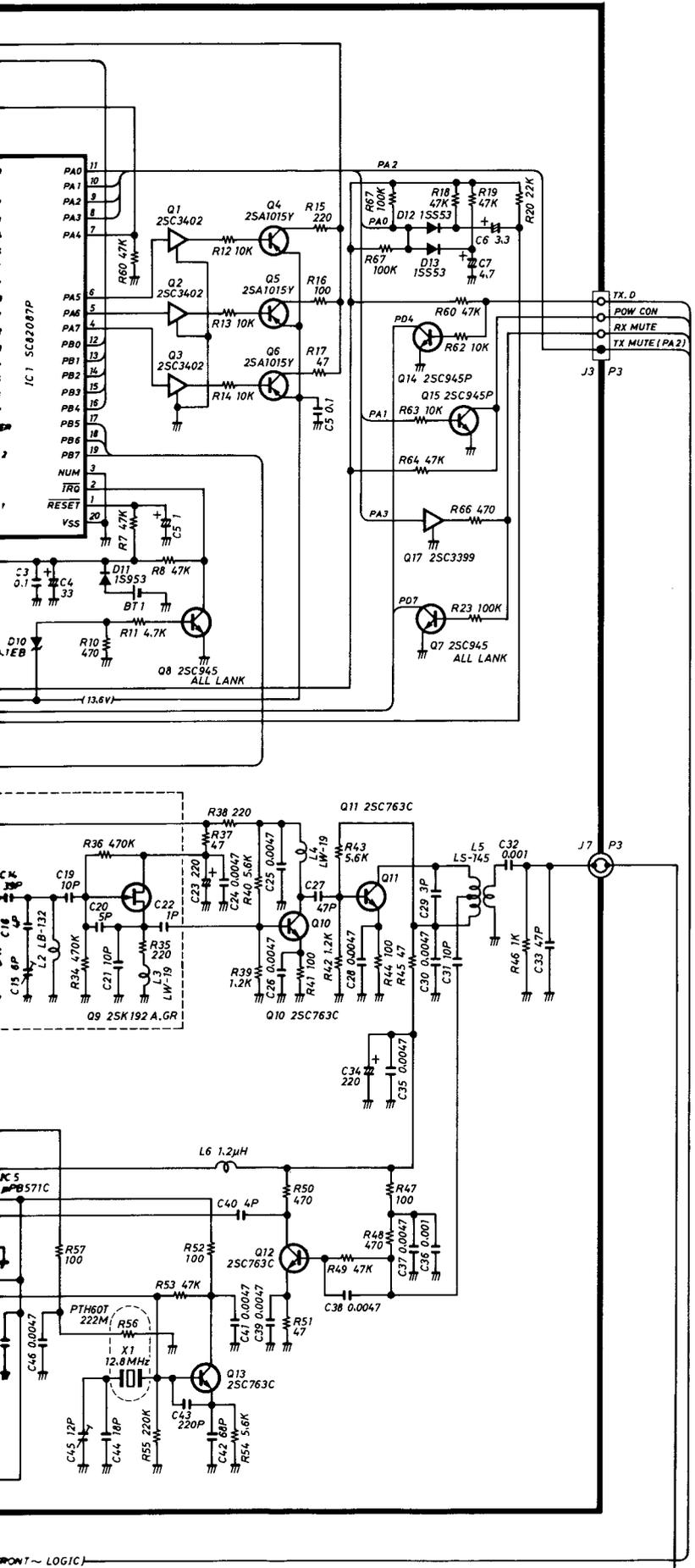
IC-M80

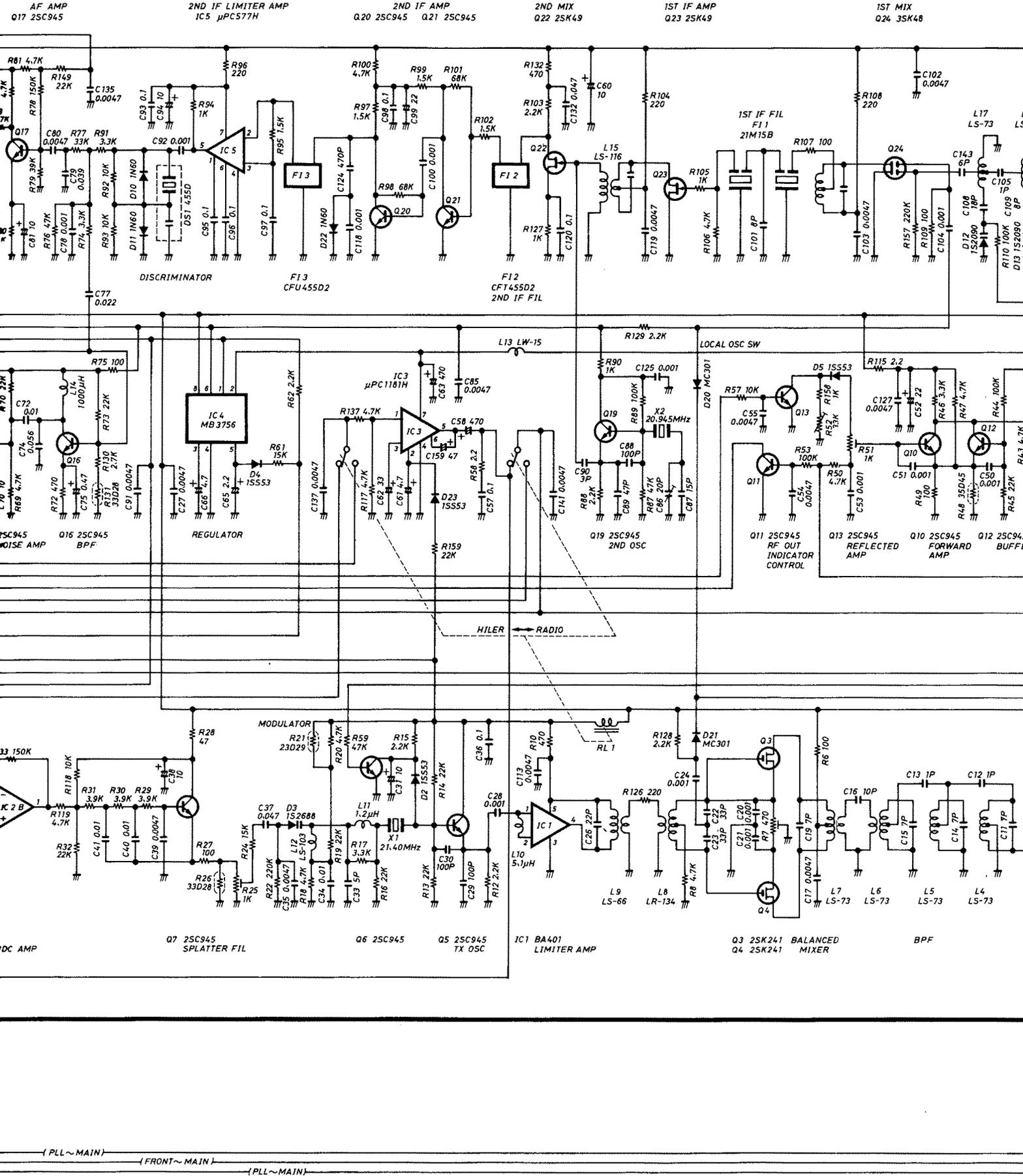
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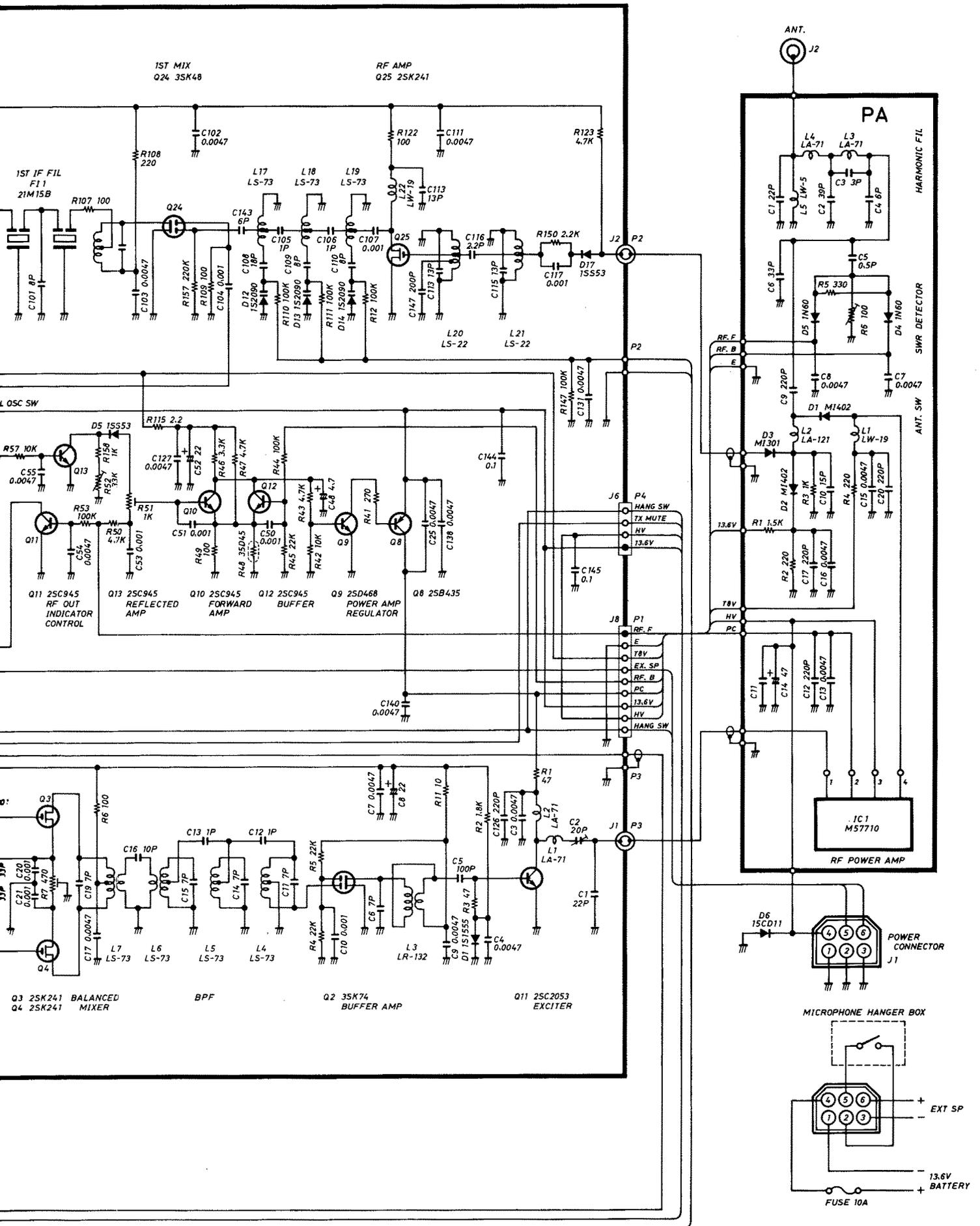


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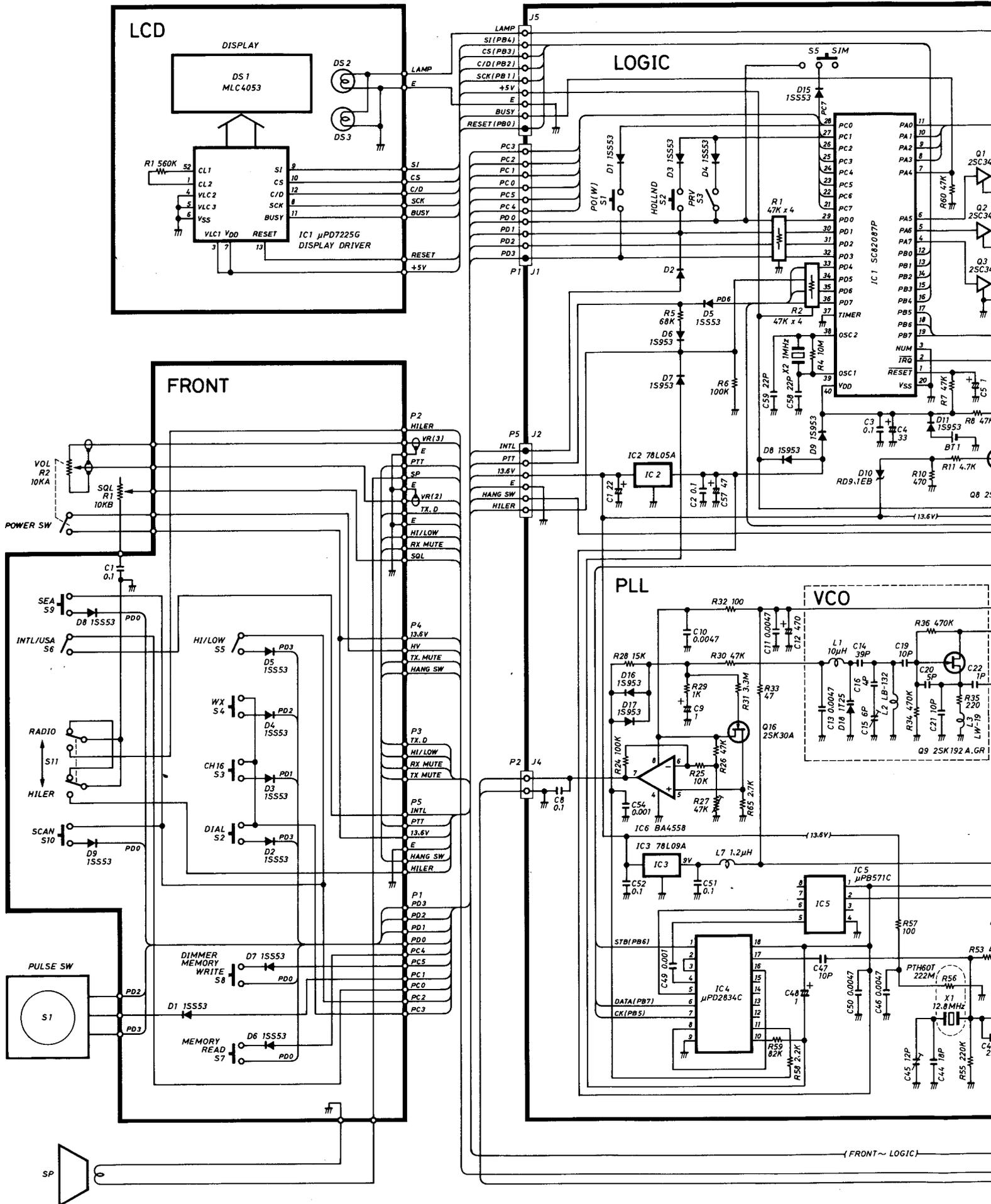
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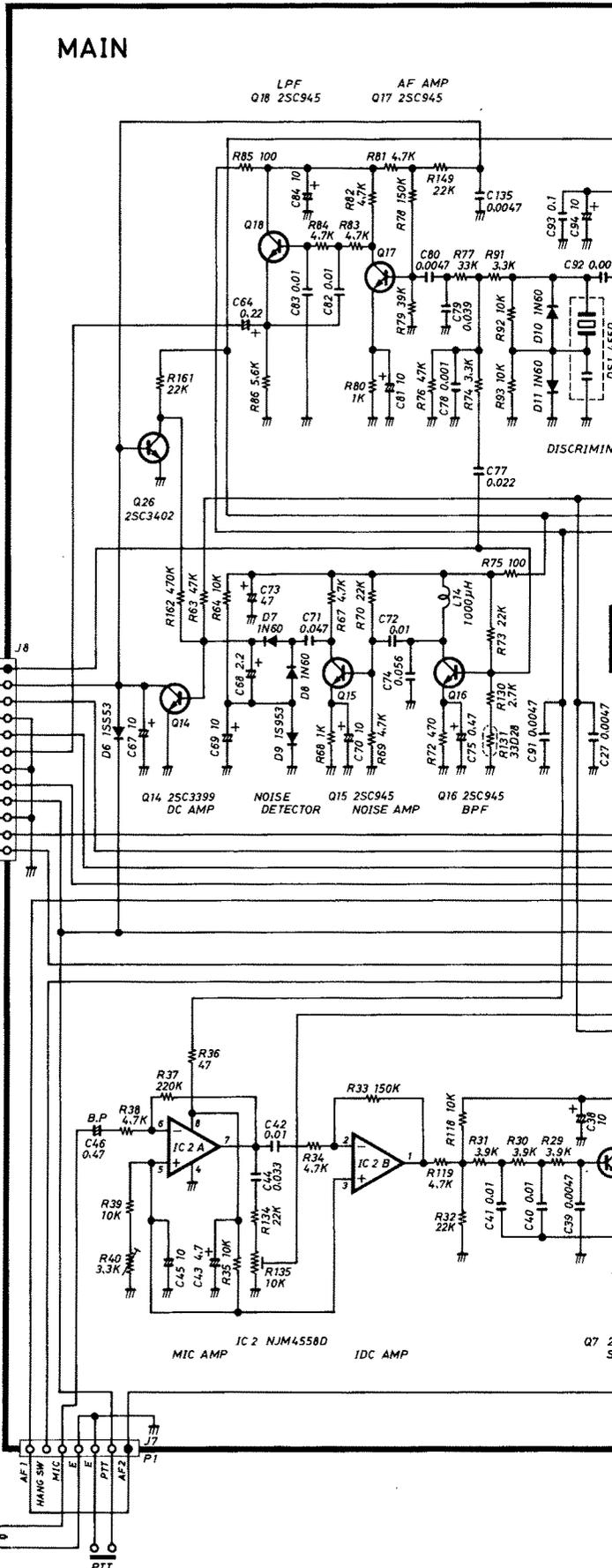
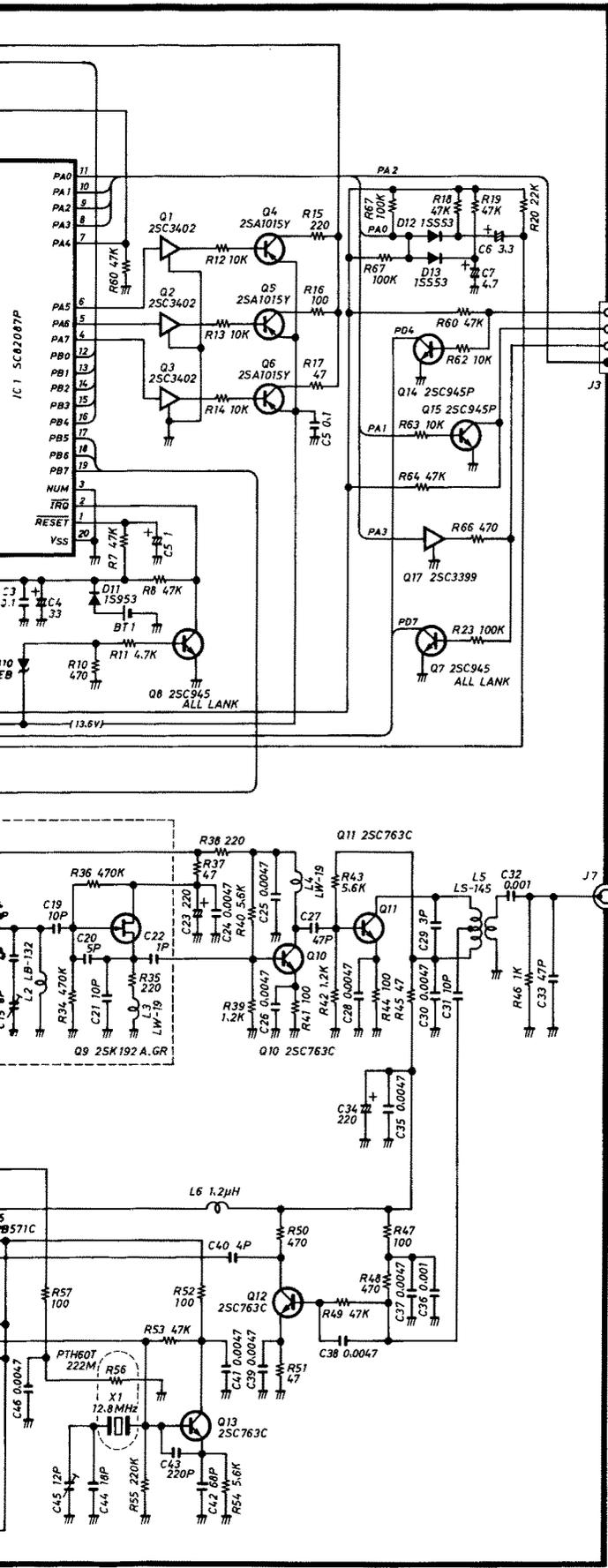


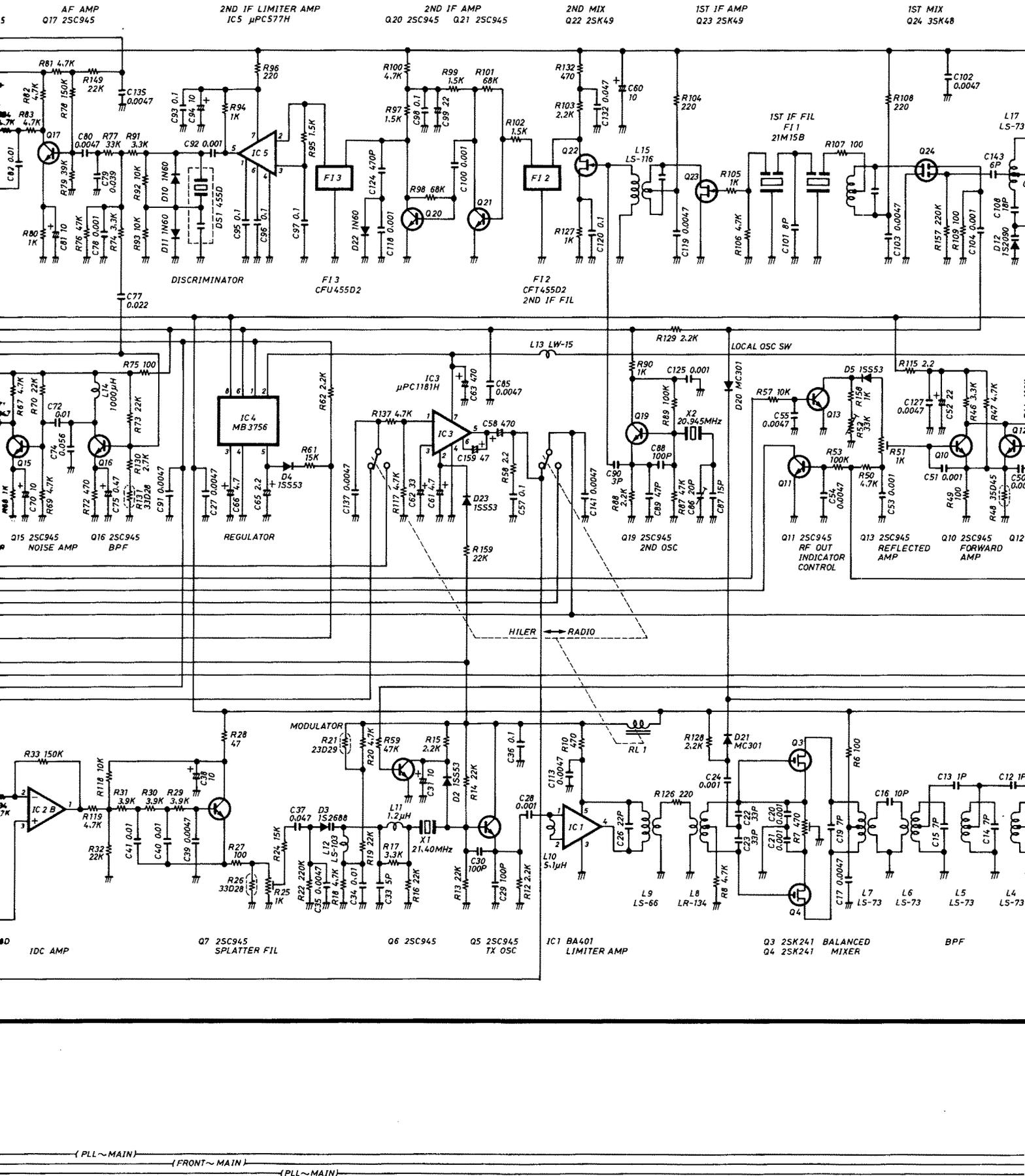


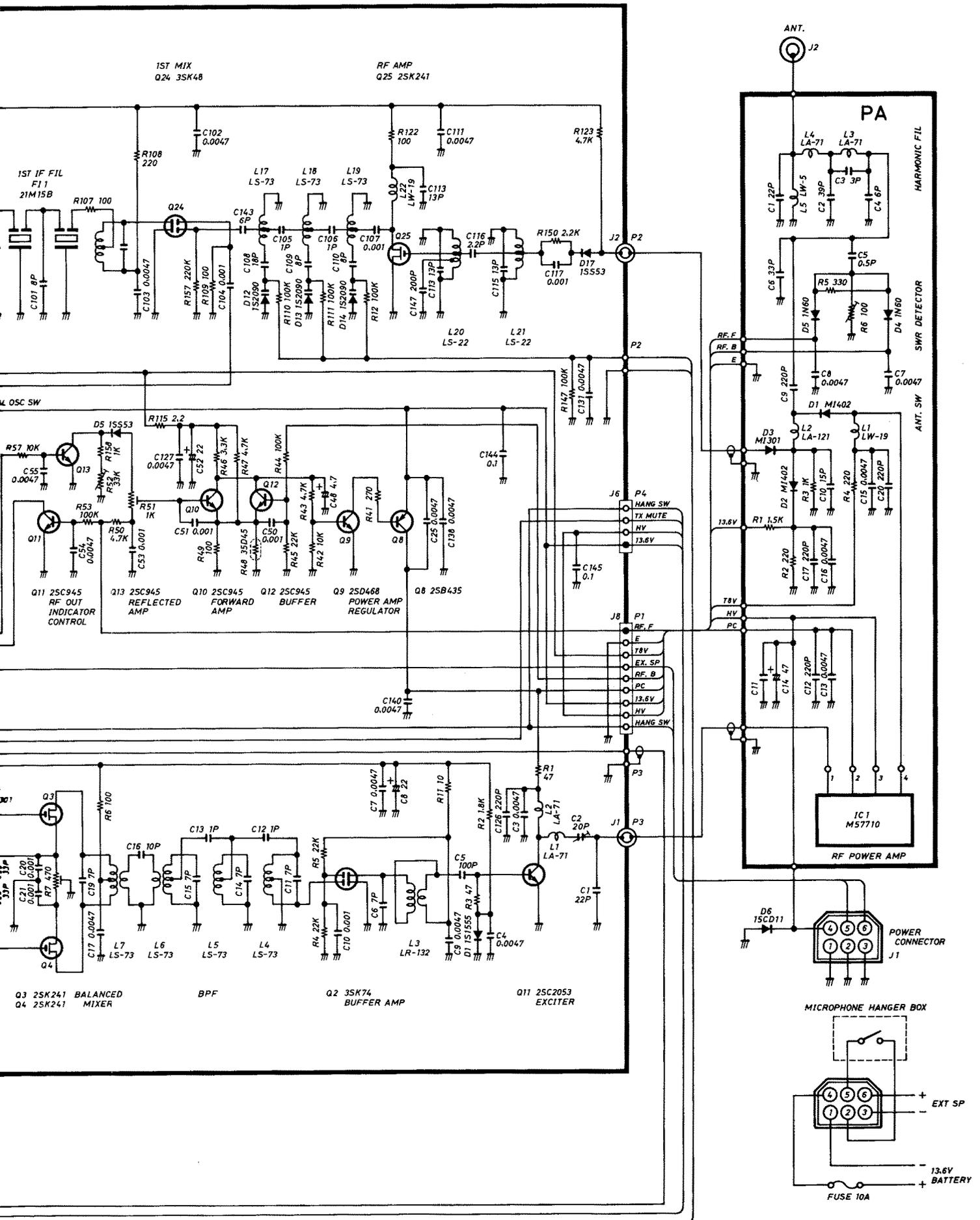
IC-M80 USA



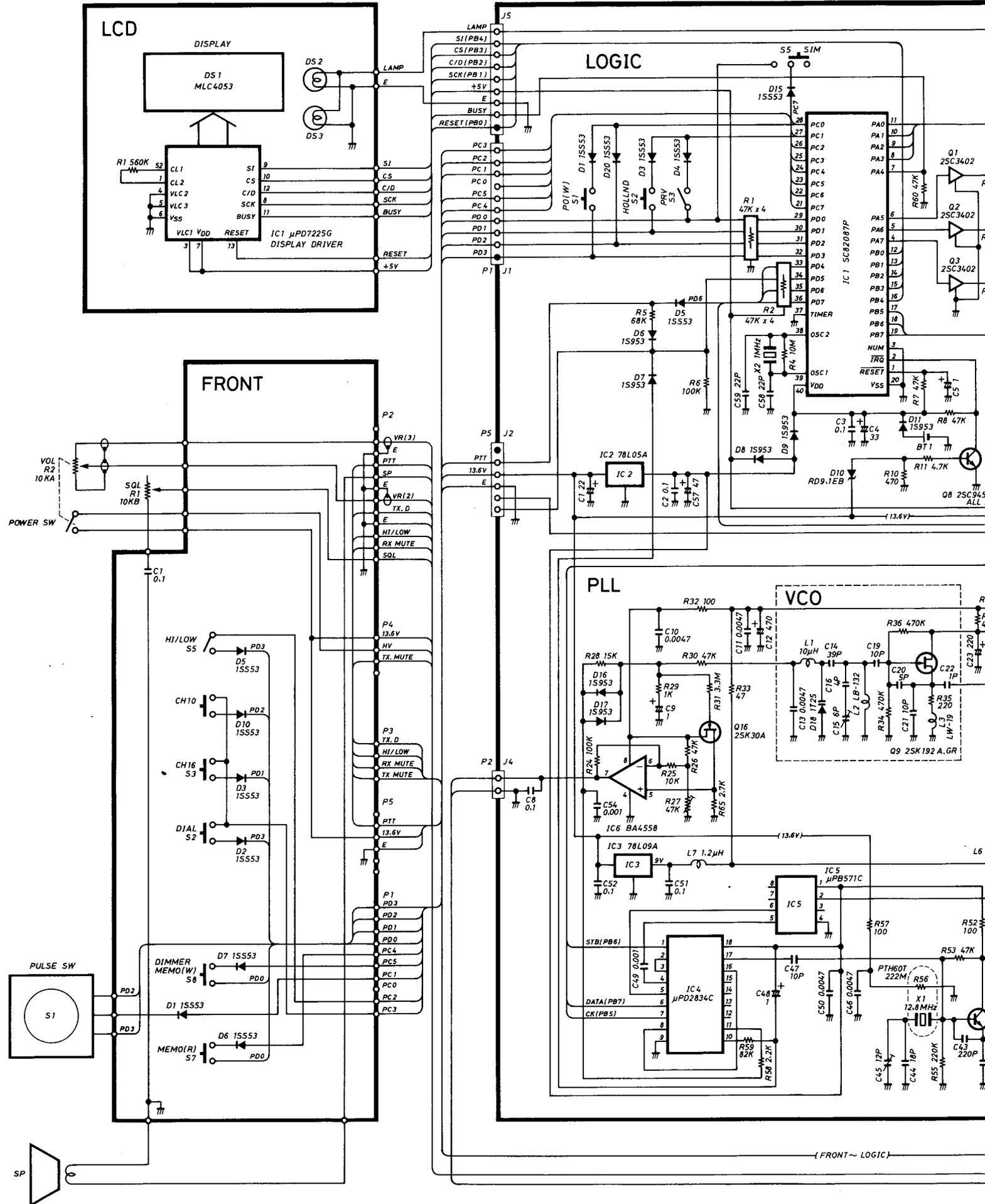
TIC DIAGRAM





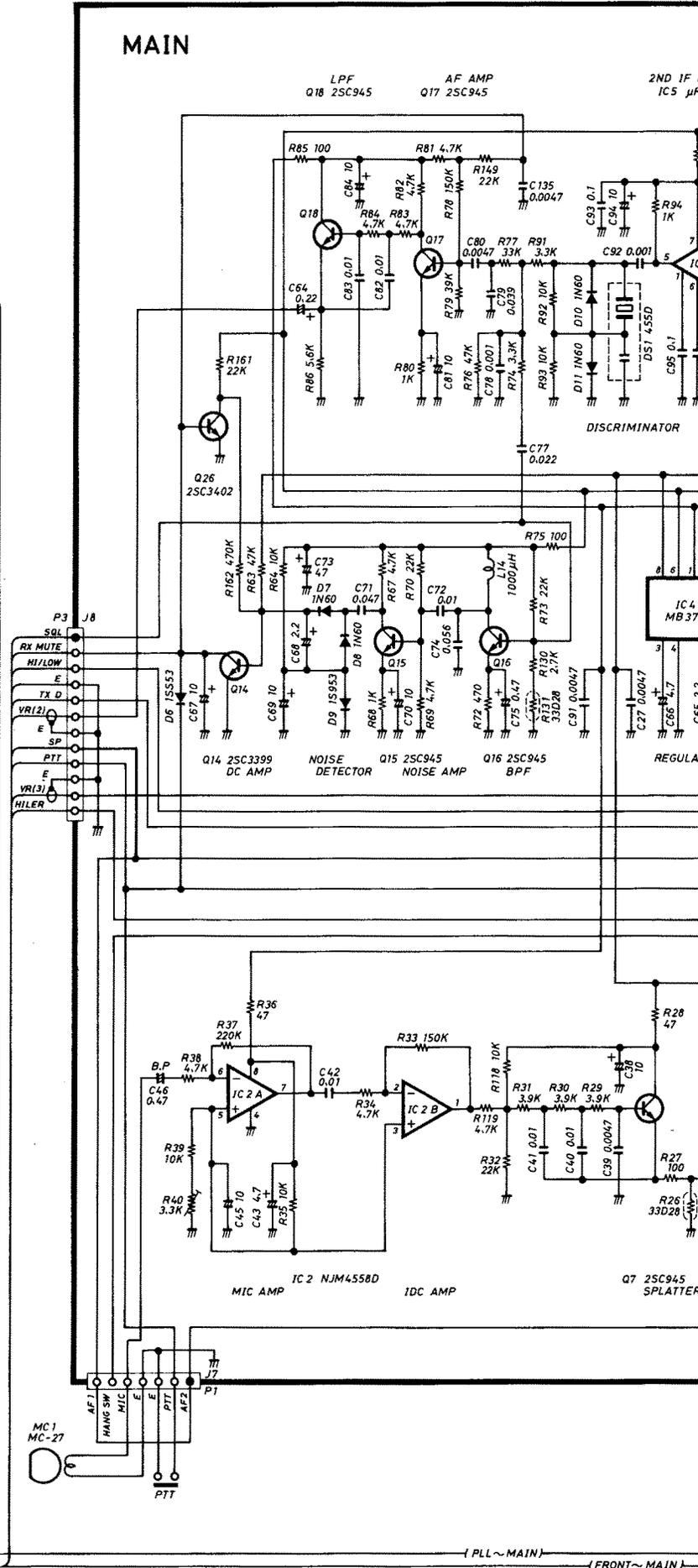
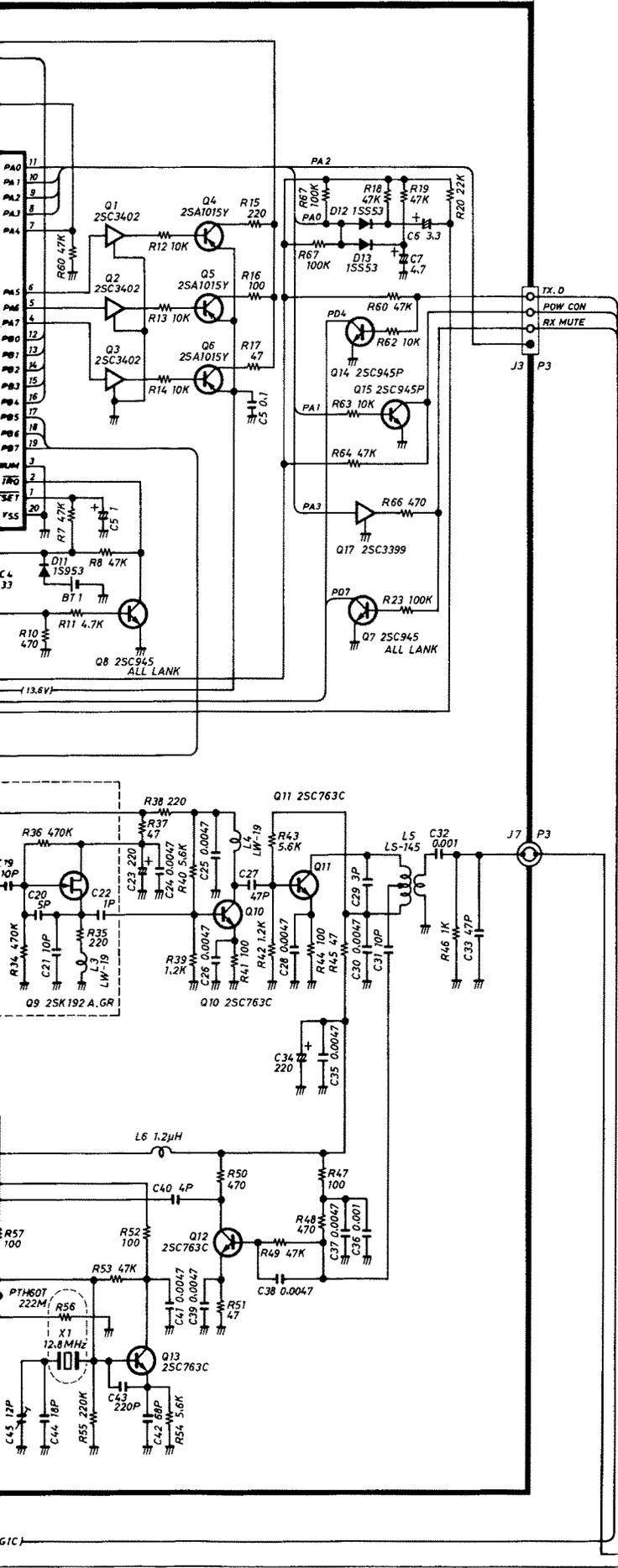


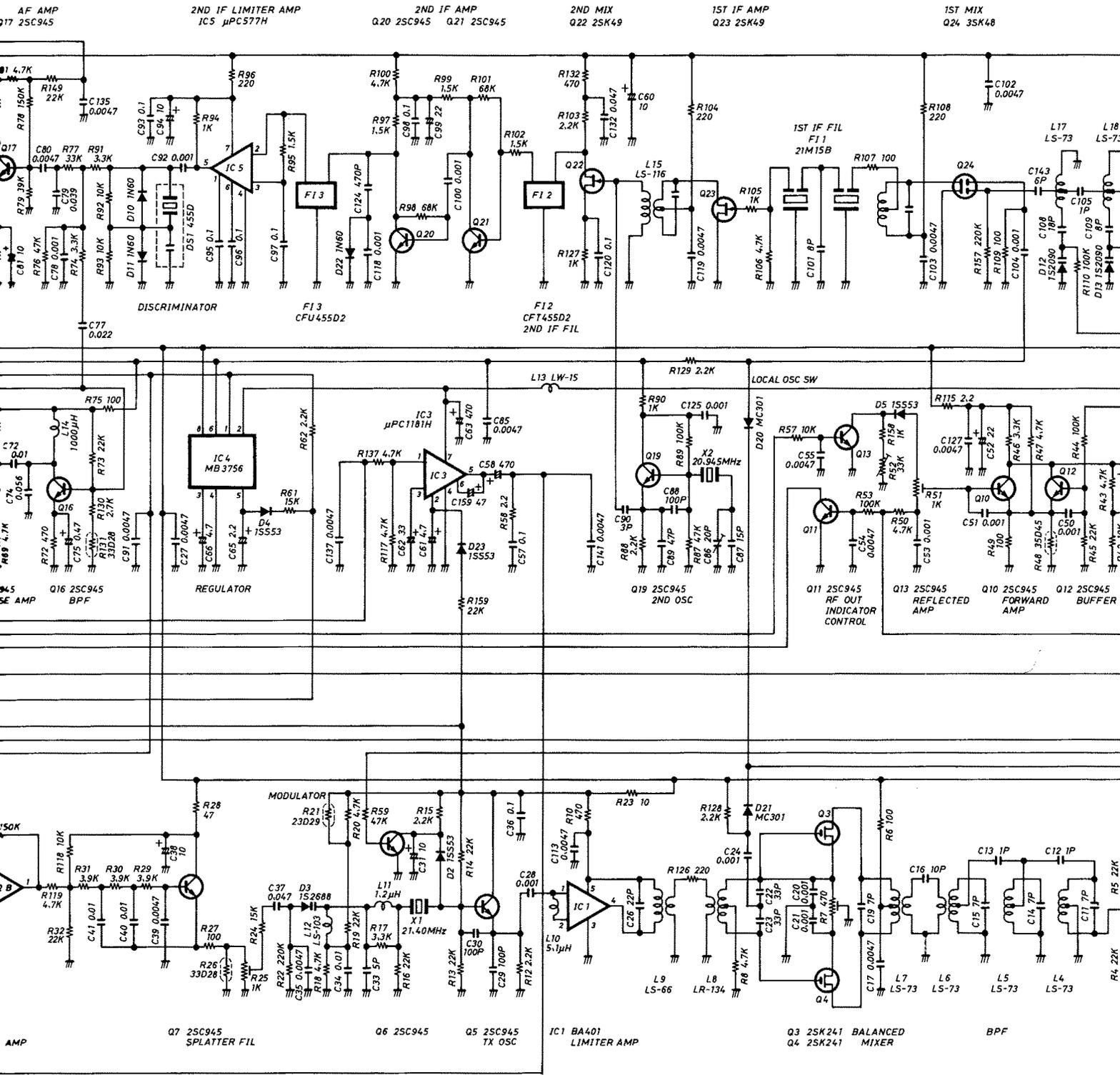
IC-M80H



(FRONT ~ LOGIC)

TIC DIAGRAM





(PLL~MAIN) (FRONT~MAIN) (PLL~MAIN)

