ICOM

ICOM AMERICA

IC-25A / H

Support package

First in Communications

91113372
91113372 25A/H SUPPORT PACKAGE
( )

UM: EA
BIN: NOBIN

TABLE OF CONTENTS

SECTION I SPECIFICATIONS

GENERAL

Numbers of semi-conductors	:	Transistor	48	
		FET	5	
		IC	21 (IC-25A : 20)	
		Diode	89 (IC-25A : 91)	
Frequency coverage	:	144.000 ~ 145.995MHz (IC-25A : 143.800 ~ 148.195MHz)		
Frequency resolution	:	5KHz/25KHz steps (IC-25A : 5KHz/15KHz steps)		
Frequency control	:	Microcomputer based 5KHz step Digital PLL synthesizer Independent Dual VFO Capability.		
Frequency stability	:	Within ±1.5KHz		
Memory channels	:	5 channels with any inband frequency programmable		
Usable conditions	:	Temperature: −10°C ~ 60°C (14°F ~ 140°F)		
		Operational time: Continuous		
Antenna impedance	:	50 ohms unbalanced		
Power supply requirement	:	13.8V DC ±15% (negative ground) 6A Max.		
Current drain (at 13.8V DC)	:	Transmitting	HIGH (25W)	Approx. 4.8A
			LOW (1W)	Approx. 1.3A
		Receiving	At max audio output	Approx. 0.6A
			Squelched	Approx. 0.4A
Dimensions	:	50mm(H) x 140mm(W) x 177mm(D)		
Weight	:	Approx. 1.5kg		

TRANSMITTER

Output power	:	25W (HIGH), 1W (LOW)
Emission mode	:	$16F_3$
Modulation system	:	Variable reactance frequency modulation
Max. frequency deviation	:	±5KHz
Spurious emission	:	More than 60dB below carrier
Microphone	:	1.3Kohm dynamic microphone with built-in preamplifier and push-to-talk switch
Operating mode	:	Simplex, Duplex (Any inband frequency separation programmable)
Tone burst	:	1750Hz ±0.1Hz (IC-25A : Not installed)

RECEIVER

Receiving system	:	Double-conversion superheterodyne
Modulation acceptance	:	$16F_3$
Intermediate frequency	:	1st: 16.9MHz 2nd: 455KHz
Sensitivity	:	More than 30dB S+N+D/N+D at 1μV Less than 0.6μV for 20dB Noise quieting
Squelch sensitivity	:	Less than 0.4μV
Spurious response rejection ratio	:	More than 60dB
Selectivity	:	More than ±7.5KHz at −6dB point Less than ±15KHz at −60dB point
Audio output power	:	More than 2.0W
Audio output impedance	:	4 ~ 8 ohms

SECTION II DESCRIPTION

144MHz FM TRANSCEIVER INCORPORATING A MICROCOMPUTER

CPU control with ICOM's original programs provide various operating capabilities. No-backlash dial controlled by ICOM's unique rotary encoder circuit. The band-edge detector and Endless System provides out-of-band protection. There are no variable capacitors or dial gear, ensuring problem-free use. The IC-25A/E can accomodate FM, coverage in the 144 ~ 146MHz (IC-25A: 143.8 ~ 148.2MHz) frequency range.

MULTI-PURPOSE SCANNING

The Memory Scan allows you to monitor five different memory channels and two VFO frequencies, and the Program Scan provides scanning between two programmed frequencies. The scanning speed is adjustable, and the auto-stop terminates scanning when a signal is received or a channel is empty.

DUAL VFO'S

Two separate VFO's can be used independently either for simplex operation or for duplex operation, and any desired frequency can be split in duplex operation.

CONTINUOUS TUNING SYSTEM

ICOM's new continuous tuning system features an LED display that follows the tuning knob movement and provides an extremely accurate readout. Frequencies are displayed in 4 LED digits representing 5KHz digits.

Automatic recycling restarts tuning at the top of the band, i.e., at 145.995MHz when the dial goes below 144.000MHz. Recycling changes 145.995MHz to 144.000MHz as well. Quick tuning in 25KHz steps (IC-25A : 15KHz) is available with VFO "B", and is also provided for trouble free QSO (IC-25A : 145.995MHz and 144.000MHz should be read 148.195MHz and 143.800MHz.)

OUTSTANDING PERFORMANCE

The RF amplifier using a MOS FET and the first mixer using a double balanced mixer, and other circuits provide excellent cross modulation and two-signal selectivity characteristics. The IC-25A/E has excellent sensitivity demanded especially for mobile operation, high stability, and with a pair of high quality monolithic crystal filters and ceramic filters facilitates very stable receiving and excellent durability.

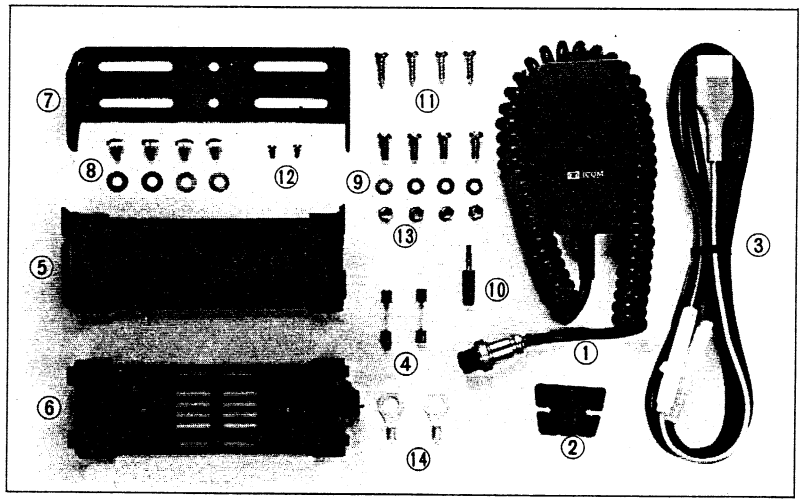
The transmitter uses the double balanced mixer (the same one for receiver) in a single conversion system, a band-pass filter and a high-performance low-pass filter. This system provides distortion-free signals with a minimum spurious radiation level.

The IC-25A/E has everything you need to truely enjoy VHF FM operation, in an extremely compact, rugged transceiver, designed to ensure high quality, long term use.

SECTION III INSTALLATION

UNPACKING

Carefully remove your transceiver from the packing carton and examine it for signs of shipping damage. Should any be apparent, notify the delivering carrier or dealer immediately, stating the full extent of the damage. It is recommended you keep the shipping cartons. In the event storage, moving, or reshipment becomes necessary, they come in handy. Accessory hardware, cables, etc., are packed with the transceiver. Make sure you have not overlooked anything.



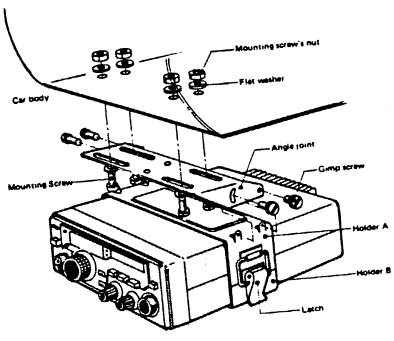
1. Microphone (dynamic type IC-HM7). . 1
2. Microphone hook 1
3. Power cord. 1
4. Spare fuses (10A) 2
5. Installing holder A. 1
6. Installing holder B 1
7. Installing angle joint. 1
8. Gimp screws. 4
9. Flat washers 12
10. Plug for speaker 1
11. Mounting screws 8
12. Screws for additional bracket. 2
13. Mounting screw's nuts 4
14. Battery terminal lugs 2

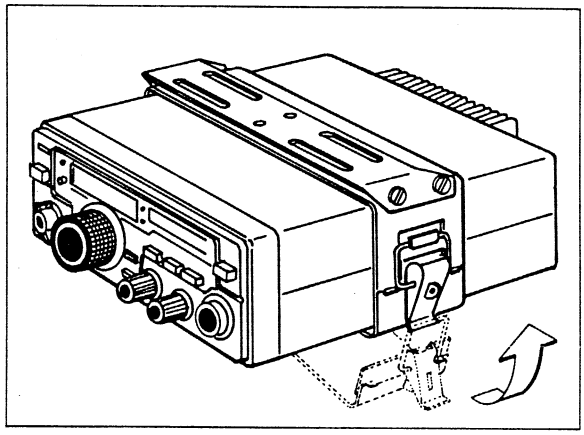
Note: Some version supplies IC-HM8 (dual tone encoder mic) instead of IC-HM7.

LOCATION

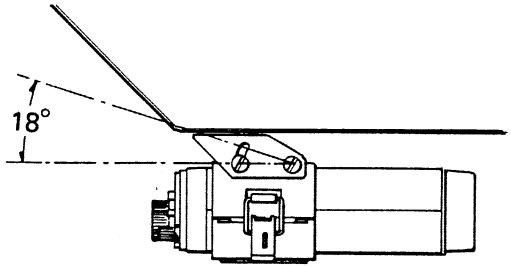
Where you place the transceiver in your automobile is not critical and should be governed by convenience and accessibility. Since the unit is so compact, many mobile possibilities present themselves. In general, the mobile mounting bracket will provide you with some guide as to placement. Any place where it can be mounted with metal screws, bolts, or pop-rivets will work. For fixed station use, a power supply should be designed to produce 6 amps for the transceiver.

Mounting bracket installation

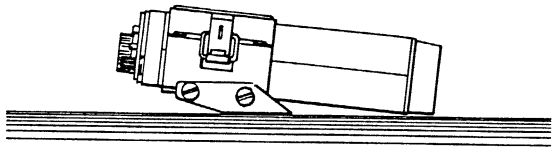




Angle adjustment



Optional installation

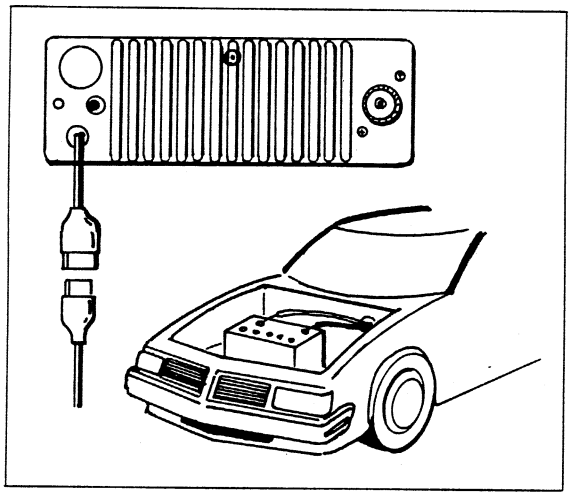


POWER REQUIREMENTS

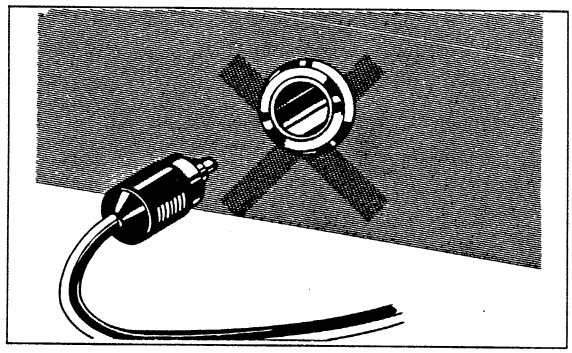
The transceiver is supplied ready to operate from any regulated 13.8V DC, 6 ampere negative ground source. An automobile 12 volt, negative ground, system is usually more than adequate. Some note must be taken, however, of the condition of the vehicle's electrical system. Items such as low battery, worn generator/alternator, poor voltage regulator, etc., will impair operation of your transceiver as well as the vehicle. High noise generation or low voltage delivery can be traced to these deficiencies. If an AC power supply is used with your transceiver, make certain it is adequately regulated for both voltage and current. Low voltage while under load will not produce satisfactory results from your transceiver. Receiver gain and transmitter output will be greatly impaired. Caution against catastrophic failure of the power supply should be observed.

CAUTION: Excessive Voltage (above 15VDC) will cause damage to your transceiver. Be sure to check source voltage before plugging in the power cord.

Included with your transceiver is a DC power cable with plug attached. The Red Wire is positive (+), the Black, negative (–). If your mobile installation permits, it is best to connect these directly to the battery terminals. This arrangement eliminates random noise and transient spikes sometimes found springing from automotive accessory wiring. If such an arrangement is not possible, then any convenient B+ lead in the interior of the vehicle and the negative frame can be utilized. Remember, the unit operates on a negative ground system only; it cannot be used in a positive ground automobile. After making your connections, simply insert the plug into your transceiver.



Do not use a cigarette lighter socket.



ANTENNA

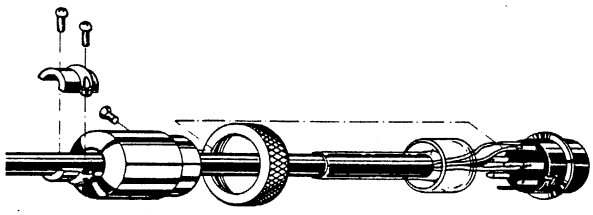
The most important single item that will influence the performance of any communication system is the antenna. For that reason, a good, high-quality, gain antenna of 50 ohms impedance is recommended, fixed or mobile. In VHF as well as the low bands, every watt of ERP makes some difference. Therefore, 25 watts average output plus 3dB of gain antenna equals 50 watts ERP, presuming low VSWR of course. The few extra dollars invested in a gain type antenna is well worth it. When adjusting your antenna, whether mobile or fixed, by all means follow the manufacturer's instructions. There are some pitfalls to be aware of. For example, do not attempt to adjust an antenna for lowest VSWR when using a diode VSWR meter not engineered for VHF applications. Such readings will invariably have an error of 40% or more. Instead, use an in line watt meter similar to the Drake WV-4, Bird Model 43 or Sierra Model 164B with VHF cartridge. Further, when adjusting a mobile antenna, do so with the motor running preferably above normal idling speed. This will insure proper voltage level to the transceiver.

The RF coaxial connector on the rear panel mates with a standard PL-259 connector. Some models may have metric threads. In any event, the RF connector will mate with almost any PL-259 connector if care is taken to seat them properly.

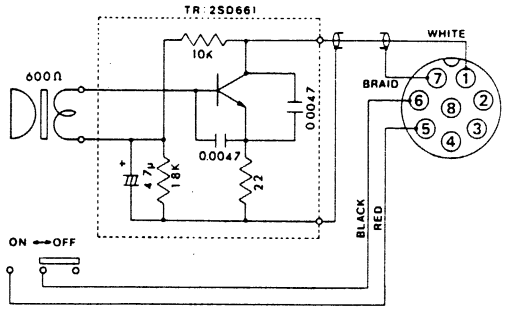
MICROPHONE

A high quality dynamic microphone with built-in preamplifier is supplied with your transceiver. Merely plug it into the proper receptacle on the front panel. Should you wish to use a different microphone, make certain it has a proper preamplifier. Particular care should be excercised in wiring also, as the internal electric switching system is dependent upon it. See the schematic for the proper hook up.

Microphone plug exploded view



Microphone connection

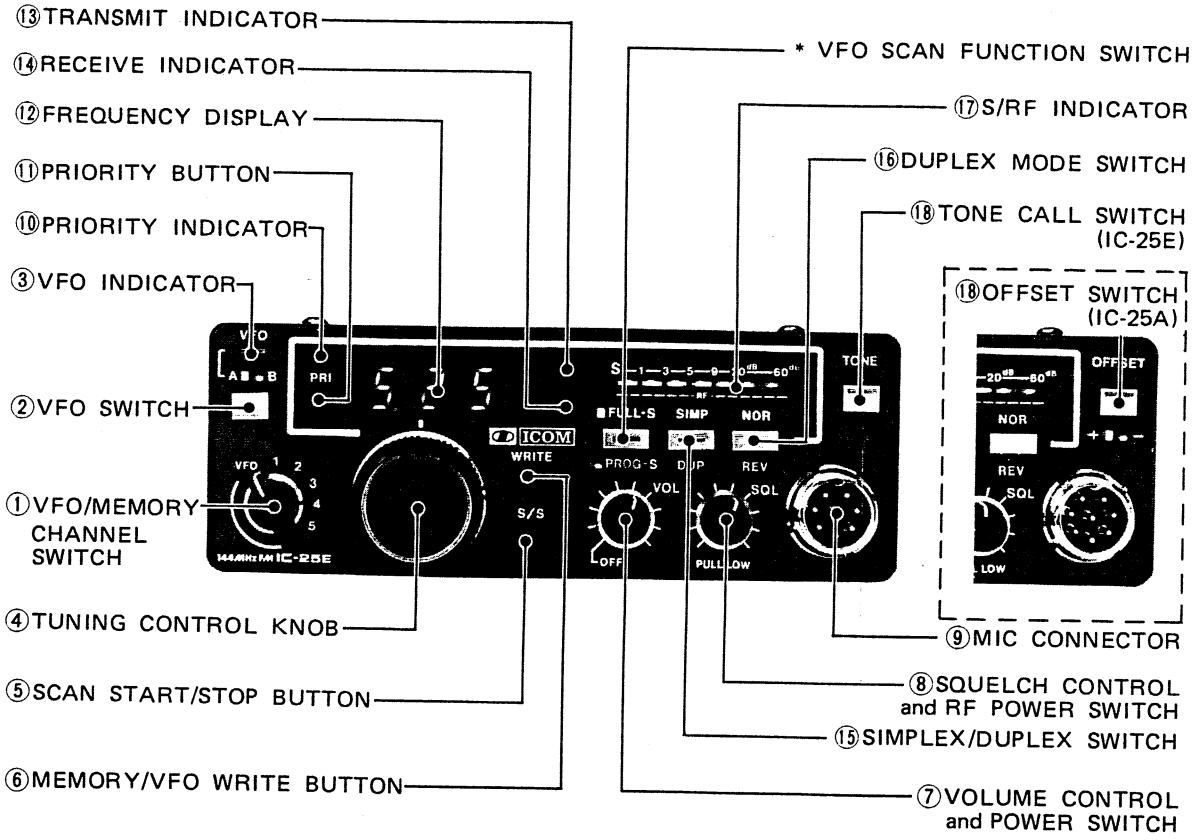


EXTERNAL SPEAKER

An external speaker jack and plug is supplied with your unit in the event another speaker is desirable. The external speaker impedance should be 4 ~ 8 ohms, and when used, will disable the internal speaker. A 4 ~ 16 ohm headset can be utilized as well.

SECTION IV CONTROL FUNCTIONS

FRONT PANEL



1. **VFO/MEMORY CHANNEL SWITCH**
   Selects operation with the tuning control ("VFO" position) or operation with the memory channels (1 ~ 5). See "PROGRAMMING THE MEMORY CHANNELS" on page 13 for more details.

2. **VFO SWITCH**
   Selects either VFO, "A" or "B", for tuning. In the "A" position, the VFO indicator is lit and the frequency changes 5KHz steps by turning the tuning control knob. In addition, this frequency can be memorized into any memory channel. In the "B" position, the frequency changes 25KHz steps (IC-25A : 15KHz steps) by turning the tuning control knob.

3. **VFO INDICATOR**
   When the VFO A is selected, this indicator illuminates.

4. **TUNING CONTROL KNOB**
   Rotating the TUNING CONTROL KNOB clockwise increases the frequency, while rotating it counterclockwise decreases the frequency. The frequency is changed in 5KHz steps with the VFO "A", and 25KHz steps (IC-25A : 15KHz steps) with the VFO "B", when tuning up past 145.995MHz (IC-25A : 148.195MHz), the frequency will automatically revert to 144.000MHz (IC-25A : 143.800MHz). Likewise, when tuning down past 144.000MHz (143.800MHz), the frequency will automatically revert to 145.995MHz (148.195MHz).

5. **SCAN START/STOP BUTTON**
Starts and stops any of the scan functions. When depressing it again to restart the scan, it will start from the stopped memory channel or frequency.

6. **MEMORY/VFO WRITE BUTTON**
By pushing this button, VFO A's frequency is written into a memory channel, or one VFO's frequency is transfered to the other VFO.

7. **VOLUME CONTROL and POWER SWITCH**
When the control is turned completely counterclockwise, the power is OFF. By turning the control clockwise beyond the "click", the unit is turned ON and the audio level increases by further rotating it clockwise.

8. **SQUELCH CONTROL and RF POWER SWITCH**
Turning this control clockwise sets the squelch threshold higher. To turn OFF the squelch function, turn this control completely counterclockwise.
By pulling the Squelch control knob, the RF output power is reduced to 1 watt. By depressing the knob to the normal position, the RF output power returns to 25 watts.

9. **MIC CONNECTOR**
Connect the supplied microphone to this jack. If you wish to use a different microphone, refer to the drawing on page 5.

10. **PRIORITY INDICATOR**
Illuminates when the priority function is turned ON.

11. **PRIORITY BUTTON**
Turns the priority function ON and OFF.
During a QSO or receiving with VFO, if you would like to watch your favorite channel or a calling channel, that is busy or empty, set the memory channel switch to the favorite or calling channel which is memorized in a memory channel, and push the priority button, and the receiving frequency will go to the channel a moment at every five seconds.

12. **FREQUENCY DISPLAY**
The three large 7 segment LED's represent the digits between 1MHz and 10KHz and an LED for 5KHz of the operating frequency. The frequency indicated is the carrier frequency.

13. **TRANSMIT INDICATOR**
Illuminates in the transmit mode.

14. **RECEIVE INDICATOR**
Illuminates when the squelch is opened in the receive mode.

15. **SIMPLEX/DUPLEX SWITCH**
Selects the SIMPLEX operation or the DUPLEX (repeater) operation.

16. **DUPLEX MODE SWITCH**
Selects the relationship of the receiving frequency and the transmitting frequency in the duplex mode.

In the "NOR" position, the transmitting frequency is set 600KHz (This can be changed to any in-band frequency.) below the receiving frequency. (IC-25A : The transmitting frequency can be set either below or above the receiving frequency by the OFFSET switch.)

In the "REV" position, the transmitting frequency and receiving frequency are reversed the above function.

These operations may be utilized with the VFO or any memory channels.

17. S/RF INDICATOR

Indicates S-unit and RF output level with seven LED's in line. The numbers on the S-meter represent S1 through S9 and 20 and 60dB over S9. The RF output level meter functions only as a relative output meter and does not indicate the wattage. These functions are switched automatically when T/R switching is made.

18. TONE CALL SWITCH (IC-25E only)

Most repeaters require a 1750Hz Tone-burst for initial access. Depressing the Tone Call Switch for the required period for a repeater, puts the set in the transmit mode and the tone burst generator actuates so you can then access the repeater.

18'. OFFSET SWITCH (IC-25A only)

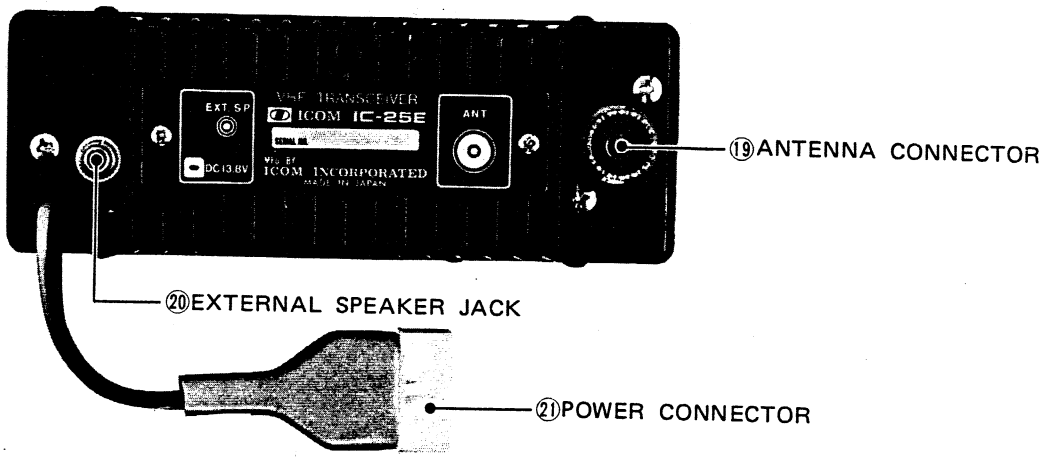
In the "+" position, the transmitting frequency is set 600KHz (This can be changed to any in-band frequency.) above the receiving frequency. (When the DUPLEX MODE Switch is in the "NOR" position.)

In "–" position, the transmitting frequency is set 600KHz below the receiving frequency. Also the offset frequency can be changed to any in-band frequency. (When the DUPLEX MODE Switch is in the "NOR" position.)

*** VFO SCAN FUNCTION SWITCH**

Selects the VFO FULL RANGE SCAN which scans the entire band or the PROGRAMMED SCAN which scans between two specified frequencies.

REAR PANEL



In the "NOR" position, the transmitting frequency is set 600KHz (This can be changed to any in-band 100KHz step frequency.) below the receiving frequency. (The transmitting frequency can be set either below or above the receiving frequency by the OFFSET switch.)

In the "REV" position, the transmitting frequency and receiving frequency are reversed the above function.

The operations may be utilized with the VFO or any memory channels.

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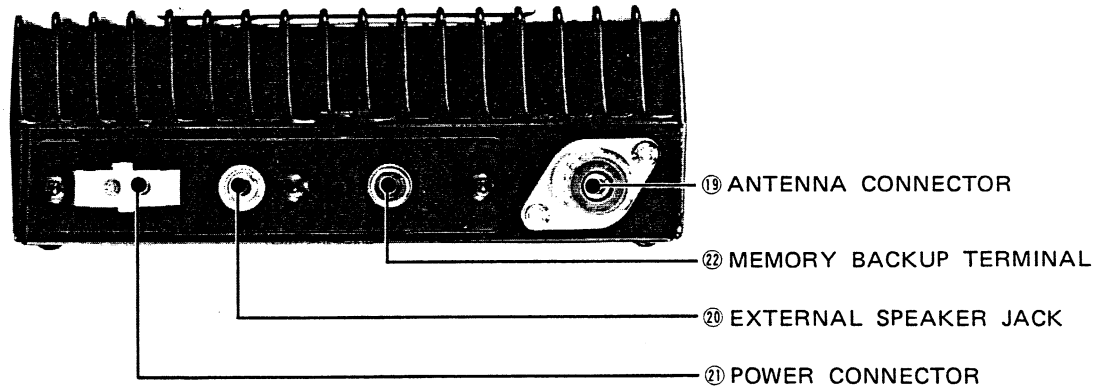
18. OFFSET SWITCH

In the "+" position, the transmitting frequency is set 600KHz (This can be changed to any in-band 100KHz steps frequency.) above the receiving frequency. (When the DUPLEX MODE Switch is in the "NOR" position.)

In "–" position, the transmitting frequency is set 600KHz below the receiving frequency. Also the offset frequency can be changed to any in-band 100KHz steps frequency. (When the DUPLEX MODE Switch is in the "NOR" position.)

REAR PANEL

25H



19. ANTENNA CONNECTOR

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

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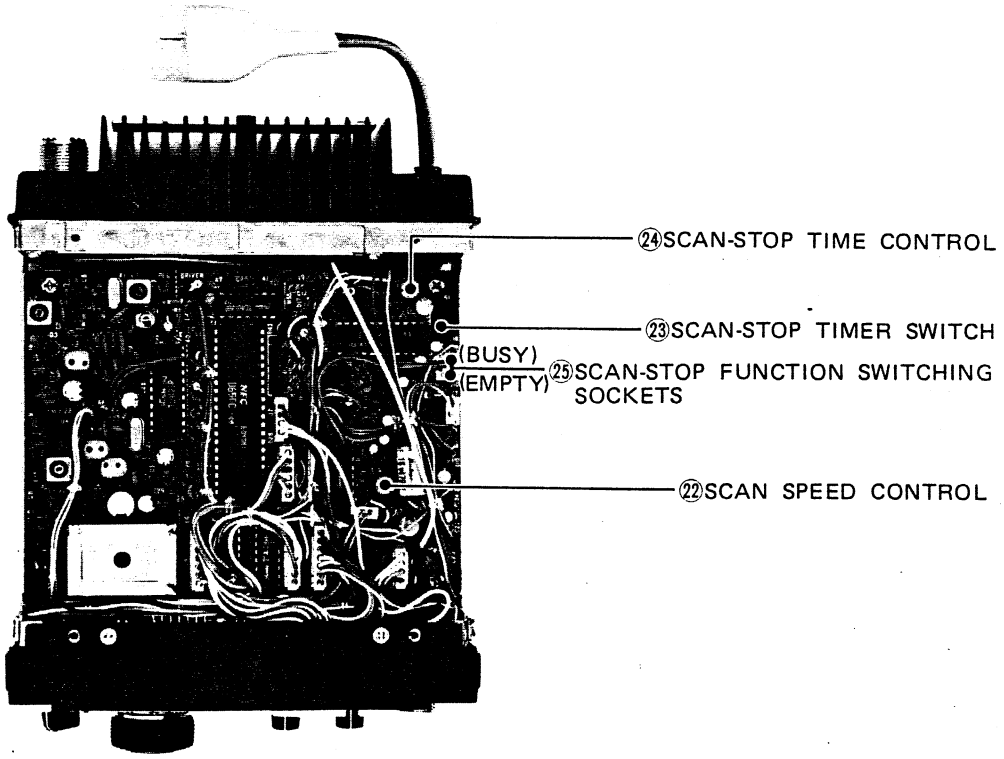
20. EXTERNAL SPEAKER JACK

When an external speaker is used, connect it to this jack. Use a speaker with an impedance of 4 ~ 8 ohms. When the external speaker is connected the built-in speaker does not function.

21. POWER CONNECTOR

Connect the supplied power cord to this connector.

UNDER THE TOP COVER



22. SCAN SPEED CONTROL

Controls the scanning speed in any scan mode. Adjust the control to desired scanning speed.

23. SCAN-STOP TIMER SWITCH

Switches the scan-stop interval function ON and OFF.

24. SCAN-STOP TIME CONTROL

Controls the interval of the scan auto-stopping time. Adjust the control to desired interval. It can be adjustable between 5 to 20 seconds.

25. SCAN-STOP FUNCTION SWITCHING SOCKETS

Switches the scan-stop function to either stop on a busy channel or stop on an empty channel, by changing the socket.

20. EXTERNAL SPEAKER JACK

When an external speaker is used, connect it to this jack. Use a speaker with an impedance of 4 ~ 8 ohms. When the external speaker is connected the built-in speaker does not function.

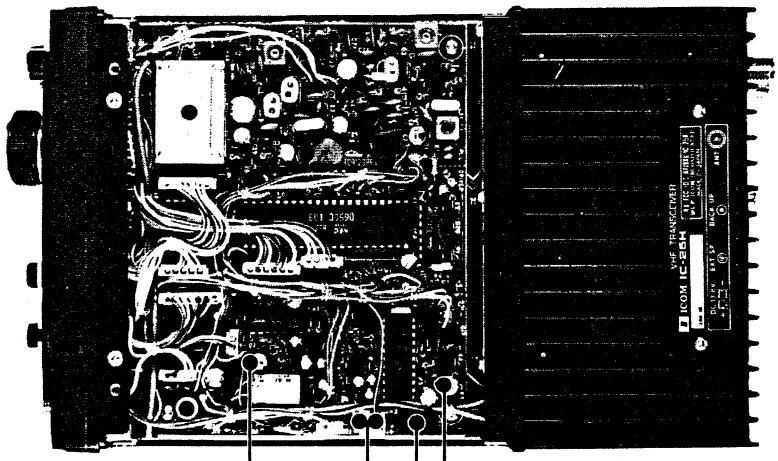
21. POWER CONNECTOR

Connect the supplied power cord to this connector.

22. MEMORY BACKUP TERMINAL

For connection of a 9 ~ 12V DC power supply. For mobile installation connection to the vehicle's battery can be made the current drain is low, for fixed installation use of the IC-BC10A is recommended.

UNDER THE TOP COVER 25H



23. SCAN SPEED CONTROL

Controls the scanning speed in any scan mode. Adjust the control to desired scanning speed.

24. SCAN-STOP TIMER SWITCH

Switches the scan-stop interval function ON and OFF.

25. SCAN-STOP TIME CONTROL

Controls the interval of the scan auto-stopping time. Adjust the control to desired interval. It can be adjustable between 5 to 20 seconds.

26. SCAN-STOP FUNCTION SWITCHING SOCKETS

Switches the scan-stop function to either stop on a busy channel or stop on an empty channel, by changing the socket.

SECTION V OPERATION

HOW TO TUNE

The following instructions are for tuning in any mode. Please read carefully and understand fully before turning ON your unit. Proper tuning is necessary for optimum operation.

PRESET FREQUENCIES

When the POWER Switch is turned ON, the frequency display will be "5.00" representing 145.000 MHz (IC-25A : "6.01" representing 146.010MHz). The frequencies of the VFO's and the Memory Channels are preset so that they start from the frequencies shown above whenever the IC-25A/E is turned ON.

TUNING CONTROL

Rotating the Tuning Knob clockwise increase the frequency; turning it counterclockwise decreases the frequency in 5KHz steps when VFO "A" is used, or in 25KHz (IC-25A : 15KHz) steps when VFO "B" is used.

The click stops of the knob change in 5KHz steps or 25KHz steps (IC-25A : 15KHz steps). One complete rotation of the tuning knob results frequency increases or decreases of a 250KHz or 1,250KHz (IC-25A : 750KHz).

When you reach 145.995MHz, turning the Tuning Control knob clockwise will bring the operating frequency to 144.000MHz, the lowest edge, and you can continue increasing the frequency from there by continuing to rotate the knob clockwise. The VFO endless system functions in the same way when decreasing the frequency from 144.000MHz, and will prevent you from inadvertently operating out of the amateur radio band. (IC-25A : 145.995MHz and 144.000MHz should be read as 148.195MHz and 143.800MHz.)

VFO/MEMORY CHANNEL SWITCH and VFO SWITCH

The CPU in the IC-25A/E contains two "VFO's" for both receiving and transmitting. The VFO's are labeled "A" VFO and "B" VFO and are selectable with the VFO Switch, when the VFO/MEMORY CHANNEL Switch is the VFO position. The dual VFO system gives the IC-25A/E many very convenient features. Please read this section very carefully and perform the operation several times until you are comfortable with the system. Try the example for practice!

1. "A" VFO is for both transmitting and receiving and is selected by placing the VFO Switch in the "A" (out) position. The transmit and receive frequency will be controlled by "A" VFO, displayed on the frequency display and stored in "A" memory.

2. "B" VFO is for both transmitting and receiving and is selected by placing the VFO Switch in the "B" (in) position. The transmit and receive frequency will be controlled by "B" VFO, displayed on the frequency display, and stored in "B" memory.

   NOTE: The memory channel positions are described in the "MEMORY CHANNEL OPERATION" on page 13.

■ When the IC-25A/E is first turned ON, 145.000MHz (IC-25A : 146.010MHz) is preset into the VFO "A" and VFO "B".

FOR EXAMPLE:

When the VFO Switch is set in the "A" position and the set is turned ON, "5.00" will be displayed on the readout representing 145.000MHz. (IC-25A: "6.01" representing 146.010MHz). This will occur whether the VFO switch is in either the "A" or "B" position. Rotating the tuning control knob clockwise will increase the frequency, and rotating the tuning knob counterclockwise will decrease the frequency in 5KHz steps with VFO "A", or in 25KHz (IC-25A : 15KHz) steps with VFO "B".

- Switching from one VFO to the other VFO does not clear the first VFO. The frequency is retained in the VFO's memory.

FOR EXAMPLE:

If 145.125MHz is set with "A" VFO, and the VFO switch is set to "B" VFO, the frequency readout will show "B" VFO's frequency, but 145.125MHz is still stored in "A" VFO's memory. Returning the VFO Switch to "A" VFO position, and "5.125" will be displayed on the readout. Accordingly, if the switch is placed in the "B" VFO position, the frequency that was set with the "B" VFO will appear. This allows you to set a certain frequency with one VFO, work up and down the band with the other VFO, and periodically check the set frequency simply by switching between "A" and "B" VFO. It also allows you to search for a clear frequency with one VFO, while keeping your operating frequency on the other VFO. When you have found a clear frequency, switch back to your operating frequency, inform the station you are in contact with of the new frequency, and switch back. It's that simple!

TRANSFERING VFO FREQUENCY

The MEMORY/VFO WRITE button allows either VFO's to be brought to the exact frequency of the other VFO without turning the tuning control knob.

FOR EXAMPLE:

When "A" VFO is 144.255MHz and "B" VFO is 144.355MHz, pushing the VFO Switch to select "B" VFO, then the MEMORY/VFO WRITE button, "B" VFO's frequency becomes the same as "A" VFO's (144.255MHz). Now the "A" VFO's frequency is memorized in the "B" VFO, and you can operate anywhere with "A" VFO or "B" VFO. When you want to return to the previous frequency (144.255MHz), switch back to the other VFO. To reverse this (A the same as B), select "A" VFO first, then push the MEMORY/VFO WRITE button.

DUPLEX (REPEATER) OPERATION

The SIMPLEX/DUPLEX Switch and DUPLEX MODE Switch allow DUPLEX (repeater) operation. The offset frequency is preset for the standard separation; 600KHz, but this frequency can be reset for any in-band frequency. So you can access to any repeater.

1. When the SIMPLEX/DUPLEX Switch is in the "SIMP" position, the set is in SIMPLEX mode; the receive frequency and transmit frequency are controlled a frequency which is by placing the VFO/MEMORY CHANNEL Switch and VFO Switch in any position of "A", "B" or Memory Channel 1 ~ 5.

2. When the SIMPLEX/DUPLEX Switch is in "DUP" position and the DUPLEX MODE Switch is in "NOR" position, the set is in DUPLEX mode, and the transmit frequency is set 600KHz (or reset offset frequency) below the receive frequency. (IC-25A : When the OFFSET Switch is in "–" positin.)

3. When the SIMPLEX/DUPLEX Switch is in "DUP" position and the DUPLEX MODE Switch is in "REV" position, the set is in DUPLEX mode, and the receive frequency becomes the expecting transmit frequency and the transmit frequency becomes the previous receive frequency, so you can receive the repeater's input frequency, or you can access a repeater which has reverse input/output frequencies.

   NOTE: IC-25A; The OFFSET frequency can be set either below or above the receiving frequency by the OFFSET switch.

■ "NOR" or "REV" position will allow you to access a repeater that has a 600KHz input/output frequency separation.

FOR EXAMPLE:

Set "A" VFO to 145.725MHz. Then set the SIMPLEX/DUPLEX Switch to the "DUP" position and the DUPLEX MODE Switch to the "NOR" position. **5.725** will be shown on the readout during receive and **5.125** during transmit. You are now receiving on 145.725MHz and transmitting on 145.125MHz, so you can access 145.125/145.725 repeater.

If you change the receiving ("A" VFO) frequency from 145.725MHz to 145.675MHz, the transmitting frequency will change from 145.125MHz to 145.075MHz, so now you can access a 145.075/145.675 repeater.

If you set the DUPLEX MODE Switch to the "REV" position, the receiving frequency will be 145.075MHz and the transmitting frequency will be 145.675MHz. So you can receive the repeater's input frequency.

These functions will be available also in "B" and Memory 1 ~ 5 positions of the VFO MEMORY CHANNEL Switch.

RESETTING THE OFFSET FREQUENCY

The offset frequency can be reset to any in-band frequency other than 600KHz.

Set the VFO/MEMORY CHANNEL Switch in the "VFO" position. By pushing the PRIORITY button, the FREQUENCY DISPLAY shows 1MHz digit and 100KHz digit of the offset frequency while the button is pushed. If no offset frequency has been reset since turning the power of the set ON, "0.6" will be shown on the display.

Rotating the Tuning control knob clockwise increases the frequency; turning it counterclockwise decreases the frequency in 100KHz steps. Turn the tuning control knob to obtain desired offset frequency, then push the MEMORY/VFO WRITE button, and the desired offset frequency is written into the CPU and maintained as long as the power of the set is not turned OFF or a new offset frequency is reset.

■ What to do if you want to operate repeaters that have a frequency difference other than ±600KHz (for example : 1MHz).

FOR EXAMPLE:

Set the VFO/MEMORY CHANNEL Switch in the "VFO" position, and by pushing the PRIORITY button, the FREQUENCY DISPLAY shows "0.6". Turn the tuning control knob clockwise to

show "1.0" on the display, then push the MEMORY/VFO WRITE button.

Set "A" VFO to 145.725MHz. Then set the DUPLEX MODE Switch to the "NOR" position. **5.725** will be shown on the display during receive and **4.725** during transmit.
You are now receiving on 145.725MHz and transmitting on 144.725MHz, so you can access a 144.725/145.725 repeater.

If you change the receiving frequency from 145.725MHz to 145.675MHz, the transmitting frequency will change from 144.725MHz to 144.675MHz, so now you can access a 144.675/145.675 repeater.

MEMORY CHANNEL OPERATION

MEMORY-WRITE (PROGRAMMING THE MEMORY CHANNELS)

NOTE: Only "A" VFO can be used for memory-writing.

1. Set the Tuning Control to the desired frequency, using "A" VFO. For example, set it for 145.700MHz, the display shows "5.70".
2. Set the VFO MEMORY CHANNEL Switch to the channel to be programmed (1 ~ 5). As an example, set it at Memory Channel 1. If no frequency has been programmed since turning the power of the unit ON, "5.00" will be shown on the display (IC-25A : "6.01"), and the unit will receive on 145.000MHz (IC25A : 146.010MHz).
3. One push of the MEMORY/VFO WRITE Button erases the previous programmed frequency (145.000) and programs the new frequency (145.700) into Memory Channel 1.
4. Program any desired frequencies in Memory Channels 2 ~ 5 in the same manner. Memory Channels 1 and 2 are used also for the Programmed Scan. For Programmed Scan operation, refer to SCANNING OPERATION.

MEMORY READING

Set the VFO/MEMORY CHANNEL Switch to the desired memory channel 1, 2, ... or 5. At that frequency the "A" or "B" VFO was set, that previously programmed frequency is then recalled. When the VFO/MEMORY CHANNEL Switch is set back to "VFO", the previous operating frequency of that VFO will again be shown on the display.

The programmed frequencies in the five Memory Channels are maintained as long as the power, including MEMORY BACKUP power, of the IC-25A/E is not turned OFF or new frequencies reprogrammed. When the power cord is connected to a continuous operating power source, all the programmed frequencies on the Memory Channels and the operating frequencies of both "A" and "B" VFO's are retained even when the POWER Switch is turned OFF.

SCANNING OPERATION

The IC-25A/E provides various scanning operations. Please read the following instructions carefully to fully enjoy the IC-25A/E's many capabilities.

MEMORY SCAN

This is to scan the five Memory Channels and two VFO's frequencies continuously.

1. Program five desired frequencies in Memory Channels 1 ~ 5.
2. Set the VFO/MEMORY CHANNEL Switch to the memory position. (The VFO/MEMORY CHANNEL Switch may be set in any position.)

3. Depress the S/S (Scan Start/Stop) button, and the frequency starts scanning the programmed frequencies in the Memory Channels 1, 2, 3, 4, 5, then "A" VFO and "B" VFO, 1, 2, 3, 4, 5, "A" VFO, "B" VFO.
4. If the SQUELCH is engaged, the scan stops when the squelch is opened and receives a signal. To stop scanning without opening the squelch, depress the S/S Button. Depress it again to restart the scanning.
   This function can be changed to stop when the squelch is closed, i.e., an empty channel, by the SCAN-STOP FUNCTION SWITCHING SOCKETS located under the top cover.

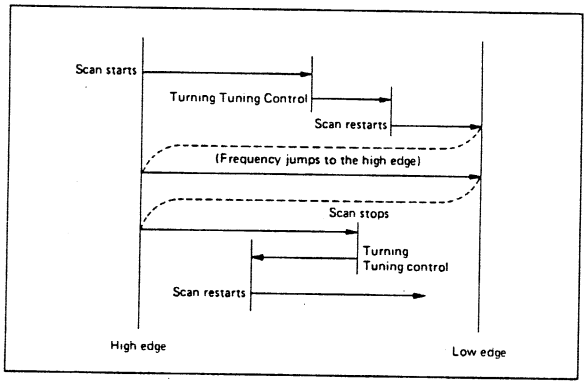
PROGRAMMED SCAN

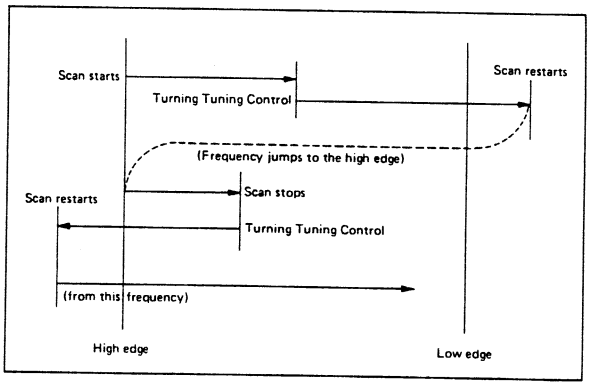
This is used to scan between two desired frequencies, which are programmed in Memory Channels 1 and 2, by setting the VFO-SCAN FUNCTION Switch located on the front panel to "PROG-S" position.

1. Program the frequencies of the high edge of the desired scanning range into Memory Channel 2, and the low edge into Memory Channel 1.
   For example, program 145.200MHz into Memory Channel 1 and 145.800MHz into Memory Channel 2.
2. Set the VFO/MEMORY CHANNEL Switch to VFO position. Depressing the S/S Button starts the scan from the high edge (145.800MHz) to the low edge. The scanning frequency increments depend on the VFO Switch setting.
3. When the scanning frequency reaches the lowest edge (145.200MHz), it automatically returns to the high edge (145.800MHz) and continues scanning down to provide endless scanning operation.
4. While the SQUELCH is engaged, the squelch opening as a signal is received will stop the scanning automatically to lock onto the frequency. If the RECEIVE indicator LED is lit because the SQUELCH is not engaged, the scan does not stop at any signal.
5. To stop the scan operation, depress the S/S Button. Depressing the S/S Button again restarts the scan from the frequency at which it stopped.
6. If this frequency is changed with turning the Tuning Control knob while the scan is stopped, the scanning will restart from the VFO frequency.

   In this case, if the VFO frequency is below the low edge frequency, the frequency jumps to the high edge frequency (145.800MHz) and restarts from the high edge.

   If the changed frequency is higher than the high edge frequency and the S/S Button is pushed, scanning will begin at the VFO frequency, scan down to the low edge but will return to the preprogrammed high edge frequency.





VFO FULL RANGE SCAN

This is to scan the entire band between 144.000MHz and 145.995MHz. (IC-25A : between 143.800MHz and 148.195MHz.)

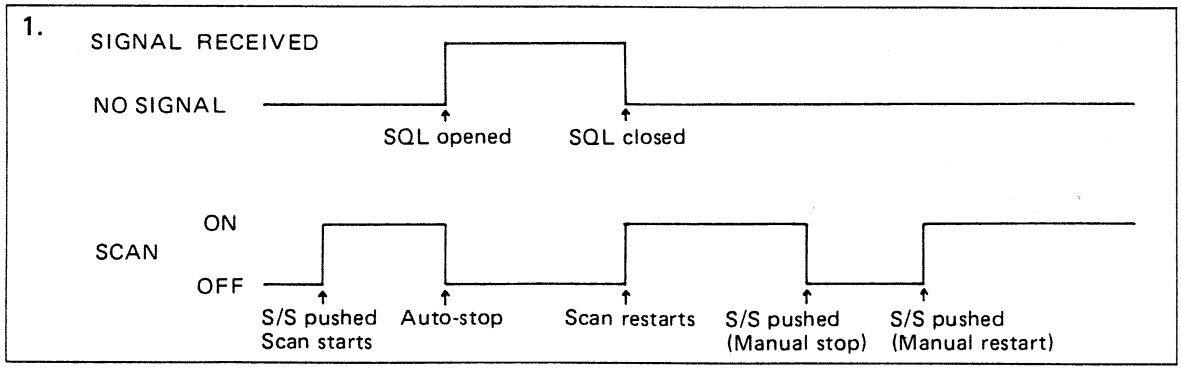
1. Set the VFO/MEMORY CHANNEL Switch to VFO position, and the VFO-SCAN FUNCTION Switch to "FULL-S" position. Depressing the S/S button starts the scan from the VFO frequency to the low edge. The scanning frequency increments depend on the VFO Switch setting.
2. When the scanning frequency reaches the low edge, it automatically returns to the high edge and continues scanning down to provide endless scanning operation.
3. Other operations are the same as the PROGRAMMED SCAN and MEMORY SCAN.

The scanning speed can be adjusted by the SCAN SPEED Control located under the top cover. Rotating the control counterclockwise makes the scanning speed faster.

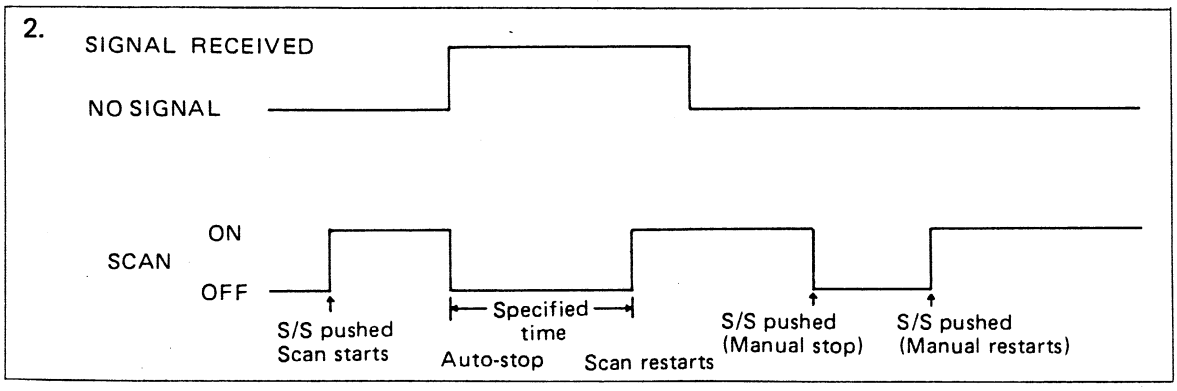
While the SCAN is operating even if the SCAN stops on a frequency, the decimal point of the frequency display will blink according to the scanning speed.

RESUMING SCAN

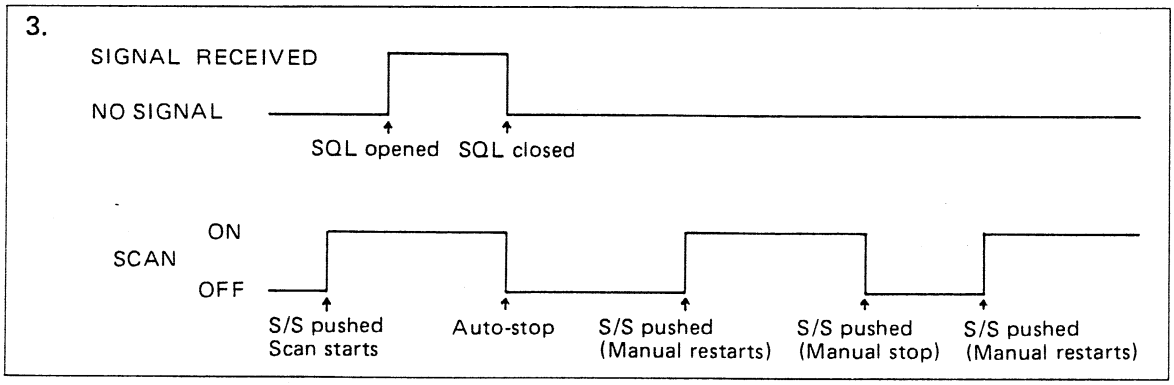
All scan modes are provided with the resume scan function. When the scan has been stopped by the auto-stop function, the scan will restart after the cause goes away, or after passing a specified time.



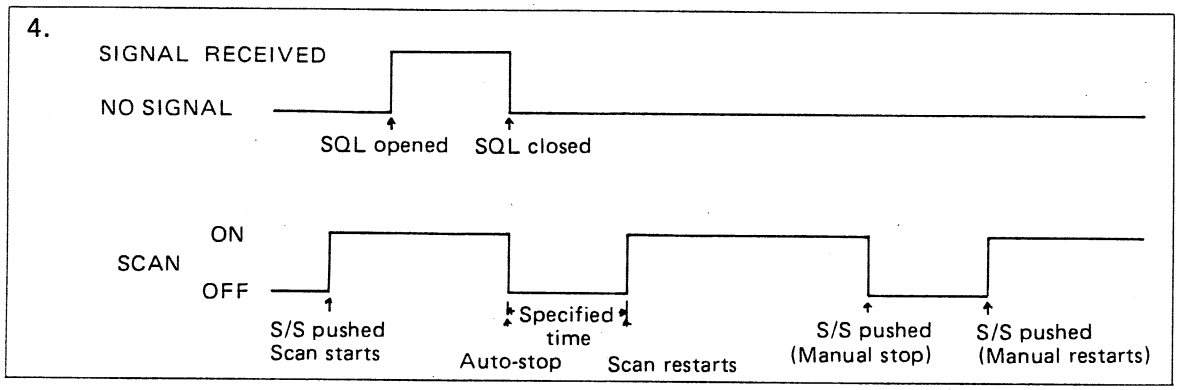
By setting the SCAN-STOP TIMER Switch in OFF position and the SCAN-STOP FUNCTION SWITCHING SOCKETS in BUSY position (both located under the top cover), the scan will stop on a signal (by opening the squelch), then the scan will restart with disappearing the signal.



By setting the SCAN-STOP TIMER Switch in ON position and the SCAN-STOP FUNCTION SWITCHING SOCKETS in BUSY position, the scan will stop on a signal, and will restart after specified time is passed, whether a signal has been received or not. This scan stopping time is adjustable between 5 seconds and 25 seconds with the SCAN-STOP TIME CONTROL located under the top cover.



By setting the SCAN-STOP FUNCTION SWITCHING SOCKETS in EMPTY position and the SCAN-STOP TIMER Switch in OFF position, the scan will stop on an empty channel (by closing the squelch), then the scan will restart with appearing a signal.



By setting the SCAN-STOP FUNCTION SWITCHING SOCKETS in EMPTY position and the SCAN-STOP TIMER Switch in ON position, the scan will stop on an empty channel, then will restart after specified time is passed, whether a signal has been received or not.

Set the SCAN-STOP TIMER Switch, SCAN-STOP TIME Control, and SCAN-STOP FUNCTION SWITCHING SOCKETS for your convenient positions before the set installed.

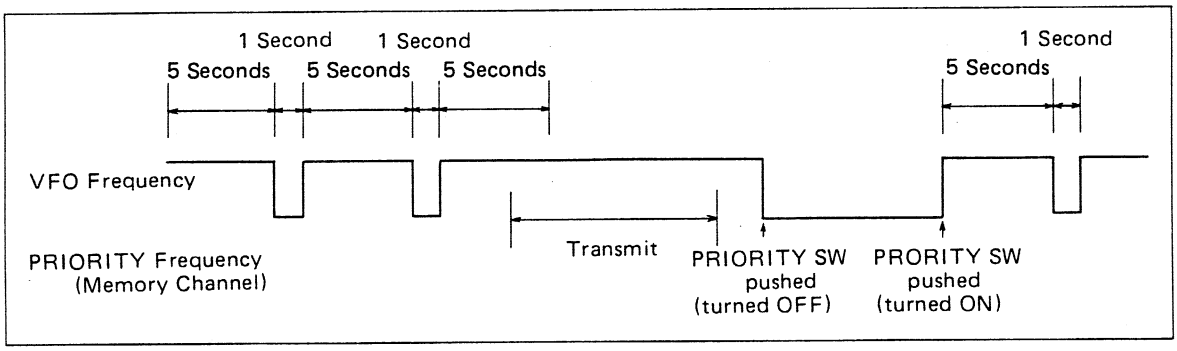
PRIORITY FUNCTION

This function provides to check your favorite channel, such as a local repeater or a calling channel, written into a memory channel while operating on a VFO frequency, whether a signal has appeared on the selected favorite channel, or disappeared from the channel.

The following steps are taken to utilize the PRIORITY FUNCTION.

1. Write your favorite frequency into a memory channel.

2. Set the VFO MEMORY CHANNEL Switch in the position written with your favorite frequency, and push VFO/MEMORY CHANNEL Switch, and the set then receives on the memory channel.
3. By pushing the PRIORITY button, the PRIORITY INDICATOR is lit and the set receives on a VFO frequency, a period of five seconds and on the priority channel (written with your favorite frequency) one second, and then repeats this function until the PRIORITY button is pushed again.
4. If the set is turned to transmit mode, during the priority function, the transmit frequency will be the VFO frequency in SIMPLEX mode, or its OFFSET frequency in DUPLEX mode. When returned to receive mode, the priority function will be continued.
5. If you wish to stop the priority function, push the PRIORITY button again, and the PRIORITY indicator is turned OFF and the operating frequency goes to the priority channel's frequency.
6. If you wish to continue the operation on the VFO frequency, set the VFO/MEMORY CHANNEL Switch to the VFO position.



OPERATION

1. RECEIVING

After connecting an antenna, microphone, etc., set knobs and switches as follows.

VFO/MEMORY CHANNEL SWITCH	"VFO"
VFO SWITCH	"A" (out)
VOLUME CONTROL and POWER SWITCH	Completely counterclockwise (OFF position)
SQUELCH CONTROL and RF POWER SWITCH	Completely counterclockwise (Pull switch is normal position.)
SIMPLEX/DUPLEX SWITCH	"SIMP" (out)
DUPLEX MODE SWITCH	"NOR" (out)
OFFSET SWITCH (IC-25A only)	"–" (in)

The other switches are unrelated to receiving and need not be set at this time.

Now turn ON the POWER SWITCH. The RECEIVE indicator will be illuminated and "5.00" (IC-25A : "6.01") will be shown on the FREQUENCY DISPLAY. Slowly turn the VOLUME Control clockwise to a comfortable level. Rotate the tuning knob until a signal is received. The S/RF indicator will light according to the signal strength, so tune for the highest possible indicator reading and the clearest audio.

If no signal can be heard but only noise, turn the Squelch Control clockwise until the noise

from the speaker stops and set it just below this threshold. (When adjusting the Squelch control setting, if some communication signals can be heard, turn the tuning control either direction and set it where only noise can be heard.) The transceiver will now remain silent until an incoming signal is received which opens the squelch and lights the RECEIVE indicator. If the squelch is unstable due to the reception of weak signals or mobile stations, adjust the squelch control further until the proper threshold is obtained.

For tuning, Memory Channel operation and Scanning operation refer to "HOW TO TUNE" on page 10, "Memory CHANNEL OPERATION" on page 13, and "SCANNING OPERATION" on page 13,

2. TRANSMITTING

For simplex operation, set the SIMPLEX/DUPLEX Switch in the "SIMP" position.

For duplex operation, set the SIMPLEX/DUPLEX Switch in the "DUP" position and the DUPLEX MODE Switch in the "NOR" or "REV" position according to repeater's input frequency.

When the IC-25A/E is first turned ON, the OFFSET frequency will be preset 600KHz. This OFFSET frequency is normal repeater input/output frequency separation.
If you desire to operate repeaters that have a frequency difference other than ±600KHz, reset the OFFSET frequency to desired frequency. Refer to "RESETTING THE OFFSET FREQUENCY" on page 12.

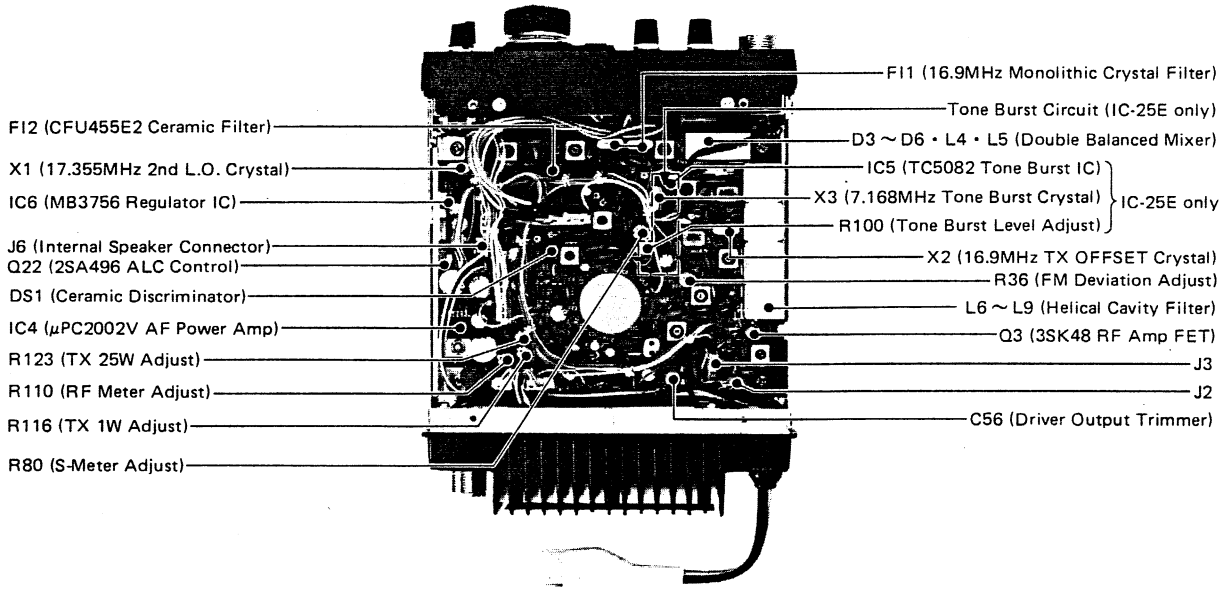
If the lower output power (1 watt) is sufficient, set the Squelch Control and RF Power Switch to the LOW (out) position.

Depress the PTT (push-to-talk) Switch on the microphone and the transceiver will transmit. At the same time the TRANSMIT indicator will illuminate red and the S/RF indicator will provide an indication of relative power output of the transmitter.

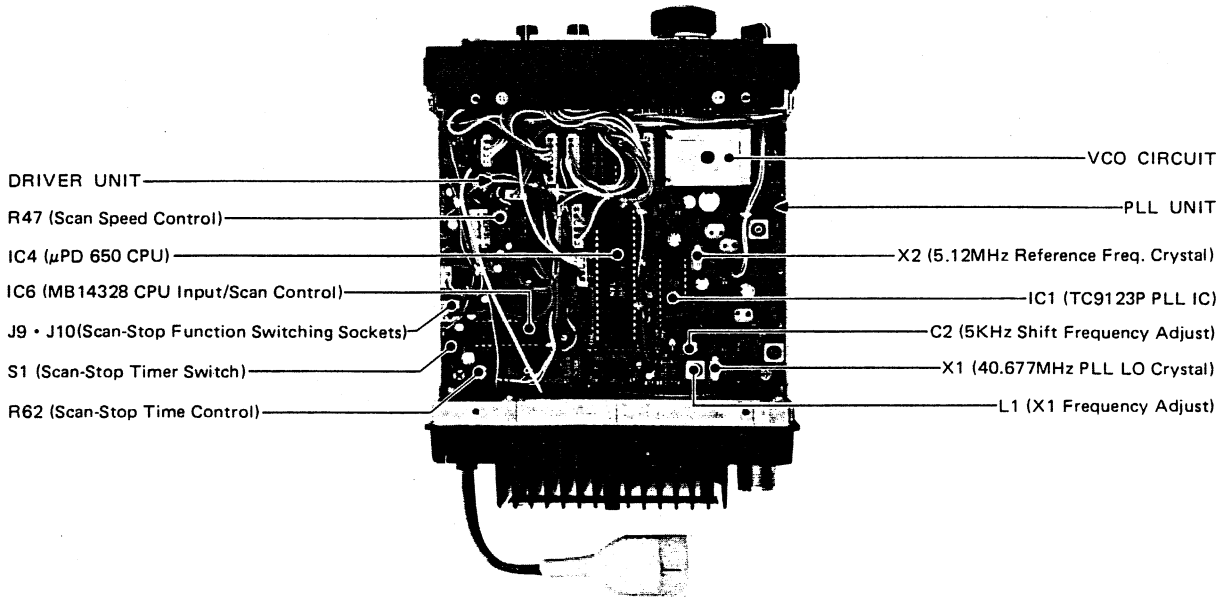
If you need a tone-burst for initial access of the repeater, depress the Tone Call Switch for the required period. (Tone-burst periods vary individually from 100 milliseconds to 2 seconds.) (IC-25A : The Tone Call circuit is not installed.)

SECTION VI INSIDE VIEW

MAIN UNIT SIDE



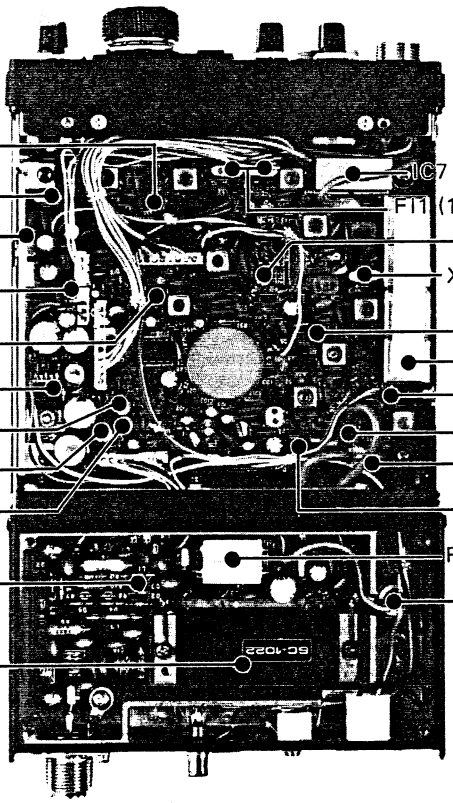
PLL UNIT SIDE



SECTION VI INSIDE VIEWS

25H

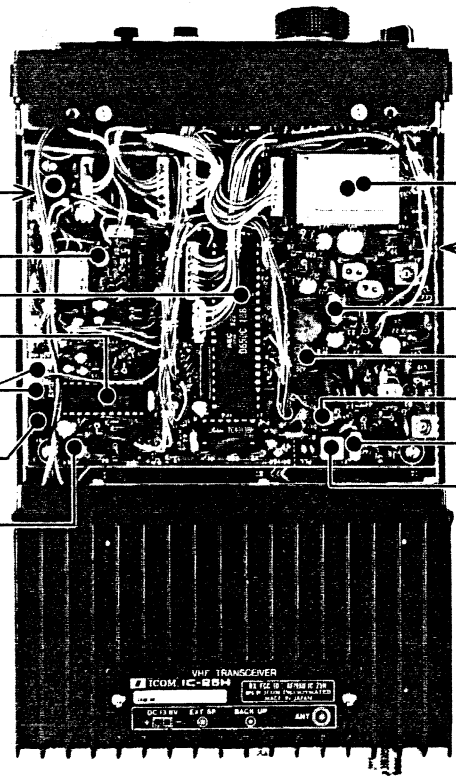
MAIN UNIT SIDE



F12 (CFU455E2 Ceramic Filter)
X1 (17.355MHz 2nd L.O. Crystal)
IC6 (MB3756 Regulator IC)
J6 (Internal Speaker Connector)
DS1 (Ceramic Discriminator)
IC4 (μPC2002V AF Power Amp)
R123 (TX 45W Adjust)
R110 (RF Meter Adjust)
R116 (TX 2W Adjust)
D2 · D3 (T/R Switching Diodes)
IC1 (SC-1022 PA Module)

IC7 · L4 · L5 (Doubly Balanced Mixer)
F11 (16.9MHz Monolithic Crystal Filter)
R80 (S-Meter Adjust)
X2 (16.9MHz TX OFFSET Crystal)
R36 (FM Deviation Adjust)
L6 ~ L9 (Helical Cavity Filter)
Q3 (3SK48 RF Amp FET)
J3
J2
C56 (Driver Output Trimmer)
R1 ~ R4 (APC Detecting Resistors)
D22 (15CD11 Reverse Polarity Protecting Diode)

PLL UNIT SIDE



DRIVER UNIT
R47 (Scan Speed Control)
IC4 (μPD 650 CPU)
IC6 (MB14025 CPU Input /Scan Control)
J9 · J10 (Scan-Stop Function Switching Sockets)
S1 (Scan-Stop Timer Switch)
R62 (Scan-Stop Time Control)

VCO CIRCUIT
PLL UNIT
X2 (5.12MHz Reference Freq. Crystal)
IC1 (TC9123P PLL IC)
C2 (5KHz Shift Frequency Adjust)
X1 (40.677MHz PLL LO Crystal)
L1 (X1 Frequency Adjust)

SECTION VII CIRCUIT DESCRIPTION

OUTLINE

The IC-25A/E employs a digital phase locked loop (PLL) circuit as the local oscillator for both transmit and receive. The output of the PLL circuit is approximately 16.9MHz below the receive frequency, thereby spurious is kept to a minimum.

The operating frequency is controlled by pulse signals, generated by the rotary encoder located at the tuning knob, being added to or subtracted from the preset frequencies in the microcomputer.

The microcomputer controls the PLL circuit which determines the output frequency of the VCO (Voltage Controlled Oscillator).

In the receiver section, signals from the antenna are mixed with the local oscillator output from the PLL circuit. The circuits function as a dual-conversion type with 16.9MHz 1st IF and 455KHz 2nd IF.

In the transmitter section, a crystal oscillator is used to produce the 16.9MHz signals which are direct-frequency modulated.

The FM signal is mixed with the local oscillator output from the PLL circuit, which is the same as that of the receiver section, and then amplified, filtered, and sent to the antenna.

RECEIVER CIRCUITS

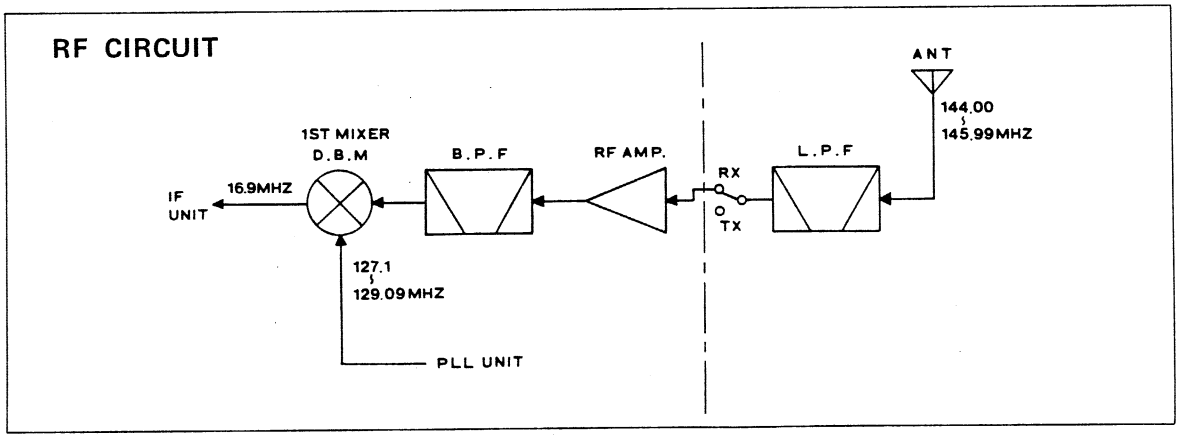
ANTENNA SWITCHING CIRCUIT

Signals from the antenna connector are fed to the RF amplifier Q3 in the MAIN unit through low-pass filters in the PA unit. The switching diodes D1 and D2 in the PA unit, are turned OFF in the receive mode, and isolate the PA module from the receiver circuit.

RF CIRCUIT

The signals from the PA unit, are amplified by the low-noise MOS FET Q3 and then sent to the four-stage helical cavity filter, which reduces interference and intermodulation from other radio signals or nearby signals. The filtered signals are then fed to one of the ports of the double balanced mixer (DBM) consisting of four Schottky diodes, D3 ~ D6.

To another port of the DBM, a 127MHz signal is supplied from the PLL unit to convert the RF signals into first IF signals.

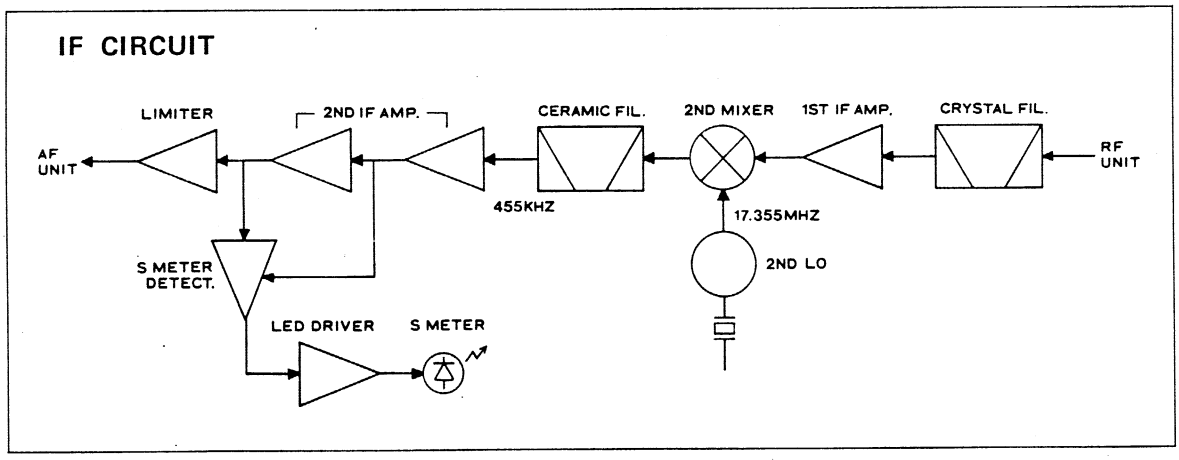


The 16.9MHz, first IF signals are taken from the other port of the DBM through a monolithic crystal filter FI1, then fed to the IF circuit.

IF CIRCUIT

16.9MHz 1st IF signals from the crystal filter FI1 are fed to the 1st gate of the dual gate MOS FET Q2. Signals amplified by Q2 are supplied together with 17.355MHz signals from the second local oscillator Q1, to the base of second mixer Q10, for conversion to the 455KHz second IF.

In the second IF amplifier, which has excellent selectivity due to a CFU455E ceramic filter, signals are amplified by Q11 – Q13 and Q14. After removal of noise and other AM components by IC3 functioning as a limiter, the signals are detected in terms of audio frequency signals by a ceramic discriminator.
This ceramic discriminator has outstanding temperature characteristics, linearity and detection sensitivity, which guarantee clear, stable reception.
Audio signals from the discriminator are divided into audio signals and noise component signals to operate the squelch circuit.



AUDIO CIRCUIT

In the audio amplifier, audio signals are passed through the de-emphasis circuit consisting of R85 and C78, and amplified by Q15. High frequency components are cut by a low-pass filter Q16, in order to improve the signal-to-noise ratio. Then the audio signals are adjusted to a suitable level by volume control R1, amplified by AF power amplifier IC4 to 2W or more, and fed to the speaker.

SQUELCH CIRCUIT

This is a noise circuit that suppresses noise when signals enter the set. To avoid erroneous operation due to audio signals, noise components of about 25KHz are selectively amplified.

Squelch control R2 is located immediately after the discriminator, thus increasing the dynamic range of the circuit.

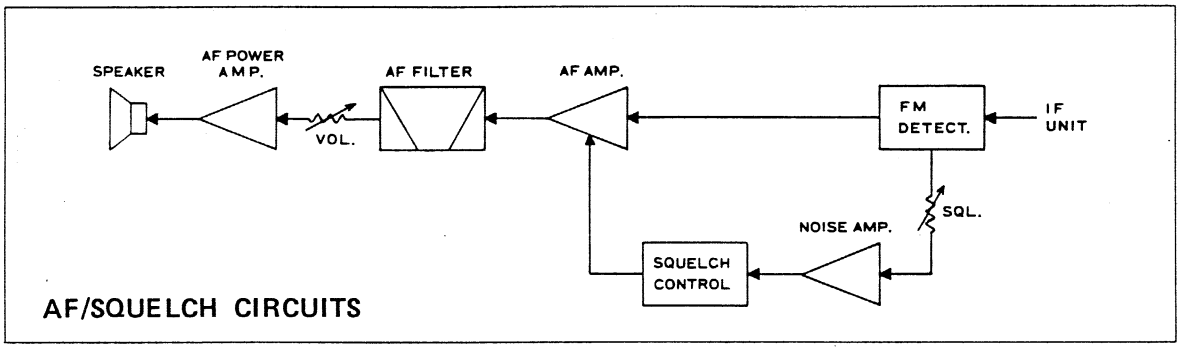
Noise components from squelch control R2 are amplified by Q17 and Q18, rectified by D16 and D17, and with C103, C105, and R112 ensure correct timing sequence for smooth squelching supplied to the base of squelch control transistor Q19.

When there are no audio signals, rectified DC voltage from D16 and D17 is applied to the base of Q19, turning it on. Since the collector of Q19 is connected to the base bias network of AF amplifier Q15, base voltage of Q15 falls and Q15 is turned off, thus squelch action is applied, and no audio is amplified by IC4. At this time, signal lamp control IC, IC3 of DRIVER unit, does not conduct, and so the RECEIVE lamp goes off.

When incoming signals are received, noise is suppressed, the base voltage of Q19 falls, and Q19 is turned off. Therefore, normal voltage is applied to the base of Q15, the squelch circuit is opened, and audio signals are heard from the speaker. IC3 also is turned on, and the RECEIVE lamp lights up.

The point at which squelch becomes operative (squelch threshold) is adjusted by R2.

During transmit, Q19's collector is grounded through D18 and PTT switch, and the squelch circuit is operative, so squelch action is started the moment there is switchover from transmit to receive, and no loud crackling or similar noise is heard.



AF/SQUELCH CIRCUITS

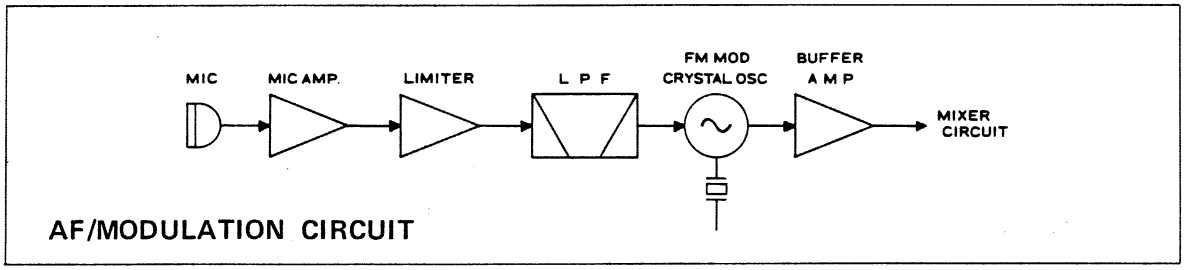
TRANSMITTER CIRCUITS

16.9MHz OSCILLATOR, MODULATION CIRCUITS

16.9MHz signals are oscillated by Q6 and amplified audio signals from the microphone are supplied to varactor diode D10 connected in series with the crystal unit. Voltage of these signals causes the capacitance of D10 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 in the 144MHz band, and so use is made of a crystal unit with special characteristics to ensure suitable frequency deviation and stability.

AUDIO FREQUENCY CIRCUIT

Audio signals from the microphone are fed to the audio amplifier Q4. Amplified signals are sent through a differential circuit C24 and R26 to Pin 3 of IC1, which is a limiter amplifier and has 6dB/Octave response between 300Hz and 3KHz. This output is fed to low-pass filter Q5, and then the FM modulator D10, through level adjust trimmer R36.



AF/MODULATION CIRCUIT

MIXER CIRCUIT

These modulated signals are taken out at the emitter of Q6, and after amplified by IC2, are applied to the same DBM that is used for the receiver.

127MHz band signals from the PLL unit, are mixed with the 16.9MHz modulated signals to give signals of 127MHz ±16.9MHz. As a double balanced mixer is used for this mixing stage, 16.9MHz and 127MHz band signals are canceled and do not appear in the output.

DRIVER CIRCUIT

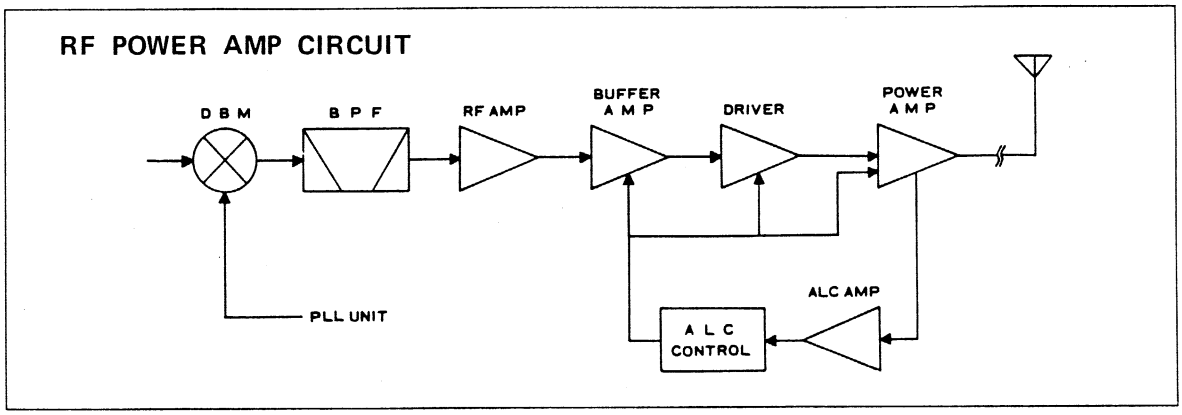
The signals are further passed through a helical cavity band-pass filter, to produce signals in the 144MHz band only, and then amplified by Q7, Q8, Q9, and fed to PA module IC1 in the PA unit.

POWER AMPLIFIER CIRCUIT

The signals from Q9 in the MAIN unit are amplified by IC1 in the PA unit to obtain 25W output. The heat from IC1 is transmitted to the diecast heat sink which radiates the heat very efficiently. IC1 is a hybrid IC consisting of a two-stage RF power amplifier. The output signals of IC1 are fed to the antenna terminal through the T/R switching diode D1 and three-stage low-pass filter, which suppress harmonics by more than 60dB.

ALC CIRCUIT

This circuit stabilizes the output power, even when the power voltage or the antenna load is fluctuating, and switches the output power 1 watt and 25 watts. The variation in the current of IC1 is detected at R1 in the PA unit and amplified by differential amplifier IC1 in the MAIN unit. The output voltage from Pin 7 of IC1 is fed to Q21 then Q22. This lowers Q9's collector 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 R124 in normal power (25W), and by R116 in low power (1W) conditions.



METERING CIRCUIT

In the receive mode, the S/RF indicator functions as an S-meter. A part of the second IF signals from L21 is rectified by D11 and D12 (for weak signals), and from Q13's collector is rectified by D20 and D21 (for stronger signals). Both rectified signals are fed to the indicator driver IC, and provide wide dynamic range meter function.

In the transmit mode, the S/RF indicator functions as a relative RF power meter. A part of the

RF power output is fed to D4 in the PA unit and rectified, then fed to the indicator driver IC through the level adjust resistor R110.

POWER SUPPLY CIRCUIT

This circuit employs a multipurpose voltage regulator, IC6. 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 IC6. By grounding Pin 5, R8V goes 0V and T8V is actuated, thus the set will be turned to transmit mode.

PLL (PHASE LOCKED LOOP) UNIT

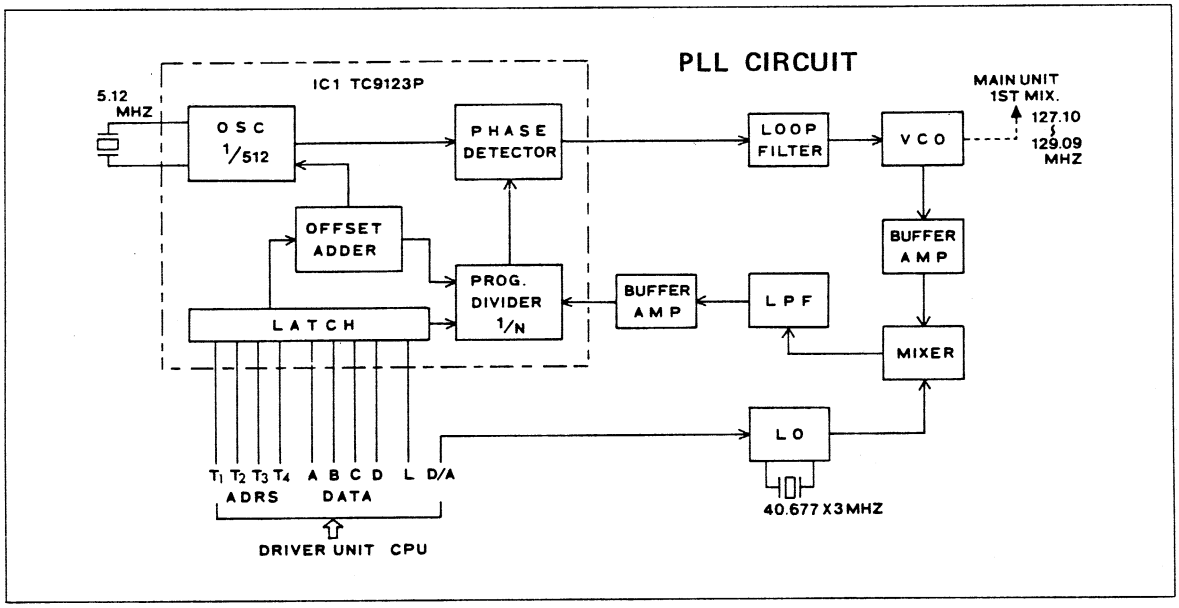
LOCAL OSCILLATOR CIRCUIT

This circuit produces 40.677MHz signal with Q1, and the signal at 3 times this frequency, i.e., 122.03MHz, are taken from the collector of Q1.

When the operating frequency, has 5KHz digit, D1 is turned OFF and C2 is inserted in series into the serial capacitor of the crystal. Thus the output frequency of the local oscillator is shifted +5KHz.

MIXER, LOW PASS FILTER, AND AMPLIFIER CIRCUIT

The output signals from the local oscillator circuit and the VCO signals are mixed by the MOS FET mixer Q5. The output signals are fed to the low-pass filters to filter out only the signals below 15MHz. The output signals from the filter are amplified to the proper drive level (more than 3Vp-p) of the programmable divider IC1 by Q2. Then the signals are fed to Pin 12 of IC1 through C9.



PROGRAMMABLE DIVIDER CIRCUIT

The input signals at Pin 12 of the PLL IC, IC1, consists of programmable divider, reference frequency generator and phase detector, are divided by the BCD input signals at Pins 6 ~ 9 and its digit signals at Pins 2 ~ 5.

The programmable divider is also called the 1/N counter and the BCD input is N. The relationship between the display frequency and the divide number N is as follows:

DISPLAY FREQUENCY	CPU OUTPUT	DIVIDE NUMBER (N)
144.000MHz	400	507
144.010MHz	401	508
≀	≀	≀
145.000MHz	500	607
≀	≀	≀
146.000MHz	600	707
≀	≀	≀
147.000MHz	700	807
≀	≀	≀
148.000MHz	800	907

REFERENCE FREQUENCY GENERATOR CIRCUIT

Reference frequency generator consists of a crystal oscillator and a highspeed divider. X2 oscillates at 5.12MHz, which is divided by 512. The 10KHz reference frequency is fed to phase detector. This 10KHz reference frequency decides the variation step of the PLL output frequency and the divide number N decides the PLL output frequency.

PLL output freq. = local oscillator freq. (MHz) + 0.01MHz (the reference freq.) x N (divide number of programmable divider)

NOTE: The local oscillator frequency is 122.03MHz or 122.035MHz (when the operating frequency has 5KHz digit).

PHASE DETECTOR AND LOOP FILTER CIRCUIT

Digital phase detector detects the phase difference of the pulse signals of the 10KHz reference frequency, and the output signal of the programmable divider, and proportionately puts out positive/negative pulse signals at Pin 16. Pin 18 is for detecting the lock failures and changes to ground level according to the phase difference of the two pulse signals.

The loop filter, consisting of R26 ~ R28 and C28, C29 and C31, converts the pulse signal from Pin 16 into a DC voltage and decides the response time of the whole loop. The output signals are fed to tuning diode D5 of the VCO unit as the control voltage for the VCO frequency set.

BUFFER AMPLIFIER CIRCUIT

The VCO output signals are fed to buffer amplifiers Q6 and Q7. They are then fed to the second gate of the mixer Q3 through isolation buffer amplifier Q4, and to the transmit and receive mixer through a buffer amplifier Q8.

VCO UNIT

The VCO (Voltage-Controlled Oscillator) is a Clapp circuit, using Q5, and oscillates in the 127MHz range. The oscillation frequency is controlled by a DC voltage which is supplied from the loop filter in the PLL unit to varactor diode D5, inserted in series with the oscillation coil.

The oscillator output is taken from the source of Q5, and fed to buffer amplifiers Q6, Q7 and Q8 .

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.

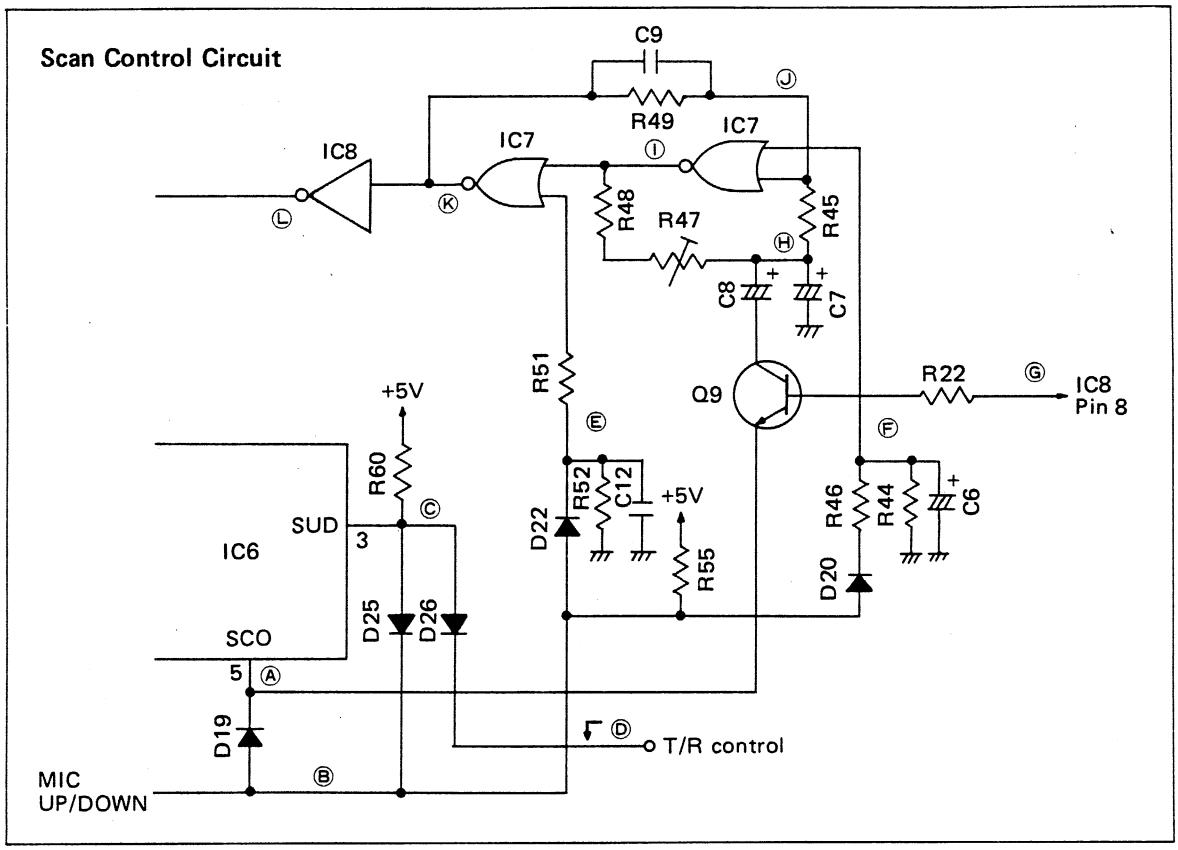
DRIVER UNIT

CLOCK PULSE GENERATE CIRCUIT

The input data for the microcomputer, is controlled by a custom-made LS type TTL IC, IC6,.

The clock pulses are generated by a mechanical rotary-encoder which is connected directly to the shaft of the tuning control knob. The rotary-encoder puts out two signals which are 90 degree out of phase signals. Clock pulse signals and UP/DOWN signals are generated by the UP/DOWN control circuit consisting of IC7 and IC8. These signals are fed to Pins 3 and 4 of IC6 through level converters Q10 and Q11.

SCAN and MIC UP/DOWN CONTROL CIRCUIT



The scan function is provided by pushing the scan Start/Stop (S/S) button. When pushed the S/S button, Pin 5 of IC6 is lowered to ground level, the voltage at Ⓔ and Ⓕ are also lowered, and the multivibrator, consisting of IC7, starts oscillation for scanning, and the decimal point of the frequency display will blink. When Pin 5 of IC6 is lowered, Pin 3 (UP/DOWN control terminal) is also lowered, but its voltage is still 1V ~ 2V, so the downward scanning is selected.

The oscillation frequency (scan speed) can be adjusted by R47. When a VFO is selected (in the programmed scan or full range scan function), the voltage at Ⓖ is ground level, and Q9 is turned

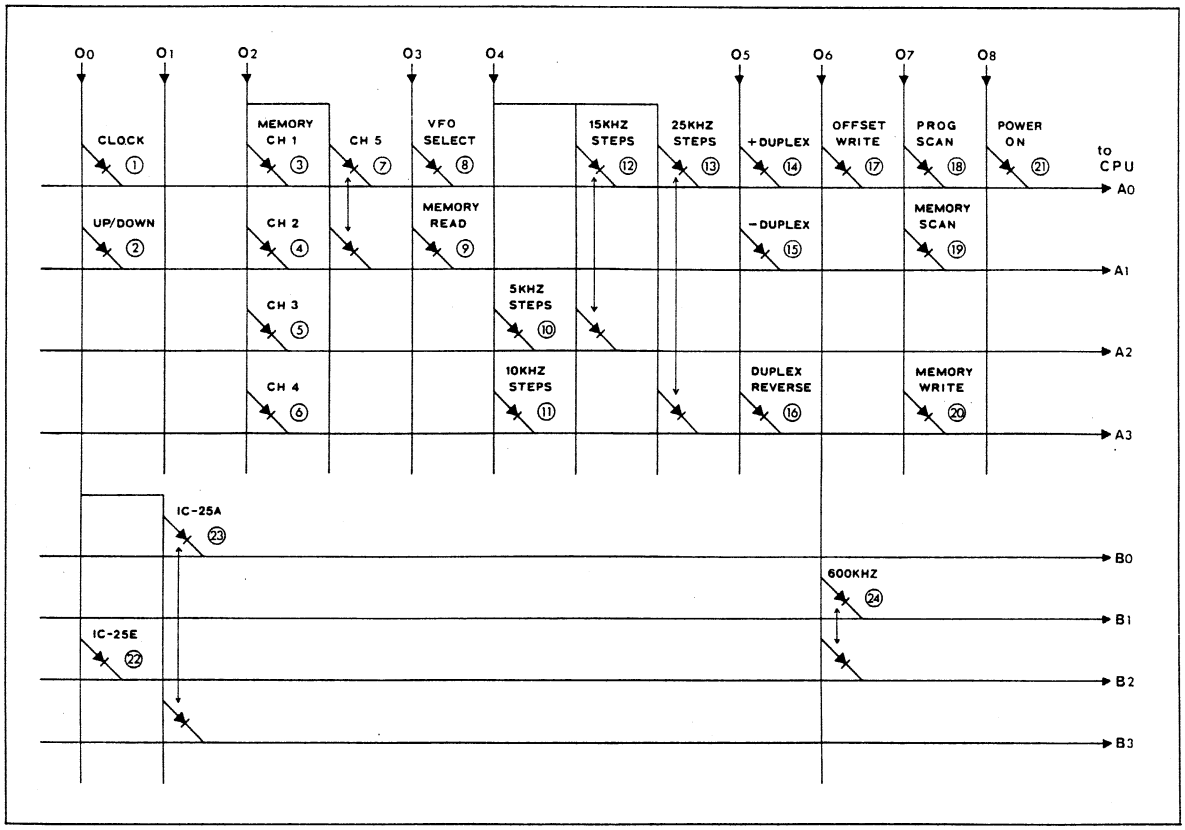
OFF. So the oscillation frequency is decided by C7 only and the frequency is higher and the scan speed is fast. When a memory channel is selected (in the memory scan function), a voltage is applied to Ⓖ, Q9 is turned ON and C8 is paralleled to C7. Thus the oscillation frequency is lowered and the scan speed is slow.

In the MIC UP/DOWN function (when using an optional UP/DOWN microphone IC-HM10), as the UP button on the microphone is depressed, the Ⓑ point is grounded and the multivibrator starts oscillation. In this case, Pin 3 is grounded through D25 only and near ground level. Thus the upward scanning is selected. When the DOWN button is depressed the Ⓑ point is grounded through a 470 ohms resistor installed inside the microphone. So the voltage divided by R60 and the 470 ohms resistor, is applied to Pin 3 and the downward scanning is selected.

CPU CONTROL CIRCUIT

The CPU in the unit is a 4-bit CPU and the input terminals are A0 ~ A3 and B0 ~ B3.

Since the CPU cannot make many functions with the small number of A and B input signals, to increase the functions of the CPU, scanning E output signals and decoded O0 ~ O7 signals by IC1, and are fed to A and B input terminals through the matrix circuit. The CPU reads the relationship of E output, and A and B input signals to decide the function as follows:



① **O0 → A0 (Clock)**

This flow occurs when the frequency is moved up or down with each pulse input by turning the tuning control knob or scanning.

② **O0 → A1 (Up/Down)**
This flow occurs when the frequency is moved up. When the frequency is moved down, the O0 signal is not fed to A1.

③ **O2 → A0 (Memory Channel 1)**
This flow occurs when the VFO/MEMORY CHANNEL Switch is set at "1".

④ **O2 → A1 (Memory Channel 2)**
This flow occurs when the VFO/MEMORY CHANNEL Switch is set at "2".

⑤ **O2 → A2 (Memory Channel 3)**
This flow occurs when the VFO/MEMORY CHANNEL Switch is set at "3".

⑥ **O2 → A3 (Memory Channel 4)**
This flow occurs when the VFO/MEMORY CHANNEL Switch is set at "4".

⑦ **O2 → A0, A1 (Memory Channel 5)**
This flow occurs when the VFO/MEMORY CHANNEL Switch is set at "5".

⑧ **O3 → A0 (VFO Select)**
This flow occurs when the VFO Switch is set in "B", and the unit operates at the frequency set by "B" VFO. When the VFO Switch is set in "A", the O3 signal is not fed to A0, and the unit operates at the frequency set by "A" VFO.

⑨ **O3 → A1 (Memory Read)**
This flow occurs when the VFO/MEMORY CHANNEL Switch is set at a memory channel, and the set operates on the channel. This function is prior to the function ⑧.

⑩ **O4 → A2 (5KHz Steps)**
This flow occurs when the VFO Switch is set at "A", and the operating frequency is moved up or down with 5KHz steps.

⑪ **O4 → A3 (10KHz Steps)**
When this flow occurs, the operating frequency is moved up or down with 10KHz steps. (This mode is not used for IC-25A/E.)

⑫ **O4 → A0, A2 (15KHz Steps)**
When this flow occurs, the operating frequency is moved up or down with 15KHz steps. (This mode is used for VFO B of IC-25A.)

⑬ **O4 → A0, A3 (25KHz Steps)**
When this flow occurs, the operating frequency is moved up or down with 25KHz steps. (This mode is used for VFO B of IC-25E.)

⑭ **O5 → A0 (+Duplex)**
This flow occurs when the OFFSET Switch is set at "+", and the transmit frequency becomes a frequency which is added the specified offset frequency to the receive frequency.
(This mode is not used for IC-25E.)

⑮ **O5 → A1 (–Duplex)**
This flow occurs when the OFFSET Switch is set at "–", and the transmit frequency becomes a frequency which is subtracted the specified offset frequency from the receive frequency. (This mode is preset for IC-25E.)

⑯ **O5 → A3 (Duplex Reverse)**
This flow occurs when the OFFSET Switch is set at "+" or "–" and the DUPLEX MODE Switch is in "REV" position, the receive frequency becomes a frequency which is added to, the specified offset frequency or subtracted it from the original receive frequency, and the transmit frequency becomes the original receive frequency.

NOTE: In the duplex operation, if an expecting transmit frequency becomes out of the band, this frequency will remain at the original receive frequency.

⑰ **O6 → A0 (Offset Write)**
This flow occurs when the VFO/MEMORY CHANNEL is set at "VFO" position and the PRIORITY button is pushed, and the offset frequency can be reset by turning the tuning control knob.

⑱ **O7 → A0 (Programmed Scan)**
When this flow occurs, and the S/S button is depressed, the operating frequency scans between frequencies written into the Memory Channels 1 and 2. (Memory Channel 2 should be written higher frequency than Memory Channel 1, if not the scan function does not actuate.) When this flow does not occur and the S/S button is depressed, the operating frequency scans the entire band.

⑲ **O7 → A1 (Memory Scan)**
When this flow occurs, the operating frequency scans on the memory channels and the VFO's A and B.

⑳ **O7 → A3 (Memory Write)**
When a memory channel is selected and this flow occurs, a frequency of the VFO A is written into the selected memory channel.

When a VFO is selected and this flow occurs, a frequency of the other VFO is written into the selected VFO.

㉑ **O8 → A0 (Power ON)**
This flow occurs when the POWER Switch is turned ON. When this flow does not occur, the CPU is in stand by condition.

NOTE: The port B is used to initialize the CPU when the power is turned ON.

㉒ **O0 → B2**
When this flow occurs, the operating frequency range is selected between 144.000MHz and 145.995MHz. (This mode is used for IC-25E.)

㉓ **O0 → B0, B3**
When this flow occurs, the operating frequency range is selected between 143.800MHz and 148.195MHz. (This mode is used for IC-25A.)

㉔ **O6 → B1, B2**

When this flow occurs, the offset frequency is preset for 600KHz.

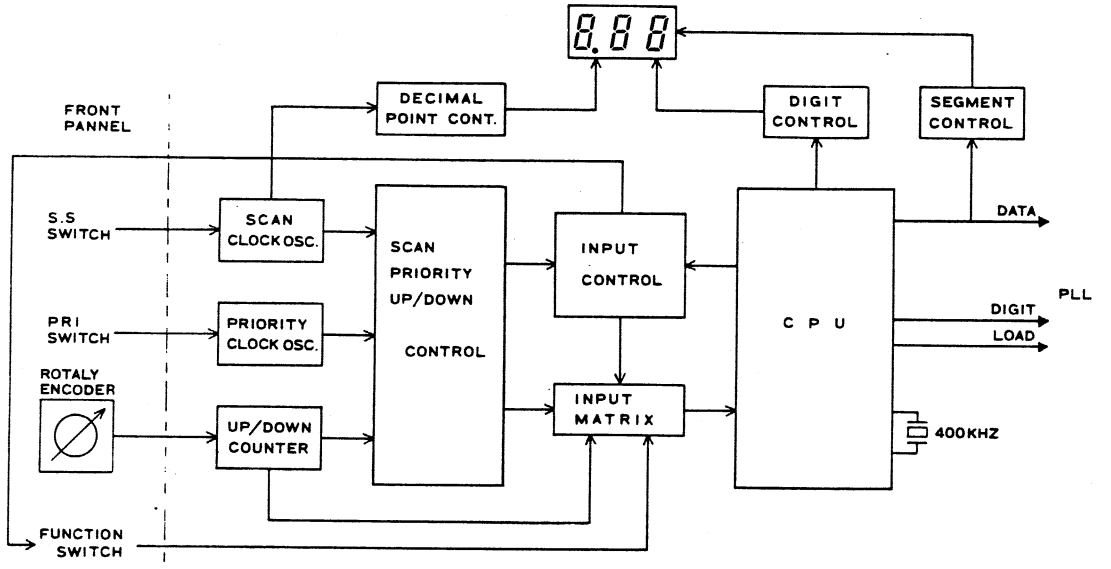
FREQUENCY CONTROL, DISPLAY AND I/O CIRCUIT

The dynamic lighting display functions with the 7-segment data output which are decoded by IC2 from BCD output at the E0 ~ E3 terminals of the CPU and the digit designation output signals at the F0 ~ F3 terminals. The decimal point is illuminated with the current through scan blinking transistor Q15, only when the digit designation signals for the 1MHz order is put out. The E0 ~ E3 terminals are timeshared for the other data output. The E0 ~ E3 terminals also put out the divide number (N) for the PLL divider, and supplied to the CPU control circuit through IC1.

When the power is turned ON, the CPU is initialized and then reads the mode setting and memorizes it. Then the CPU reads the control data from the external controller in the order of the numbers of the matrix and controls the various necessary operations. The data of the display, "A" VFO, "B" VFO, the frequency shift, step pitch, Memories 1 ~ 5, and the divide number (N) are programmed in each RAM area for the initial presetting.

Then, at the CPU output terminals E0 ~ E3, the divide number and the 5KHz shift data are put out in the BCD code. The data to designate the latch position (digit-position) are output at the CPU output D0 ~ D3 and the signals from G3 are latched as the strobe pulse in the PLL IC.

DRIVER CIRCUIT



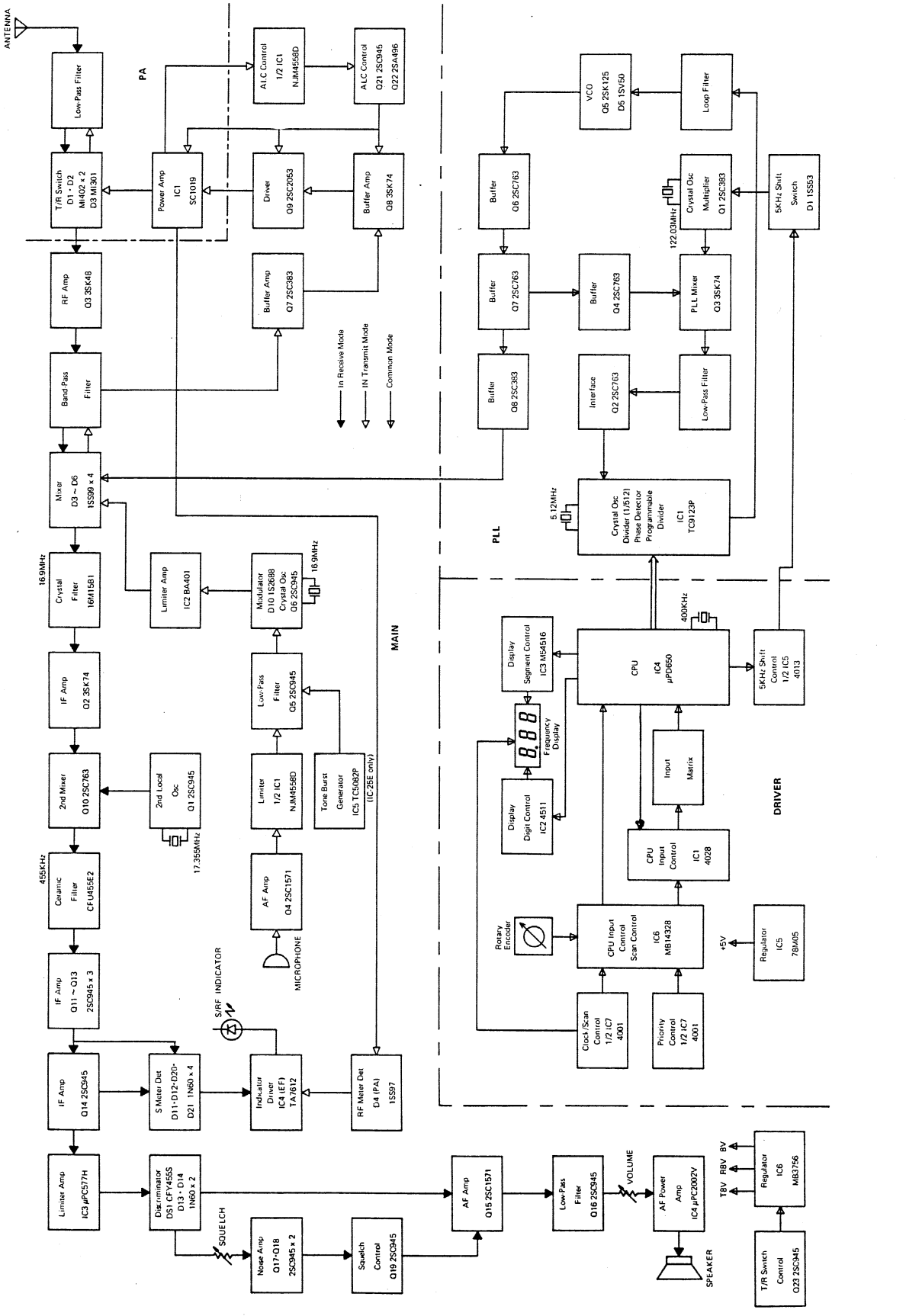
SECTION VIII TROUBLE-SHOOTING

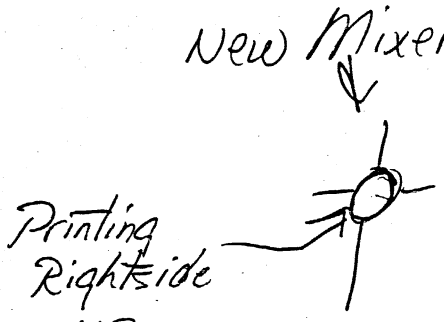
Your IC-25A/E has been tested very carefully at the factory before shipping. The chart below has been designed to help you correct any problems which are not equipment malfunctions. If you are not able to locate the problem and/or solve it through use of this chart, please contact your dealer or ICOM distributor for assistance.

Problem	Possible Cause	Solution
1. Power does not come ON when the switch is turned.	Power cord is improperly connected.	Carefully reconnect power cord.
	Power cord is connected with the polarity reversed.	Disconnect the power cord, replace the blown fuse, then reconnect the power cord observing proper polarity.
	Blown fuse.	Check for the cause, then replace the fuse with a new one.
2. No sound comes from the speaker.	VOLUME Control knob is completely counterclockwise, but not "clicked OFF".	Turn the knob clockwise to a suitable level.
	The unit is in the transmit mode, by the PTT Switch on the microphone.	Put the unit in the receive mode.
	SQUELCH setting is turned too far clockwise.	Turn the SQUELCH control counterclockwise until noise can be heard and reset it just below the threshold.
	External speaker is in use.	Check if the external speaker plug is inserted properly or if the external speaker cable is cut.
	The internal speaker cable is not connected.	Connect the speaker connection.
3. Sensitivity is low and only strong signals are audible.	The antenna feed line is cut or shorted.	Check the feed line and correct any improper condition.
4. No or low RF output.	RF Power Switch is set at the Low position.	Set the RF Power Switch to the High (normal) position.
	PTT Switch is not functioning due to bad connection of the MIC connector.	Check the connection of the MIC connector and correct any problems.
	The antenna feeder is cut or shorted.	Check the antenna feeder and correct any problems.
5. No modulation.	Bad connection of the MIC connector.	Check the connection of the MIC connector and correct any problems.
	The MIC cable is cut.	Repair the disconnected or cut wire.

Problem	Possible Cause	Solution
6. The receive mode functions properly and your signals are transmitted, but you are unable to make contact with another station.	The SIMPLEX/DUPLEX Switch is in "DUP" position. (When desiring SIMPLEX mode.)	Set the SIMPLEX/DUPLEX Switch to the "SIMP" position.
	The SIMPLEX/DUPLEX Switch is in "SIMP" position. (When desiring DUPLEX mode.)	Set the SIMPLEX/DUPLEX Switch to the "DUP" position.
	Improper frequency split or input/output frequency of the repeater.	Set the proper frequency split and set the DUPLEX MODE Switch to the "NOR" or "REV" position, or the OFFSET Switch to the "+" or "–" position according to repeater input/output frequency.
7. The memorized frequencies are lost and the display shows 5.00 (IC-25A : 6.01) when power switch is turned ON.	The main switch of the power source was turned OFF or the power plug was unplugged.	Use the continuous operating power source or optional memory power source.
	The power failed (when using the AC power source).	
8. The memory scan operation does not function when the S/S Switch is pushed.	No frequency is programmed in the memory channels or the same frequency is programmed in all the memory channels.	Program the required frequencies in the memory channels following the instructions for "MEMORY CHANNEL OPERATION" on page 13.
	The VFO/MEMORY CHANNEL Switch is not in a Memory Channel position.	Set the VFO/MEMORY CHANNEL Switch in a Memory Channel position.
9. The programmed scan operation does not function when the S/S Switch is pushed.	The same frequency is pro grammed in the memory channel 1 and 2, or the programmed frequency in the memory channel 1 is higher than the one in the channel 2.	Program the low edge frequency into the memory channel 1, and the high edge frequency into the memory channel 2.
	The VFO/MEMORY CHANNEL Switch is not in the VFO position.	Set the VFO/MEMORY CHANNEL Switch in the VFO position.
10. The scan does not stop even if a signal is received.	The squelch has opened when the scan started.	Engage the squelch on a no signal frequency, then start the scan by pushing the S/S Switch.

SECTION IX BLOCK DIAGRAM





Long lead to L4

144MHz FM TRANSCEIVER

IC-25A/E

MAINTENANCE MANUAL

D3-D6
Replaced by
ND487C1 Chip

D-12 opens - Unit will
Switch offset

R57 sometimes causes
Spurs (in predriver Circuit)

SPECIFICATIONS

GENERAL

Numbers of semiconductors	:	Transistors	48
		FETs	5
		ICs	21 (IC-25A: 20)
		Diodes	89 (IC-25A: 91)
Frequency coverage	:	144.000 ~ 145.995 MHz (IC-25A: 143.800 ~ 148.195 MHz)	
Frequency resolution	:	5 kHz/25 kHz steps (IC-25A: 5 kHz/15 kHz steps)	
Frequency control	:	Microcomputer based 5 kHz step Digital PLL synthesizer Independent Dual VFO Capability.	
Frequency stability	:	Within ± 1.5 kHz	
Frequency channels	:	5 channels with any inband frequency programmable	
Usable conditions	:	Temperature:	−10°C ~ 60°C (14°F ~ 140°F)
		Operational time:	continuous
Antenna impedance	:	50 ohms unbalanced	
Power supply requirement	:	13.8V DC ± 15% (negative ground) 6A Max.	
Current drain (at 13.8V DC)	:	Transmitting	
		HIGH (25W)	Approx. 4.8A
		LOW (1W)	Approx. 1.3A
		Receiving	
		At max audio output	Approx. 0.6A
		Squelched	Approx. 0.4A
Dimensions	:	50 mm (H) x 140 mm (W) x 177 mm (D)	
Weight	:	Approx. 1.5 kg	

TRANSMITTER

Output power	:	25W (HIGH), 1W (LOW)
Emission mode	:	16F3
Modulation system	:	Variable reactance frequency modulation
Max. frequency deivation	:	5 kHz
Spurious emission	:	More than 60 dB below carrier
Microphone	:	1.3 K ohm dynamic microphone with built-in preamplifier and push-to-talk switch
Operating mode	:	Simplex, Duplex (Any inband frequency separation programmable)
Tone burst	:	1750 Hz ± 0.1 Hz (IC-25A: Not installed)

RECEIVER

Receiving system	:	Double-conversion superheterodyne	
Modulation acceptance	:	$16F_3$	
Intermediate frequency	:	1st:	16.9 MHz
		2nd:	455 kHz
Sensitivity	:	More than 30 dB S+N+D/N+D at 1μV Less than 0.6μV for 20 dB Noise quieting	
Squelch sensitivity	:	Less than 0.4μV	
Spurious response rejection ratio	:	More than 60 dB	
Selectivity	:	More than ±7.5 kHz at −6 dB point Less than ±15 kHz at −60 dB point	
Audio output power	:	More than 2.0W	
Audio output impedance	:	4 ~ 8 ohms	

FRONT PANEL

(1) VFO SWITCH

For selection of either VFO "A" or "B" for tuning.

In the "A" position, the VFO indicator illuminates and the frequency is changed in 5-kHz steps when the tuning control knob is turned. The frequency can be entered into any of the memory channels.

In the "B" position, the frequency is changed in 25-kHz steps (IC-25A: 15-kHz steps) when the tuning control knob is turned.

(2) VFO INDICATOR

This LED illuminates when VFO "A" is selected.

(3) PRIORITY INDICATOR

This LED illuminates when the priority function is switched ON.

(4) PRIORITY BUTTON

This switch is used to switch the priority function ON and OFF.

During a QSO or VFO reception, a calling channel or other desired channel can be monitored (whether the channel is in use or not) by setting the memory channel switch to that channel which has been memorized in a memory channel, and then press the priority button. The receiving frequency will thereafter automatically change to that channel for a moment every five seconds.

(5) FREQUENCY DISPLAY

The displayed frequency is the carrier frequency. The three large 7-segment LED's display the digits between 1 MHz and 10 kHz, and for 5 kHz of the operating frequency.

(6) RECEIVE INDICATOR

This LED illuminates when, during the RECEIVE mode, the squelch is opened.

(7) TRANSMIT INDICATOR

This LED illuminates in the TRANSMIT mode.

(8) VFO SCAN-FUNCTION SWITCH

This switch is used to select either full scan or program scan.

(9) S/RF INDICATOR

The seven in-line LED's indicate the S-unit and the RF output level. The digits of the S-meter represent S1 through S9 and 20 and 60 dB over S9. The RF output level meter functions only as a relative output meter; it does not indicate the wattage. These functions are automatically switched when T/R is switched.

(10) SIMPLEX/DUPLEX SWITCH

This switch is used to select either SIMPLEX operation or DUPLEX (repeater) operation.

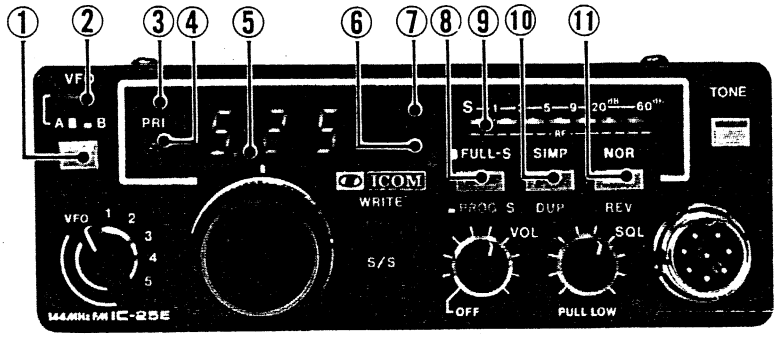
(11) DUPLEX-MODE SWITCH

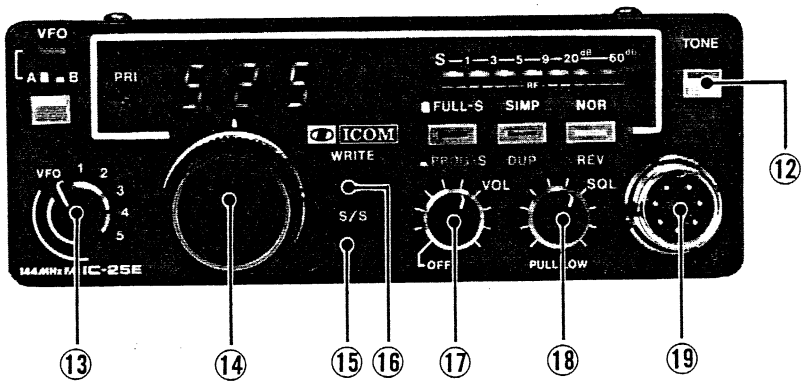
The switch is used to select the relationship of the reception frequency and the transmission frequency in the duplex mode.

In the "NOR" position, the transmission frequency is set to 600 kHz (This can be changed to any in-band frequency.) below the reception frequency. (IC-25A: The transmission frequency can be set to either above or below the reception by using the OFFSET switch.)

In the "REV" position, the reverse of the above is true for the transmission frequency and the reception frequency.

These operations can be used with the VFO or any of the memory channels.





(12) TONE CALL SWITCH (IC-25E only)

Most repeaters require a 1750-Hz tone burst for initial access. Pressing this switch for the required period for a repeater switches the unit to the transmit mode, and the tone-burst generator is activated, thus giving access to the repeater.

(12) OFFSET SWITCH (IC-25A only)

In the "+" position, the transmission frequency is set to 600 kHz (This can be changed to any in-band frequency.) above the reception frequency (when the DUPLEX MODE switch is in the "NOR" position).

In the "—" position, the transmission frequency is set 600 kHz below the reception frequency. In addition, the offset frequency can be changed to any in-band frequency (when the DUPLEX MODE switch is in the "NOR" position).

(13) VFO/MEMORY CHANNEL SWITCH

This switch is used to select either operation with the tuning control ("VFO" position) or operation with the memory channels (1 ~ 5).

(14) TUNING CONTROL KNOB

Turning this control clockwise increases the frequency, and turning it counterclockwise decreases the frequency. At the VFO "A" setting, the frequency is changed in 5-kHz steps, and at the VFO "B" setting, it is changed in 25-kHz (IC-25A: 15-kHz) steps. When this control is turned to a frequency exceeding 145.995 MHz (IC-25A: 148.195-MHz), the frequency will automatically revert to 144.000 MHz (IC-25A: 143.800 MHz). In the same way, when this control is turned to a frequency below 144.000 MHz (143.800-MHz), the frequency will automatically revert to 145.995 MHz (148.195 MHz).

(15) SCAN START/STOP BUTTON

This button is used to start and stop any of the scan functions. When it is pressed once again to restart the scan, the scan will start from the memory channel or frequency where it was stopped.

(16) MEMORY/VFO WRITE BUTTON

When this button is pressed, the VFO A frequency is "written" into a memory channel, or the frequency of one VFO is transferred to the other VFO.

(17) VOLUME CONTROL/POWER SWITCH

The power is OFF when this control is turned completely counterclockwise. The power can be switched ON by turning this control clockwise until a "click" is heard. The audio level is increased as the control is turned further clockwise.

(18) SQUELCH CONTROL/RF POWER SWITCH

The squelch threshold is increased by turning this control clockwise. Turn it completely counterclockwise to turn the squelch function OFF.

When this knob is pulled outward, the RF output power is reduced to 1 watt. When it is pressed inward to the normal position, the RF output power is returned to 25 watts.

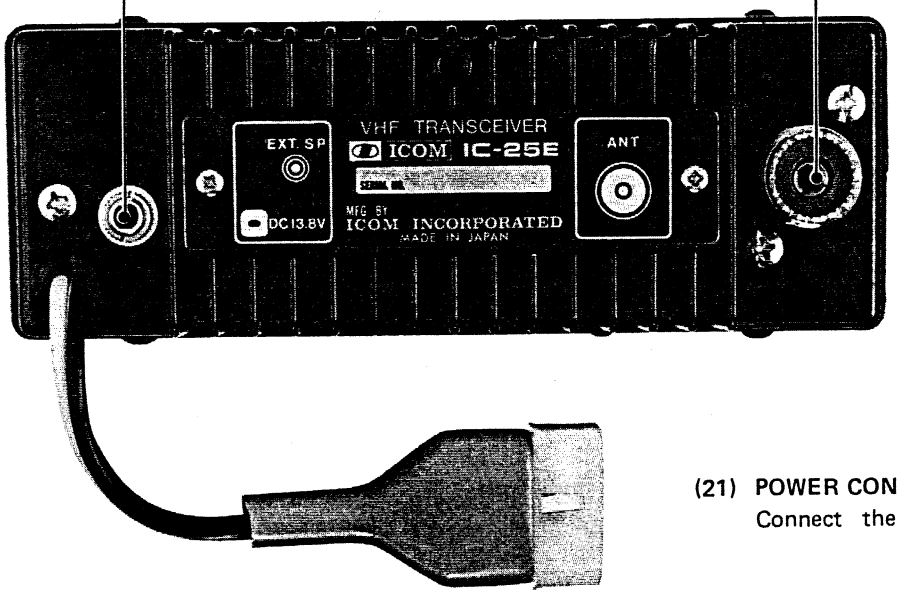
19) MIC CONNECTOR

Connect the microphone (included) to this connector.

(If you want to use a different microphone, refer to the illustration on page 5.)

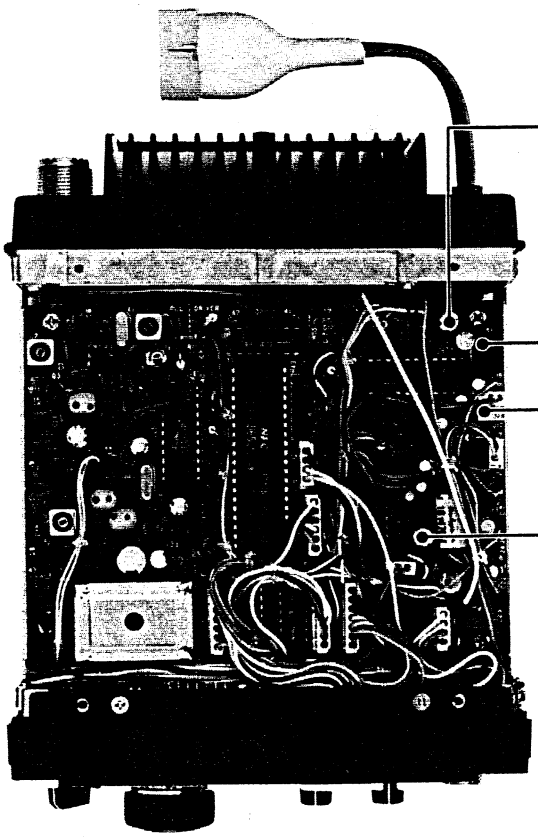
(22) EXTERNAL SPEAKER JACK
If an external speaker is used, connect it to this jack. The speaker impedance should be 4 to 8 ohms. Note that the built-in speaker will not function when an external speaker is connected.

(20) ANTENNA CONNECTOR
This is for connection of the antenna to the unit.
The impedance is 50 ohms. The connection is made with a PL-259 connector.



(21) POWER CONNECTOR
Connect the power cord (included) here.

UNDER THE TOP COVER



(25) SCAN-STOP TIME CONTROL
This control is used to set the interval of the scan automatic-stop time. It can be adjusted to the desired interval within a range of 5 to 20 seconds.

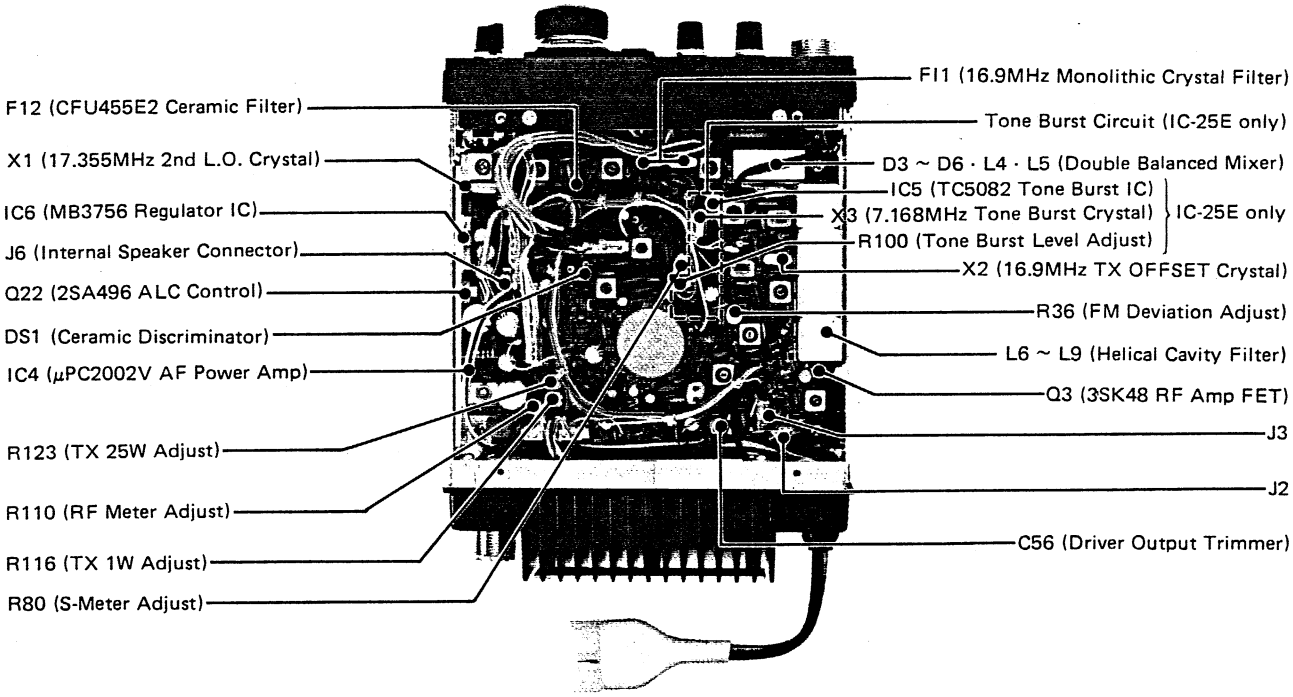
(24) SCAN-STOP TIMER SWITCH
This switch is used to switch the scan-stop interval function ON or OFF.

(26) SCAN-STOP FUNCTION SWITCHING SOCKETS
By changing the socket, the scan-stop function is switched to either "stop on a busy channel" or "stop on an unused channel".

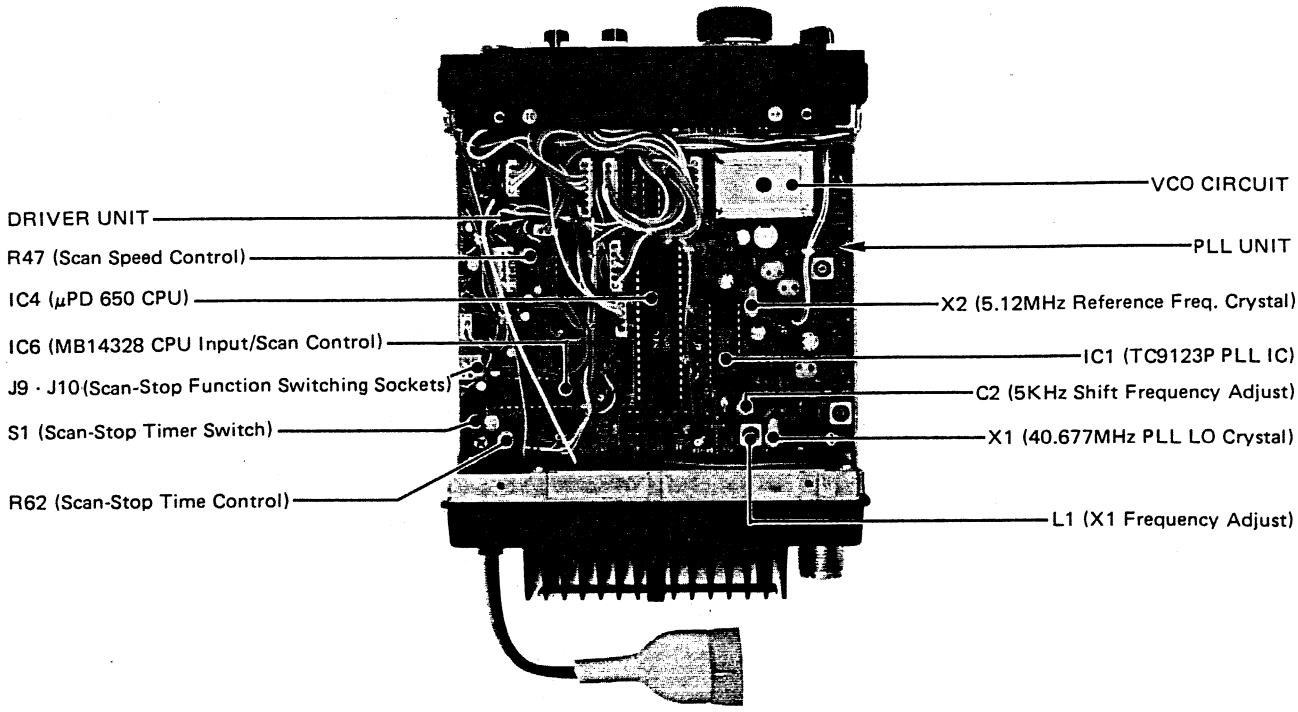
(23) SCAN-SPEED CONTROL
This control is used to set the scanning speed in any scan mode. Adjust it to the desired scanning speed.

INSIDE VIEWS

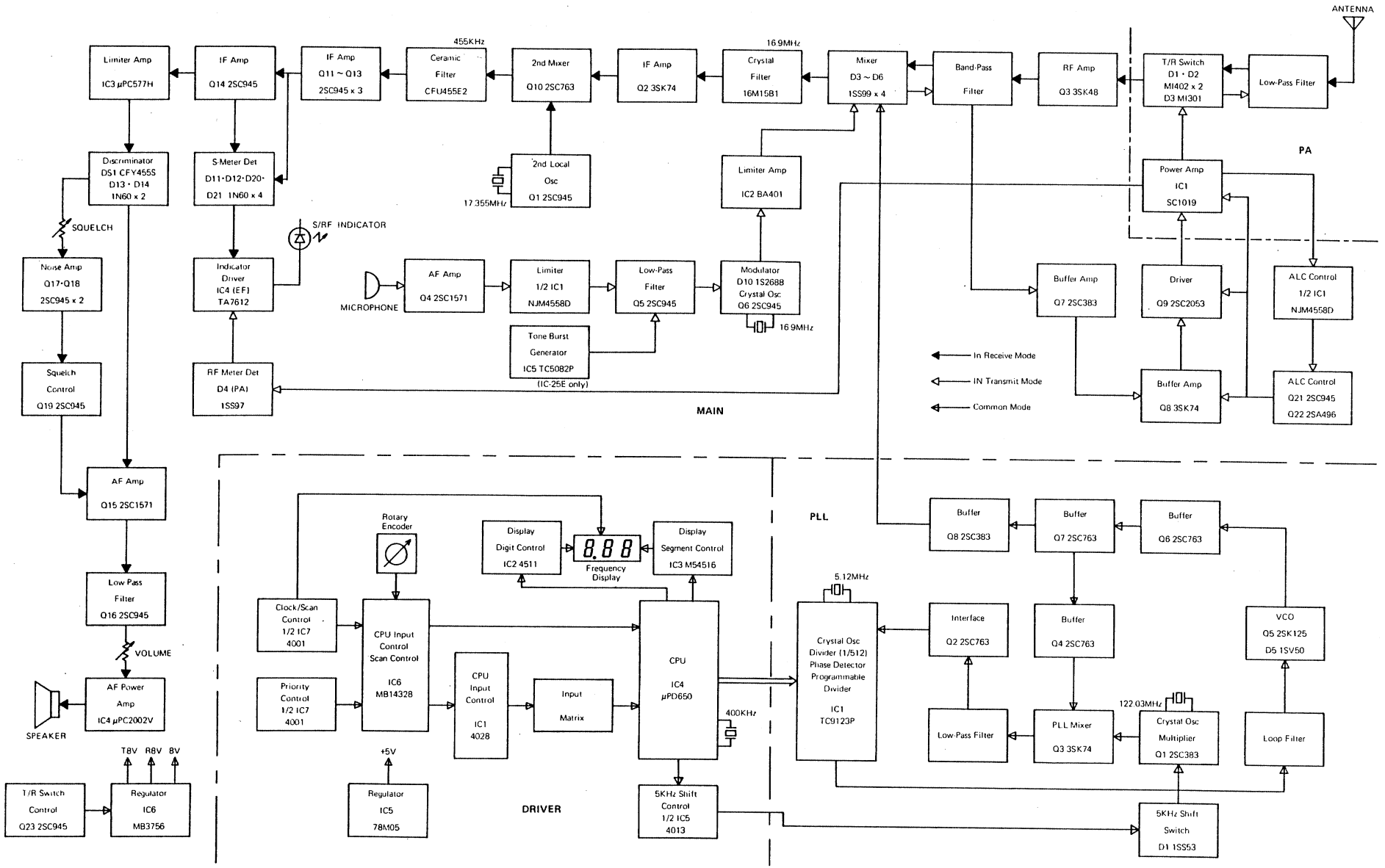
MAIN UNIT SIDE



PLL UNIT SIDE



BLOCK DIAGRAM



Model IC-25A/E is a 144-MHz FM transceiver composed of the main unit, PLL unit, driver unit, PA unit, etc.

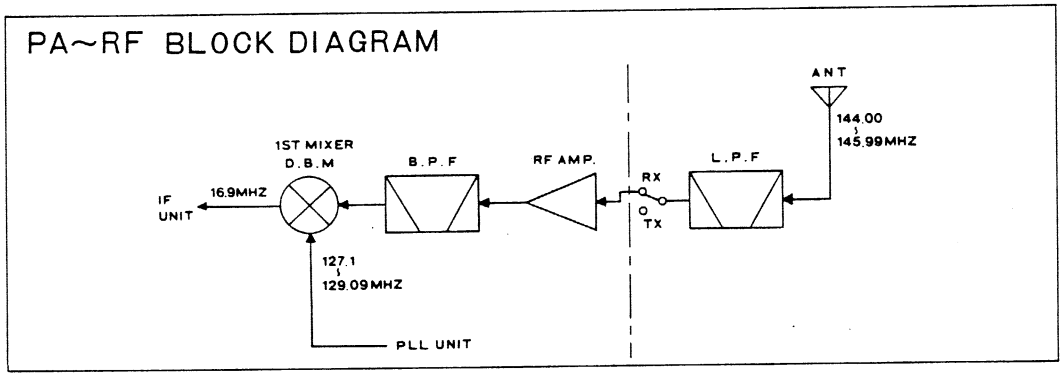
Its fundamental circuitry is the double-conversion superheterodyne type, with a 1st IF of 16.9 MHz and a 2nd IF of 455 kHz. Frequency control is made by the microcomputer (incorporated in the driver unit) and the PLL unit which it controls.

1. Receiver

(1) PA unit

The PA unit is composed of the low-pass filter, T/R switching, power amplifier circuitry, etc.

The signal input from the antenna passes through the low-pass filter (consisting of L3 ~ L5 and C13 ~ C17), and is then led to the main unit RF circuitry after passing through a constant-K π-type filter (composed of C9, L2 and C5 by D3, which is ON only during reception).



(2) Main unit (RF circuitry)

The RF unit is composed of RF amplifier, a band-pass filter, mixer circuitry, etc.

The receiving signal, which has passed from the PA unit through J2 is amplified by approximately 18 dB by MOS FET (3SK48) Q3, which features a low noise figure and intermodulation characteristics.

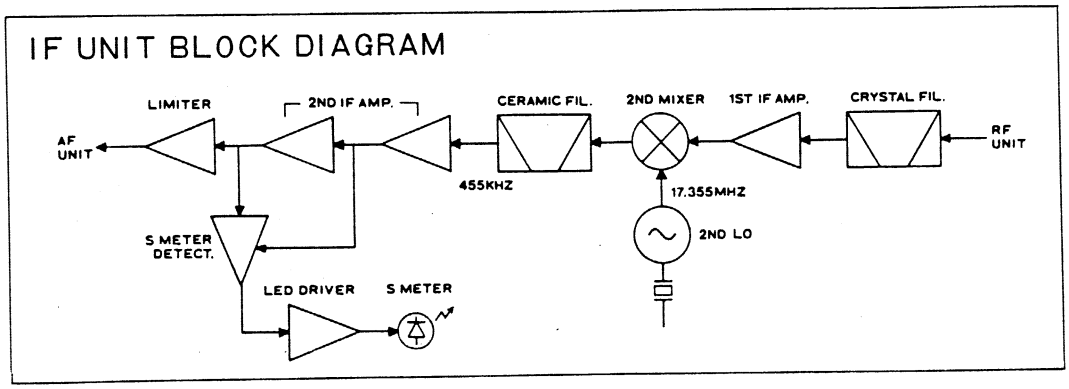
Unwanted signals are removed from the RF-amplified signal by the helical cavity band-pass filter (L6 ~ L9), after which the signal is input to the mixer circuitry of the next stage. This mixer circuitry features a wide dynamic range, and employs a double balanced mixer (DBM) composed of Schottky diodes (D3 ~ D6) which feature superb isolation between each port. The signal is mixed at this DBM with the 127 ~ 9-MHz signal input from the PLL unit, and converted to the first IF.

(3) Main unit (IF circuitry)

The IF unit is composed of a filter, the 1st IF amplifier, 2nd mixer, 2nd IF amplifiers circuitry, etc.

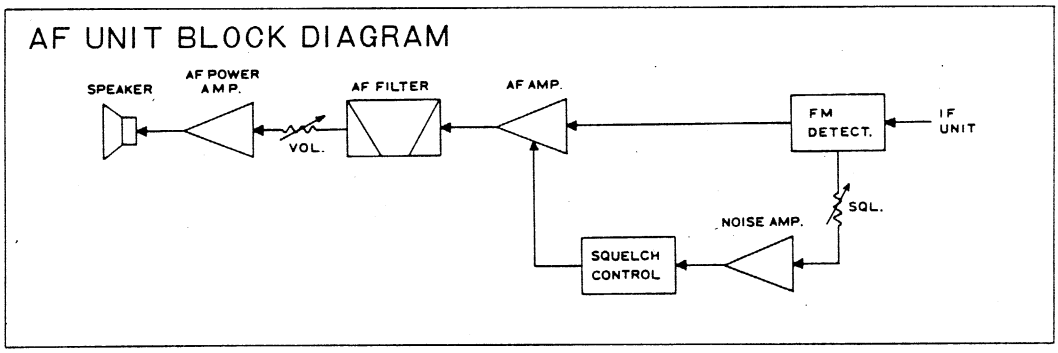
The crystal filter, which features superb selectivity, takes out only the wanted signals from the receiving signal of the RF unit after the signal has been frequency-converted by the DBM, and then, after amplification of approximately 20 dB by Q2, it is input to Q10 of the 2nd mixer circuitry.

The signal is then, at Q10, mixed with the 17.355-MHz signal oscillated by Q1, after which the 455-kHz 2nd IF signal is output. This signal output from the 2nd mixer passes through ceramic filter FI2, is IF-amplified by amplifier circuitry composed of Q11 ~ Q13, after which it passes through IC3 limiter-amplifier.



(4) Main unit (AF-amplification circuitry)

The AF-amplification unit is composed of circuitry for FM detection, AF amplification, AF power amplification, etc.
The signal input by limiter-amplifier IC3 is detected by the frequency-discrimination circuitry (composed of DS-1, D13, D14, R82 and R83), and is then de-emphasized at the integration circuitry (R85 and C78).
This signal is AF-amplified by Q15, passes through the low-pass filter formed by Q16, where unnecessary components are removed, and then, via the volume control, is amplified to the level which will drive the speaker by IC4 (for AF amplification), so that the speaker is thereby driven.



(5) S-meter circuitry

In the S-meter circuitry, a weak signal passes from the L21 center tap and through C66 where it is taken out and rectified by D11 and D12. Because strong signals are detected by D20 and D21, the circuit has a wide dynamic range.

(6) Squelch circuitry

Signals detected by discriminator DS-1 pass through the squelch control, the noise component only is amplified by Q17, and then Q19 is switched as a result of D16 and D17 detection, and the Q15 (AF amplifier) is switched.

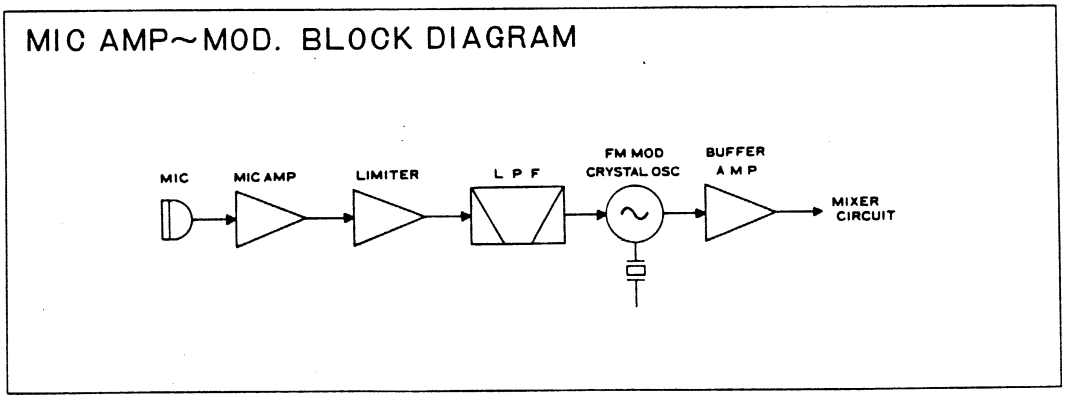
2. Transmitter

(1) Microphone amplification and modulation unit

This unit is composed of microphone amplifier, limiter-amplifier, FM modulation circuitry, etc.
Modulation is applied when 16.9 MHz is oscillated by X2 and Q6, and the output from Q5 is applied to varactor diode D10. Residual AM is removed from the modulated signal by IC2 (limiter amp.) In the next stage, after which the signal is input to the double balanced mixer (used also for reception) composed of Schottky diodes.

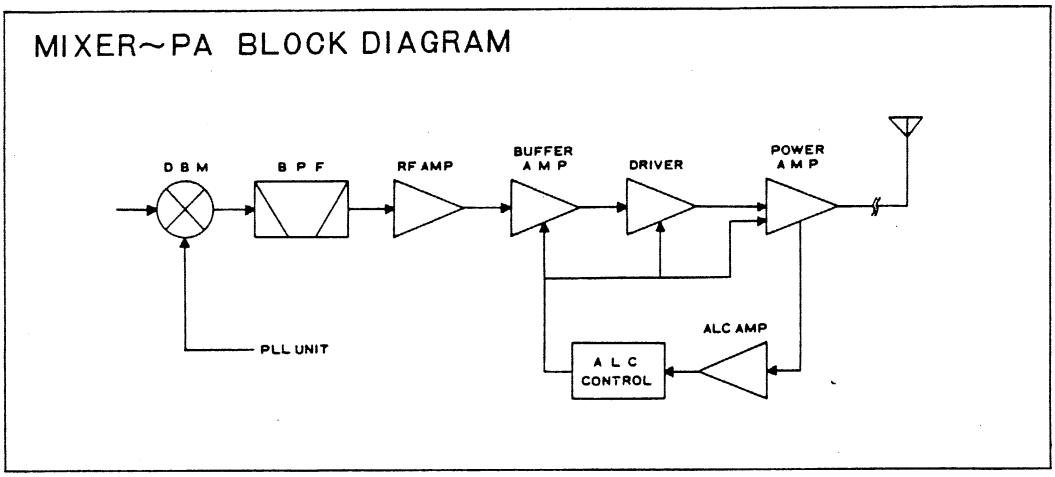
(2) Band-pass filter and Younger stage (YGR) unit

The signals mixed by the DBM pass through a band-pass filter (used also for reception) composed of L6 ~ L9, where nearby spurious signals are removed.
Signals which have passed through this filter are applied, via T/R switch D7, to Q7.
Next, they are amplified by the YGR unit (composed of Q7, Q8 and Q9), and are power-amplified to the PA module drive level (200mW).



(3) PA unit

Input signals from the YGR unit are amplified to approximately 25W by the PA module IC1 (SC1019), after which they pass, via D1 and D2 (ON during transmission), through the resonance circuitry (composed of C9 and L2). The low-pass filter (composed of L3 ~ L5 and C13 ~ C17), with Chebyshev characteristics, suppresses spurious signals by approximating the maximum attenuation points to the second and third harmonics, after which the transmission signal is supplied to the antenna's circuitry.



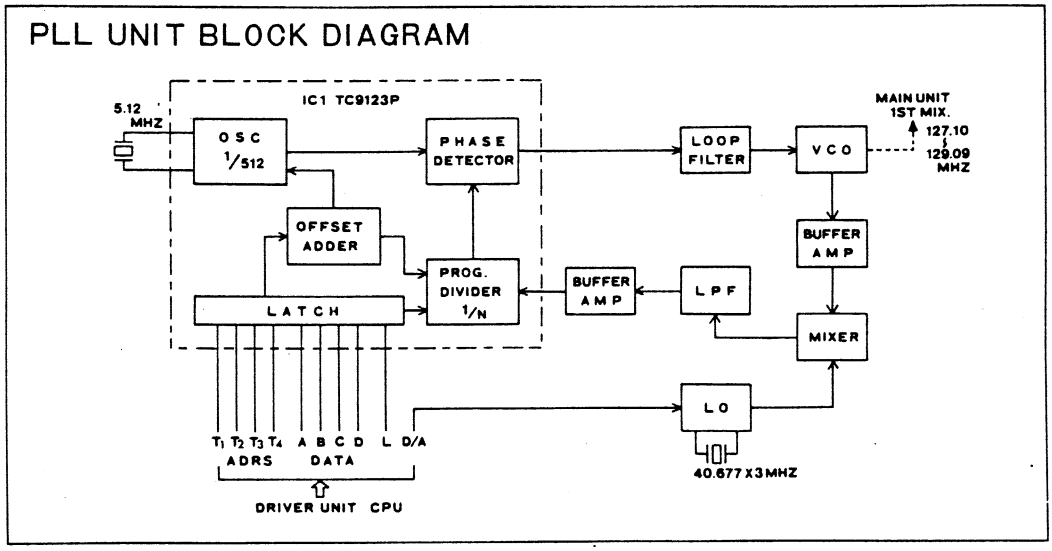
(4) ALC unit

The final-stage current of the PA section is detected as a result of the R1 voltage drop, and is input to IC1 (pin 5) of the main unit. In addition, HV line is applied to pin 6 of IC1, so that the operation voltage of the excitation amplifier (Q8 and Q9) and PA module IC1 is thereby controlled by IC1, Q21 and Q22.

(5) Power-supply unit

The power-supply circuitry IC6 is a voltage regulator IC (MB3756) to assure a stable voltage supply. An input of 13.8V is input from pin 2, and a regulated 8.2V is supplied to +8V (pin 1), R8V (pin 6) and T8V (pin 8) lines. Note that Q23 is, by stand-by muting, the IC6 control transistor.

3. PLL unit



The PLL unit of this model is mixed-down PLL circuitry controlled by the CPU of the driver unit. A frequency of 40.677 MHz is oscillated in the local-oscillator circuitry, and a frequency of 122.03 MHz (40.677 x 3) is obtained. The VCO is locked at each 10-kHz interval through the PLL frequency range of 127.10 ~ 129.09 MHz.

(1) Local-oscillator circuitry

The oscillation frequency of the local-oscillator circuitry is obtained according to the following formula:

fo: VCO output frequency
fm: local-oscillator frequency
N: programmable divider divisions (see table 1)
fi: reference frequency (10 kHz)

(1) Converted to the formula:

$fm = fo - Nfi$ ——— (2)

For a carrier frequency of 144 MHz, the VCO output frequency fo:

fo = 144 (MHz) – 16.9 (MHz) = 127.1 (MHz)

* 16.9 MHz is the first IF frequency

(2) Which is expressed as:

fm = 127.1 (MHz) – 507 x 10 (kHz)
= 127.1 (MHz) – 5.07 (MHz)
= 122.03 (MHz)

By the above, then, the local-oscillator frequency becomes 122.03 MHz at 144 MHz. The frequency oscillated by X1 and Q1 is tripled and tuned by the tuning circuitry consisting of C8 and L2, with the result that X1 (VCO crystal) oscillates a frequency of 40.676 MHz (122.03 ÷ 3).

Table 1

Freq. (MHz)	CPU output	Division N
144.00	400	507
144.01	401	508
⋮	⋮	⋮
144.99	499	606
145.00	500	607
145.01	501	608
⋮	⋮	⋮
145.99	599	706
⋮	⋮	⋮
147.00	700	807
⋮	⋮	⋮
148.00	800	907

(2) PLL mixer circuitry

A high-gain, low-noise dual-gate MOS FET is employed in mixer Q3, thereby reducing local-oscillation leakage.

Only the difference component is taken out by low-pass filter (composed of L3, C13 and C14) in the next stage. This signal is then amplified by Q2 to the level at which the programmable divider is enabled, and is then input to IC1 (pin 12).

(3) Reference frequency oscillation division, phase comparison and programmable divider

IC1 is a multi-function IC which incorporates the above functions in one package.

The reference frequency of 10 kHz oscillates 5.12 MHz by the crystal attached at IC1 (pins 20 and 21), and by a frequency division of 1/512, an accurate reference signal of 10 kHz is obtained.

Digital phase comparison of this reference signal and the signal which has been mixed-down by the PLL mixer circuitry and frequency-divided by the frequency division N of the programmable divider is made by the phase comparator, and the result is output to pin 16.

As for the programmable divider input, the frequency data (BCD code) output from the CPU goes to the A ~ D terminals (pins 6 ~ 9), the digit-assigned data is prepared for T1 ~ T3 (pins 2 ~ 4), and the readout is performed, according to the timing of the load enable pulse (L terminal), in the order beginnig from the most-significant digit.

Note that, because the counter offset of this IC is +107, the frequency and divider frequency division N become just as shown in table 1.

(4) Loop filter circuitry

The phase comparator output, taken from pin 16 of IC1, pulses in accordance with the phase difference, and, for that reason, the harmonic component and noise component are removed, together with DC conversion, as the signal passes through the lag-lead filter (composed of R26, R27, R28, C28, C29 and C31). When the output voltage is rapidly changed by a large value by jumping the frequency from the upper to lower band edges or vice versa, D3 or D4 is turned ON and the output signal does not pass through R26, and C29 is charged directly, with the result that response becomes quicker.
In addition, so that there will be response to the positive and negative pulses from the phase comparator, each is attached at reverse polarity. And, in constant operation, D3 and D4 are OFF, and the loop filter width is narrow, so that there is little influence by surrouding noise, etc.

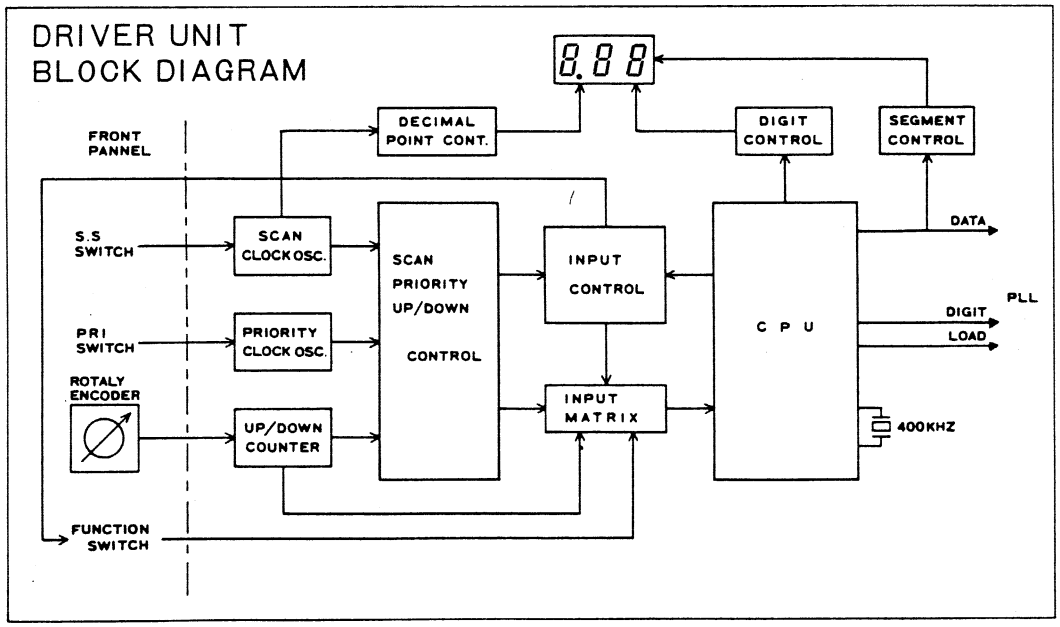
(5) VCO and buffer-amplification circuitry

The voltage changed to DC by the loop filter is supplied to varactor diode D5 of VCO circuitry, and is subjected to control the oscillation frequency. This VCO is a Colpitts type of oscillation circuitry consisting of Q5 and a tuned circuit, and the signal is buffer-amplified by Q6 and Q7 in the next stage. Because the VCO output is used as the 1st local oscillator signal for transmission and reception, the impedance is matched with DBM, and the signal is amplified until the conversion loss of DBM is minimized by Q8.
In addition, the output taken from the center tap of L10 passes through isolation amplifier Q4, and is injected at the second gate of Q3 PLL mixer, thereby reducing leakage from the PLL local oscillator.

(6) Transmission muting circuitry

When the lock is unlocked, pin 18 of IC1 becomes ground level. By taking advantage of this, unwanted waves are prevented by stopping T8V of the main unit from being applied.

4. Driver unit



The driver unit, the CPU, as the main device, is composed of circuitry for CPU input control, input matrix, display, etc.
The up/down and clock signals obtained from the rotary encoder (directly coupled to the tuning control knob on the front panel) are sent in order to the CPU. These signals are handled at the CPU according to the program, and display data and frequency control data are sent to the frequency display and the PLL unit.

Main functions of logic unit IC's transistors and diodes

IC1	Conversion of BCD code to 10 digits; Q output
IC2	For display; BCD code conversion to 7-segment code
IC3	Transistor array; display digit control
IC4	CPU
IC5	CPU reset
IC6	Input control; control of sensor data, mic up/down data, timer, priority, scan, etc.
IC7	2 input NOR x 4; unstable multi-vibrator for priority and scanning
IC8	INV x 6; control of busy/unused, VFO5, etc.
Q1 & Q2	Memory scan ⟷ full/prog. scan switching
Q4	Power ON (CPU)
Q5	For memory read
Q6	For priority release at VFO
Q7	For priority start at memory ch.
Q8	For auto-stop during priority operation
Q9	For scan speed reduction during memory ch.
Q10	For scan clock and sensor input
Q12	For control of CK and UD (IC6 output)
Q13	For timer
Q14	For S power supply
Q15 & Q19	For decimal point flashing during scanning
Q16 & Q17	For 5V during VFO operation
D1 & D4	Memory ⟷ full/prog. scan switching
D1, D3 & D6	For voltage drop prevention
D9 & D10	For offset frequency setting during initial operation
D14	For priority auto-stop
D24	For decimal point flashing during scanning
D27	1 count when scan stops
D32 & D33	For load reduction during initial operation
D34	For prevention of latch-up
D36	For band setting during initial operation

Operation of logic unit IC6 (MB14025)

This IC is a custom LS type TTL, with ICOM's own unique circuitry in a 22-pin plastic package. Its main functions are the scan and input controls and interface for IC4 (CPU).

This IC controls each operation by the clock input to pin 14 (STM).

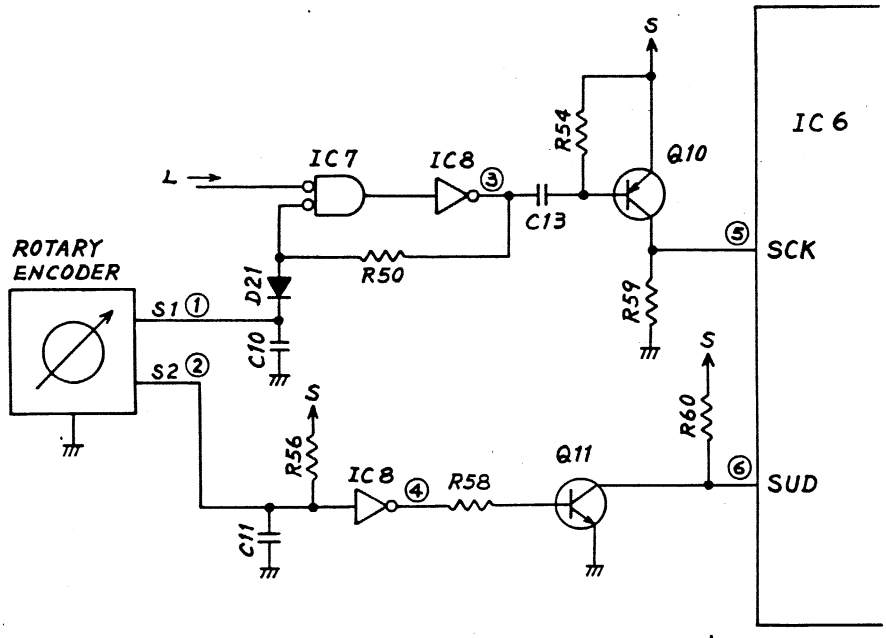
Pin	Name	Operation
1.	N.C.	Not used
2.	N.C.	Not used
3.	SUD	Sensor data up/down and scan input control
4.	SCK	Sensor data count and scan input control
5.	SCO	Output of S/S input (pin 8)
6.	MSL	For reset
7.	MCL	For reset
8.	S/S	S/S switch input
9.	RSW	Internal latch input
10.	SEL	Timer ON/OFF input
11.	GND	Ground
12.	BUSY	Used as ground
13.	SQL	Squelch input
14.	STM	Custom clock input
15.	ITI	Timer input
16.	ITO	Timer output
17.	RIC	Internal latch output
18.	RLD	For PRIO LED
19.	RCK	Control of up (pin 20) and CK (pin 21)
20.	UD	SUD output
21.	CK	SCK output
22.	+Vcc	Power supply (+4.5 ~ 5.5 V)

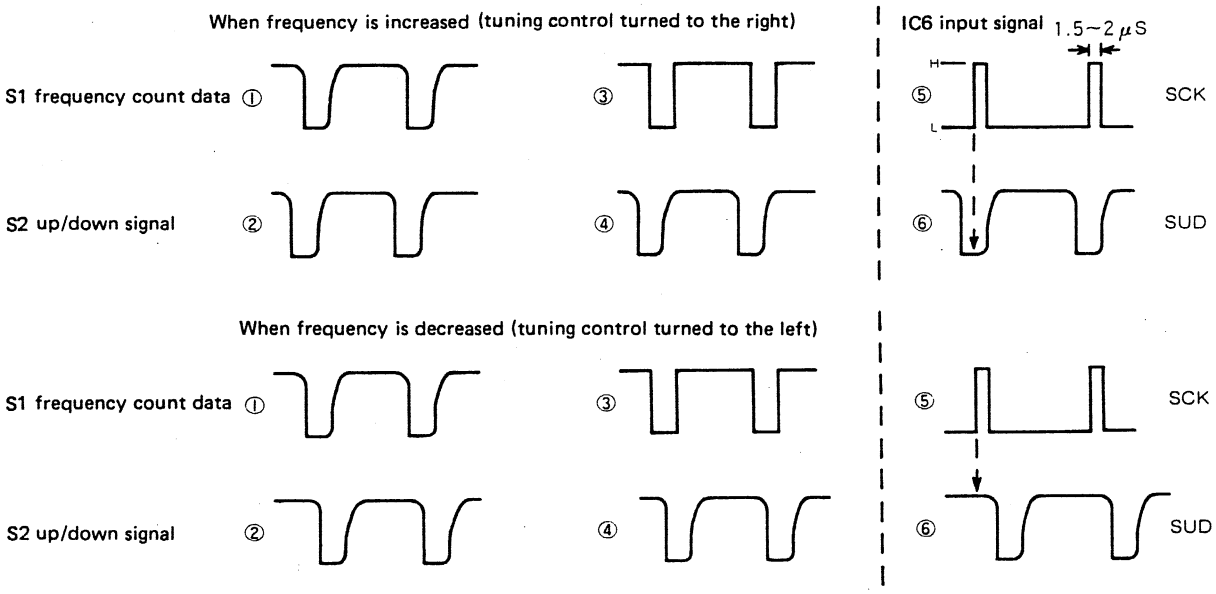
(1) Up/down, scan and external up/down control circuitry

The signals (data) generated by operation of the tuning control knob, the scan start/stop button, microphone scan, etc., pass through the pulse-generation circuitry (consisting of IC7, IC8, Q9, Q10 and Q11), the waveform-shaping circuitry, and the A/D conversion circuitry, and are then input to the input control TTL IC (IC6), developed by ICOM with its own unique program written in.
AT IC6, these input data are quickly and precisely fed to the CPU.

Frequency up/down circuitry

By turning the tuning control knob clockwise or counterclockwise, signal S1 (for counting the frequency), and signal S2 (up or down) which distinguishes the turning direction are generated at the rotary encoder. S1 and S2 have a 90° phase difference, so that S2 is advanced from S1 when the tuning control is turned to the right, and is delayed when it is turned to the left.
The S1 signal (1) is integrated by the rotary encoder's internal resistor (approx. 600Ω) and C10, and then, after removing contact chattering, it is formed into a perfectly square wave by the Schmitt circuitry (consisting of IC7 and IC8), is differentiated at (3) C13 and R54, and is input to the IC6 SCK with a pulse width of 1.5 to 2μS. An addition (if the tuning control was turned to the right) or subtraction (if turned to the left) of an initialized 5 kHz or 25 kHz (IC-25A: 15 kHz) occurs for each pulse input at the SCK.
The S2 signal, which makes addition or subtraction, is integrated by the encoder's internal resistor and C11, and then, after chattering has been removed, the signal (4) is input at SUD (6) IC6.
When the S1 pulse is input to the SCK, the action will be an addition (up) if SUD (S2 pulse) is H level, or subtraction (down) if the pulse is L level.

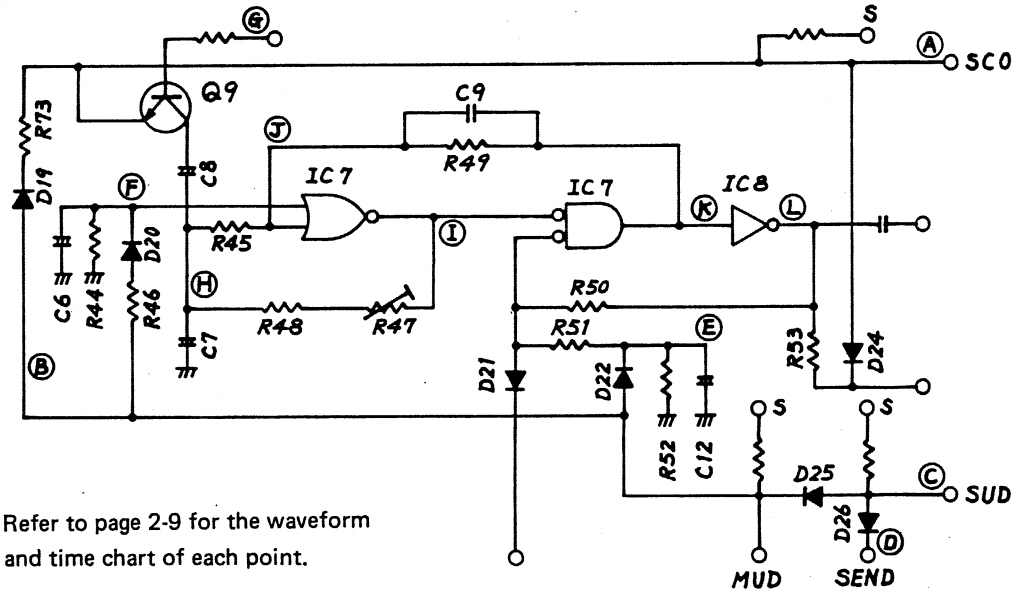




- **Microphone up/down and scan control circuitry**

The voltage of SCO is reduced when the scan start/stop button is pressed, and because the voltages of (F) and (E) are reduced as a result, the multi-vibrator (IC7) oscillates. At this time, SUD becomes the H level according to the voltage across R73 and the junction voltage of D19 and D25, and the down-scan action is activated. Because the time-constants of C6 and R44 and of C12 and R52 differ, continuous scan starts after the first count of one.

As for memory scan, the scan speed becomes slower because C7 and C8 are in parallel. Note that R47 is the control for adjustment of scan speed.
Microphone up/down is accomplished in the same way. When it is up, only the junction voltage of D25 is applied to the SUD terminal, and, when it is down, a voltage divided by R60 and 470Ω (H-level) is applied to the SUD.
D26 is a diode which stops the scan operation during transmission. Actually, microphone up-scanning only is possible during transmission.



* Refer to page 2-9 for the waveform and time chart of each point.

Priority control circuitry

When the power is turned on, IC6's RSW, RIC and RLD become H level. When the VFO/MEMORY CHANNEL switch is set to the VFO position, the Q7 base becomes L level, causing Q7 to switch OFF, so that RSW will not become L level even if the priority button is pressed.

When the VFO/MEMORY CHANNEL switch is set to a memory channel (1 ~ 5), Q7 is switched ON, and when the priority button is pressed once, an L pulse enters RSW, and the priority circuitry becomes ON. In this condition, both RIC and RLD become L level.

When RIC becomes L level, the IC7 (A) and (B) oscillation circuitry operates.

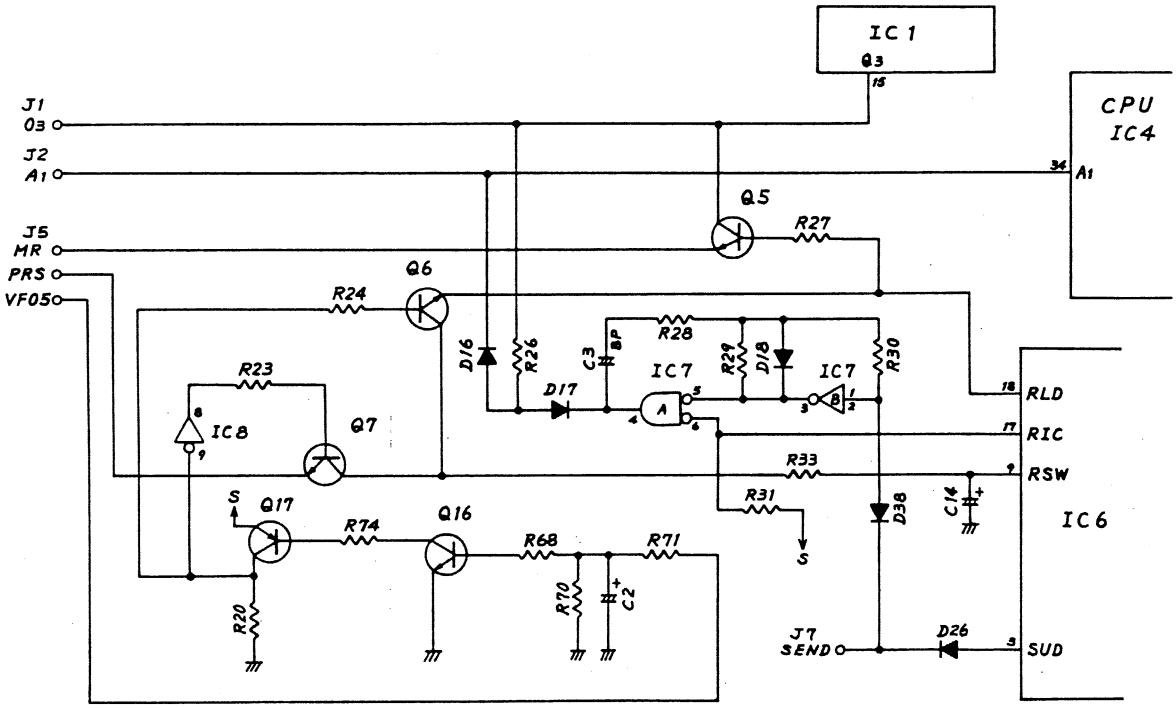
When RLD is L level, Q5 is switched OFF, and, unless pin 4 of IC7 becomes H level, the condition is of VFO A or B.

When pin 4 of IC7 becomes H level, the flow in the input matrix (consisting of R26 and D16) becomes $Q_3 \rightarrow A_1$, and the designated memory read-out occurs.

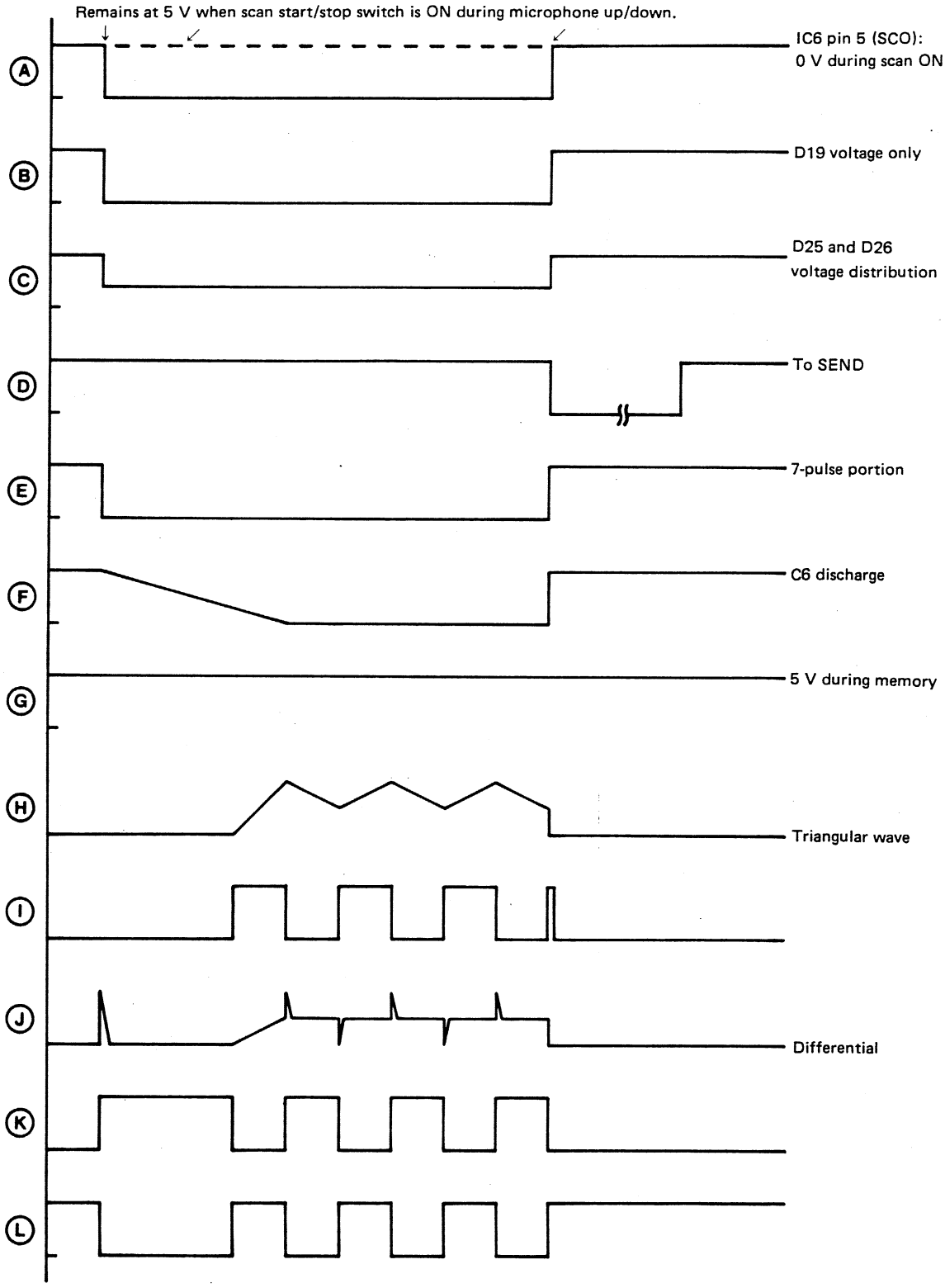
When transmission occurs during the priority condition, SUD is changed to L level by D26, and, as a result, RIC becomes H level. As a consequence, the oscillation of IC7 (A) and (B) stops, and pin 4 of IC7 becomes L level. However, because the level of RLD is maintained even during a condition of oscillation, the priority LED remains illuminated.

When the unit changes back to reception, RIC becomes L level, and IC7 (A) and (B) again resume their oscillation.

When, during the priority condition, the VFO/MEMORY CHANNEL switch is switched from the memory channel to VFO, the Q6 base changes from L level to H level, so that RSW is changed to L level by Q6, and the priority condition is released.

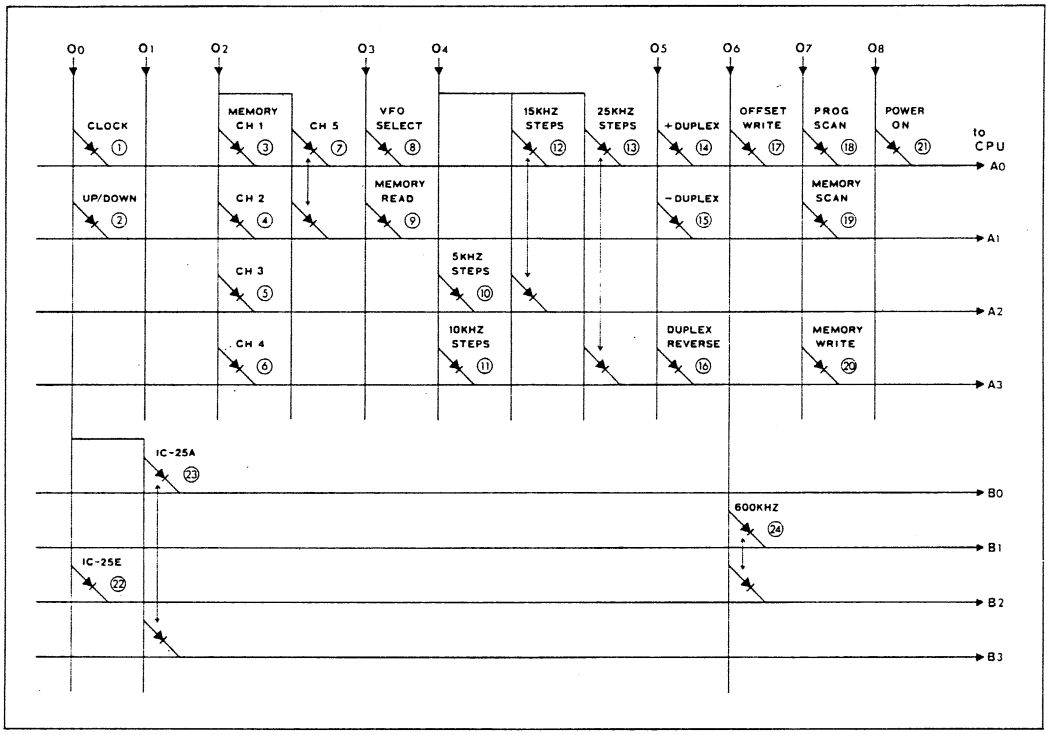


Scan operation when scan start/stop switch is ON



(2) CPU input-control and matrix circuitry

In order for the CPU to catch the various input data activated by the switches and buttons on the front panel, others for up/down and scan, input matrix circuitry and IC1 for input control are incorporated. Input data pass through this circuitry and are input to the CPU. When, however, there are many input data, the 4-bit configuration limits discrimination to 16, so that data discrimination is performed by a time-sharing operation by a timing pulse (Q0 ~ Q8) sent out from IC1 as data pass through input-control IC6.



(1) O0 → A0 (Clock)
This flow occurs when the frequency is moved up or down with each pulse input by turning the tuning control knob or scanning.

(2) O0 → A1 (Up/Down)
This flow occurs when the frequency is moved up. When the frequency is moved down, the O0 signal is not fed to A1.

(3) O2 → A0 (Memory Channel 1)
This flow occurs when the VFO/MEMORY CHANNEL Switch is set at "1".

(4) O2 → A1 (Memory Channel 2)
This flow occurs when the VFO/MEMORY CHANNEL Switch is set at "2".

(5) O2 → A2 (Memory Channel 3)
This flow occurs when the VFO/MEMORY CHANNEL Switch is set at "3".

(6) O2 → A3 (Memory Channel 4)
This flow occurs when the VFO/MEMORY CHANNEL Switch is set at "4".

(7) O2 → A0, A1 (Memory Channel 5)
This flow occurs when the VFO/MEMORY CHANNEL Switch is set at "5".

(8) O3 → A0 (VFO Select)
This flow occurs when the VFO Switch is set in "B", and the unit operates at the frequency set by "B" VFO. When the VFO Switch is set in "A", the O3 signal is not fed to A0, and the unit operates at the frequency set by "A" VFO.

(9) O3 → A1 (Memory Read)
This flow occurs when the VFO/MEMORY CHANNEL Switch is set at a memory channel, and the set operates on the channel. This function is prior to the function (8).

(10) O4 → A2 (5KHz Steps)
This flow occurs when the VFO Switch is set at "A", and the operating frequency is moved up or down with 5KHz steps.

(11) O4 → A3 (10KHz Steps)
When this flow occurs, the operating frequency is moved up or down with 10KHz steps.
(This mode is not used for IC-25A/E.)

(12) O4 → A0, A2 (15KHz Steps)
When this flow occurs, the operating frequency is moved up or down with 15KHz steps.
(This mode is used for VFO B of IC-25A.)

(13) O4 → A0, A3 (25KHz Steps)
When this flow occurs, the operating frequency is moved up or down with 25KHz steps.
(This mode is used for VFO B of IC-25E.)

(14) O5 → A0 (+Duplex)
This flow occurs when the OFFSET Switch is set at "+", and the transmit frequency becomes a frequency which is added the specified offset frequency to the receive frequency.
(This mode is not used for IC-25E.)

(15) O5 → A1 (–Duplex)
This flow occurs when the OFFSET Switch is set at "–", and the transmit frequency becomes a frequency which is subtracted the specified offset frequency from the receive frequency.
(This mode is preset for IC-25E.)

(16) O5 → A3 (Duplex Reverse)
This flow occurs when the OFFSET Switch is set at "+", or "–" and the DUPLEX MODE Switch is in "REV" position, the receive frequency becomes a frequency which is added to, the specified offset frequency or subtracted it from the original receive frequency, and the transmit frequency becomes the original receive frequency.

NOTE: In the duplex operation, if an expecting transmit frequency becomes out of the band, this frequency will remain at the original receive frequency.

(17) O6 → A0 (Offset Write)
This flow occurs when the VFO/MEMORY CHANNEL is set at "VFO" position and the PRIORITY button is pushed, and the offset frequency can be reset by turning the tuning control knob.

(18) O7 → A0 (Programmed Scan)
When this flow occurs, and the S/S button is depressed, the operating frequency scans between frequencies written into the Memory Channels 1 and 2. (Memory Channel 2 should be written higher frequency than Memory Channel 1, if not the scan function does not actuate.)
When this flow does not occur and the S/S button is depressed, the operating frequency scans the entire band.

(19) O7 → A1 (Memory Scan)
When this flow occurs, the operating frequency scans on the memory channels and the VFO's A and B.

(20) O7 → A3 (Memory Write)
When a memory channel is selected and this flow occurs, a frequency of the VFO A is written into the selected memory channel.
When a VFO is selected and this flow occurs, a frequency of the other VFO is written into the selected VFO.

(21) O8 → A0 (Power ON)
This flow occurs when the POWER Switch is turned ON. When this flow does not occur, the CPU is in stand by condition.

NOTE: The port B is used to initialize the CPU when the power is turned ON.

(22) O0 → B2
When this flow occurs, the operating frequency range is selected between 144.000MHz and 145.995MHz. (This mode is used for IC-25E.)

(23) O0 → B0, B3
When this flow occurs, the operating frequency range is selected between 143.800MHz and 148.195MHz. (This mode is used for IC-25A.)

(24) O6 → B1, B2
When this flow occurs, the offset frequency is preset for 600KHz.

(3) CPU and output

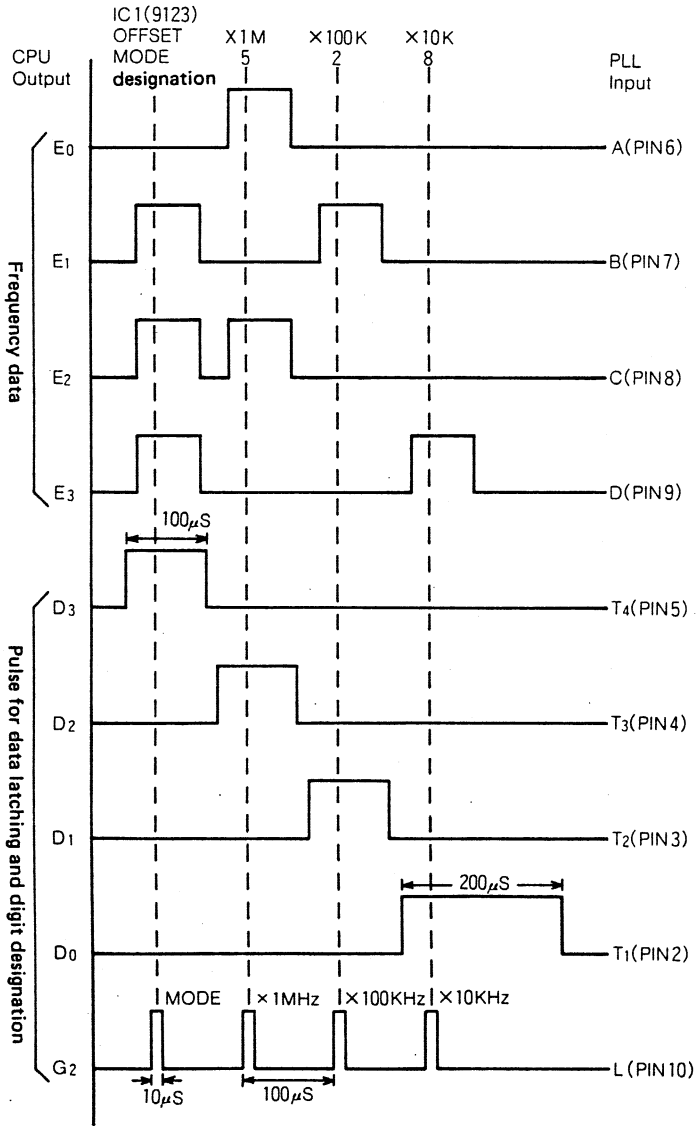
The CPU performs several operations depending on the programs written into it: initial setting, memorization, calculation, and output processing. The data input from terminals A0 ~ A3 and B0 ~ B3 are instantaneously processed according to the program. The data are then output from output terminals E0 ~ E3, F0 ~ F3 and D0 ~ D3, and the individual data are then sent on to frequency display and PLL unit. The data output from terminals F0 ~ F3 are the frequency data, and are displayed, via IC2 (for display drive), on the display. These data are also sent to IC1 (A ~ D terminals) of the PLL unit, there becoming the PLL frequency data. IC2 converts the CPU output data to character display segment (a ~ g) data, and tranfers the data to the display. IC3, based upon the data output from F0 ~ F2 of the CPU, designates the display digits.

The output data from D0 ~ D3 are sent to IC1 of the PLL unit, and are there used to designate the frequency digits. Note that the following time chart should be used as reference concerning the relationship between the F0 ~ F3 and D0 ~ D3 output and the PLL.

CPU → PLL frequency data transfer time chart

- Frequency data are sent from E0 ~ E3 of the CPU to terminals A ~ D of IC1 (TC9123P) of the PLL.
- The digit signal to the PLL is output from D0 ~ D3 of the CPU, and is input at T1 ~ T4 of the PLL IC1.
- Load pulses are sent out one after another from G2 of the CPU, and the data are latched according to the timing of the pulses.

Example: FM 145.280MHz



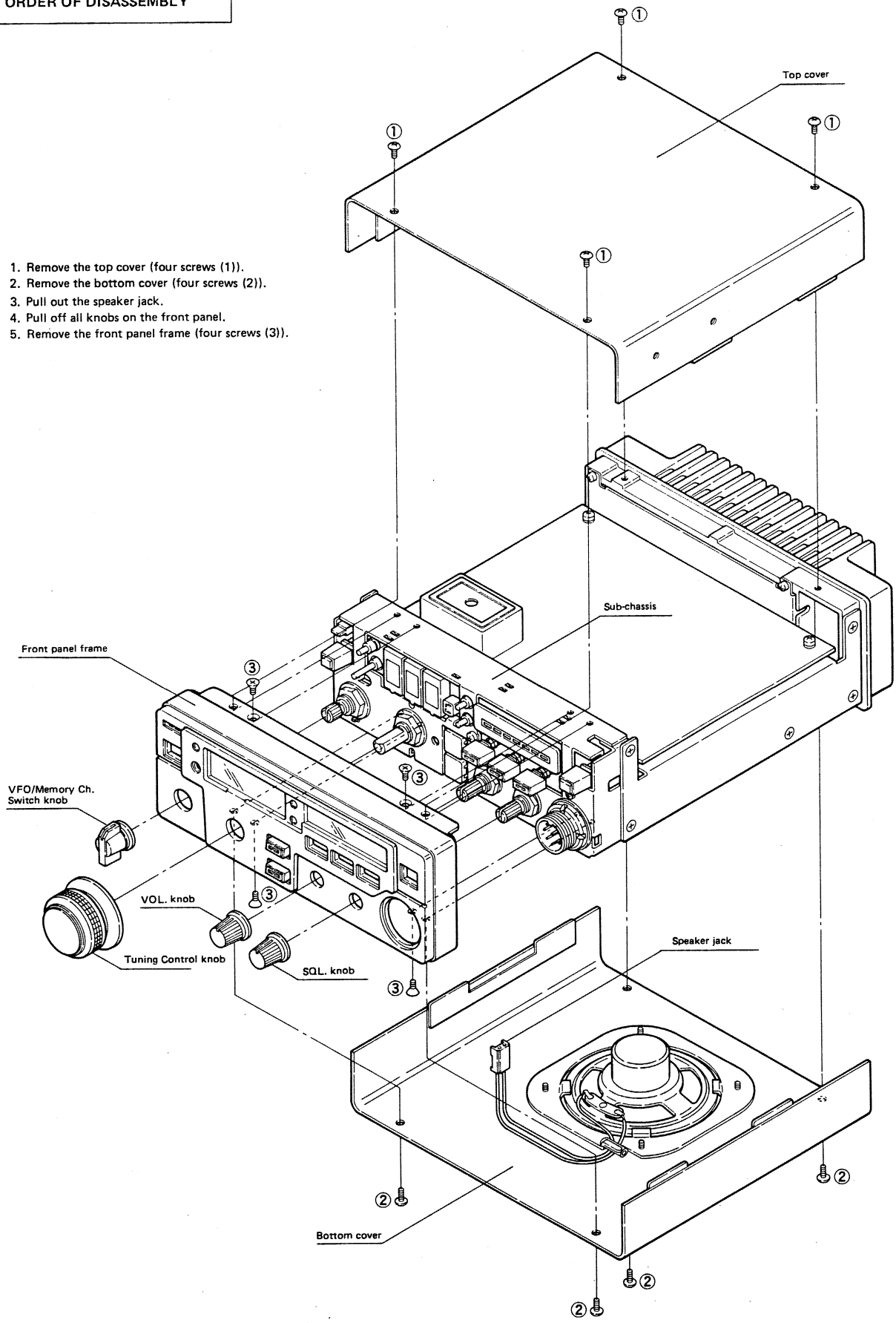
Logic unit IC's

The IC's used in the logic unit are TTL (IC6 only) and C-MOS (except IC6).
Because it is difficult to check with a tester each part which operates digitally because of the pulse signals, it is very important to know the operation timing of each part, and to know the H or L level operation points.
The IC threshold voltages are as follows:

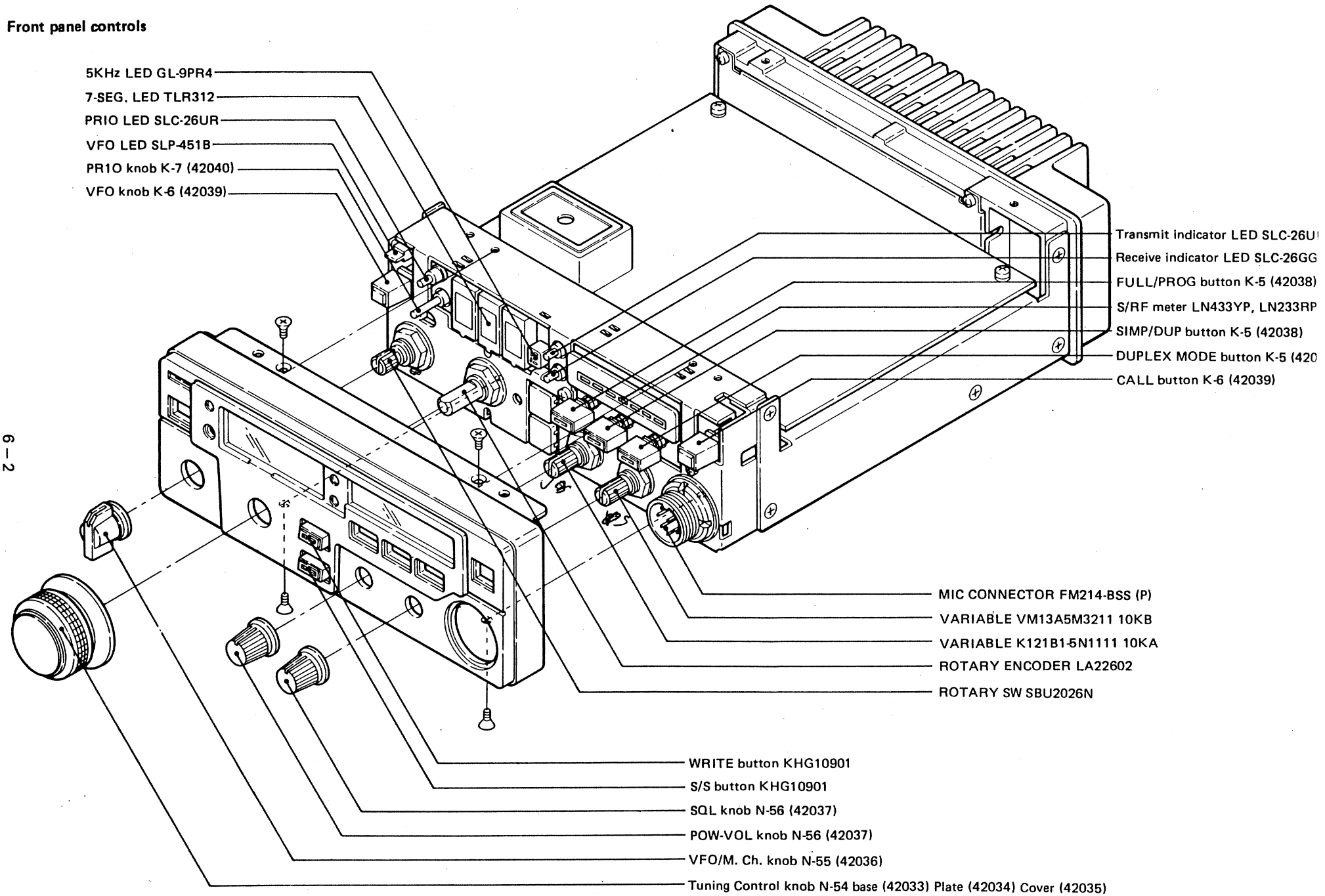
IC6 (TTL)	Vcc: 5V
Threshold:	1.5V
L level input (max.):	0.8V
H level input (min.):	2.0V
Except IC6 (C-MOS)	VDD: 5V
Threshold:	2.5V
L level input (max.):	1.5V
H level input (min.):	3.5V

ORDER OF DISASSEMBLY

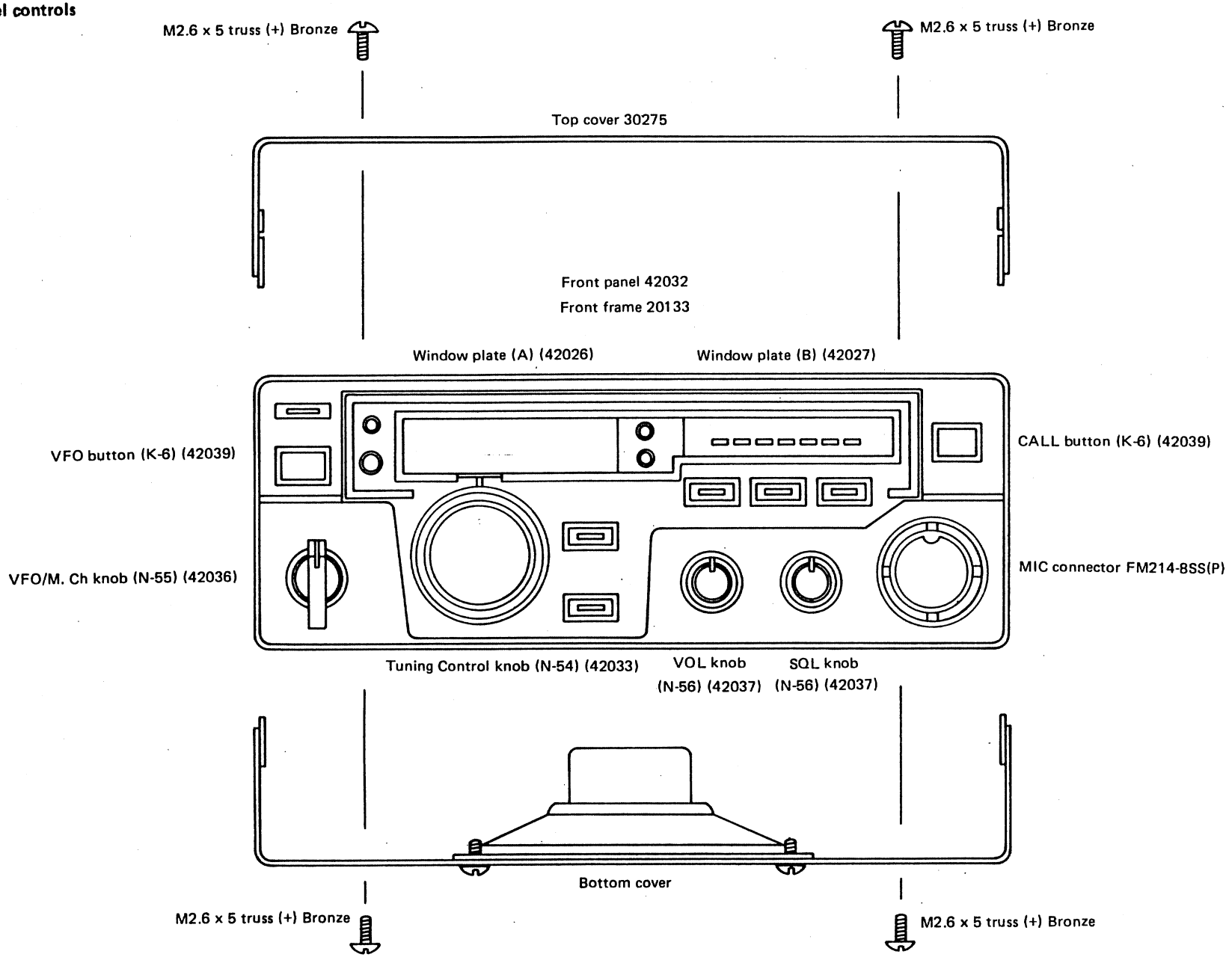
1. Remove the top cover (four screws (1)).
2. Remove the bottom cover (four screws (2)).
3. Pull out the speaker jack.
4. Pull off all knobs on the front panel.
5. Remove the front panel frame (four screws (3)).



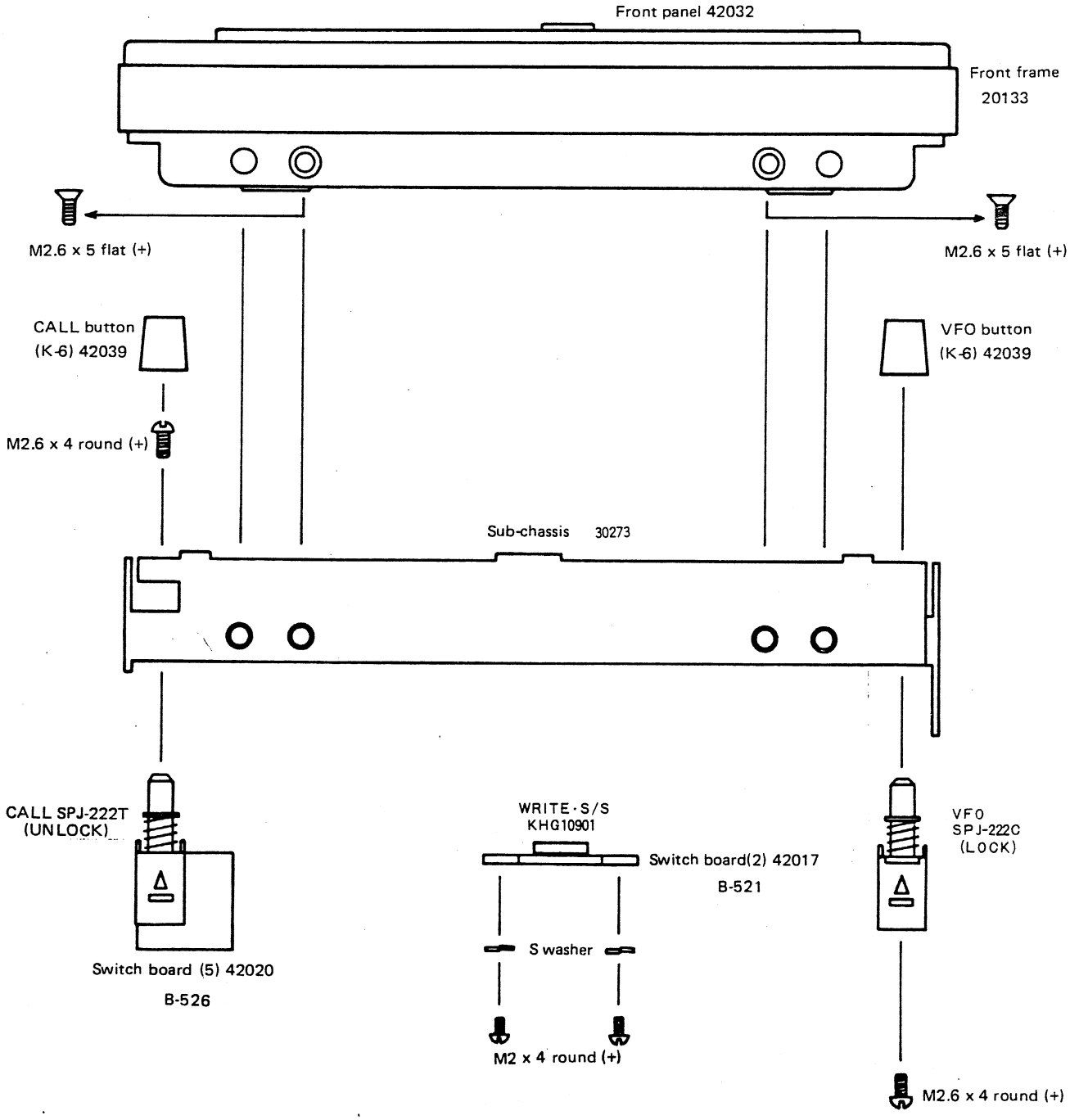
Front panel controls



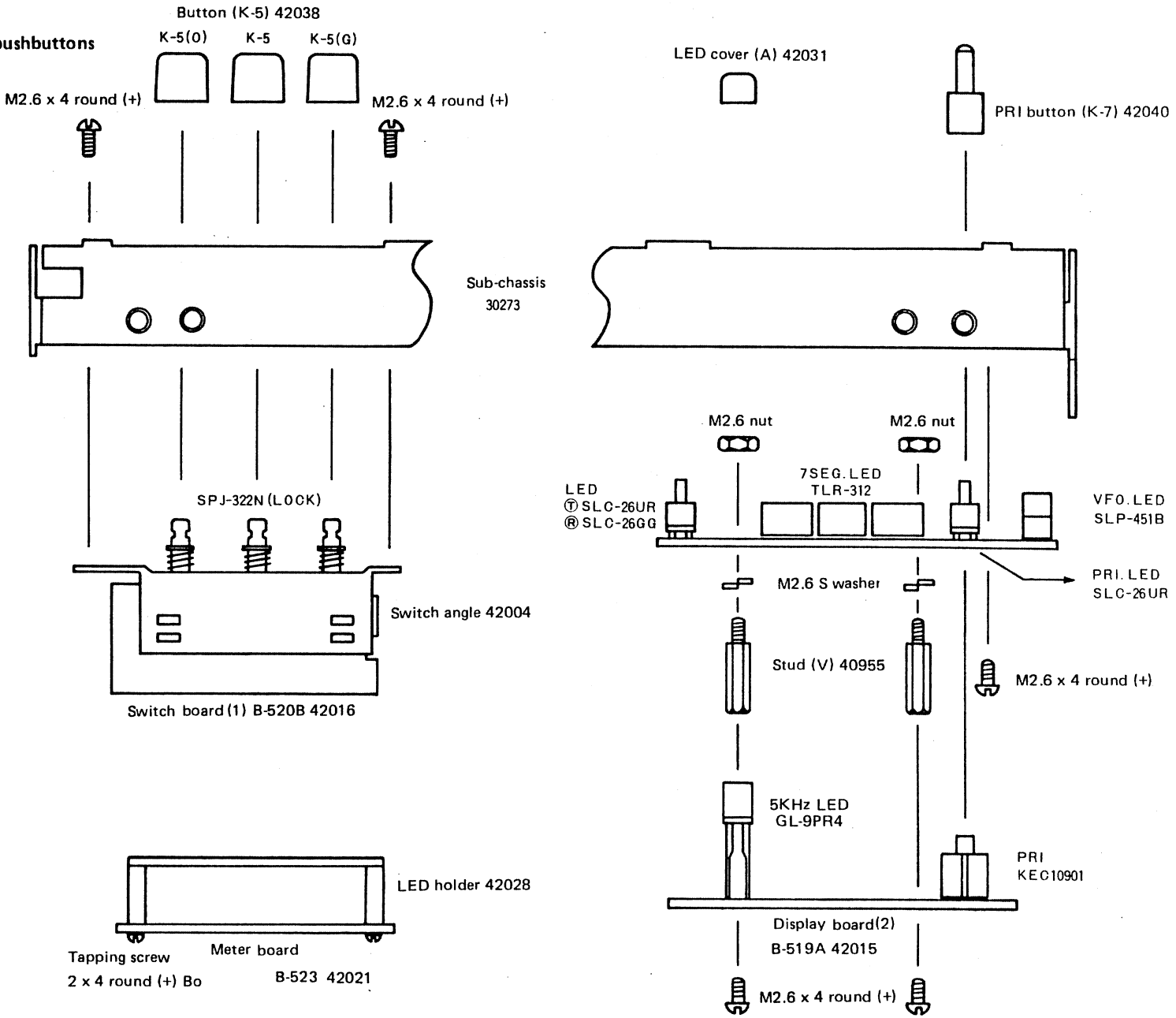
Front panel controls



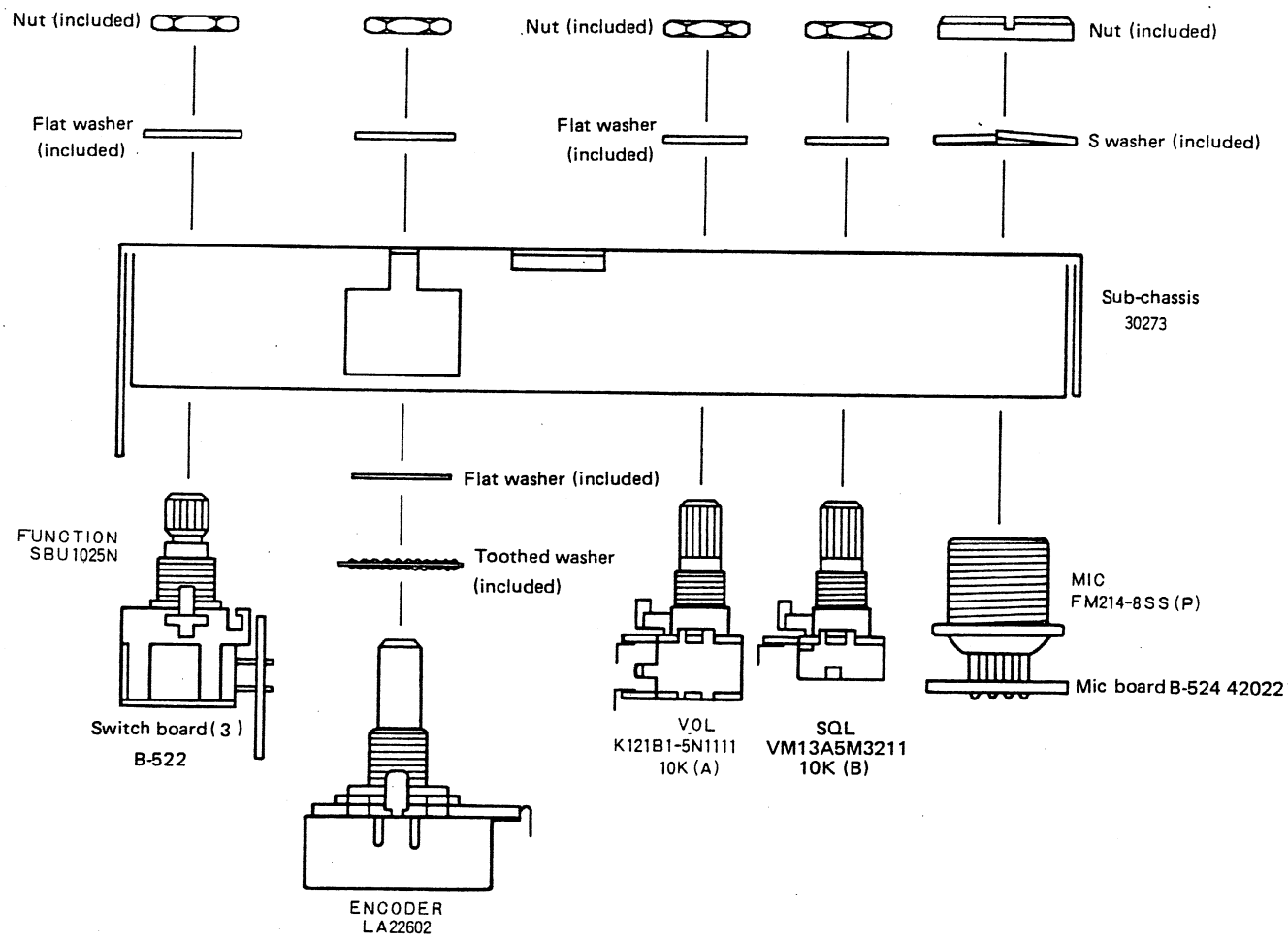
Removal of front frame and pushbuttons



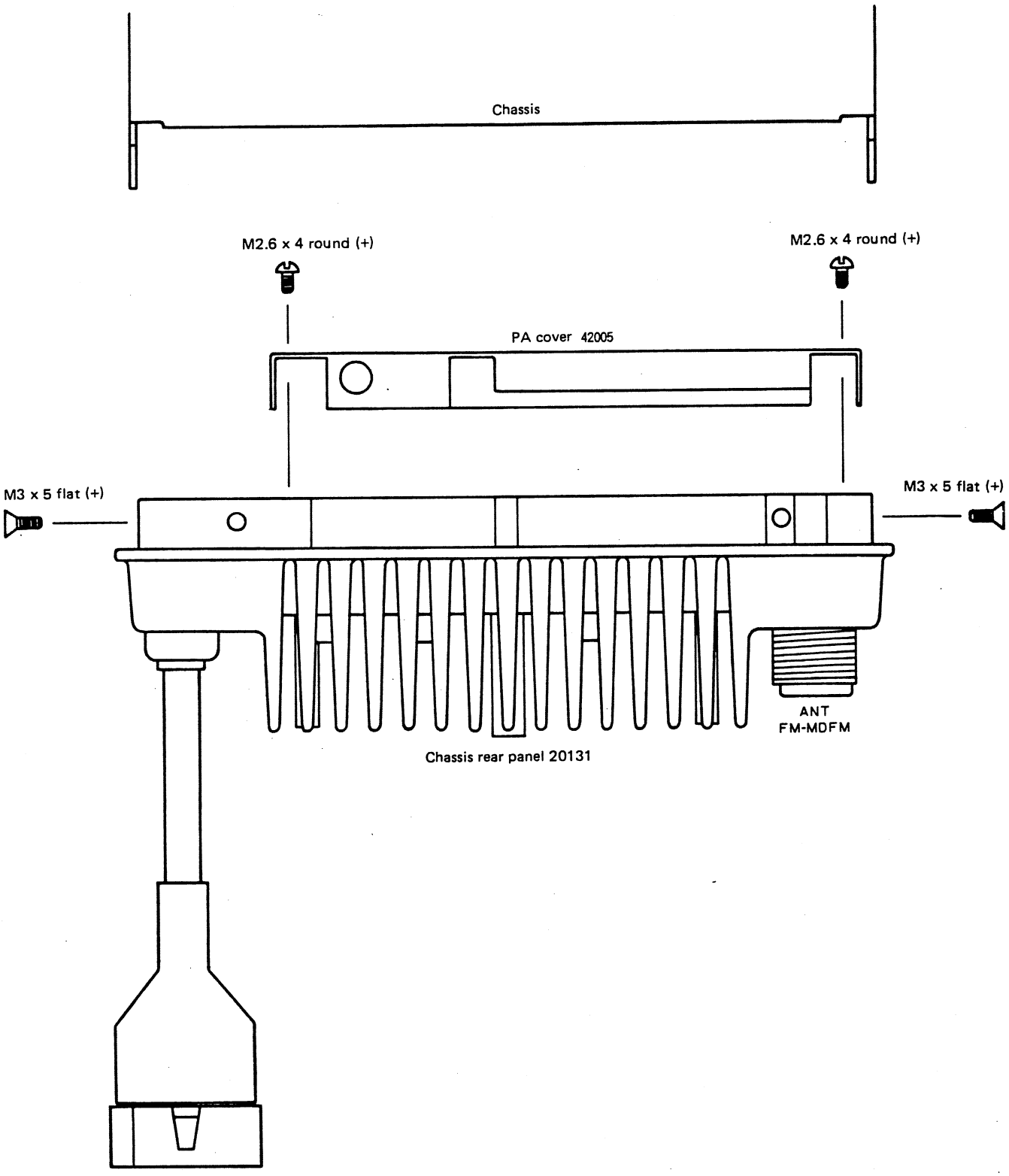
Replacement of front panel pushbuttons



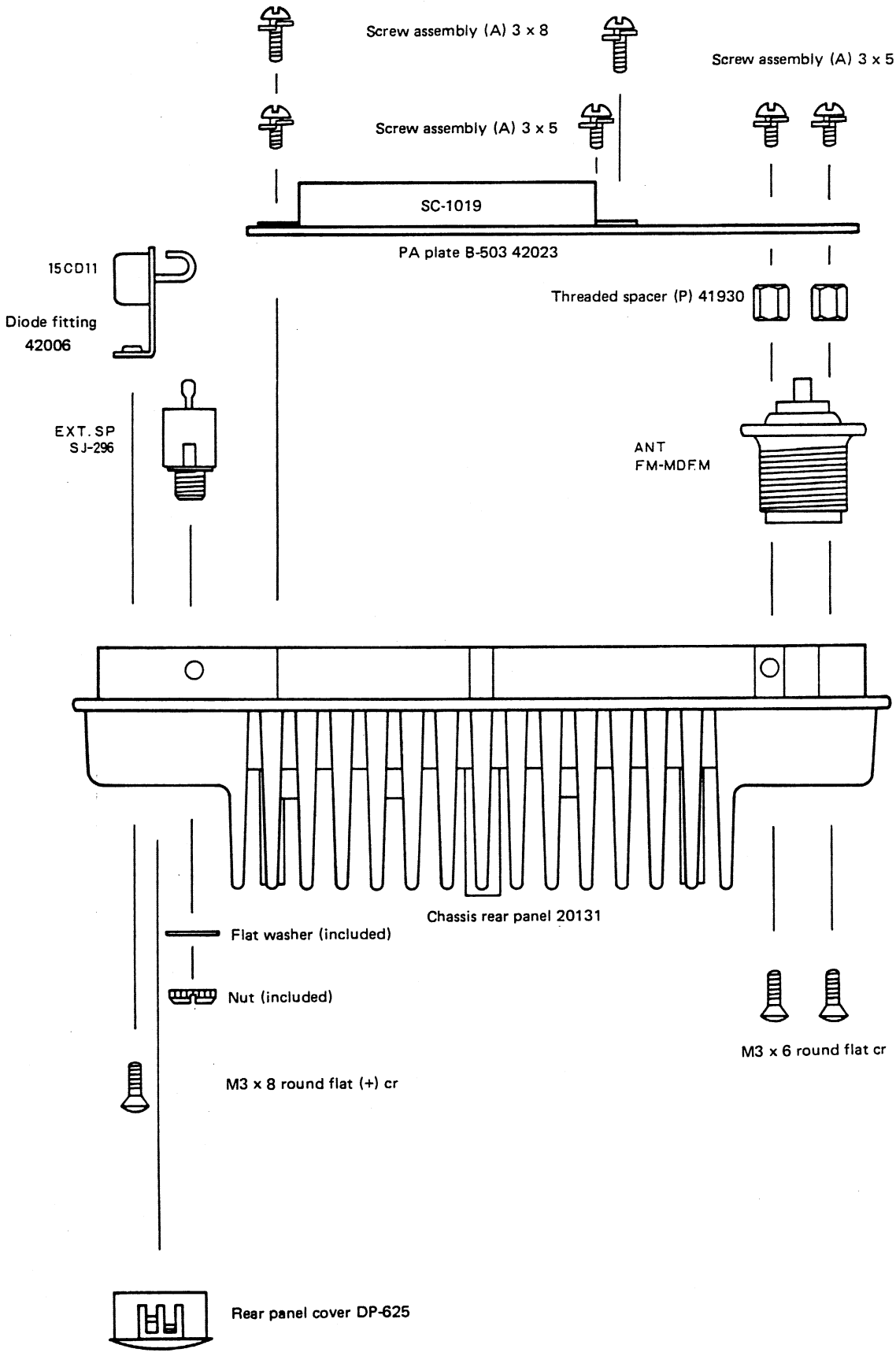
Replacement of front panel controls

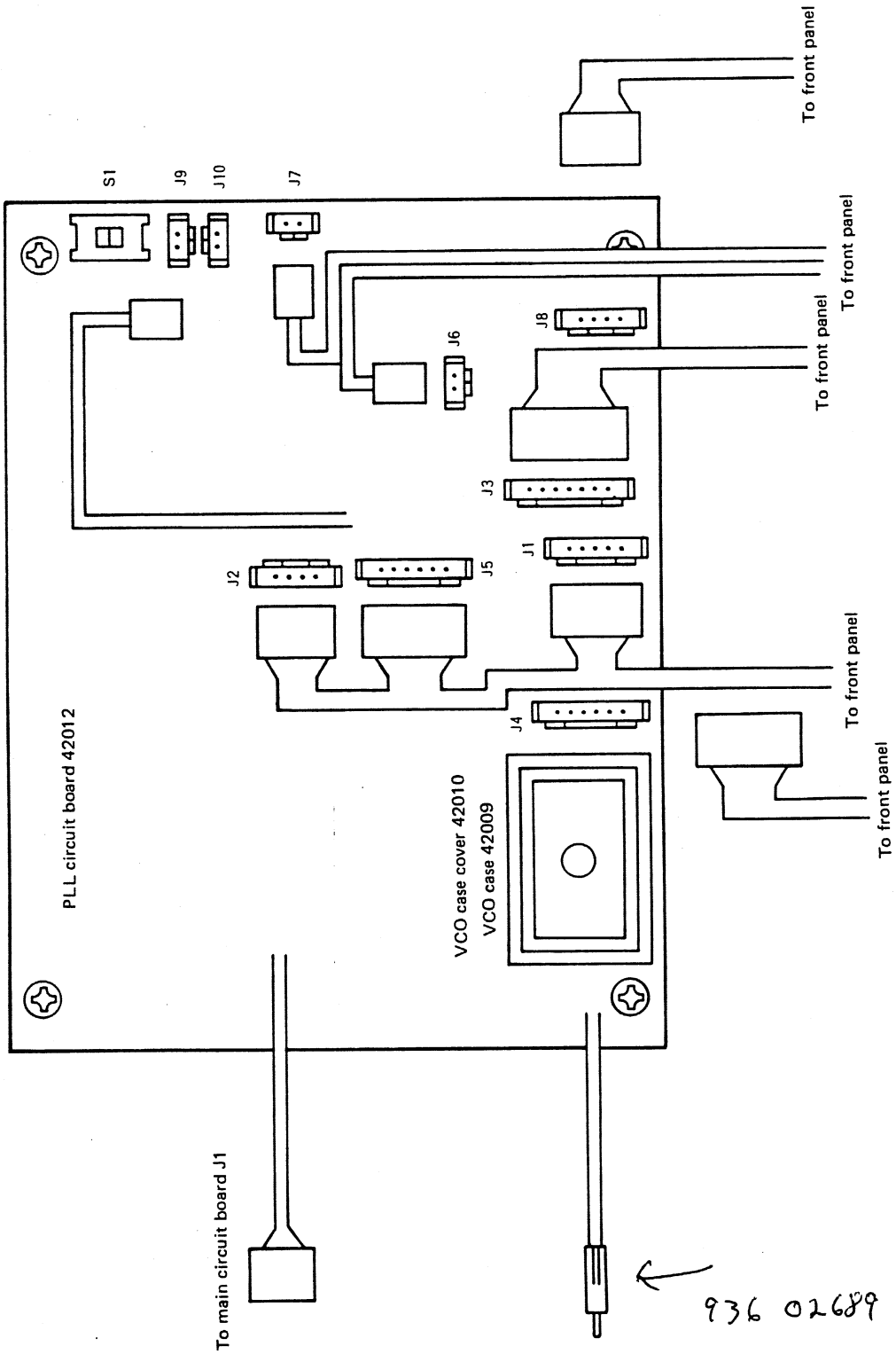


Disassembly of rear panel



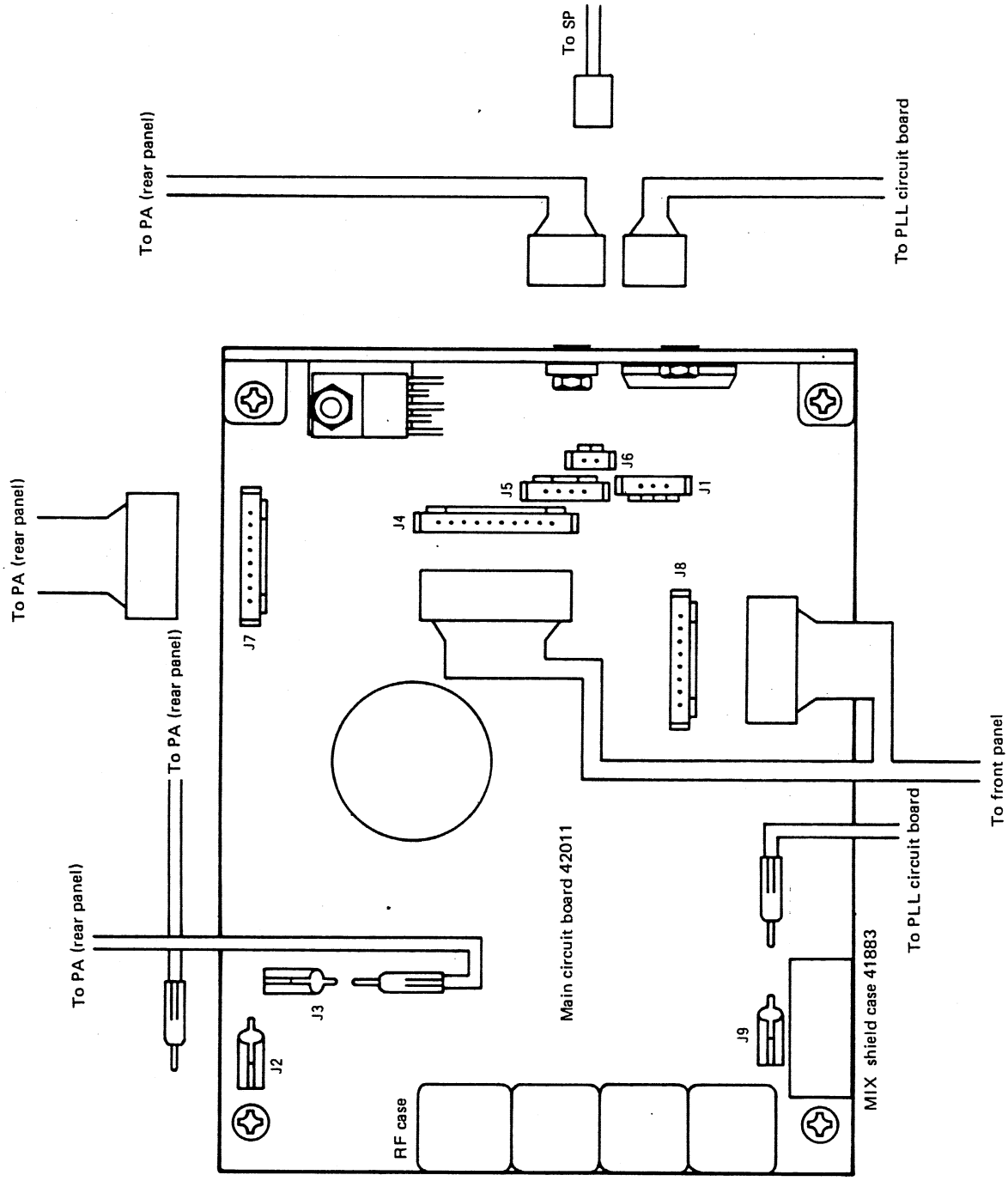
Disassembly of rear panel



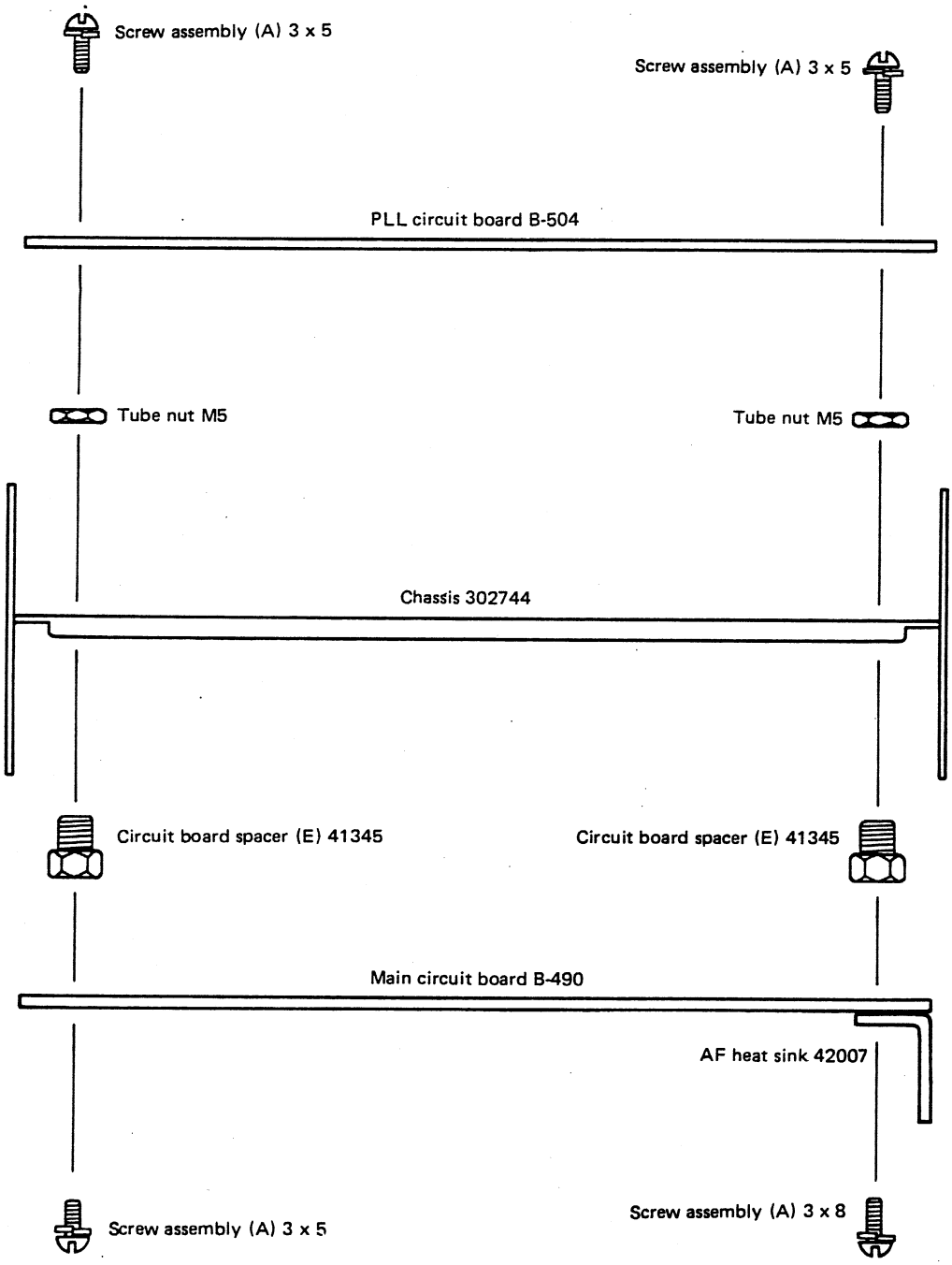


PLL unit wiring

Main unit wiring



Removal of circuit boards



* **Adjustment numbers and locations are shown in ○ and □, and are shown in parts layout drawings.**

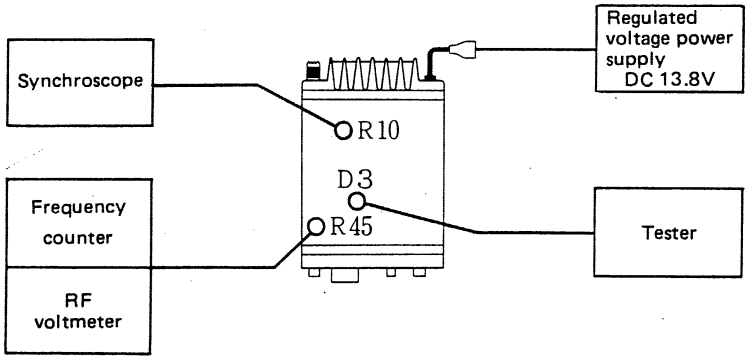
Notes for PLL adjustment

Adjustment No. Location

- **Measuring instruments for adjustment**

  Frequency counter (Frequency Range 0.1 ~ 160MHz)
  Synchroscope (which can measure 10 MHz and above)
  Multimeter (with internal resistance of approx. 40KΩ/V)
  RF voltmeter (Frequency Range 0.1 ~ 160MHz)
  Regulated voltage power supply (DC 13.8V output)

(Connection of measuring instruments)



1. Frequency adjustment

(1) Using the tuning control knob, set the displayed frequency to 145.00MHz.
(2) Connect the frequency conter to R45 of the PLL unit.
(3) Adjust L1 so that the frequency counter indication is 128.100MHz.

① 101

2. LO level adjustment

(1) Connect the synchroscope to R10 of the PLL unit.
(2) Adjust L2 so that the Amplitude of the waveform becomes 2.7Vp-p or greater.

② 102

3. VCO control voltage adjustment

(1) Using the tuning control knob, set the displayed frequency to 144.00MHz.
(2) Connect the multimeter to the cathode side of D3 of the PLL unit.
(3) Adjust L7 so that the voltage at D3 becomes about 4.2V

③ 103

4. PLL output level check

(1) Connect the RF voltmeter to R45 of the PLL unit, and check to be sure that there is 220mV or more.

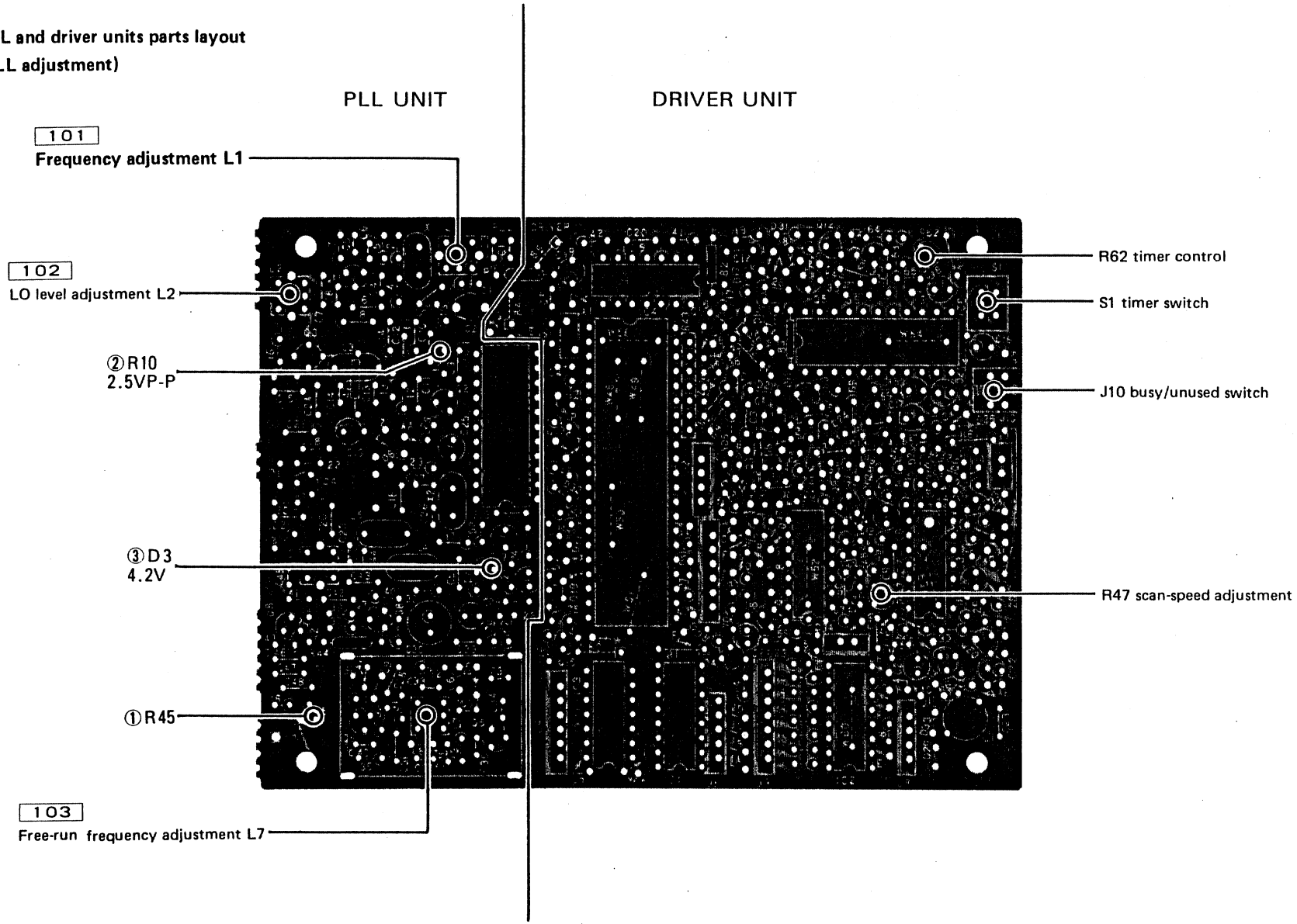
①

5. Reference frequency check

(1) With a reference frequency of 144.00MHz, connect the frequency counter to R45 of the PLL unit, and then check to be sure that the frequency is within the range of 127.1000MHz ± 200Hz.

①

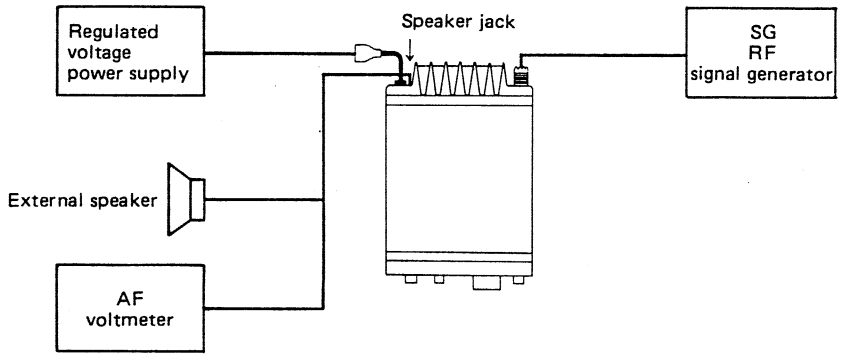
PLL and driver units parts layout
(PLL adjustment)



- **Measuring instruments for adjustment**

Regulated-voltage power supply (DC 13.8V output)
AF voltmeter (millivoltmeter)
RF signal generator (SG) (Frequency Range 10 ~ 150MHz)
8Ω external speaker

(Connection of measuring instruments)



1. Reception sensitivity adjustment

(1) Using the tuning control knob, set to a displayed frequency of 145.00MHz.
(2) Set an SG output to the extent that the S-meter just begins to move (modulated with 1kHz AF, 7.5kHz deviation) — 201 ④
(3) Turn L3, L2 and L1 of the main unit, and adjust so that the deflection of the S-meter is maximum. — 202 ④
(Apply the multimeter to the lead wire of R140 of the main unit, and make the adjustment so that the multimeter reading is maximum.)
(4) Next, set an SG output modulation of 3.5kHz.
(5) By using L21 of the main unit, make the adjustment so that the S-meter reading is maximum.
(Apply the multimeter to the lead wire of R140 of the main unit, and then make the adjustment so that the multimeter reading is maximum.)

Reception sensitivity:
20 dB noise-quieting sensitivity: 0.6μV or more
At 1μV input S + N/N: 30 dB or more

2. Discriminator adjustment — 203

(1) Using the tuning control knob, set to a displayed frequency of 145.00MHz.
(2) Adjust L22 so that AF output becomes maximum.

3. S-meter adjustment — 204

(1) With SG output at ~~10 dB~~ 4μV, make adjustment of R80 so that four LED's of the S-meter illuminate.
(2) Next, with the SG output at ~~40 dB~~ 7μV, check to be sure that all of the S-meter LED's are illuminated.

4. Squelch operation check

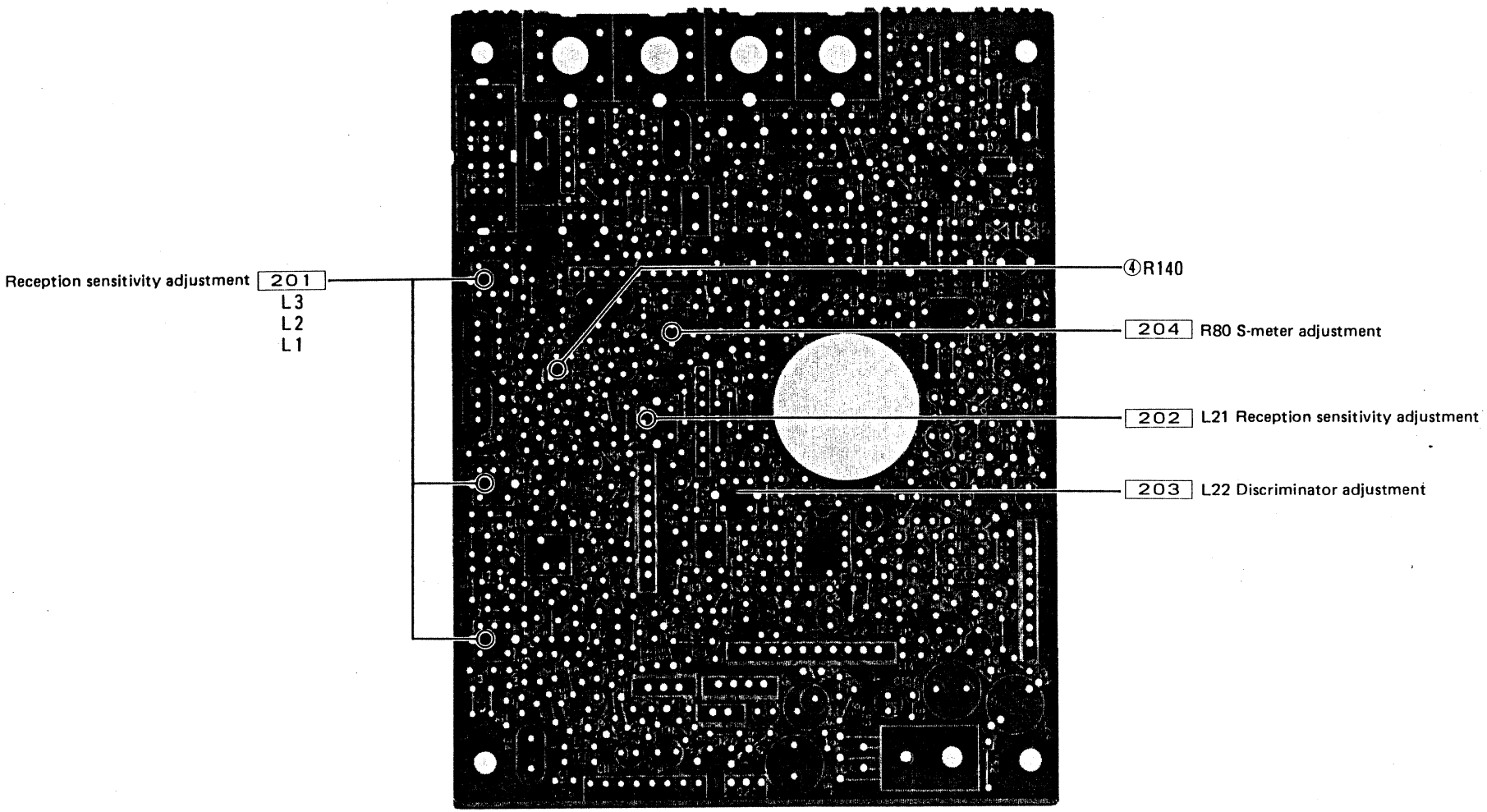
(1) With the SG output at 10 dB, and with SQL volume at maximum, check to be sure that the squelch opens.

5. AF output check

(1) With the SG output at 10 dB, check to be sure that AF output is 4V or more.

Note: Because there is the possibility, when these adjustments are made, that adjustment of the RF helical cavity may cause band deviation, cross-modulation, etc., it is recommended that the service department of our company be requested to make adjustment of the helical cavity if and when such adjustment becomes necessary.

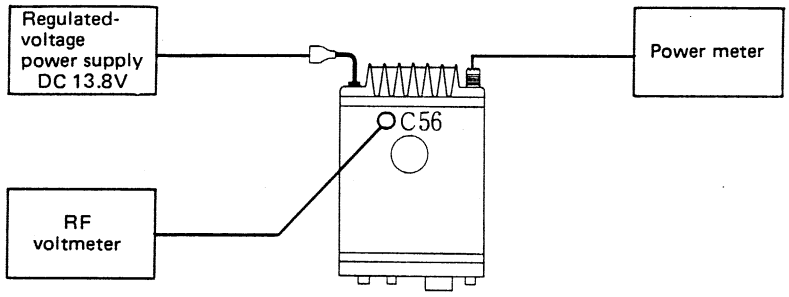
Main unit parts layout (reception adjustment)



- **Measuring instruments for adjustment**

  Power meter (terminated type 130 ~ 160MHz)
  RF voltmeter
  Regulated-voltage power supply (DC 13.8V output)

(Connections of measuring instruments)



1. Transmission output adjustment

(1) Using the tuning control knob, set the displayed frequency to 145.00MHz.
(2) Connect the power meter to the antenna connector.
(3) Short-circuit R118 and R119 of the main unit, and then disable the ALC. (Also the ALC can be disabled by turning R123 to the right.) ⑤
(4) Adjust L18 and C56 of the main unit so that the power becomes maximum. 301
(5) Connect the RF voltmeter to the rotator of C56, and then make adjustment of L15 and L16 so that voltage becomes maximum. 302
(6) Once again repeat the adjustment of L18 and C56.

2. Setting the power

(1) When the power is high, adjust R123 of the main unit to a setting of 25W. 303
(2) When the power is low, adjust R116 of the main unit to a setting of approximately 1.2W. 304

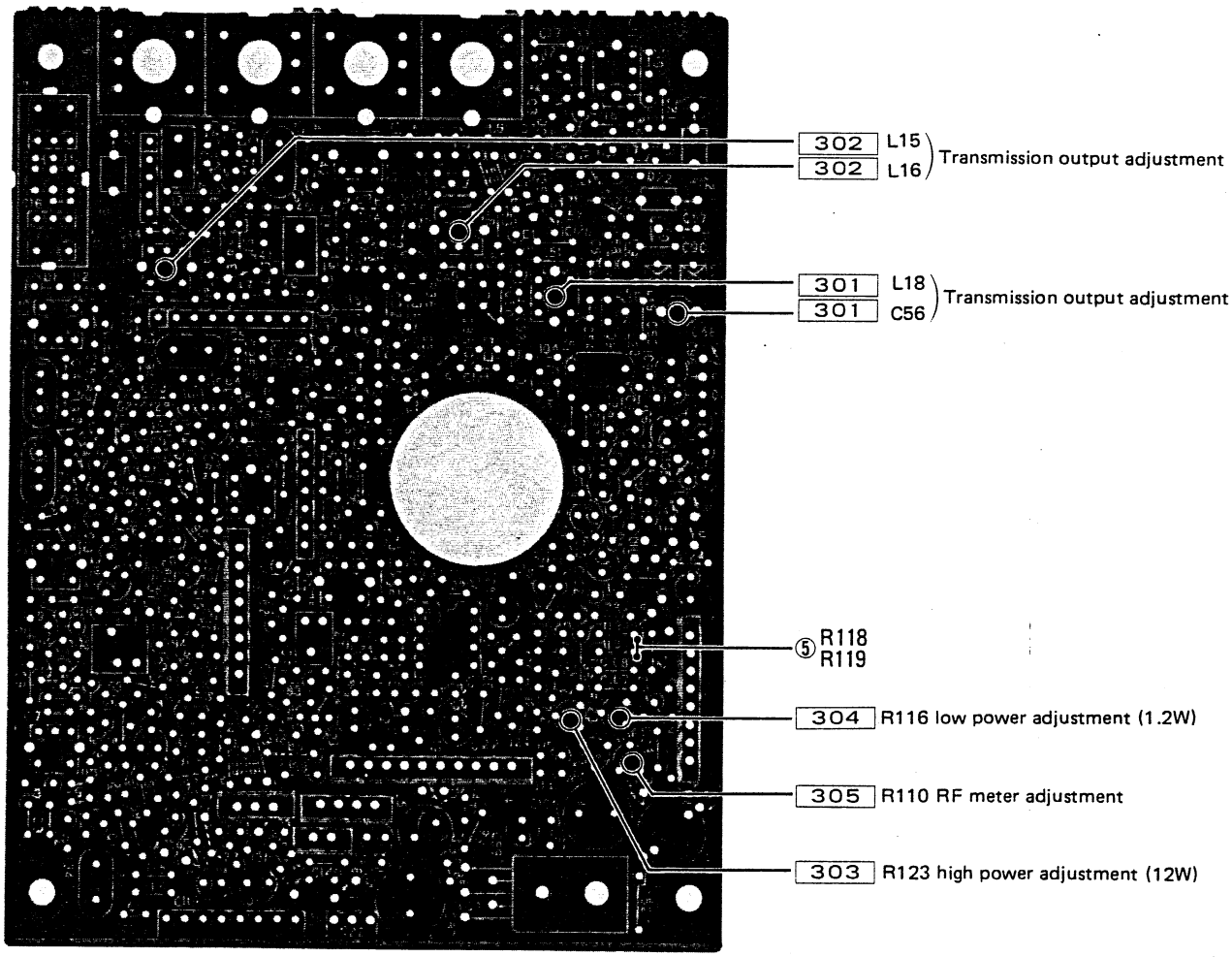
3. RF meter display adjustment

(1) When the power is low, make adjustment of R110 so that three LED's of the meter (LED) illuminate. 305
(2) In this condition, switch to high power, and check to be sure all seven LED's illuminate.

4. APC current check

(1) Disconnect the power meter from the antenna connector, measure the current, and check to be sure that the measured reading is equivalent to, or lower than, the transmission current.

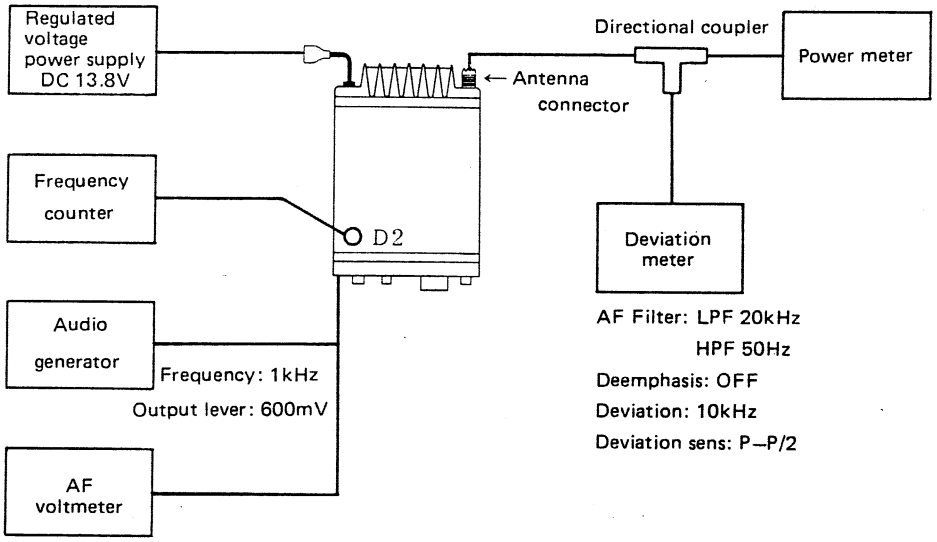
Main unit parts layout (transmission adjustment)



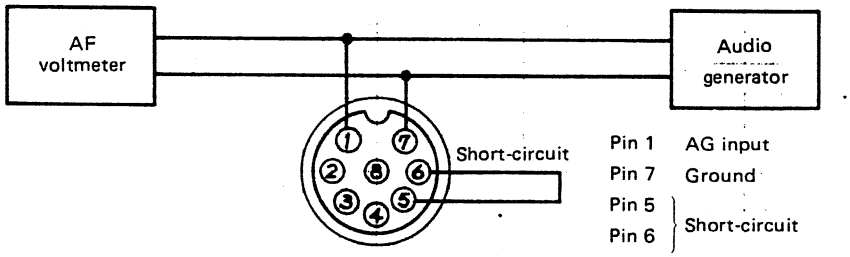
- **Measuring instruments for adjustment**

  Audio generator (AG)
  Deviation meter
  Frequency counter
  Directional coupler
  AF voltmeter (milli-voltmeter)

(Connection of measuring instruments)



Microphone connector (8 pin) connections



1. Local oscillation frequency adjustment

(1) Connect the frequency counter to D2 of the main unit.
(2) Make adjustment of L12 of the main unit so that the frequency is within the range of 16.900MHz ± 100Hz.

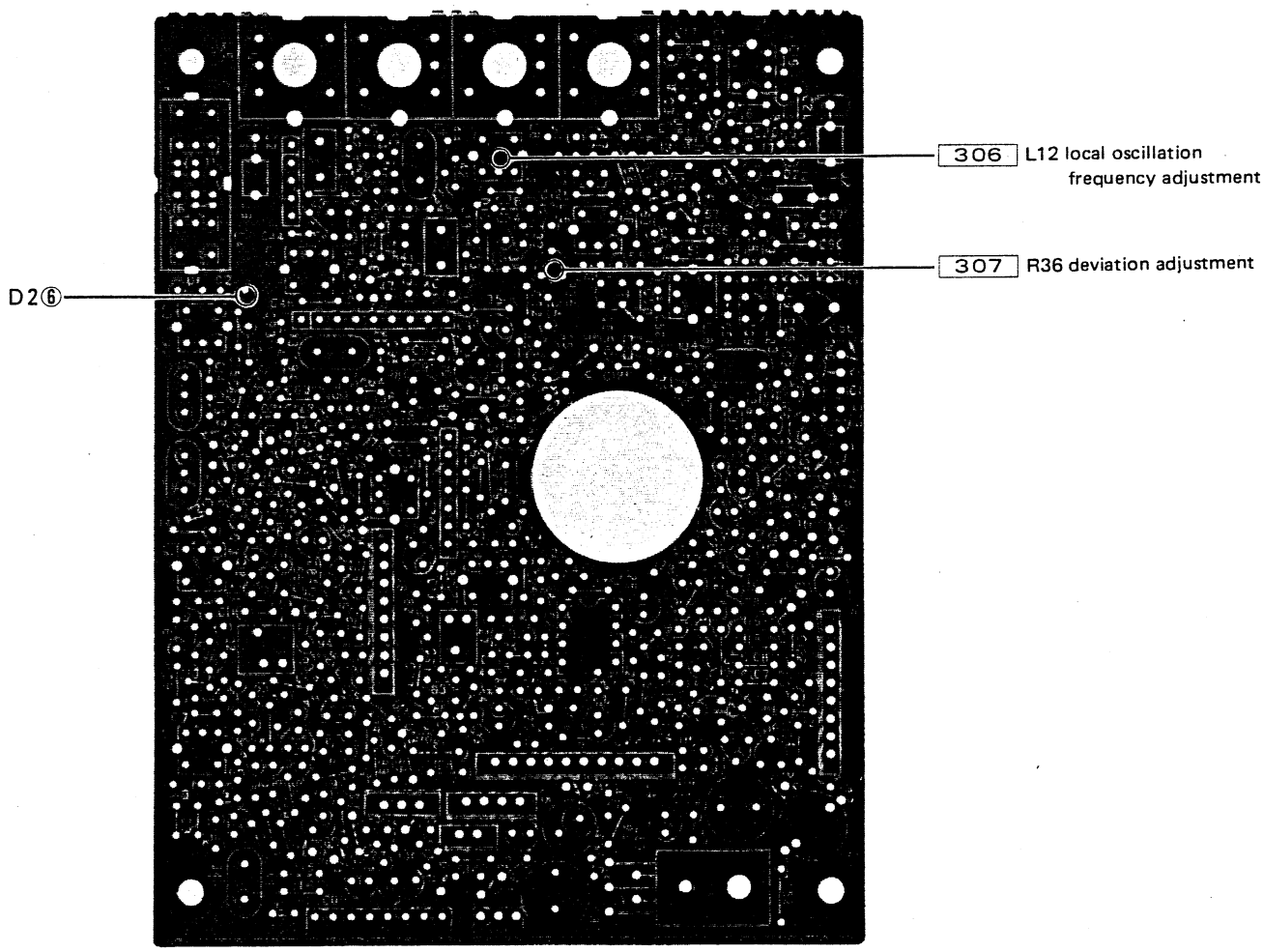
⑥ 306

2. Deviation adjustment

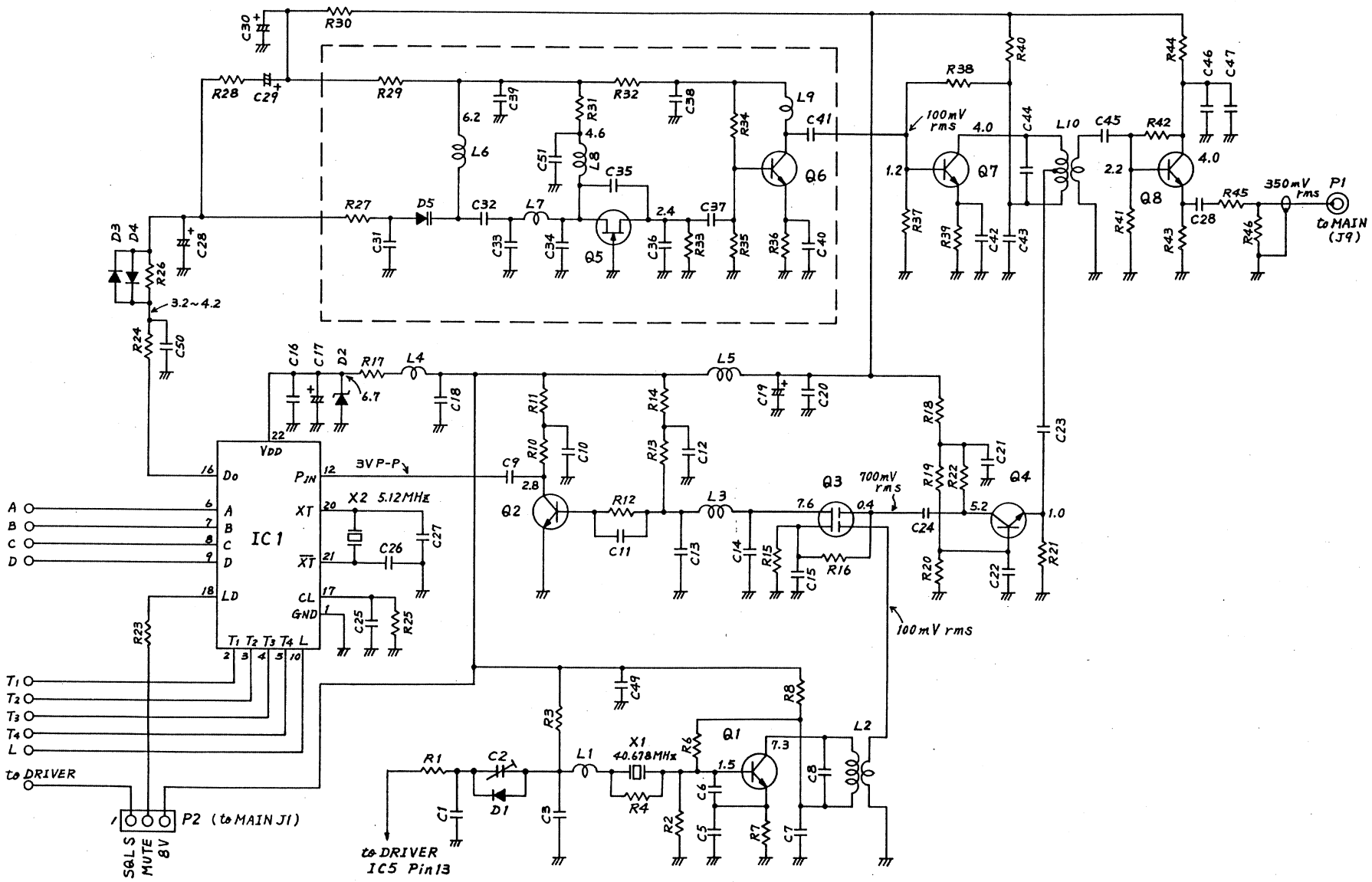
(1) Input an AG signal (1kHz, 600mV) to the microphone input terminal, and, by using R36 of the main unit, make the adjustment for 4.8kHz ± 0.2kHz.
(2) Next, reduce the AG input signal by 20 dB, and, at an input of 60mV, check to be sure that the deviation is then 3.5kHz or more.

307

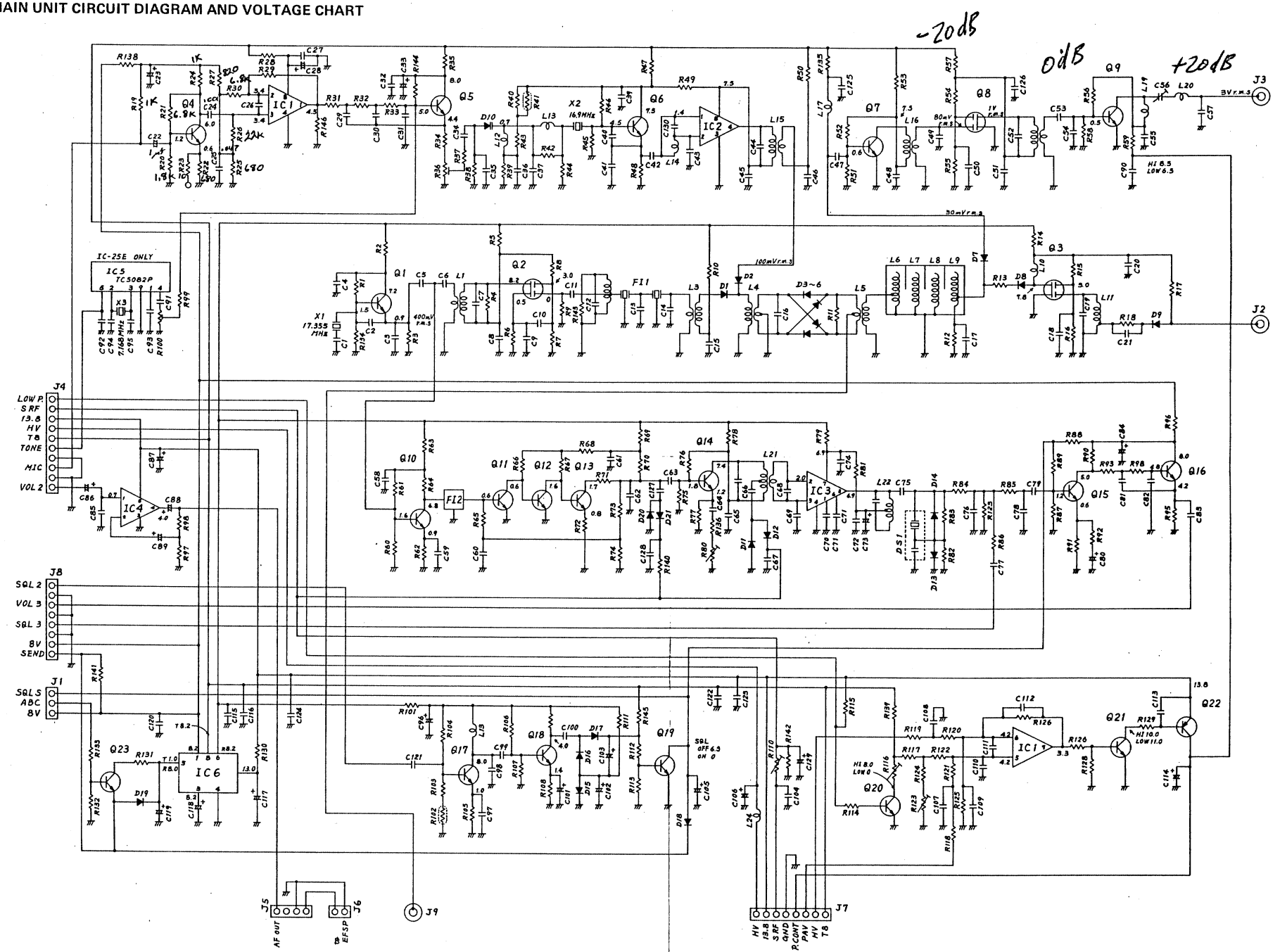
Main unit parts layout (modulation adjustment)

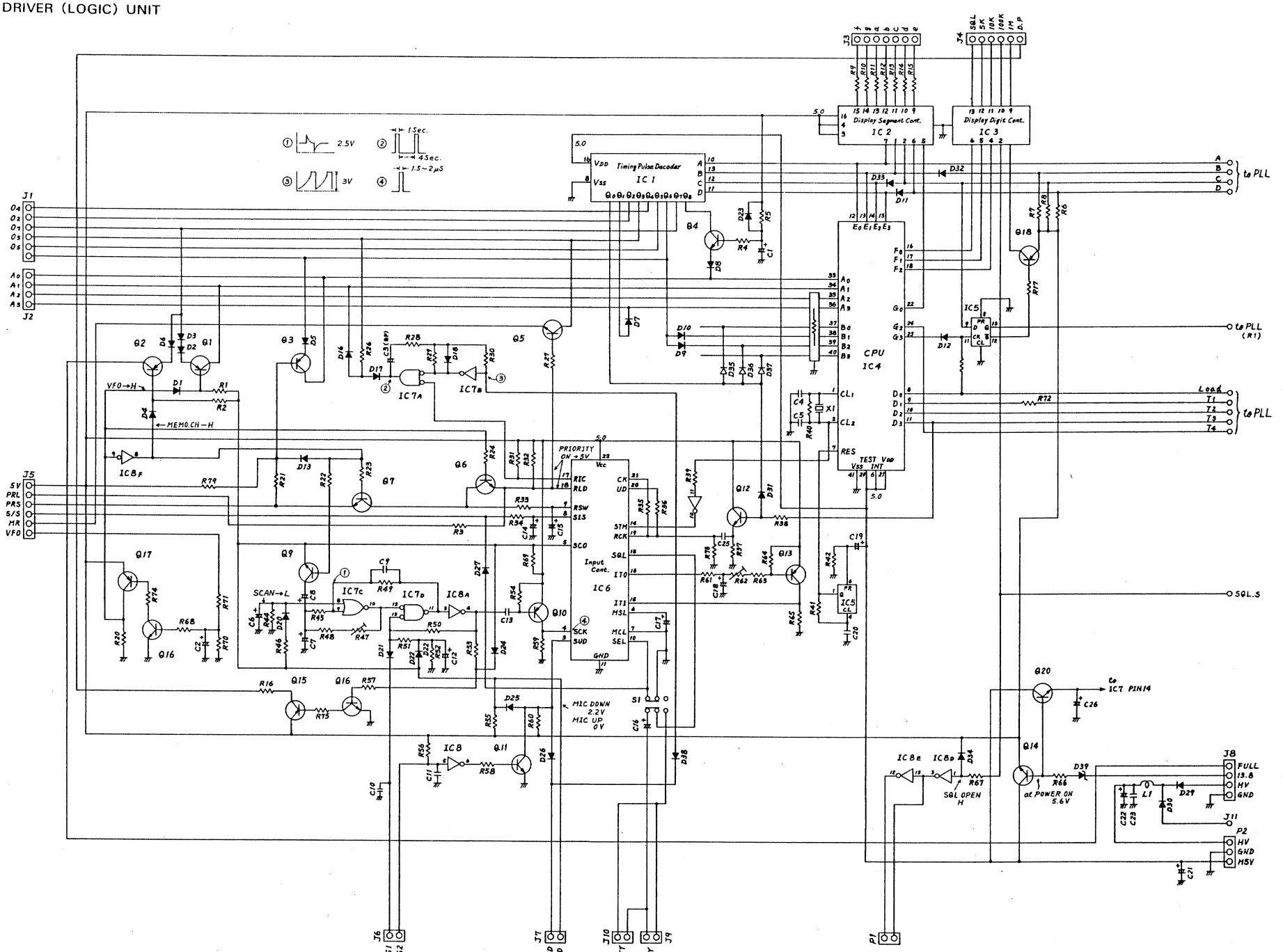


PLL UNIT CIRCUIT DIAGRAM AND VOLTAGE CHART

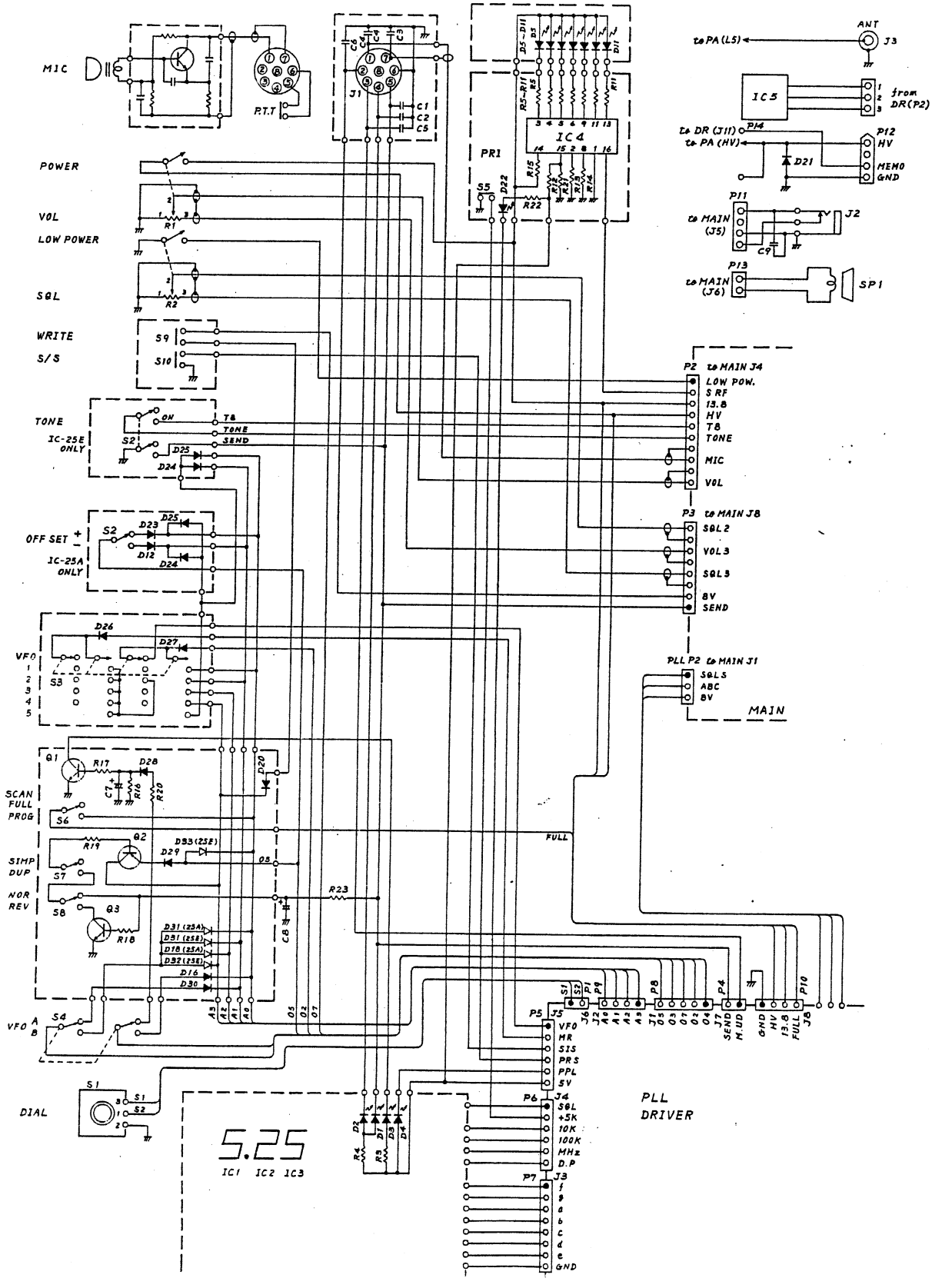


MAIN UNIT CIRCUIT DIAGRAM AND VOLTAGE CHART

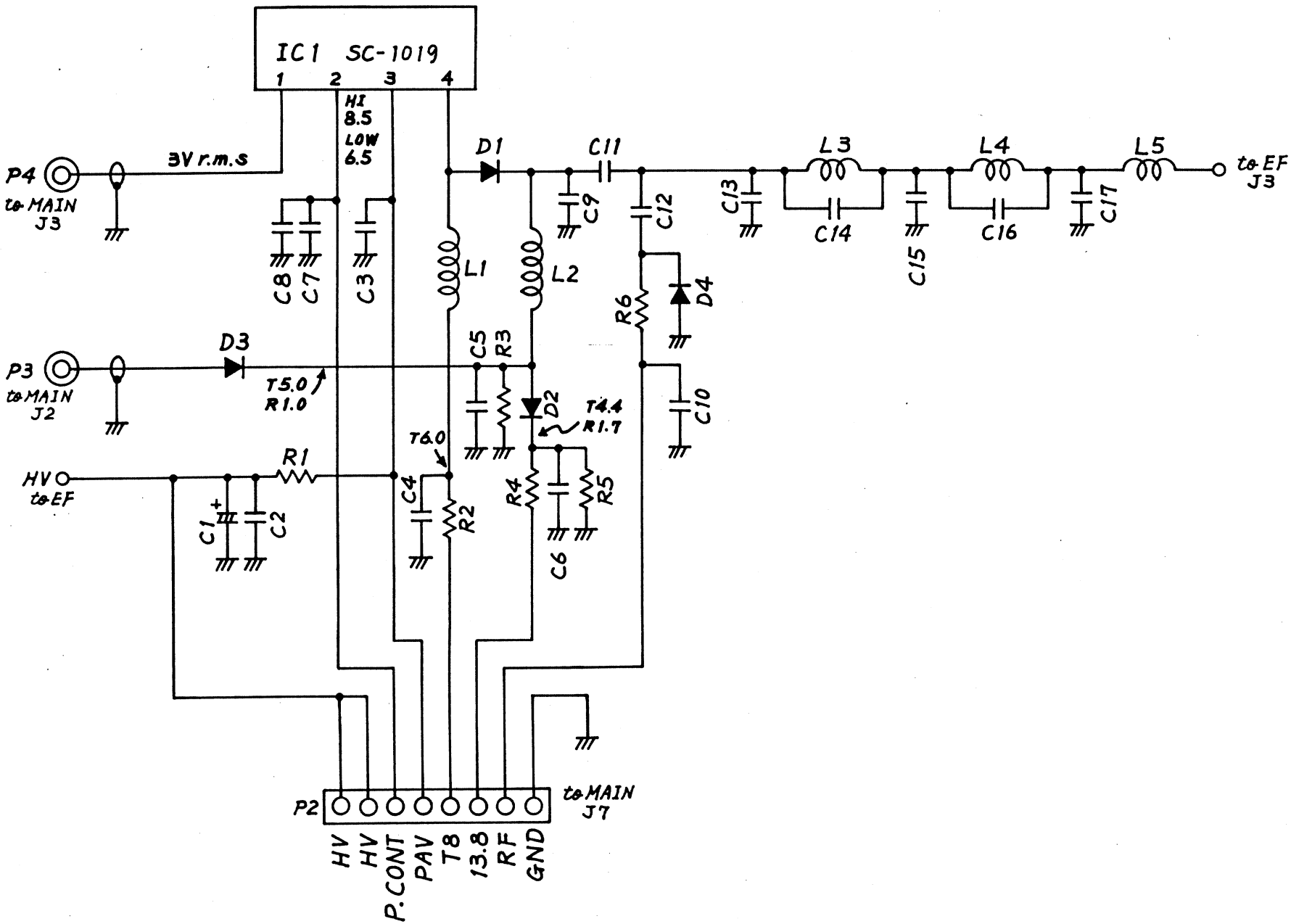


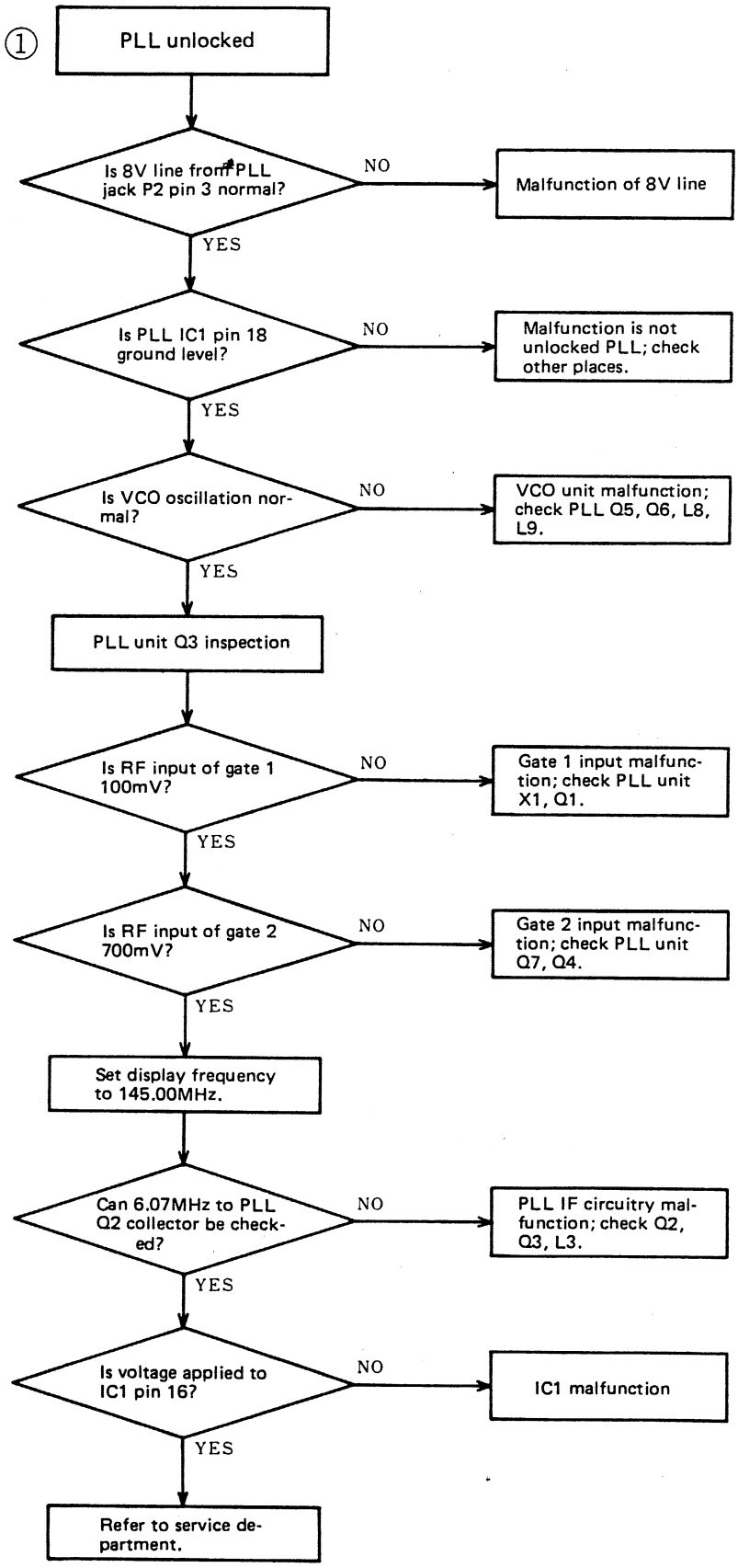

J1
J2
J3
J4
J5
J6
J7
J8
J9
J10
J11
P1
P2
IC1
Timing Pulse Decoder
IC2
Display Segment Cont.
IC3
Display Digit Cont.
IC4
CPU
IC5
IC6
Input Cont.
IC7
IC8
to PLL
to PLL (R1)
to PLL
SQL.S
to IC7 PIN14
2.5V
3V
1.5sec.
4.5sec.
1.5~2μS
VFO→H
←MEMO.CH—H
SCAN→L
PRIORITY ON→5V
MIC DOWN 2.2V
MIC UP 0V
SQL OPEN H
at POWER ON 5.6V
FULL
13.8
HV
GND
HSV
SEND
BUSY
EMPTY

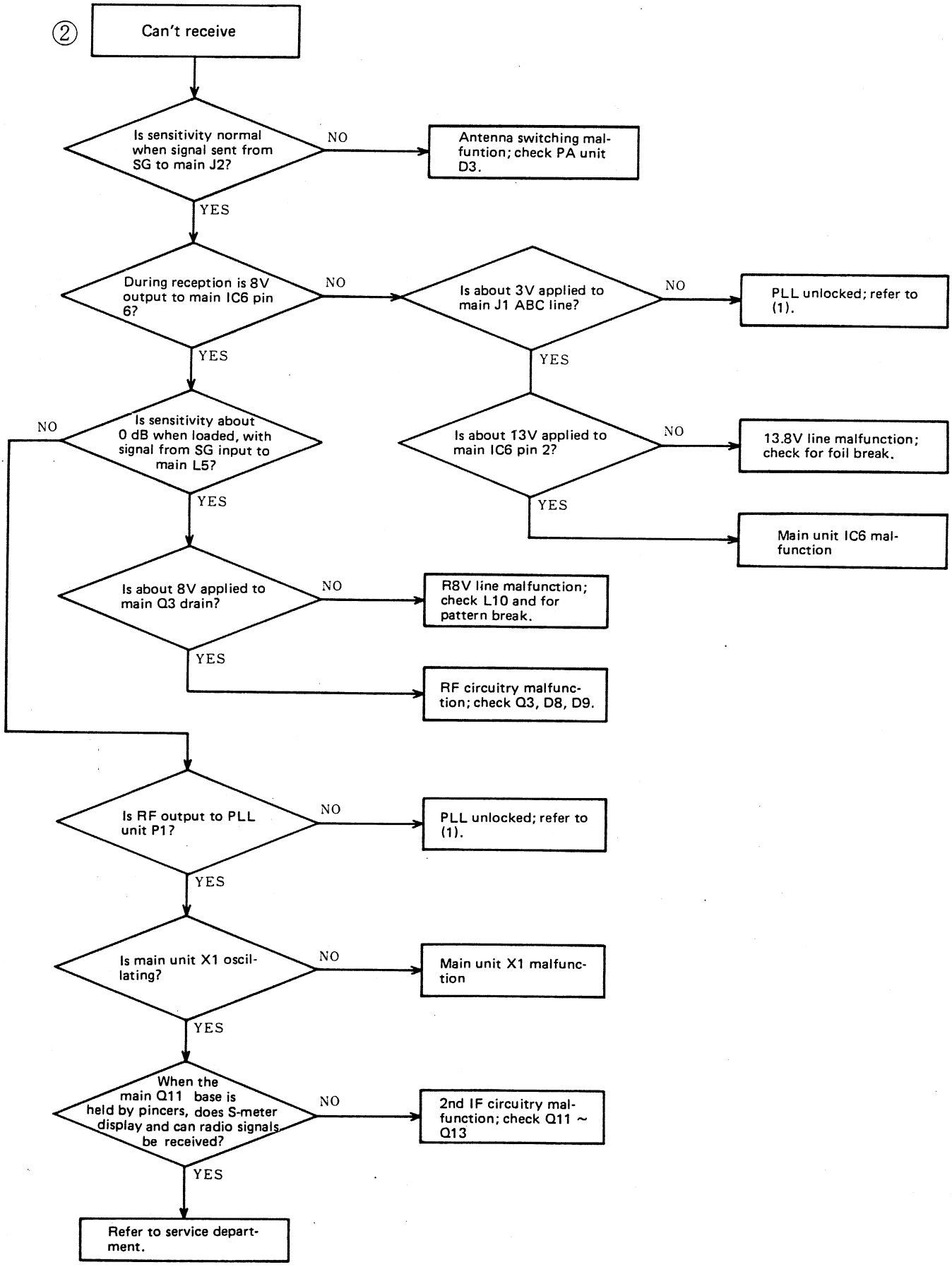
EF UNIT CIRCUIT DIAGRAM

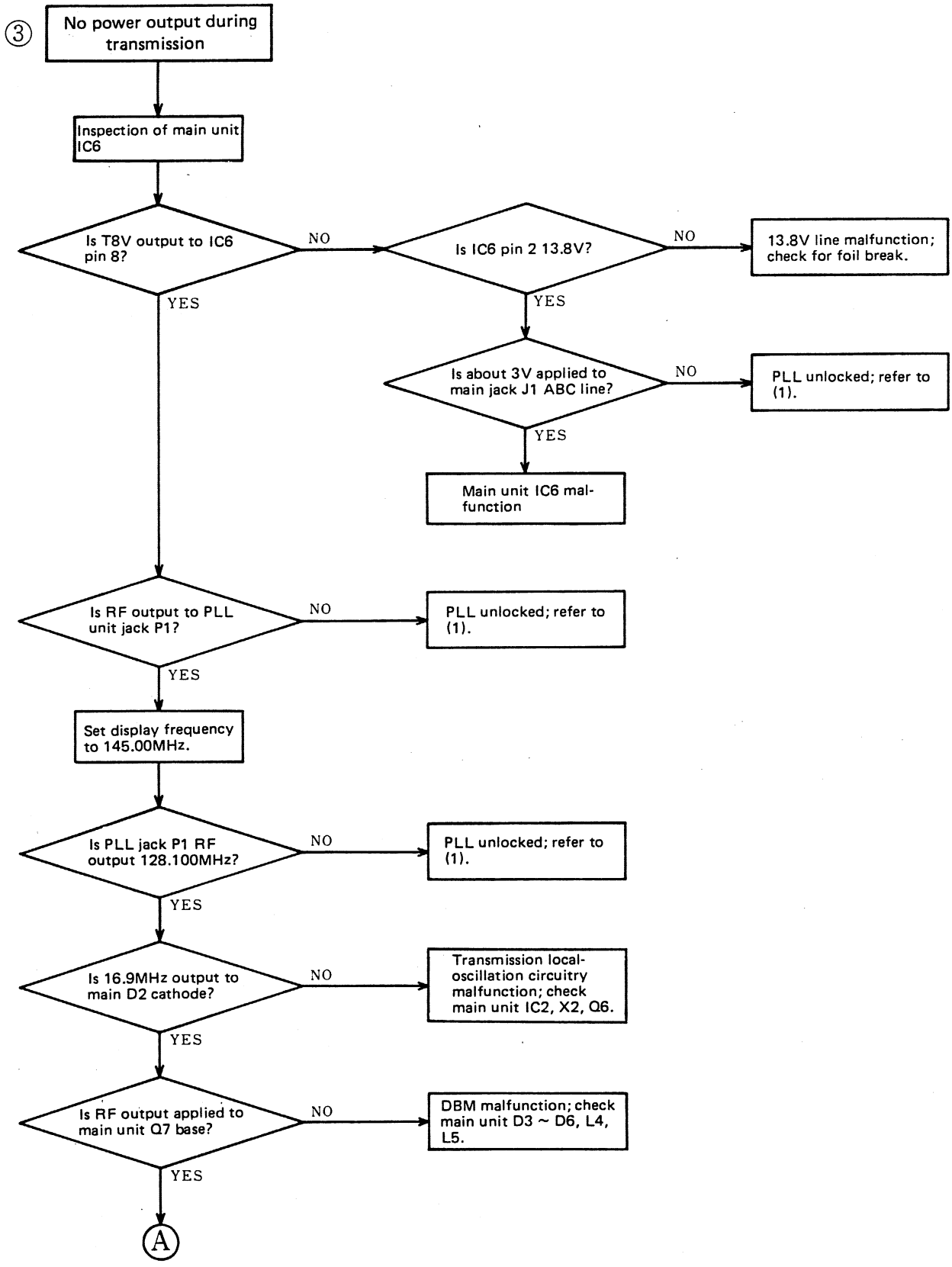


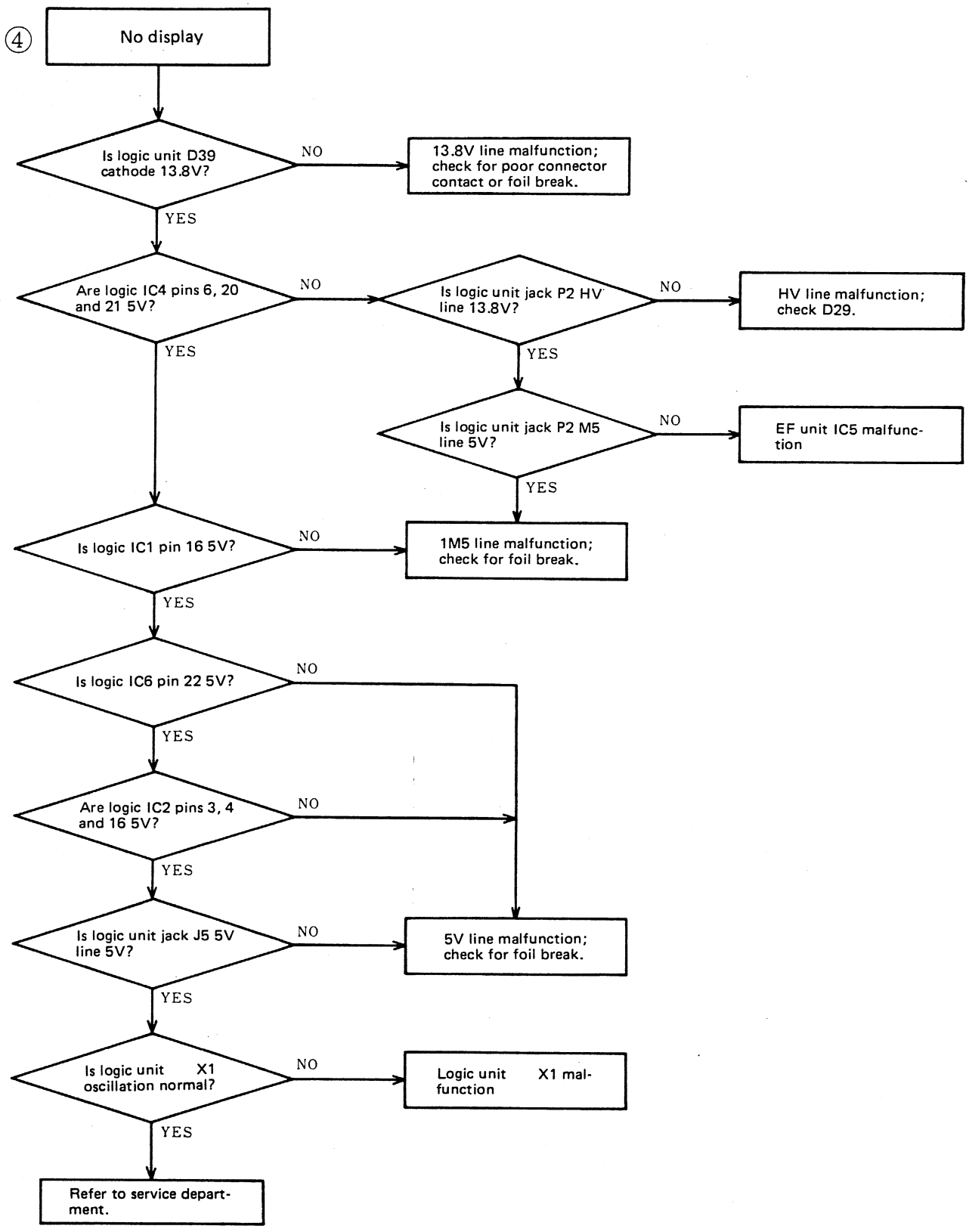
PA UNIT CIRCUIT DIAGRAM AND VOLTAGE CHART

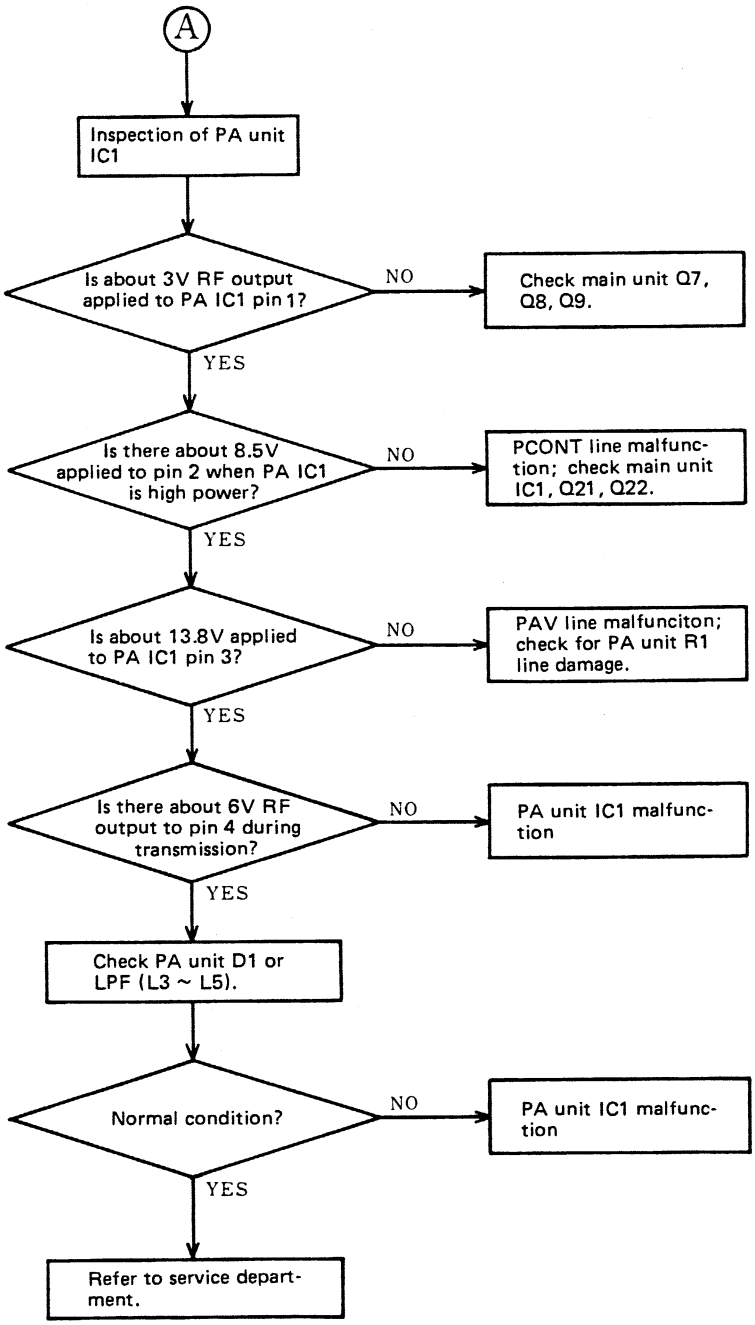



①
PLL unlocked
Is 8V line from PLL jack P2 pin 3 normal?
NO
Malfunction of 8V line
YES
Is PLL IC1 pin 18 ground level?
NO
Malfunction is not unlocked PLL; check other places.
YES
Is VCO oscillation normal?
NO
VCO unit malfunction; check PLL Q5, Q6, L8, L9.
YES
PLL unit Q3 inspection
Is RF input of gate 1 100mV?
NO
Gate 1 input malfunction; check PLL unit X1, Q1.
YES
Is RF input of gate 2 700mV?
NO
Gate 2 input malfunction; check PLL unit Q7, Q4.
YES
Set display frequency to 145.00MHz.
Can 6.07MHz to PLL Q2 collector be checked?
NO
PLL IF circuitry malfunction; check Q2, Q3, L3.
YES
Is voltage applied to IC1 pin 16?
NO
IC1 malfunction
YES
Refer to service department.


②
Can't receive
Is sensitivity normal when signal sent from SG to main J2?
NO
Antenna switching malfuntion; check PA unit D3.
YES
During reception is 8V output to main IC6 pin 6?
NO
Is about 3V applied to main J1 ABC line?
NO
PLL unlocked; refer to (1).
YES
YES
NO
Is sensitivity about 0 dB when loaded, with signal from SG input to main L5?
Is about 13V applied to main IC6 pin 2?
NO
13.8V line malfunction; check for foil break.
YES
YES
Main unit IC6 malfunction
Is about 8V applied to main Q3 drain?
NO
R8V line malfunction; check L10 and for pattern break.
YES
RF circuitry malfunction; check Q3, D8, D9.
Is RF output to PLL unit P1?
NO
PLL unlocked; refer to (1).
YES
Is main unit X1 oscillating?
NO
Main unit X1 malfunction
YES
When the main Q11 base is held by pincers, does S-meter display and can radio signals be received?
NO
2nd IF circuitry malfunction; check Q11 ~ Q13
YES
Refer to service department.


③
No power output during transmission
Inspection of main unit IC6
Is T8V output to IC6 pin 8?
NO
Is IC6 pin 2 13.8V?
NO
13.8V line malfunction; check for foil break.
YES
YES
Is about 3V applied to main jack J1 ABC line?
NO
PLL unlocked; refer to (1).
YES
Main unit IC6 malfunction
Is RF output to PLL unit jack P1?
NO
PLL unlocked; refer to (1).
YES
Set display frequency to 145.00MHz.
Is PLL jack P1 RF output 128.100MHz?
NO
PLL unlocked; refer to (1).
YES
Is 16.9MHz output to main D2 cathode?
NO
Transmission local-oscillation circuitry malfunction; check main unit IC2, X2, Q6.
YES
Is RF output applied to main unit Q7 base?
NO
DBM malfunction; check main unit D3 ~ D6, L4, L5.
YES
Ⓐ


④
No display
Is logic unit D39 cathode 13.8V?
NO
13.8V line malfunction; check for poor connector contact or foil break.
YES
Are logic IC4 pins 6, 20 and 21 5V?
NO
Is logic unit jack P2 HV line 13.8V?
NO
HV line malfunction; check D29.
YES
YES
Is logic unit jack P2 M5 line 5V?
NO
EF unit IC5 malfunction
YES
Is logic IC1 pin 16 5V?
NO
1M5 line malfunction; check for foil break.
YES
Is logic IC6 pin 22 5V?
NO
YES
Are logic IC2 pins 3, 4 and 16 5V?
NO
YES
Is logic unit jack J5 5V line 5V?
NO
5V line malfunction; check for foil break.
YES
Is logic unit X1 oscillation normal?
NO
Logic unit X1 malfunction
YES
Refer to service department.


A
Inspection of PA unit IC1
Is about 3V RF output applied to PA IC1 pin 1?
NO
Check main unit Q7, Q8, Q9.
YES
Is there about 8.5V applied to pin 2 when PA IC1 is high power?
NO
PCONT line malfunction; check main unit IC1, Q21, Q22.
YES
Is about 13.8V applied to PA IC1 pin 3?
NO
PAV line malfunciton; check for PA unit R1 line damage.
YES
Is there about 6V RF output to pin 4 during transmission?
NO
PA unit IC1 malfunction
YES
Check PA unit D1 or LPF (L3 ~ L5).
Normal condition?
NO
PA unit IC1 malfunction
YES
Refer to service department.

[EF] UNIT

REF. NO.	DISCRIPTION	PART NO.
IC1	7SEG. LED	TLR312
IC2	7SEG. LED	TLR312
IC3	7SEG. LED	TLR312
IC4	IC	TA7612AP
IC5	IC	78M05 or 7805
Q1	TRANSISTOR	2SC945K
Q2	TRANSISTOR	2SA1015
Q3	TRANSISTOR	2SC945
D1	LED	SLC-26UR
D2	LED	SLC-26GG
D3	LED	SLP-451B
D4	LED	SLC-26UR
D5	LED	LN433YP
D6	LED	LN433YP
D7	LED	LN433YP
D8	LED	LN433YP
D9	LED	LN433YP
D10	LED	LN233RP
D11	LED	LN233RP
D12	DIODE	1SS53 (IC-25A only)
D16	DIODE	1SS133
D18	DIODE	1SS53 (IC-25A only)
D20	DIODE	1SS133
D21	DIODE	15CD11
D22	LED	GL-9PR4
D23	DIODE	1SS53 (IC-25A only)
D24	DIODE	1SS53
D25	DIODE	1SS53
D26	DIODE	1SS53
D27	DIODE	1SS53
D28	DIODE	1SS133
D29	DIODE	1SS133
D30	DIODE	1SS133
D31	DIODE	1SS133
D32	DIODE	1SS133 (IC-25E only)
D33	DIODE	1SS133 (IC-25E only)
R1	VARIABLE	K121B1-5N1111 10KA
R2	VARIABLE	VM13A5M3211 10KB
R3	RESISTOR	330 R25
R4	RESISTOR	330 R25
R5	RESISTOR	1K R25
R6	RESISTOR	1K R25
R7	RESISTOR	1K R25
R8	RESISTOR	1K R25
R9	RESISTOR	1K R25
R10	RESISTOR	1K R25
R11	RESISTOR	1K R25
R12	RESISTOR	22K R25
R13	RESISTOR	1K R25
R14	RESISTOR	10K R25
R15	RESISTOR	10 R25
R16	RESISTOR	220K ELR10
R17	RESISTOR	47K R10
R18	RESISTOR	47K R10
R19	RESISTOR	47K R10
R20	RESISTOR	10K ELR10
R21	RESISTOR	10K R25
R22	RESISTOR	330 R25
R23	RESISTOR	22K ELR10

REF. NO.	DISCRIPTION	PART NO.
C1	CERAMIC	0.001 50V B
C2	CERAMIC	0.001 50V B
C3	CERAMIC	0.001 50V B
C4	CERAMIC	0.001 50V B
C5	CERAMIC	0.001 50V B
C6	CERAMIC	0.001 50V B
C7	ELECTROLY	0.47 50V RC2
C8	TANTALUM	0.47, 35V, CS15ER47M
C9	CERAMIC	0.001 50V B
C10	CERAMIC	0.001 50V B
J1	CONNECTOR	FM214-8SS(P) (MIC)
J2	CONNECTOR	SJ-296 (EXT SP)
J3	CONNECTOR	FM-MDFM (ANT)
P1	CONNECTOR	TL-25H-02-V1
P2	CONNECTOR	TL-25H-10-V1
P3	CONNECTOR	TL-25H-08-V1
P4	CONNECTOR	TL-25H-02-V1
P5	CONNECTOR	TL-25H-06-V1
P6	CONNECTOR	TL-25H-06-V1
P7	CONNECTOR	TL-25H-07-V1
P8	CONNECTOR	TL-25H-05-V1
P9	CONNECTOR	TL-25H-04-V1
P10	CONNECTOR	TL-25H-04-V1
P11	CONNECTOR	TL-25H-04-V1
P12	CONNECTOR	1490-4P
P13	CONNECTOR	TL-25P-02-V1
P14	CONNECTOR	001T-4100 1P
P15	CONNECTOR	001T-4100 1P
SP1	SPEAKER	C060A20A000
S1	ROTARY ENCODER	LA22602
S2	PUSH SWITCH	SPJ222N LOCK (IC-25A) SPJ222T (IC-25E)
S3	ROTARY SW	SBU2026C
S4	PUSH SWITCH	SPJ222C LOCK
S5	KEY SWITCH	KEC10901
S6	PUSH SWITCH	SPJ322N LOCK
S7	PUSH SWITCH	SPJ322N LOCK
S8	PUSH SWITCH	SPJ322N LOCK
S9	KEY SWITCH	KHG10901
S10	KEY SWITCH	KHG10901
B1	P.C BOARD	B-518 (DISP1)
B2	P.C BOARD	B-519 (DISP2)
B3	P.C BOARD	B-520 (SW1)
B4	P.C BOARD	B-521 (SW2)
B5	P.C BOARD	B-522 (SW3)
B6	P.C BOARD	B-525 (SW4)
B7	P.C BOARD	B-526 (SW5)
B8	P.C BOARD	B-523 (METER)
B9	P.C BOARD	B-524 (MIC)

REF. NO.	DISCRIPTION	PART NO.
IC1	IC	4558D
IC2	IC	BA401
IC3	IC	μPC577H
IC4	IC	μPC2002H
IC5	IC	TC5082P (IC-25E only)
IC6	IC	MB3756
IC7	IC	ND487C1-3R
Q1	TRANSISTOR	2SC945P
Q2	FET	3SK74M
Q3	FET	3SK48
Q4	TRANSISTOR	2SC1571G
Q5	TRANSISTOR	2SC945
Q6	TRANSISTOR	2SC945P
Q7	TRANSISTOR	2SC383
Q8	FET	3SK74M
Q9	TRANSISTOR	2SC2053
Q10	TRANSISTOR	2SC763C
Q11	TRANSISTOR	2SC945P
Q12	TRANSISTOR	2SC945P
Q13	TRANSISTOR	2SC945P
Q14	TRANSISTOR	2SC945P
Q15	TRANSISTOR	2SC1571G
Q16	TRANSISTOR	2SC945 ANY RANK
Q17	TRANSISTOR	2SC945P
Q18	TRANSISTOR	2SC945P
Q19	TRANSISTOR	2SC945K
Q20	TRANSISTOR	2SC945 ANY RANK
Q21	TRANSISTOR	2SC945P
Q22	TRANSISTOR	2SA496Y or O
Q23	TRANSISTOR	2SC945
D1	DIODE	1SS53
D2	DIODE	1SS53
D3	DELETED	
D4	DELETED	
D5	DELETED	
D6	DELETED	
D7	DIODE	1SS53
D8	DIODE	1SS53
D9	DIODE	1SS53
D10	VARACTOR DIODE	1S2688ES
D11	DIODE	1N60
D12	DIODE	1N60
D13	DIODE	1N60
D14	DIODE	1N60
D15	DIODE	1SS53
D16	DIODE	1N60
D17	DIODE	1N60
D18	DIODE	1N4002
D19	DIODE	1SS53
D20	DIODE	1N60
D21	DIODE	1N60
D22	DIODE	1SS53
FI1	CRYSTAL FILTER	16M15B1
FI2	CERAMIC FILTER	CFU455E2
DS1	DISCRIMINATOR	CFY-455S
X1	CRYSTAL	HC43/U 17.355MHz
X2	CRYSTAL	CR3
X3	CRYSTAL	HC43/U 7.168MHz (IC-25E only)
L1	COIL	LS216
L2	COIL	LS216
L3	COIL	LS216
L4	COIL	LR116
L5	COIL	LR116
L6	COIL	LB83
L7	COIL	LB1-1-A
L8	COIL	LB1-1-A
L9	COIL	LB14A
L10	CHOKE	LW-19
L11	COIL	LS209
L12	COIL	LS-141A
L13	CHOKE	LB4 3R6
L14	CHOKE	LB4 100
L15	COIL	LS216
L16	COIL	LS211
L17	CHOKE	LW-19
L18	COIL	LS211
L19	COIL	LA121
L20	COIL	LA121
L21	COIL	LS-122
L22	COIL	LS-16
L23	CHOKE	102
L24	CHOKE	LW-16
R1	RESISTOR	100K ELR25
R2	RESISTOR	1K ELR25
R3	RESISTOR	2.2K ELR25
R4	RESISTOR	1.2K ELR25
R5	RESISTOR	100 ELR25
R6	RESISTOR	330 ELR25
R7	RESISTOR	100K ELR25
R8	RESISTOR	100K ELR25
R9	RESISTOR	10K ELR25
R10	RESISTOR	2.2K ELR25
R11	RESISTOR	1K ELR10
R12	RESISTOR	2.2K ELR25
R13	RESISTOR	47 ELR25
R14	RESISTOR	47 ELR25
R15	RESISTOR	100K ELR25
R16	RESISTOR	100K ELR25
R17	RESISTOR	5.6K ELR25
R18	RESISTOR	10K ELR25
R19	RESISTOR	1K ELR25
R20	RESISTOR	1.8K ELR25
R21	RESISTOR	6.8K ELR25
R22	RESISTOR	680 R25
R23	RESISTOR	10 R25
R24	RESISTOR	1K ELR25
R25	RESISTOR	680 ELR25
R26	RESISTOR	22K R25
R27	RESISTOR	820 ELR25
R28	RESISTOR	100 ELR25
R29	RESISTOR	1.8M ELR25
R30	RESISTOR	6.8K ELR25
R31	RESISTOR	5.6K R25
R32	RESISTOR	5.6K ELR25
R33	RESISTOR	5.6K ELR25
R34	RESISTOR	680 ELR25
R35	RESISTOR	100 ELR25
R36	TRIMMER	H0651A 470
R37	RESISTOR	15K ELR25
R38	RESISTOR	220K ELR25
R39	RESISTOR	4.7K ELR25
R40	RESISTOR	4.7K ELR25
R41	THERMISTOR	23D29
R42	RESISTOR	3.3K ELR25
R43	RESISTOR	39K ELR25
R44	RESISTOR	22K ELR25

R45	RESISTOR	33K	ELR25
R46	RESISTOR	22K	ELR25
R47	RESISTOR	100	ELR25
R48	RESISTOR	2.7K	ELR25
R49	RESISTOR	47	ELR25
R50	RESISTOR	1K	ELR25
R51	RESISTOR	1K	ELR25
R52	RESISTOR	5.6K	ELR25
R53	RESISTOR	100	ELR25
R54	RESISTOR	100K	ELR25
R55	RESISTOR	100K	ELR25
R56	RESISTOR	4.7K	ELR25
R57	RESISTOR	10	ELR10
R58	RESISTOR	470	ELR25
R59	RESISTOR	22	ELR25
R60	RESISTOR	47K	ELR25
R61	RESISTOR	150K	ELR25
R62	RESISTOR	1K	ELR25
R63	RESISTOR	47	ELR25
R64	RESISTOR	1.5K	ELR25
R65	RESISTOR	1.5K	ELR25
R66	RESISTOR	1.5K	ELR25
R67	RESISTOR	1.5K	ELR25
R68	RESISTOR	4.7K	ELR25
R69	RESISTOR	47	ELR25
R70	RESISTOR	1K	ELR25
R71	RESISTOR	120	ELR25
R72	RESISTOR	150	ELR25
R73	RESISTOR	10K	ELR25
R74	RESISTOR	3.3K	ELR25
R75	RESISTOR	4.7K	ELR25
R76	RESISTOR	15K	ELR25
R77	RESISTOR	10K	ELR25
R78	RESISTOR	2.2K	ELR25
R79	RESISTOR	100	ELR25
R80	TRIMMER	H0651A	10K
R81	RESISTOR	47	ELR25
R82	RESISTOR	10K	ELR25
R83	RESISTOR	10K	ELR25
R84	RESISTOR	3.3K	ELR25
R85	RESISTOR	18K	ELR25
R86	RESISTOR	4.7K	R25
R87	RESISTOR	39K	ELR25
R88	RESISTOR	4.7K	ELR25
R89	RESISTOR	150K	ELR25
R90	RESISTOR	4.7K	ELR25
R91	RESISTOR	1K	ELR25
R92	RESISTOR	47	ELR25
R93	RESISTOR	5.6K	ELR25
R94	RESISTOR	15K	ELR25
R95	RESISTOR	5.6K	ELR25
R96	RESISTOR	100	ELR25
R97	RESISTOR	6.8	ELR25
R98	RESISTOR	100	ELR25
R100	TRIMMER	H0651A	100K (IC-25E only)
R101	RESISTOR	100	ELR25
R102	THERMISTOR	33D28	
R103	RESISTOR	2.7K	ELR25
R104	RESISTOR	27K	ELR25
R105	RESISTOR	1K	ELR25
R106	RESISTOR	22K	ELR25
R107	RESISTOR	4.7K	ELR25
R108	RESISTOR	1K	ELR25
R109	RESISTOR	4.7K	ELR25
R110	TRIMMER	H0651A	33K
R111	RESISTOR	10K	ELR25
R112	RESISTOR	15K	ELR25
R113	RESISTOR	22K	ELR25
R114	RESISTOR	100K	ELR25
R115	RESISTOR	100K	ELR25
R116	TRIMMER	H0651A	3.3K
R117	RESISTOR	150K	ELR25
R118	RESISTOR	1K	R25
R119	RESISTOR	1K	R25
R120	RESISTOR	47K	ELR25
R121	RESISTOR	47K	ELR25
R122	RESISTOR	15K	ELR25
R123	TRIMMER	H0651A	3.3K
R124	RESISTOR	5.6K	ELR25
R125	RESISTOR	22K	ELR25
R126	RESISTOR	1M	ELR25
R127	RESISTOR	10K	ELR25
R128	RESISTOR	2.2K	ELR25
R129	RESISTOR	330	ELR25
R130	JUMPER	JPW-02H	
R131	RESISTOR	15K	ELR10
R132	RESISTOR	10K	ELR10
R133	RESISTOR	22K	ELR10
R134	RESISTOR	47K	ELR25
R135	RESISTOR	100	ELR25
R136	RESISTOR	100	ELR25
R137	RESISTOR	47K	ELR25
R138	RESISTOR	100	ELR25
R139	RESISTOR	1.8K	ELR25
R140	RESISTOR	22K	ELR25
R141	RESISTOR	2.2K	R25
R142	RESISTOR	3.9K	R25
R143	RESISTOR	6.8K	ELR25
R144	RESISTOR	47K	ELR25
R145	RESISTOR	47K	ELR25
R146	RESISTOR	10K	ELR25
R147	RESISTOR	1K	ELR10 (IC-25E only)
R148	RESISTOR	10K	ELR25 (IC-25E only)
R149	JUMPER	JPW-02A	
R151	JUMPER	JPW-02H	
R152	JUMPER	JPW-02H	
C1	DIP MICA	30P	50V
C2	DIP MICA	100P	50V
C3	DIP MICA	100P	50V
C4	CERAMIC	0.0047	50V B
C5	CERAMIC	5P	50V SL
C6	CERAMIC	0.001	50V B
C7	CERAMIC	10P	50V SL
C8	CERAMIC	0.0047	50V B
C9	CERAMIC	0.0047	50V B
C10	CERAMIC	0.0047	50V B
C11	CERAMIC	0.001	50V B
C12	CERAMIC	10P	50V SL
C13	CERAMIC	20P	50V SL
C14	CERAMIC	10P	50V SL
C15	CERAMIC	0.0047	50V B
C16	CERAMIC	10P	50V SL
C17	CERAMIC	220P	50V SL
C18	CERAMIC	0.0047	50V B
C19	CERAMIC	2P	50V SL
C20	CERAMIC	0.0047	50V B
C21	CERAMIC	33P	50V SL
C22	ELECTROLY	1	50V B.P
C23	ELECTROLY	100	10V RE or MS
C24	CERAMIC	0.001	50V B
C25	BARRIER LAY	0.047	25V
C26	CERAMIC	0.001	50V B

C27	CERAMIC	0.0047	50V B
C28	ELECTROLY	100	10V
C29	BARRIER LAY	0.01	TBD05X103
C30	BARRIER LAY	0.01	TBD05X103
C31	MYLAR	0.0022	50V
C32	CERAMIC	0.0047	50V B
C33	ELECTROLY	10	10V
C34	BARRIER LAY	0.047	25V
C35	MYLAR	0.0047	50V
C36	BARRIER LAY	0.01	TBD05X103
C39	CERAMIC	0.0047	50V B
C40	CERAMIC	100P	50V XL
C41	CERAMIC	100P	50V YL
C42	CERAMIC	10P	50V SL
C43	CERAMIC	0.0047	50V B
C44	CERAMIC	10P	50V SL
C45	CERAMIC	0.0047	50V B
C46	CERAMIC	0.0047	50V B
C47	CERAMIC	2P	50V SL
C48	CERAMIC	0.0047	50V B
C49	CERAMIC	2P	50V SL
C50	CERAMIC	0.0047	50V B
C51	CERAMIC	220P	50V SL
C52	CERAMIC	3P	50V SL
C53	CERAMIC	7P	50V SL
C54	CERAMIC	47P	50V SL
C55	CERAMIC	220P	50V SL
C56	TRIMMER	CV05D2001	
C57	CERAMIC	22P	50V SL
C58	BARRIER LAY	0.1	25V
C59	BARRIER LAY	0.1	25V
C60	BARRIER LAY	0.1	25V
C61	BARRIER LAY	0.1	25V
C62	MYLAR	0.001	50V
C63	MYLAR	0.001	50V
C64	BARRIER LAY	0.01	TBD05X103
C65	BARRIER LAY	0.1	25V
C66	CERAMIC	220P	50V SL
C67	CERAMIC	0.001	50V B
C68	MYLAR	0.0022	50V
C69	BARRIER LAY	0.1	25V
C70	BARRIER LAY	0.1	25V
C71	BARRIER LAY	0.1	25V
C72	BARRIER LAY	0.1	25V
C73	ELECTROLY	4.7	10V RC2
C74	TANTALUM	2.2	16V
C75	MYLAR	0.001	50V
C76	MYLAR	0.001	50V
C77	BARRIER LAY	0.01	TBD05X103
C78	BARRIER LAY	0.047	35V
C79	MYLAR	0.0047	50V
C80	ELECTROLY	47	10V RE or MS
C81	BARRIER LAY	0.01	TBD05X103
C82	BARRIER LAY	0.01	TBD05X103
C83	BARRIER LAY	0.1	25V
C84	ELECTROLY	10	10V RC2
C85	CERAMIC	470P	50V B
C86	ELECTROLY	1	10V RE or MS
C87	ELECTROLY	470	16V RE or MS
C88	ELECTROLY	220	10V RE or MS
C89	ELECTORLY	100	10V RE or MS
C90	CERAMIC	0.0047	50V B
C91	BARRIER LAY	0.1 (IC-25E only)	25V
C92	BARRIER LAY	0.047 (IC-25E only)	35V
C93	CERAMIC	470P (IC-25E only)	50V B
C94	CERAMIC	47P (IC-25E only)	50V SL
C95	CERAMIC	47P (IC-25E only)	50V SL
C96	ELECTROLY	2.2	50V
C97	BARRIER LAY	0.1	25V
C98	BARRIER LAY	0.047	35V
C99	MYLAR	0.0022	50V
C100	BARRIER LAY	0.047	35V
C101	ELECTROLY	4.7	10V RC2
C102	ELECTROLY	10	10V RC2
C103	ELECTROLY	3.3	10V RC2
C104	CERAMIC	0.0047	50V B
C105	ELECTROLY	2.2	10V RC2
C106	ELECTROLY	470	16V MS or RE
C107	CERAMIC	220P	50V SL
C108	CERAMIC	220P	50V
C109	CERAMIC	0.0047	50V B
C110	CERAMIC	0.0047	50V B
C111	CERAMIC	0.001	50V B
C112	CERAMIC	0.001	50V B
C113	CERAMIC	0.0047	50VB
C114	ELECTROLY	0.47	10V RC2
C115	BARRIER LAY	0.1	25V
C116	BARRIER LAY	0.1	25V
C118	BARRIER LAY	47	16V
C119	BARRIER LAY	1	50V
C120	BARRIER LAY	0.1	25V
C121	BARRIER LAY	0.01	TBD05X103
C122	CERAMIC	220P	50V SL
C123	CERAMIC	470P	50V B
C124	CERAMIC	220P	50V SL
C125	CERAMIC	220P	50V SL
C126	CERAMIC	220P	50V SL
C127	CERAMIC	470P	50V B
C128	CERAMIC	0.001	50V B
C129	ELECTROLY	10	10V RC2
C130	CERAMIC	15P	50V SL
C131	CERAMIC	220P	50V SL
C132	BARRIER LAY	0.1	25V
J1	CONNECTOR	TL-25P-03-V1	
J2	CONNECTOR	TMP-J01X-A	
J3	CONNECTOR	TMP-J01X-A	
J4	CONNECTOR	TL-25P-10-V1	
J5	CONNECTOR	TL-25P-04-V1	
J6	CONNECTOR	TL-25P-02-V1	
J7	CONNECTOR	TL-25P-08-V1	
J8	CONNECTOR	TL-25P-08-V1	
J9	CONNECTOR	TMP-J01X-A	
B1	P.C BOARD	B-490	

REF. NO.	DISCRIPTION	PART NO.
IC1	IC	TC9123 BP
Q1	TRANSISTOR	2SC383 TM
Q2	TRANSISTOR	2SC763C
Q3	FET	3SK74M
Q4	TRANSISTOR	2SC763C
Q5	FET	2SK125
Q6	TRANSISTOR	2SC763C
Q7	TRANSISTOR	2SC763C
Q8	TRANSISTOR	2SC383 TM
D1	DIODE	1SS53
D2	ZENER	XZ068
D3	DIODE	1S953
D4	DIODE	1S953
D5	VARACTOR DIODE	1SV50
L1	COIL	LS-134
L2	COIL	LS-145
L3	CHOKE	5R6
L4	CHOKE	101
L5	CHOKE	101
L6	COIL	LW-19
L7	COIL	LB-73
L8	COIL	LW-19
L9	COIL	LW-19
L10	COIL	LS-211
X1	CRYSTAL	HC43/U 40.678MHz
X2	CRYSTAL	HC43/U 5.12MHz
R1	RESISTOR	4.7K R25
R2	RESISTOR	2.7K ELR25
R3	RESISTOR	4.7K ELR25
R4	RESISTOR	1.0K ELR25
R5	RESISTOR	4.7K ELR25
R6	RESISTOR	18K ELR25
R7	RESISTOR	1.2K ELR25
R8	RESISTOR	1K ELR25
R10	RESISTOR	470 R25
R11	RESISTOR	100 ELR25
R12	RESISTOR	68K ELR25
R13	RESISTOR	470 ELR25
R14	RESISTOR	100 ELR25
R15	RESISTOR	470 ELR25
R16	RESISTOR	1K ELR25
R17	RESISTOR	47 ELR25
R18	RESISTOR	100 ELR25
R19	RESISTOR	22K ELR25
R20	RESISTOR	5.6K ELR25
R21	RESISTOR	220 ELR25
R22	RESISTOR	1K ELR25
R23	RESISTOR	47K ELR25
R24	RESISTOR	2.2K ELR25
R25	RESISTOR	1K ELR25
R26	RESISTOR	15K ELR25
R27	RESISTOR	470 ELR25
R28	RESISTOR	470 ELR25
R29	RESISTOR	2.2 ELR25
R30	RESISTOR	150 ELR25
R31	RESISTOR	220 ELR25
R32	RESISTOR	220 ELR25
R33	RESISTOR	330 ELR25
R34	RESISTOR	5.6K ELR25
R35	RESISTOR	1.2K ELR25
R36	RESISTOR	33 ELR25
R37	RESISTOR	1.2K ELR25
R38	RESISTOR	5.6K ELR25
R39	RESISTOR	33 ELR25
R40	RESISTOR	47 ELR25
R41	RESISTOR	2.7K ELR25
R42	RESISTOR	1.8K ELR25
R43	RESISTOR	100 ELR25
R44	RESISTOR	220 R25
R45	RESISTOR	22 R25
R46	RESISTOR	120 ELR25
R47	JUMPER	JPW-02A
C1	CERAMIC	68P 50V SL
C2	TRIMMER	CV05D2001
C3	CERAMIC	10P 50V SL
C4	CERAMIC	0.001 50V B
C5	CERAMIC	47P 50V SL
C6	CERAMIC	33P 50V SL
C7	CERAMIC	0.0047 50V B
C8	CERAMIC	7P 50V SL
C9	BARRIER LAY	0.1 25V
C10	CERAMIC	0.0047 50V B
C11	CERAMIC	0.0047 50V B
C12	CERAMIC	0.0047 50V B
C13	CERAMIC	33P 50V SL
C14	CERAMIC	33P 50V SL
C15	CERAMIC	0.0047 50V B
C16	BARRIER LAY	0.1 25V
C17	ELECTROLY	47 10V
C18	CERAMIC	0.0047 50V B
C19	ELECTROLY	100 10V
C20	CERAMIC	220P 50V SL
C21	CERAMIC	0.0047 50V B
C22	CERAMIC	0.0047 50V B
C23	CERAMIC	10P 50V SL
C24	CERAMIC	0.0022 50V B
C25	ELECTROLY	2.2 50V
C26	DIP MICA	39P 50V
C27	DIP MICA	39P 50V
C28	TANTALUM	0.47 35V
C29	ELECTROLY	10 16V
C30	ELECTROLY	220 10V
C31	CERAMIC	470P 50V B
C32	CERAMIC	50P 50V XL
C33	CERAMIC	5P 50V CH
C34	CERAMIC	3P 50V SL
C35	CERAMIC	15P 50V SL
C36	CERAMIC	8P 50V SL
C37	CERAMIC	1P 50V SL
C38	CERAMIC	220P 50V SL
C39	CERAMIC	0.001 50V B
C40	CERAMIC	470P 50V B
C41	CERAMIC	47P 50V SL
C42	CERAMIC	0.0047 50V B
C43	CERAMIC	220P 50V SL
C44	CERAMIC	3P 50V SL
C45	CERAMIC	22P 50V SL
C46	CERAMIC	0.0047 50V B
C47	CERAMIC	220P 50V SL
C48	CERAMIC	0.0047 50V B
C49	CERAMIC	0.0047 50V B
C50	CERAMIC	0.0047 50V B
C51	CERAMIC	0.0047 50V B
C52	BARRIER LAY	0.1 25V
P1	CONNECTOR	TMP-P01X-A1
P2	CONNECTOR	TL-25H-03-A1
B1	P.C BOARD	B-504

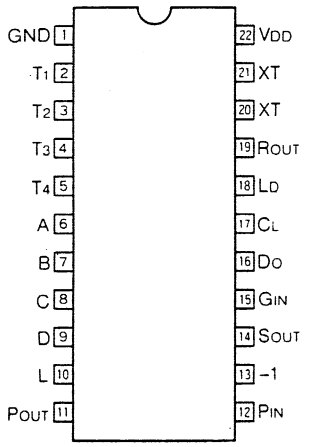
REF.NO.	DISCRIPTION	PART NO.
IC1	IC	4028
IC2	IC	4511
IC3	IC	M54516
IC4	IC	μPD650-108
IC5	IC	4013
IC6	IC	MB14025
IC7	IC	4001 (UBP) (C)
IC8	IC	4069
Q1	TRANSISTOR	2SA1015
Q2	TRANSISTOR	2SA1015
Q3	TRANSISTOR	2SA1015
Q4	TRANSISTOR	2SC945 ANY RANK
Q5	TRANSISTOR	2SC945 ANY RANK
Q6	TRANSISTOR	2SC945 ANY RANK
Q7	TRANSISTOR	2SC945 ANY RANK
Q9	TRANSISTOR	2SC945 ANY RANK
Q10	TRANSISTOR	2SA1015
Q11	TRANSISTOR	2SC945 ANY RANK
Q12	TRANSISTOR	2SC945 ANY RANK
Q13	TRANSISTOR	2SA830 or 831
Q14	TRANSISTOR	2SD468
Q15	TRANSISTOR	2SA1015
Q16	TRANSISTOR	2SC945 ANY RANK
Q17	TRANSISTOR	2SA1015
Q18	TRANSISTOR	2SA1015
Q19	TRANSISTOR	2SC945 ANY RANK
Q20	TRANSISTOR	2SC945 ANY RANK
D1	DIODE	1S953
D2	DIODE	1SS53
D3	DIODE	1SS53
D4	DIODE	1S953
D5	DIODE	1SS53
D6	DIODE	1SS53
D7	DIODE	1SS53
D8	DIODE	1SS53
D9	DIODE	1SS53
D10	DIODE	1SS53
D11	DIODE	1SS53
D12	DIODE	1SS53
D13	DIODE	1SS53
D16	DIODE	1SS53
D17	DIODE	1SS53
D18	DIODE	1SS53
D19	DIODE	1SS53
D20	DIODE	1SS53
D21	DIODE	1SS53
D22	DIODE	1SS53 (1SS133)
D23	DIODE	1S953
D24	DIODE	1SS53
D25	DIODE	1S953
D26	DIODE	1S953
D27	DELETED	
D29	DIODE	1N4002
D30	DIODE	1N4002
D31	DIODE	1S953
D32	DIODE	1SS53
D33	DIODE	1SS53
D34	DIODE	1S953
D35	DIODE	1SS53 (IC-25A only)
D36	DIODE	1SS53 (IC-25E only)
D37	DIODE	1SS53 (IC-25A only)
D38	DIODE	1SS53
D39	ZENER	YZ045B
D41	DIODE	1S953
D42	DIODE	1SS53 (1SS133)
D43	DIODE	1SS53 (1SS133)
L1	CHOKE	LW-12
X1	CERAROCK	CSB400A
S1	SWITCH	SSS022
R1	RESISTOR	47K ELR25
R2	RESISTOR	47K ELR25
R3	RESISTOR	330 ELR25
R4	RESISTOR	47K ELR25
R5	RESISTOR	10K ELR25
R6	RESISTOR	6.8K ELR25
R7	RESISTOR	6.8K ELR25
R8	RESISTOR	6.8K ELR25
R9	RESISTOR	47 ELR25
R10	RESISTOR	47 ELR25
R11	RESISTOR	47 ELR25
R12	RESISTOR	47 ELR25
R13	RESISTOR	47 ELR25
R14	RESISTOR	47 ELR25
R15	RESISTOR	47 ELR25
R16	RESISTOR	330 ELR25
R17	RESISTOR	22K ELR25
R19	RESISTOR	100K ELR25
R20	RESISTOR	10K ELR25
R21	RESISTOR	100K ELR25
R22	RESISTOR	220K ELR25
R23	RESISTOR	150K ELR25
R24	RESISTOR	150K ELR25
R26	RESISTOR	22K ELR25
R27	RESISTOR	100K ELR25
R28	RESISTOR	39K ELR25
R29	RESISTOR	1M ELR25
R30	RESISTOR	270K ELR10
R31	RESISTOR	47K ELR25
R32	RESISTOR	22K ELR25
R33	RESISTOR	100 ELR25
R34	RESISTOR	100 ELR25
R35	RESISTOR	47K ELR25
R36	RESISTOR	47K ELR25
R37	RESISTOR	10K ELR25
R38	RESISTOR	47K ELR25
R39	RESISTOR	47K ELR25
R40	RESISTOR	1M ELR25
R41	RESISTOR	1.8M ELR25
R42	RESISTOR	220K ELR25
R43	ARRAY	RM-6-473 (47K)
R44	RESISTOR	150K ELR25
R45	RESISTOR	220K ELR25
R46	RESISTOR	1K ELR25
R47	TRIMMER	H0651A 100K
R48	RESISTOR	10K ELR25
R49	RESISTOR	1M ELR25
R50	RESISTOR	470K ELR25
R51	RESISTOR	100K ELR25
R52	RESISTOR	100K ELR25
R53	RESISTOR	100K ELR25
R54	RESISTOR	1K ELR25
R55	RESISTOR	680 ELR25
R56	RESISTOR	100K ELR25
R57	RESISTOR	47K ELR25
R58	RESISTOR	22K ELR25
R59	RESISTOR	1K ELR25
R60	RESISTOR	22K ELR25
R61	RESISTOR	1K ELR10

R62	TRIMMER	H0651A 220K	
R63	RESISTOR	10K	ELR25
R64	RESISTOR	1M	ELR25
R65	RESISTOR	1.8K	ELR25
R66	RESISTOR	1K	ELR25
R67	RESISTOR	47K	ELR25
R68	RESISTOR	47K	ELR25
R69	RESISTOR	4.7K	ELR25
R70	RESISTOR	100K	ELR25
R71	RESISTOR	10K	ELR25
R72	RESISTOR	1K	ELR25
R73	RESISTOR	150	ELR25
R74	RESISTOR	22K	ELR25
R75	RESISTOR	22K	ELR25
R76	RESISTOR	680	ELR25
R79	RESISTOR	47K	ELR25
R80	JUMPER	JPW-02H	
R81	JUMPER	JPW-02H	
R82	JUMPER	JPW-02A	
R83	JUMPER	JPW-02A	
R84	JUMPER	JPW-02H	
R85	JUMPER	JPW-02H	
R86	JUMPER	JPW-02H	
R87	JUMPER	JPW-02H	
R88	JUMPER	JPW-02H	
R89	RESISTOR	390	ELR25
C1	ELECTROLY	10	10V RC2
C2	ELECTROLY	0.47	50V RC2
C3	ELECTROLY	4.7 BP	25V
C4	CERAMIC	100P	50V SL
C5	CERAMIC	100P	50V SL
C6	ELECTROLY	4.7	50V RC2
C7	ELECTROLY	4.7	50V RC2
C8	ELECTROLY	4.7	25VBP
C9	CERAMIC	0.0022	50V B
C10	BARRIER LAY	0.01	50V
C11	CERAMIC	0.001	50V B
C12	ELECTROLY	0.1	50V RC2
C13	CERAMIC	0.001	50V B
C14	ELECTROLY	0.1	50V RC2
C15	ELECTROLY	0.1	50V RC2
C16	DELETED		
C17	ELECTROLY	0.47	50V RC2
C18	ELECTROLY	47 10V	RE or CE
C19	ELECTROLY	0.47	50V RC2
C20	BARRIER LAY	0.1	25V
C21	ELECTROLY	100	10V
C22	ELECTROLY	470	16V
C23	BARRIER LAY	0.1	25V
C25	BARRIER LAY	0.047	35V
C26	TANTALUM	47	10V
J1	CONNECTOR	TL-25P-05-V1	
J2	CONNECTOR	TL-25P-04-V1	
J3	CONNCETOR	TL-25P-07-V1	
J4	CONNECTOR	TL-25P-06-V1	
J5	CONNECTOR	TL-25P-06-V1	
J6	CONNECTOR	TL-25P-02-V1	
J7	CONNECTOR	TL-25P-02-V1	
J8	CONNECTOR	TL-25P-04-V1	
J9	CONNCETOR	TL-25P-02-V1	
J10	CONNCETOR	TL-25P-02-V1	
J11	CONNECTOR	RT-01T-10B (1P)	
J12	CONNECTOR	RT-01T-1.0B	
P1	CONNECTOR	SMP03VB	
P2	CONNECTOR	TL-25H-02-A1	

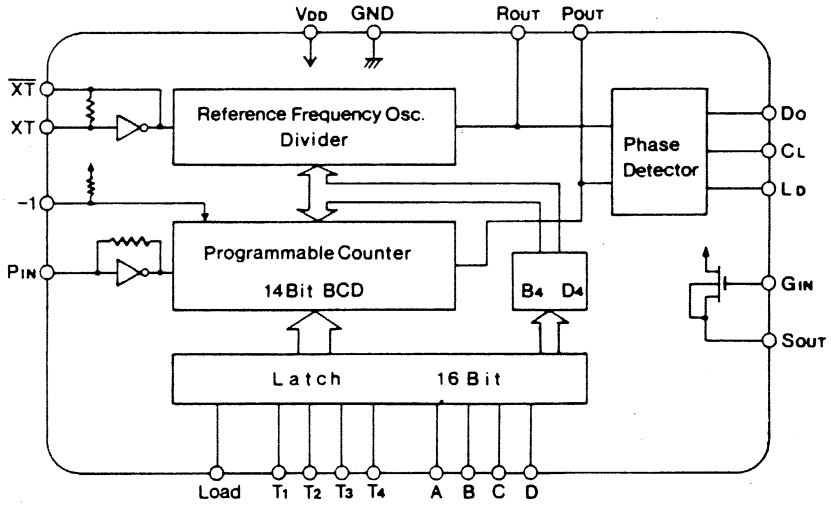
REF. NO.	DISCRIPTION	PART NO.	
IC1	IC	SC1019	
D1	DIODE	MI402	
D2	DIODE	MI402	
D3	DIODE	MI301	
D4	DIODE	1SS97	
L1	CHOKE	LW-19	
L2	COIL	LA-127	
L3	COIL	LA-2	
L4	COIL	LA-2	
L5	COIL	LA-71	
L6	COIL	LW-19	
R1	RESISTOR	0.15	2W
R2	RESISTOR	120	ELR25
R3	RESISTOR	1K	ELR25
R4	RESISTOR	1.5K	ELR25
R5	RESISTOR	220	ELR25
R6	RESISTOR	4.7K	ELR25
C1	ELECTROLY	100	16V
C2	CERAMIC	220P	50V SL
C3	CERAMIC	220P	50V SL
C4	CERAMIC	220P	50V SL
C5	CERAMIC	15P	500V SL
C6	CERAMIC	220P	50V SL
C7	CERAMIC	220P	50V SL
C8	CERAMIC	0.0047	50V B
C9	CERAMIC	15P	500V SL
C10	CERAMIC	0.0047	50V B
C11	CERAMIC	0.001	500V B
C12	CERAMIC	0.5P	500V SL
C13	CERAMIC	18P	500V SL
C14	CERAMIC	2P	500V SL
C15	CERAMIC	33P	500V SL
C16	CERAMIC	3P	500V SL
C17	CERAMIC	27P	500V SL
C18	CERAMIC	220P	50V SL
P1	CONNECTOR	——	
P2	CONNECTOR	TL-25H-08-A1	
P3	CONNECTOR	TMP-P01X-A1	
P4	CONNECTOR	TMP-P01X-A1	
B1	P.C BOARD	B-503	

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

PIN CONNECTION



BLOCK DIAGRAM

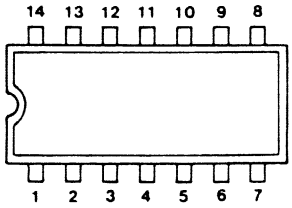


Maximum rating

Item	Symbol	Rating	Unit
Power supply voltage	V_{DD}	−0.3 ~ 9.0	V
Input voltage	V_{IN}	−0.3 ~ V_{DD} +0.3	V
Operation temperature range	T_{OPR}	−30 ~ +70	°C
Storage temperature range	T_{STC}	−55 ~ +125	°C

TC4001 (QUAD 2-INPUT POSITIVE NOR GATE)
TC4013 (DUAL D-TYPE FLIP-FLOP)
TC4028 (BCD TO DECIMAL DECODER)
TC4069 (HEX INVERTER)

PIN CONNECTION



Maximum rating

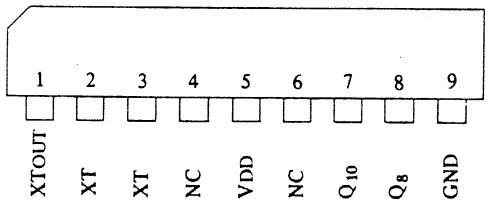
Item	Symbol	Rating	Unit
Power supply voltage	V_{DD}	V_{SS} −0.5 ~ V_{SS} +20	V
Input voltage	V_{IN}	V_{SS} −0.5 ~ V_{DD} +0.5	V
Output voltage	V_{OUT}	V_{SS} −0.5 ~ V_{DD} +0.5	V
Input current	I_{IN}	±10	mA
Permissible Dissipation	P_D	300	mW
Storage temperature range	T_{STG}	−65 ~ 150	°C
Lead temperature/time	T_{SOL}	260°C · 10Sec.	

TC-5082 (OSCILLATOR AND 10-STAGE DIVIDER)

Maximum rating

Item	Symbol	Rating	Unit
Power supply voltage	V_{DD}	10	V
Input voltage	V_{IN}	$-0.3 \sim V_{DD} +0.3$	V
Operation temperature range	T_{OPR}	$-30 \sim 75$	°C
Storage temperature range	T_{STR}	$-55 \sim 125$	°C

PIN CONNECTION

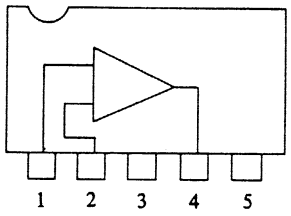


BA401 (FM/IF LIMITER)

Maximum rating

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	T_{OPR}	$-25 \sim +75$	°C
Storage temperature range	T_{STG}	$-55 \sim +125$	°C

BLOCK DIAGRAM

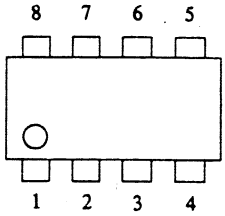


MJM4558D (DUAL LOW NOISE AMP.)

Maximum rating

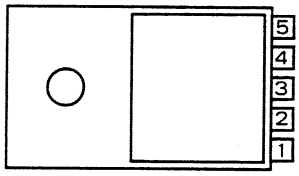
Item	Symbol	Rating	Unit
Power supply voltage	V_{DD}	18	V
Input voltage	V_{IN}	15	V
Operation temperature range	T_{OPT}	$-20 \sim +75$	°C
Storage temperature range	T_{STG}	$-40 \sim +125$	°C

PIN CONNECTION



μPC2002 (5.4-W AUDIO POWER AMP.)

PIN CONNECTION

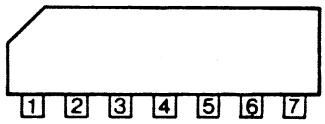


Maximum rating

Item	Symbol	Rating	Unit
Power supply voltage (surge)	V_{CC} 1 (50ms)	40	V
Power supply voltage (no-load)	V_{CC} 2	28	V
Power supply voltage (operation)	V_{CC} 3	18	V
Circuitry current (continuous pulse)	I_{CC}(PEAK)1	3.5	A
Circuitry current (single pulse)	I_{CC}(PEAK)2	4.5	A
Package Dissipation	P_D(T_C=90°C)	75	W
Operation temperature	T_{OPR}	−30 ~ +75	°C
Terminal-terminal voltage	T_{STG}	−40 ~ +150	°C

μPC577H (FM-IF AMPLIFIER)

PIN CONNECTION



Maximum rating

Item	Symbol	Rating	Unit
Power supply voltage	V_{CC}	15	V
Terminal-terminal voltage	V_{IN}	±3.0	V
Permissible Dissipation	P_D	300	mW
Operation temperature	T_{OPT}	−20 ~ +75	°C
Storage temperature	T_{STG}	−40 ~ +125	°C

ICOM

ICOM AMERICA, INC.
Corporate Headquarters
2112 116th Ave. N.E., Bellevue, Washington 98004
Phone: (206) 454-8155 Telex: 152210

MODIFICATION TO DIAL DOWN IN FREQUENCY WHEN IN TRANSMIT FOR IC-25A AND IC-290A

IC-25A

1. Remove top cover.
2. Cut the lead of D26 on the PLL/DRIVER unit.
3. Refer to fig. 1 for position of D26.

IC-290A

1. Remove top cover.
2. Cut the lead of D12 on the SENSOR unit.
3. Refer to fig. 2 for position of D12.

REGIONAL SALES / SERVICE OFFICES:
Suite 307, 3331 Towerwood, Dallas, Texas 75234 Phone: (214) 620-2780 Telex: 730901
2112 - 116th Ave. N.E., Bellevue, Washington 98004 Phone: (206) 454-8155 Telex: 152210

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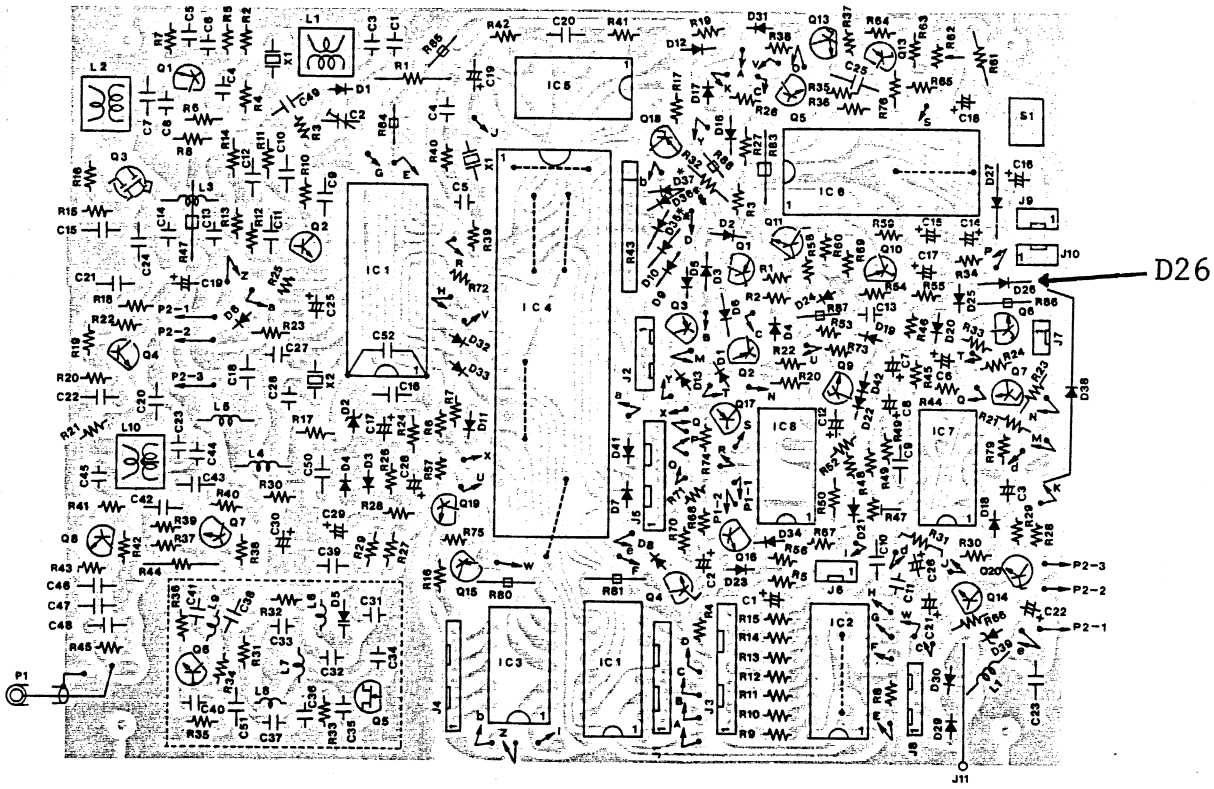
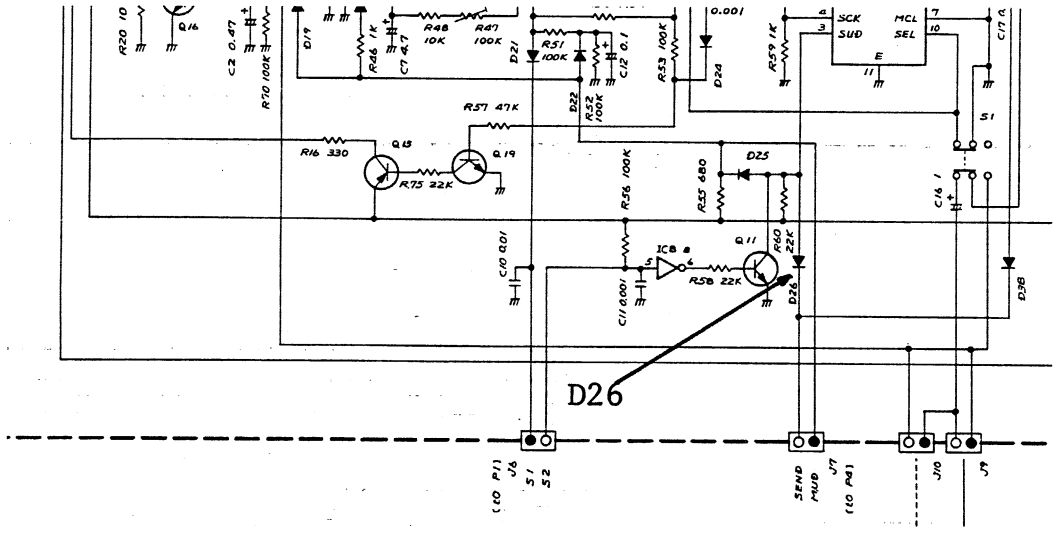
Fig.1





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2112 - 116th Ave. N.E., Bellevue, Washington 98004 Phone: (206) 454-8155 Telex: 15091

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Corporate Headquarters
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Phone: (206) 454-8155 Telex: 152210

IC-25A RECEIVE B TRANSMIT A MODIFICATION

CHECKOUT

Check to see that the amber A VFO light lights when A VFO is selected. Check to see that proper VFO selection occurs by loading different frequencies in to A and B VFO's. The readout should then change when the VFO's are changed. Finally push the VFO and OFFSET buttons in. The amber VFO light should be out in receive and lit during transmit.

OPERATION

Operation of the unit with VFO A selected is the same as stated in the owner's manual. Normal operation, if VFO B is selected, can be attained only if the OFFSET button is out.

If both VFO and OFFSET switches are pushed in the unit receives with the B VFO and transmits with the A VFO. Be sure the sim/dup switch is out if the RB-TA mode is selected.

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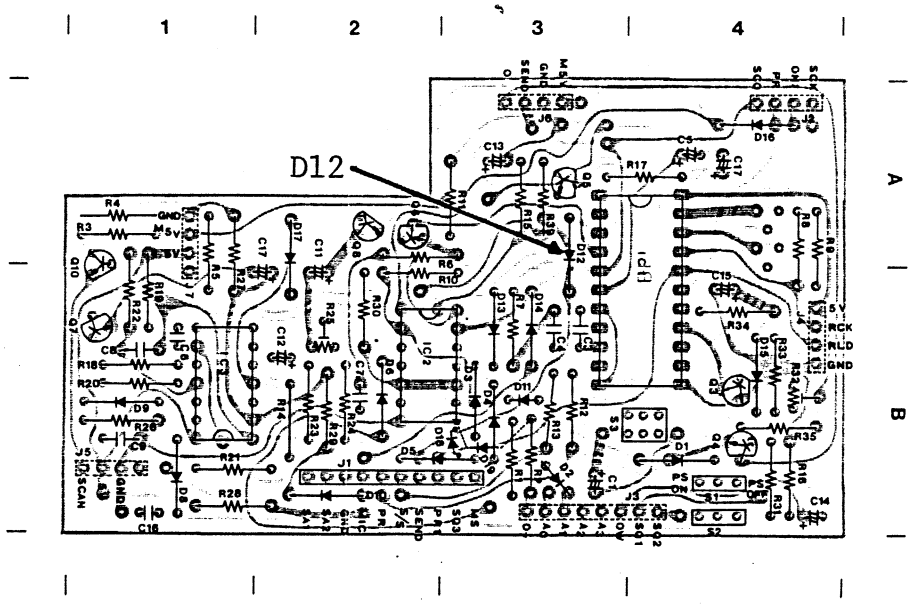
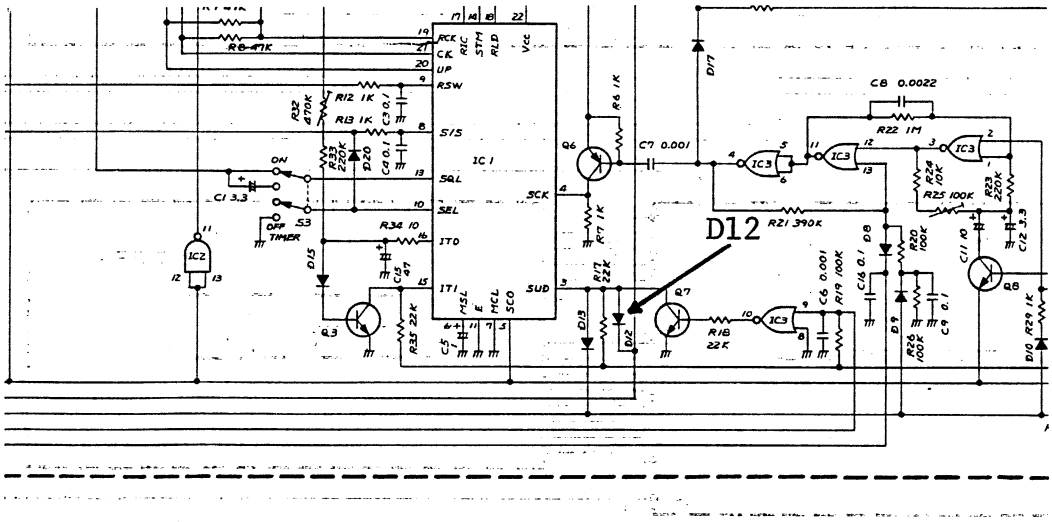
Fig.2





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IC-25A RECEIVE B TRANSMIT A MODIFICATION

You will need a 27K 1/8 watt resistor and two silicon diodes.

1. Remove top and bottom covers (carefully with speaker leads).

2. Remove screws holding front panel (2 on each side). Remove 2 plugs connected to main board.

3. Unsolder red wire on switch board (1). Solder the anode of one diode and a 27K resistor to that terminal. Resolder the red wire to the added resistor. (heat sink)

4. Solder the anode of the second diode to collector of Q1, on the same board (blue wire) (see layout sheet).

5. Connect a short wire from pin 5 of mic lead to unused tab on switch board (5) (see layout sheet).

6. Connect both diode (cathodes) to the next unused terminal on switch board (5), short wire and heat sink.

7. Reassemble.

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IC-25A SCAN MODIFICATION TO PREVENT PREMATURE STOPPAGE IN BAND SCAN MODE

PROBLEM:

In the band scan mode and depending on the strength of the incoming signal, the scanner will stop either 5 or 10 KHz from the desired frequency without regard to the scan rate.

ANALYSIS:

The cause of the problem is two fold. In the first place, the squelch circuit, which is used by the scanner to detect a signal, reacts very quickly when a signal is encountered.

Secondly, due to the sensitivity/bandwidth characteristics the squelch circuit may be opened on a frequency as much as 10 KHz away from the received signal.

SOLUTION:

1. A 10μf capacitor (see fig. 2) is added to the squelch circuit to slow its reaction time.

2. The values of R47 and R48 (see fig. 1) are changed to limit the range of scan rates.

3. Since almost all 2-meter traffic is on a frequency ending in 0 KHz a way must be found to keep the scanner on frequencies ending in 0 KHz for a maximum amount of time and the time spent on 5 KHz frequencies as short as possible. This is done by the circuit shown in figure 1 in the upper right hand corner.

The voltage from IC-3 pin 12 goes low when a 5 KHz frequency occurs. The transistor inverts the signal which is coupled to pin 13 of IC-7 by the .01μf capacitor and appears as a positive spike which in turn increments the clock circuitry by the step rate currently selected. In the case of A VFO this rate is 5 KHz per clock pulse.

When changing frequency in the manual mode, however, pin 13 is normally high except for the brief period that it is pulled low by the sensor unit through D21. Thus, a positive spike will not affect the clock circuit and the unit will tune normally.

Due to the reduced time spent on 5 KHz frequencies, the scanner will stop only on frequencies ending in 0 KHz, therefore, the frequencies stored in memory should end in 0 KHz.

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IC-25A SCAN MODIFICATION INSTALLATION INSTRUCTIONS

Parts Required:

1 ea.	22KΩ 1/4 watt carbon film resistor
1 ea.	510Ω 1/4 watt carbon film resistor
1 ea.	47KΩ 1/4 watt carbon film resistor
1 ea.	2SC945 transistor or equivalent with epoxy body
1 ea.	.01μf 50v ceramic disc capacitor
1 ea.	10μf 16v electrolytic capacitor
2"	length of 1/8" diameter heat shrink tubing
1/2"	length of 1/10" diameter heat shrink tubing
1 ea.	10KΩ potentiometer P/N H0651A

PLL/DRIVER BOARD

1. Refer to fig. 1 and change R47 and R48 (lower left corner) to the values indicated.

2. Refer to figs. 3 and 4 and install the circuitry to the foil side as shown.

MAIN BOARD

1. Install the 10μf capacitor and tubing as shown in fig. 5. The added capacitor is depicted schematically in fig. 2. To attach the lead of the capacitor to R112, the paint on the resistor lead must first be removed by heating with a soldering iron and tinning with solder.

OPERATION

Manual tuning and scan operation should perform as explained in the owner's manual. Since the scanner will only stop on frequencies ending in 0 KHz, caution should be used in storing 5 KHz frequencies in memory since they will be skipped in memory scan.

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HUM MODIFICATION FOR THE IC-25A

Problem

Low frequency hum leaking into the Audio output and is very noticable through speaker, even with the volume at 0.

Modification

1. Remove top and bottom cover.
2. Remove two screws on each side which hold front panel and back panel.
3. Unsolder the red wire on the power switch which terminates at J8 pin 2 on the driver board.
4. Slip the wire out the wire bundle so that it is free to move to the back of the radio and solder to the cathode of D22. (D22 is located just to the right of external speaker jack on the heatsink.)

Output level at volume at 0.

Before modification: 1.1mV.

After modification: 0.5mV.

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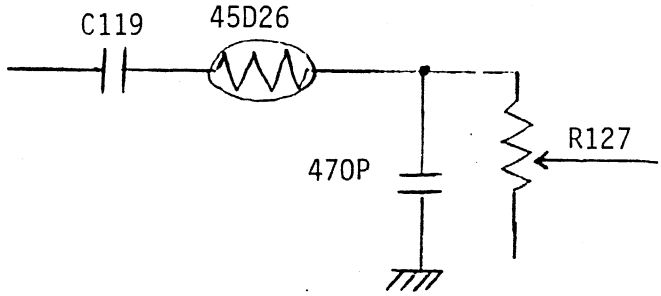
AUTHORIZED ENGINEERING NOTICE

MODEL	IC-45A
SUBJECT	To Prevent Changing Level of S-Meter After Warm-Up
PROCEDURE	

HOW TO MODIFY S-METER CIRCUIT

1. Change C119 on the Main board from 5 P to 10 P.
2. Install thermistor (45D26) between high side of R127 and low side of C119 on the Main board.
3. Install ceramic capacitor (470P) between high side of R127 and ground.



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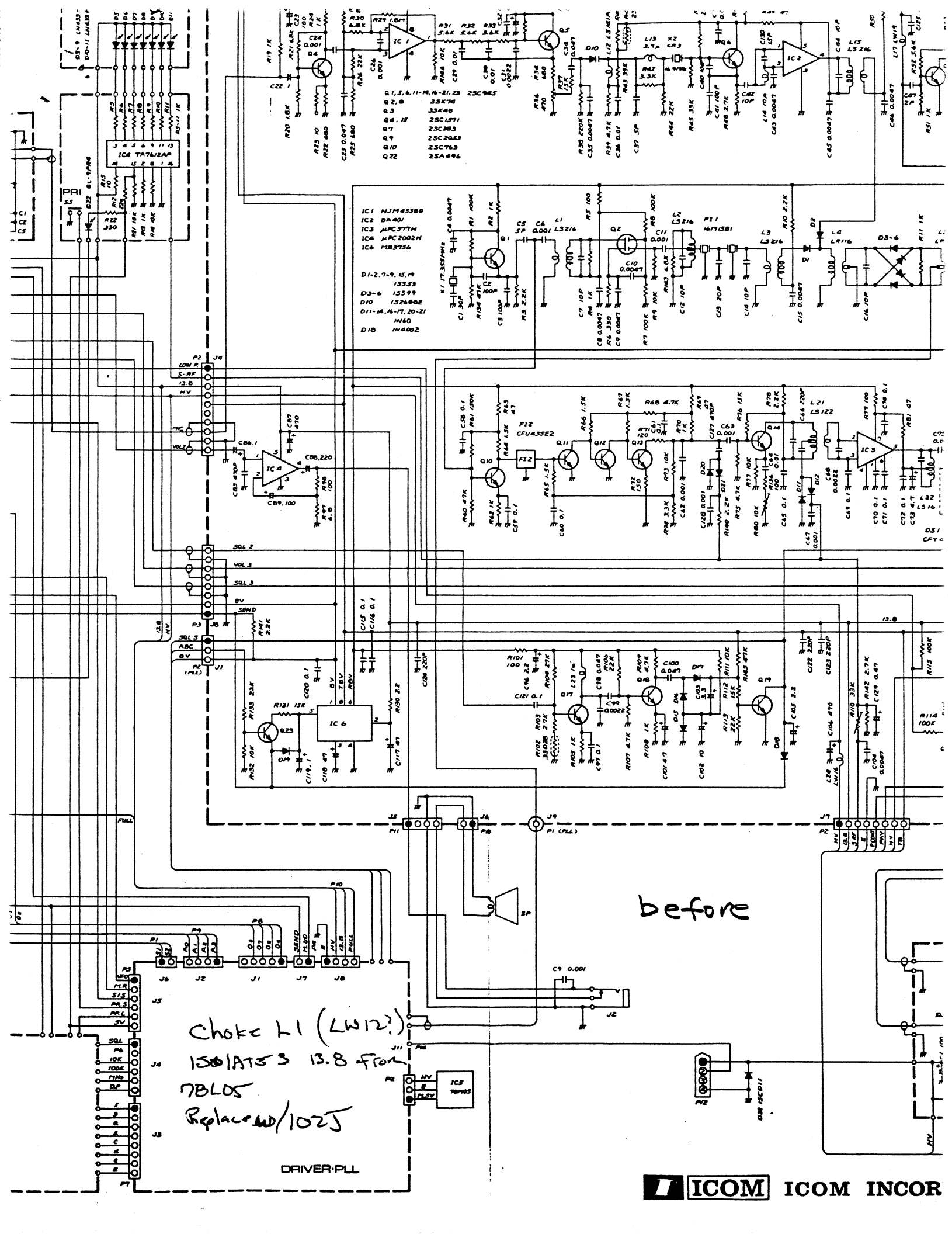
before
Choke L1 (LW12?)
150 ATS 13.8 from
7805
Replace w/ 102J
DRIVER·PLL
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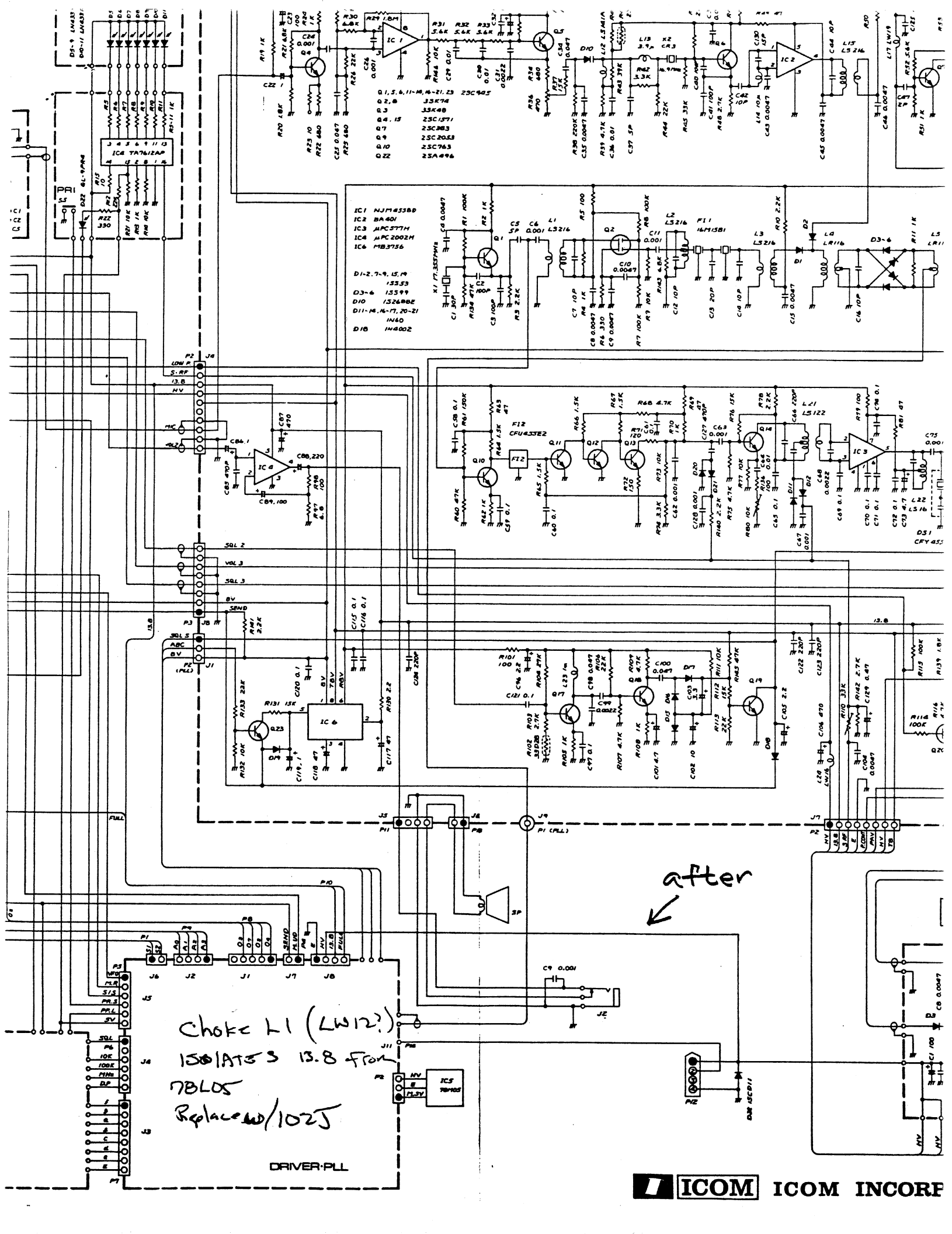
after
Choke L1 (LW12)
ISOLATES 13.8 from 78L05
Replaced/102J
DRIVER·PLL
ICOM
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ICOM IC-BU1

MEMORY BACKUP BATTERY UNIT

INSTRUCTION MANUAL

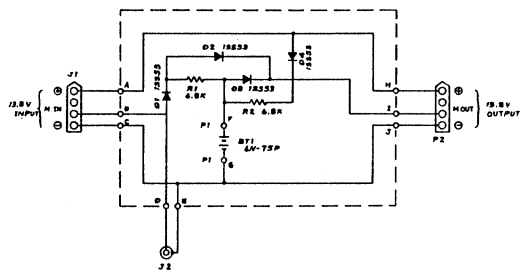
PROFILE

- This unit is a memory backup battery unit for the ICOM mobile transceivers IC-290A/E, IC-490A/E and IC-25A/E. This unit keeps programmed data of the transceiver such as operating frequencies, memory channels' frequencies, offset frequency, etc., for several hours after the power source is turned off.
- This unit can be attached to your transceiver, and its power source for charging built-in battery can be taken from the original power source for the transceiver.
- You can carry the transceiver from car to home or from home to car, or leave it in your car's trunk while keeping the programmed data.

SPECIFICATIONS

Applicable Transceivers	IC-290A/E, IC-490A/E, IC-25A/E
Number of Semiconductors	Diode 4
Power Supply Requirment	13.8V ±15% Negative ground (For operating transceiver)
	8 ~ 15V DC Negative ground (For memory backup only)
Output Voltage and Capacity (For memory backup)	7.2V 75mAh (6N-75P Nickel-Cadmium Battery)
Charging Current	2mA Floating Charge
Charging Time	50 hours (for initial charge)
Usable Temperature	−10°C ~ +60°C (14°F ~ 140°F)
Dimensions	34mm(H) x 34mm(D) x 84mm(W)
Weight	200g

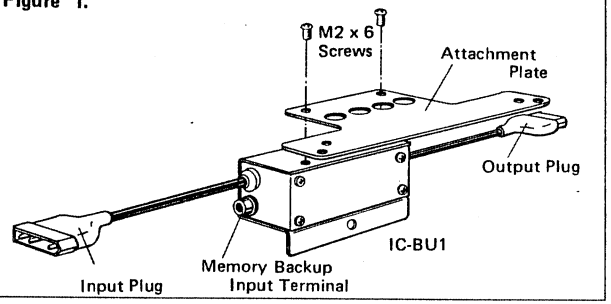
SCHEMATIC DIAGRAM



INSTALLATION

1. Attach the supplied attachment plate as shown in the figure 1, using the two screws which have retained the cover of the unit.

Figure 1.



2. Remove the two screws at the rear end of the transceiver's bottom cover.
3. Attach the unit to the rear panel of the transceiver as shown in the figure 2 and 3, using the two screws which have retained the bottom cover. Use the outer holes of the attachment plate for IC-290A/E or IC-490A/E, or the inner holes for IC-25A/E.

Figure 2. For IC-290A/E or IC-490A/E

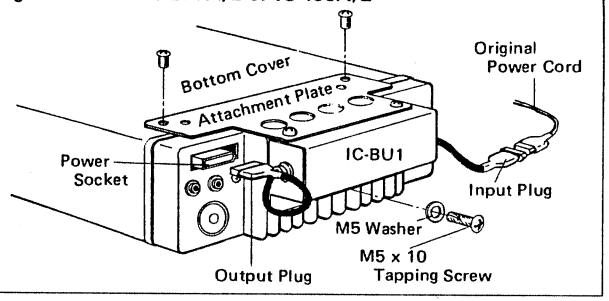
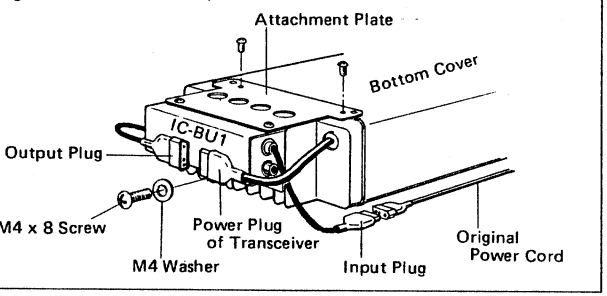


Figure 3. For IC-25A/E



4. Retain the top end of the unit to the heatsink of the transceive using the supplied M4 x 8 screw and M4 washer for IC-25A/E or M5 x 10 tapping screw and M5 washer for IC-290A/E o IC-490A/E.
5. Connect the output plug of the unit to the power socket of th transceiver as shown in the figures.
6. Connect the original power cord for the transceiver to the inpu plug of the unit as shown in the figures.
7. When you want to use an optional memory backup power supply BC-10A for charging the unit, connect it to the memory backu input terminal of the unit using the pin-plug adapter supplie with BC-10A.

OPERATION

1. Now you can use the transceiver as used before. However, fo initial use, charge the built-in nickel-cadmium battery of the un for 50 hours by connecting the unit to a continuous operatin power source.
2. Current drain (and usable time) for memory backup is shown a follows:

   IC-290A/E or IC-490A/E

   15mA (5 hours) When the POWER switch is turned ON.

   8mA (9 hours) When the POWER switch is turned OFF.

   IC-25A/E

   5mA (15 hours)

   When the power switch of the transceiver is turned ON, th current drain will be larger than when the switch is turned OFF So, turn OFF the power switch when you make memory backu with this unit.
3. When the power source for the transceiver is activated even if th power switch of the transceiver is turned off, the current drain i zero, and the battery will be charged. (The charge current i about 2mA.)
4. When you carry the transceiver from your car or your shack unplug the power plug which is connected to the input plug o this unit. If you unplug the output plug of this unit from th power socket of the transceiver, you may lose the programme data.

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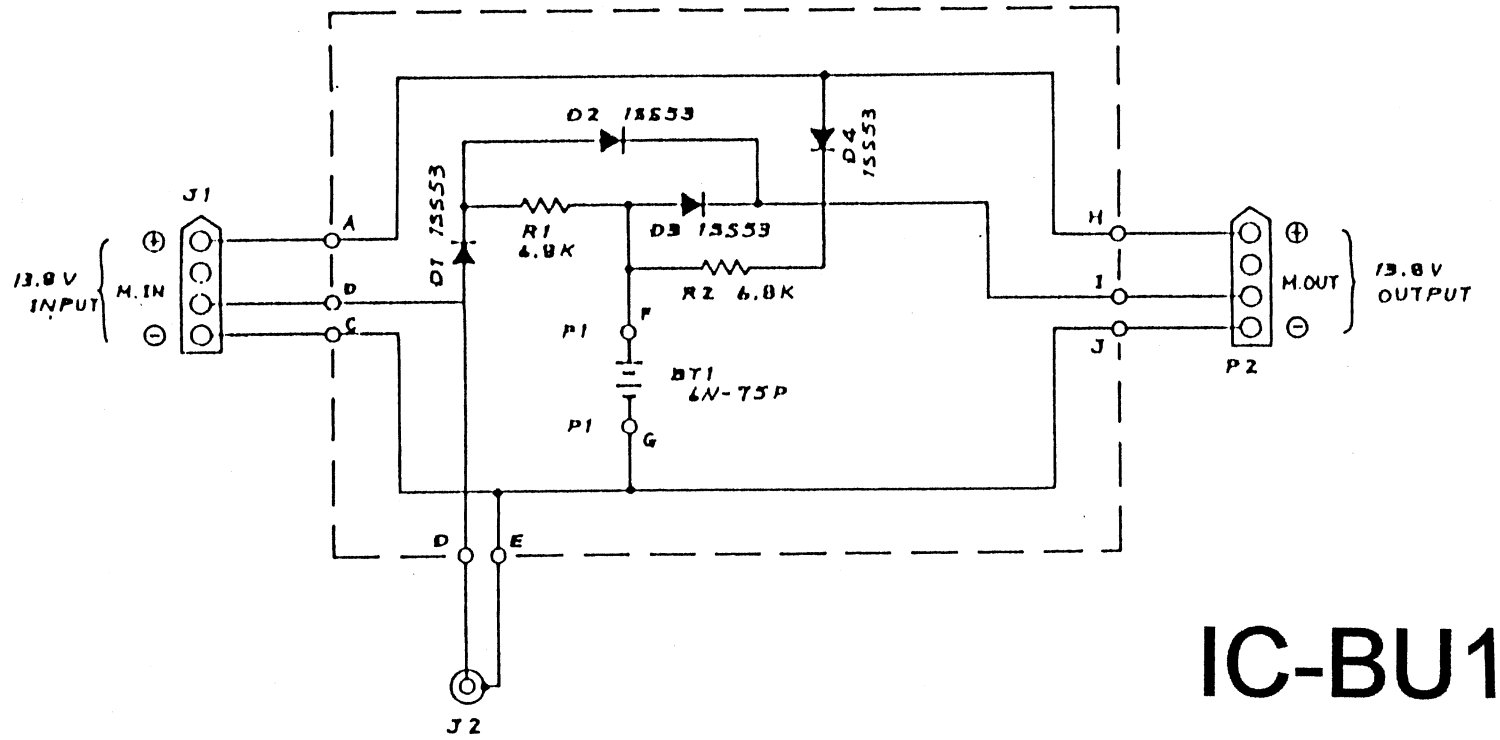
A-038

Charging Current	2mA Floating Charge
Charging Time	50 hours (for initial charge)
Usable Temperature	−10°C ~ +60°C (14°F ~ 140°F)
Dimensions	34mm(H) x 34mm(D) x 84mm(W)
Weight	200g

SCHEMATIC DIAGRAM



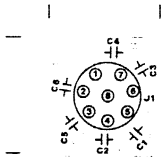
IC-BU1

ICOM

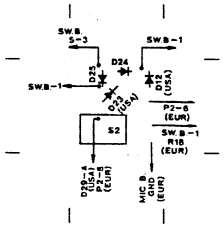
IC-25A/E

EF UNIT

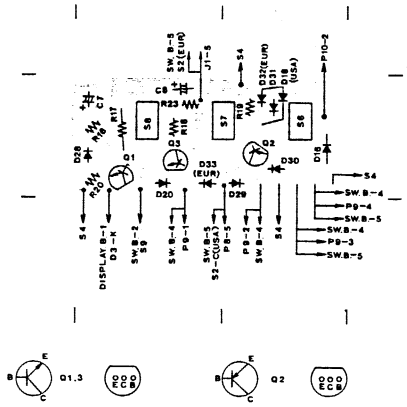
■ MIC BOARD



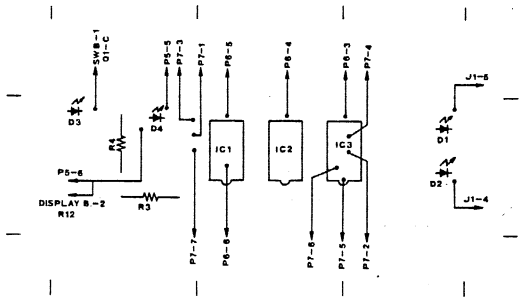
■ SWITCH BOARD (5)



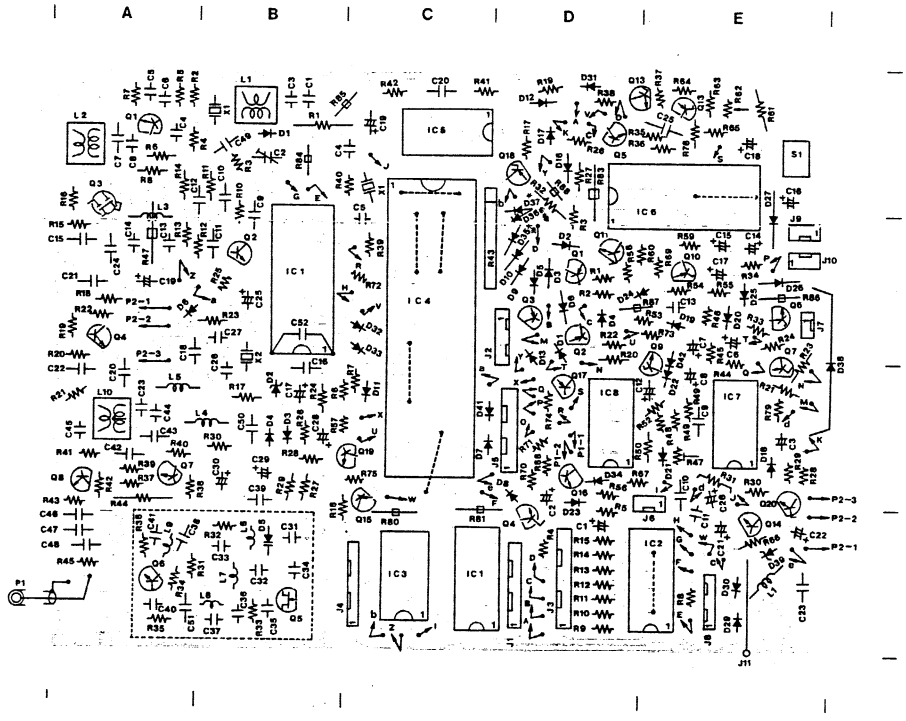
■ SWITCH BOARD (1)

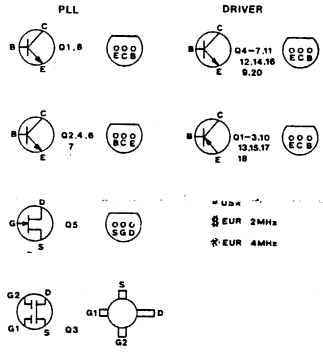


■ DISPLAY BOARD (1)

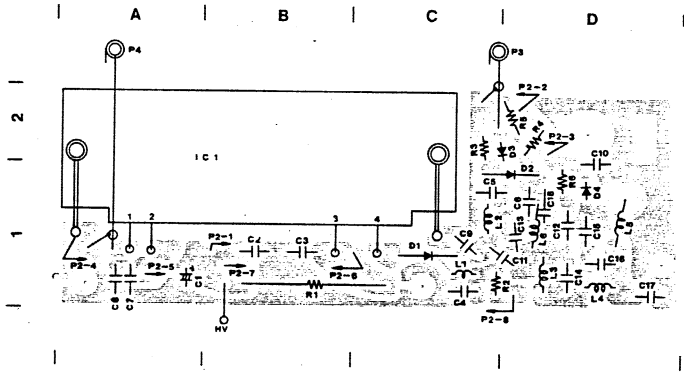


PLL · DRIVER UNIT





PA UNIT



UNIT LAYOUT

SWITCH BOARD 5

METER BOARD

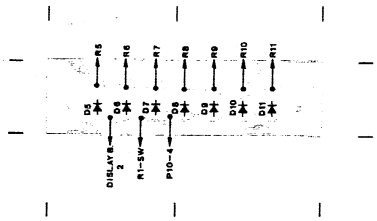
DISPLAY BOARD 1·2

PLL·DRIVER UNIT

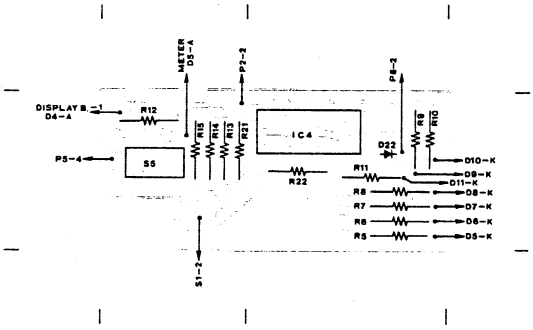
PA UNIT

BOARD LAYOUT

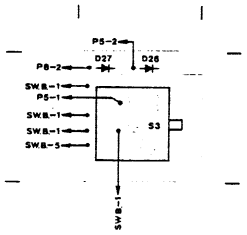
■ METER BOARD



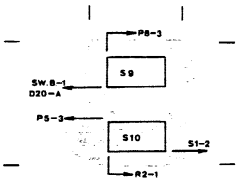
■ DISPLAY BOARD (2)



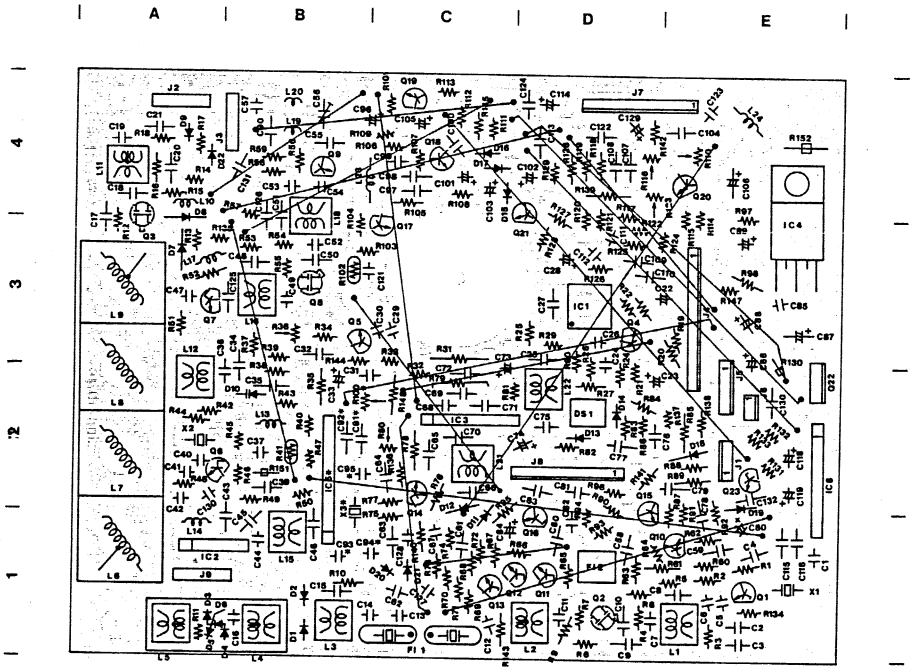
■ SWITCH BOARD (3)

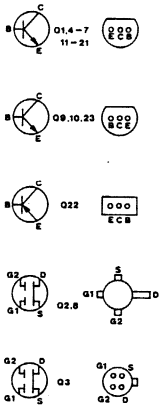


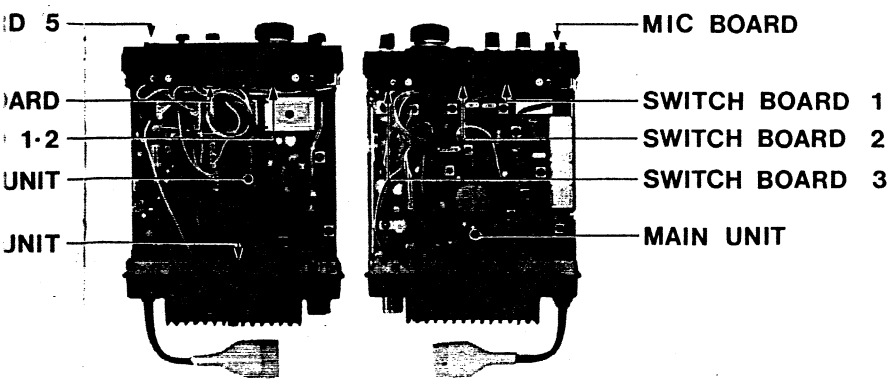
■ SWITCH BOARD (2)



MAIN UNIT







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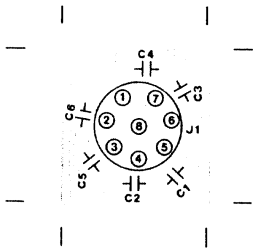
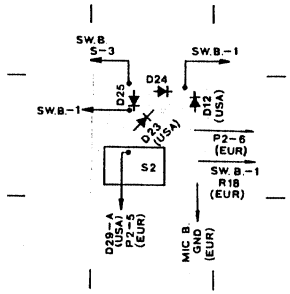
IC-25H

EF UNIT

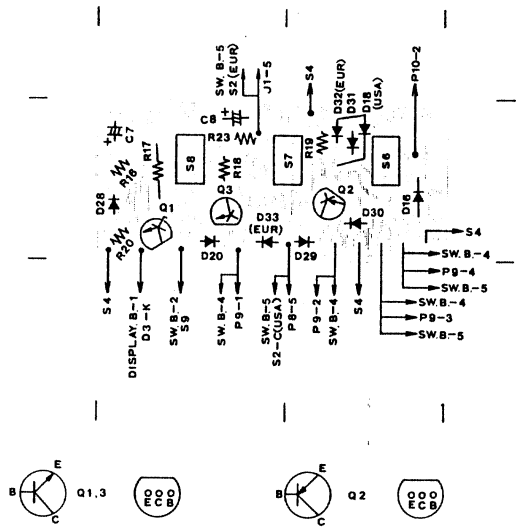
■ MIC BOARD



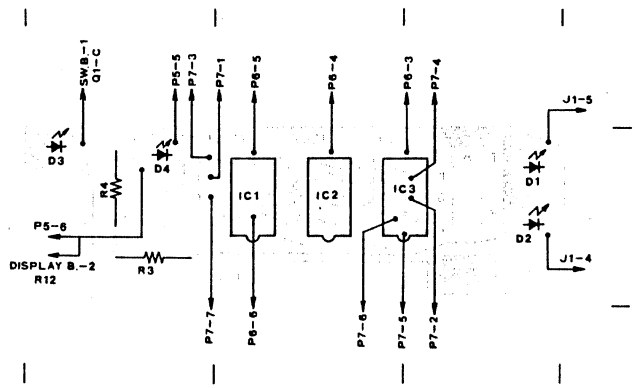
■ SWITCH BOARD (5)



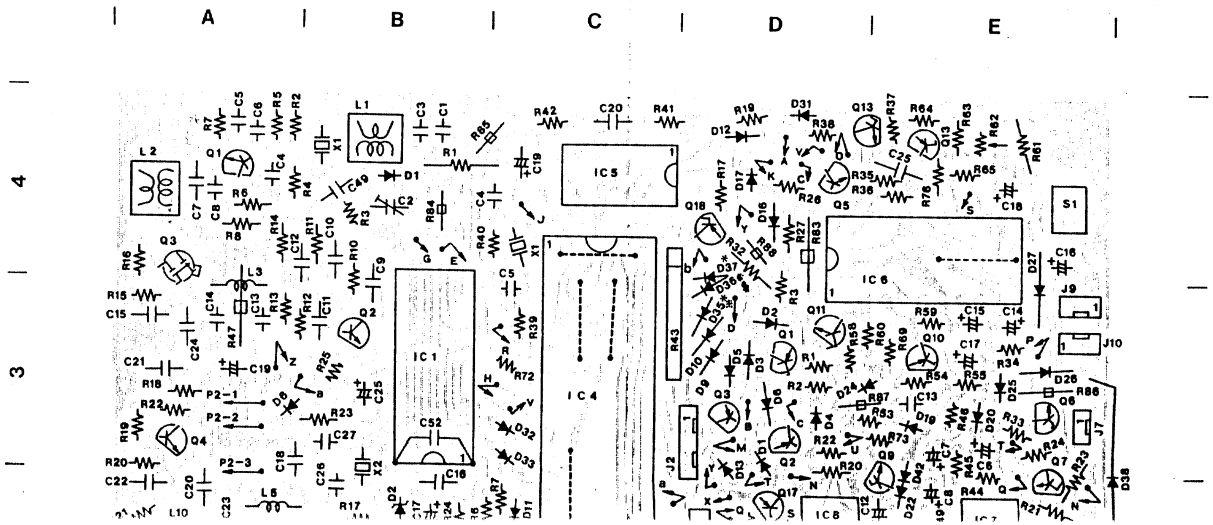
■ SWITCH BOARD (1)

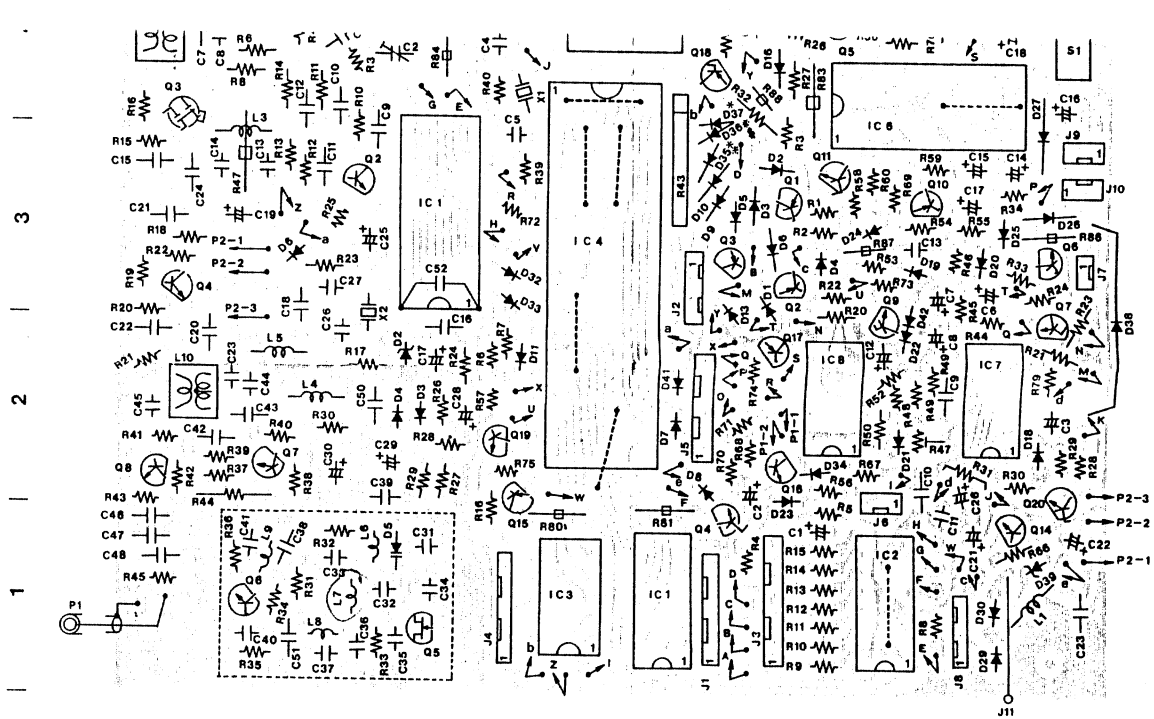


■ DISPLAY BOARD (1)

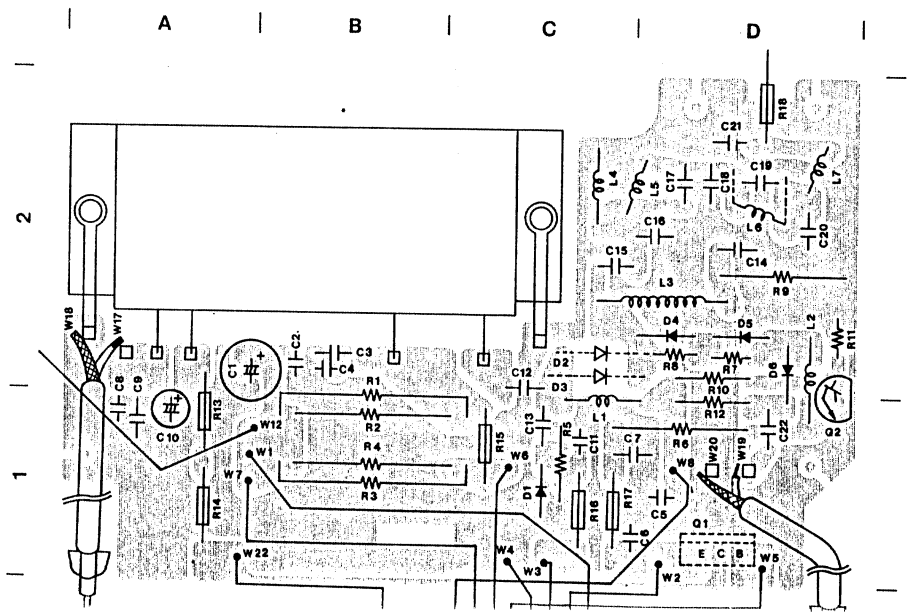


PLL · DRIVER UNIT





PA UNIT



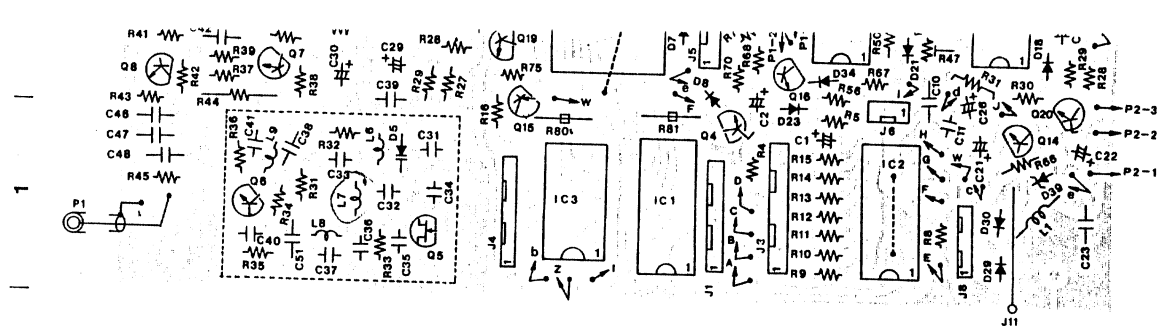
UNIT LAYOUT

SWITCH BOARD 5

METER BOARD

DISPLAY BOARD 1·2

PLL·DRIVER UNIT



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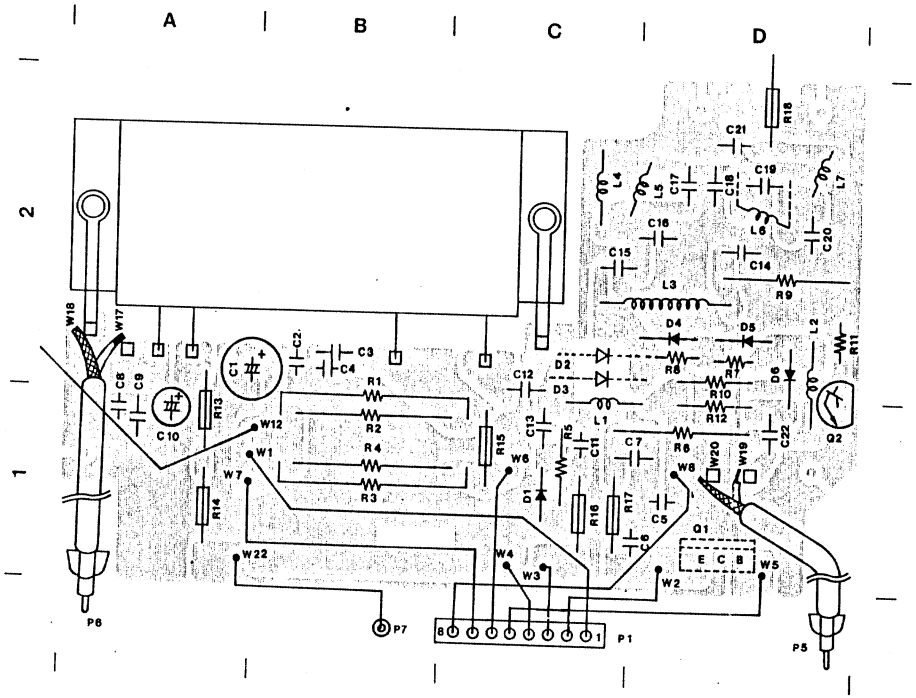


UNIT LAYOUT

SWITCH BOARD 5

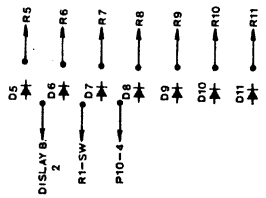
METER BOARD

DISPLAY BOARD 1·2

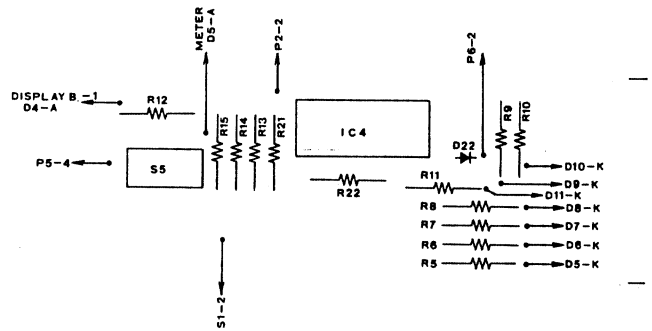
PLL·DRIVER UNIT

BOARD LAYOUT

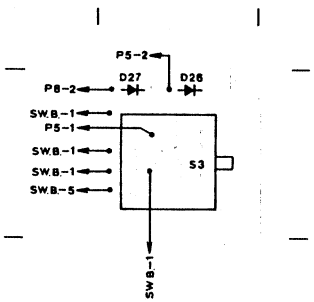
■ METER BOARD



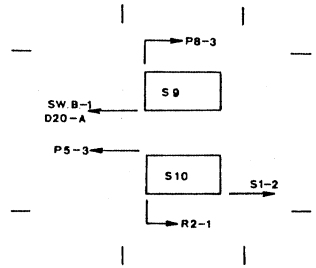
■ DISPLAY BOARD (2)



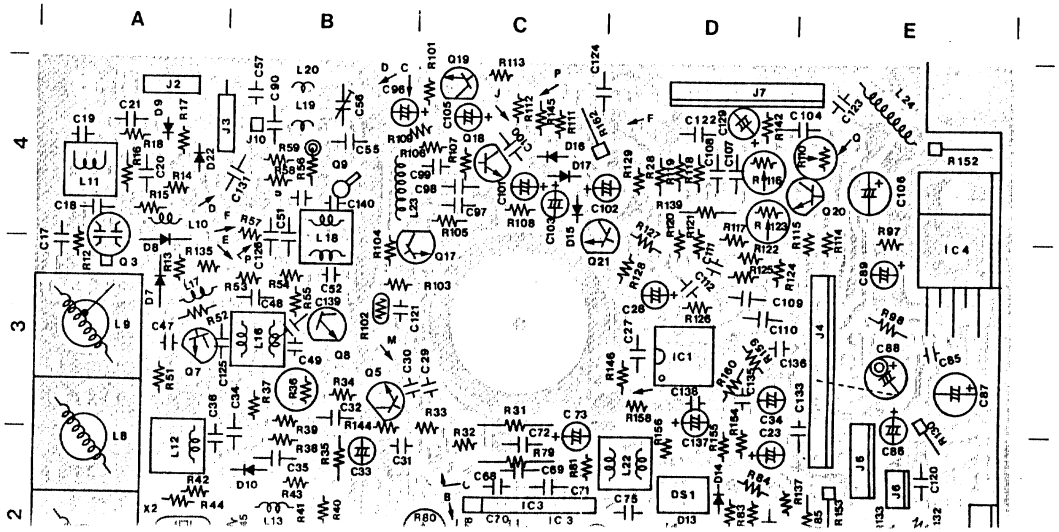
■ SWITCH BOARD (3)

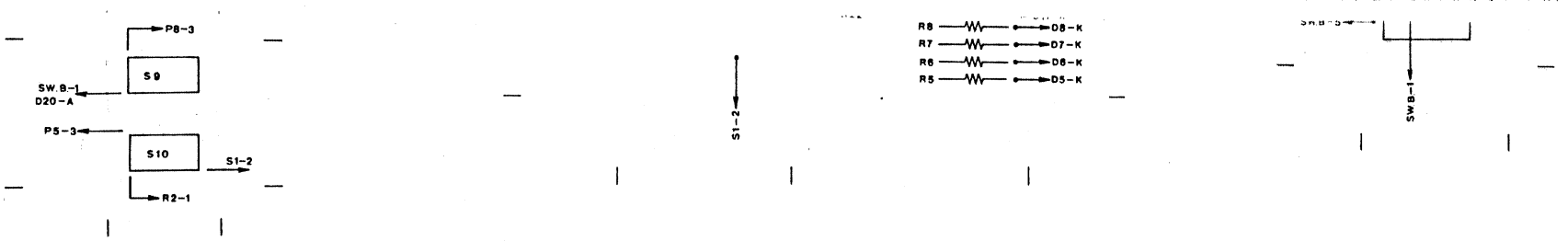


■ SWITCH BOARD (2)

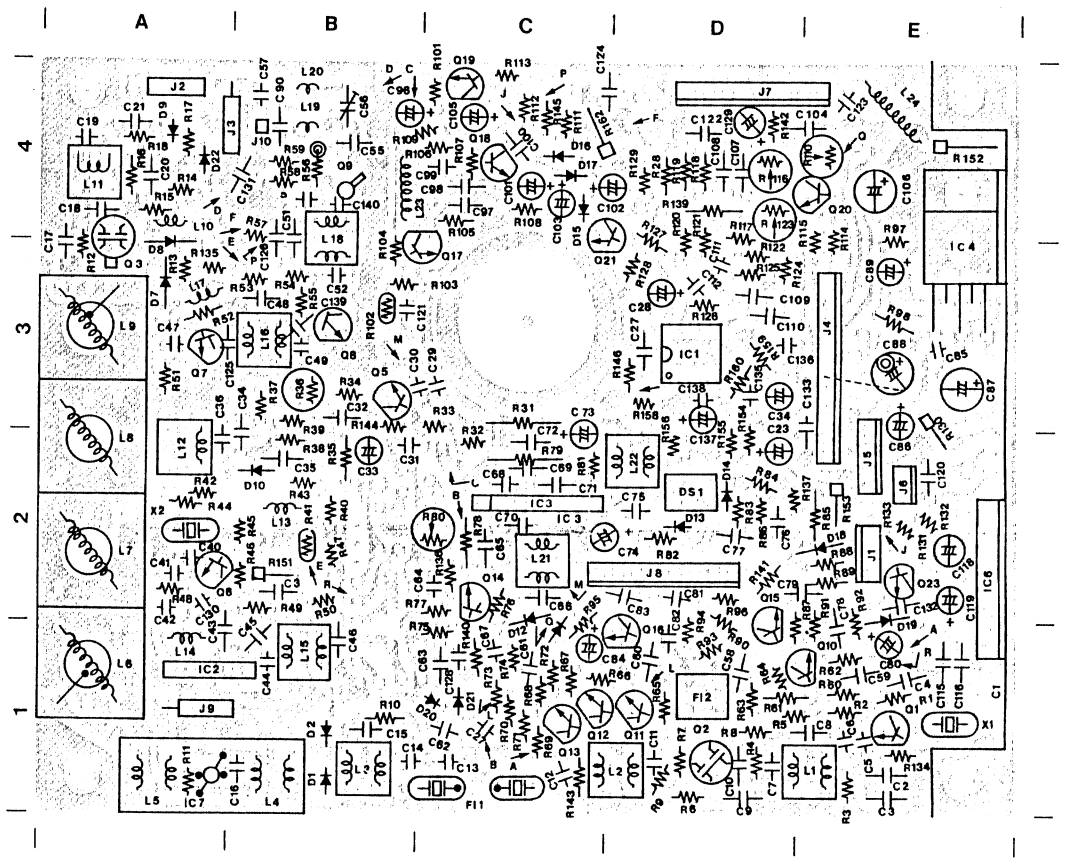


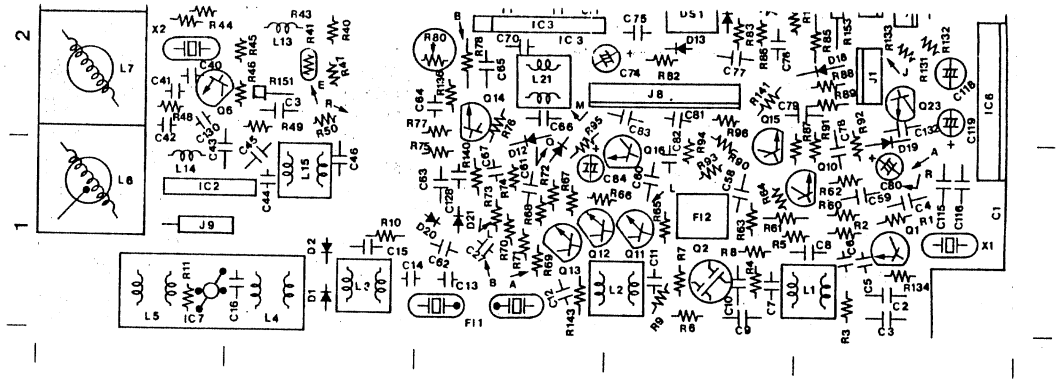
MAIN UNIT

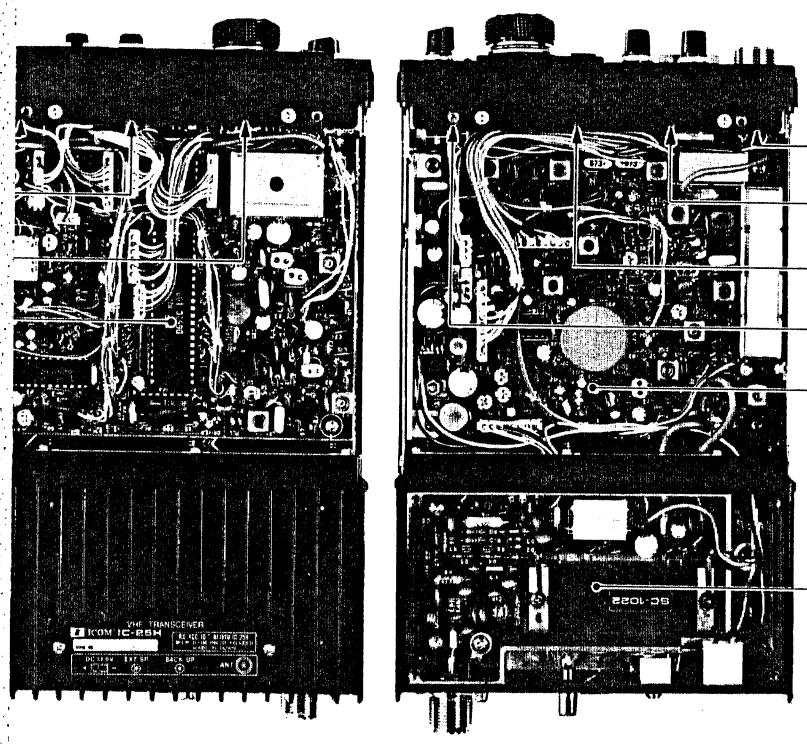



P8-3
S9
SW.B-1
D20-A
P5-3
S10
S1-2
R2-1
S1-2
R8
R7
R6
R5
D8-K
D7-K
D6-K
D5-K
SW.B-1

MAIN UNIT


A
B
C
D
E
1
2
3
4
J2
J3
J10
J7
J4
J5
J6
J8
J9
J1
IC1
IC2
IC3
IC4
IC5
IC6
IC7
DS1
F11
F12
X1
X2
L1
L2
L4
L5
L6
L7
L8
L9
L11
L12
L14
L15
L16
L18
L20
L21
L22
L23
L24
Q1
Q2
Q3
Q5
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q23
D1
D2
D7
D8
D9
D10
D12
D13
D14
D15
D16
D17
D18
D19
D22
R152



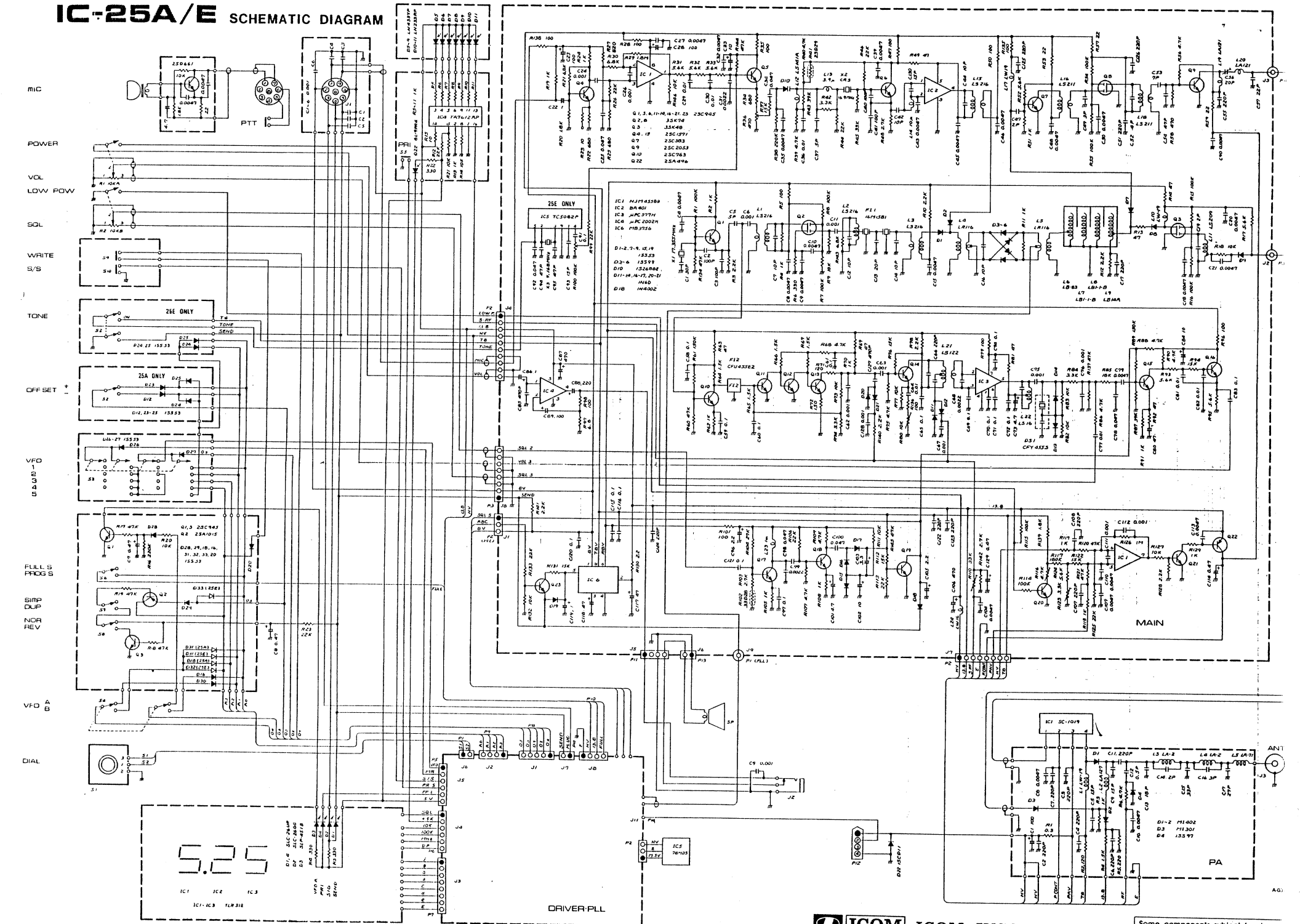


ICOM INCORPORATED

Some components subject to change for an improvement without notice.

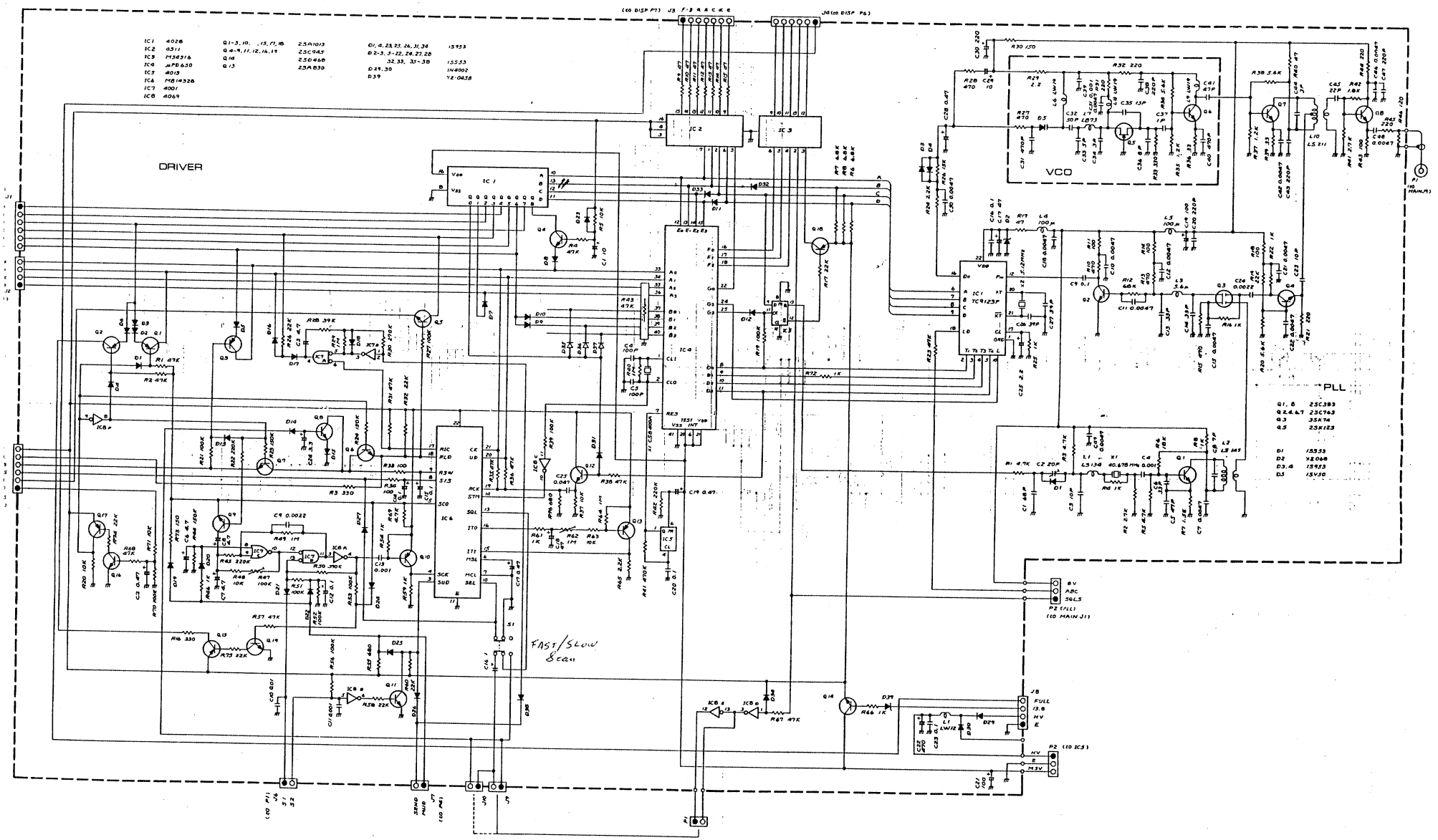
Printed in Japan

IC-25A/E SCHEMATIC DIAGRAM



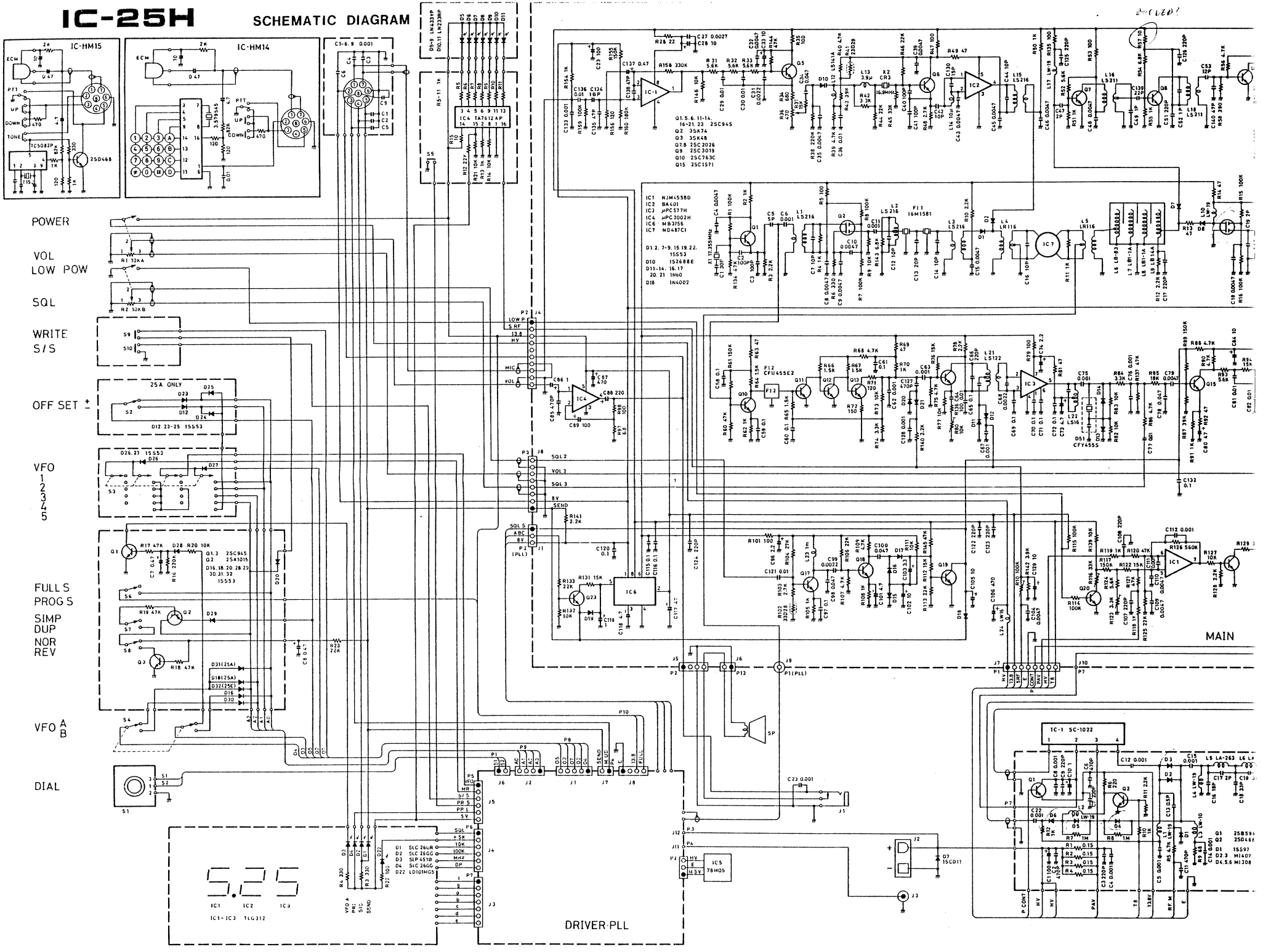
ICOM ICOM INCORPORATED

Some components subject to change for an improvement without notice

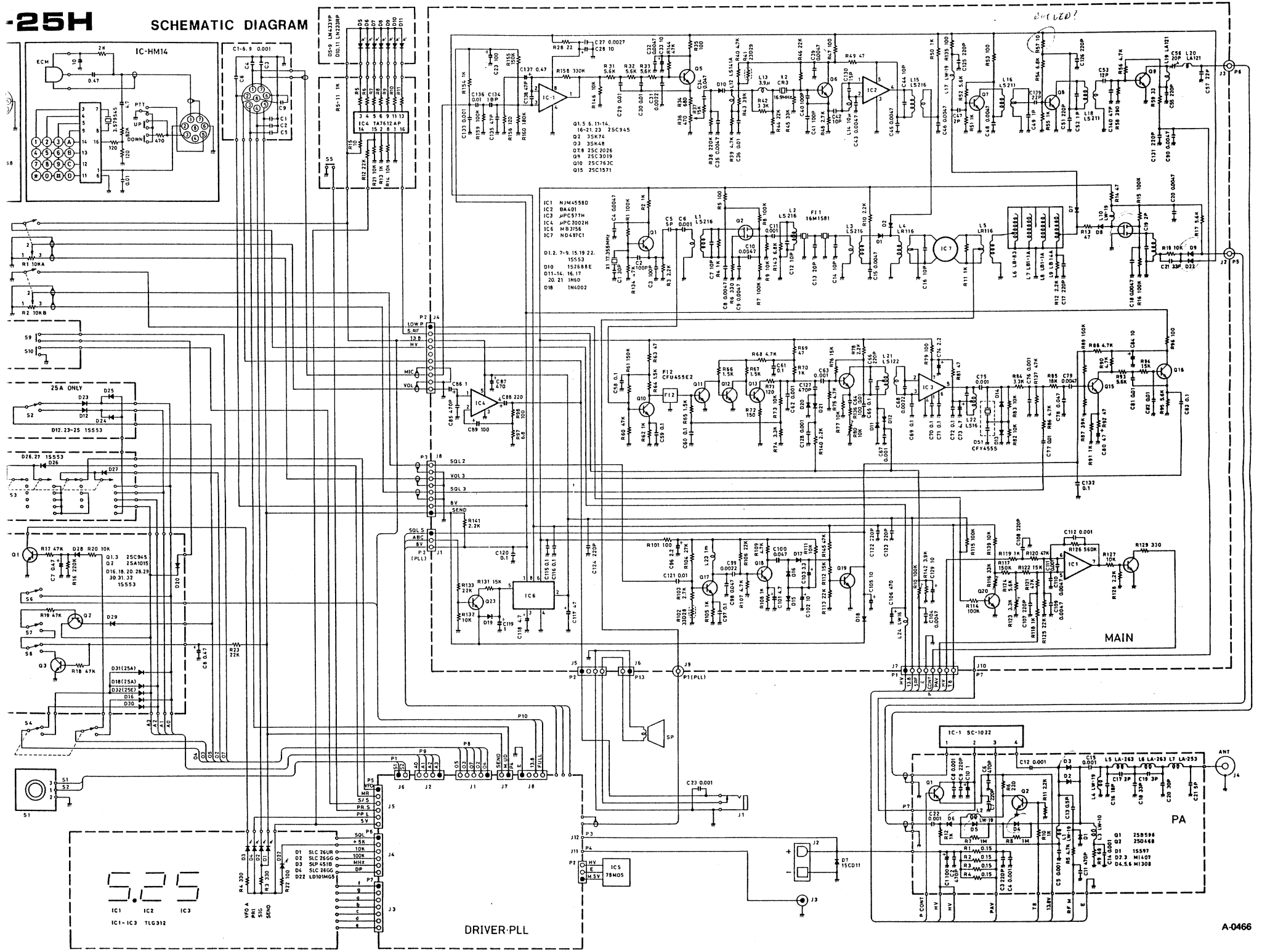

DRIVER
VCO
PLL
FAST/SLOW
IC1 4028
IC2 6311
IC3 M54516
IC4 μPD650
IC5 4013
IC6 M81A328
IC7 4001
IC8 4069
Q1-3, 10, 15, 17, 18 2SA1015
Q4-9, 11, 12, 14, 19 2SC945
Q16 2SD468
Q13 2SA839
D1, 4, 23, 25, 26, 31, 34 1S953
D2-3, 5-22, 24, 27, 28, 32, 35, 37-38 1S533
D29, 30 IN4002
D39 YE-0438
Q1, 8 2SC383
Q2, 4, 6, 7 2SC763
Q3 3SK74
Q5 2SK123
D1 1S533
D2 V2068
D3, 4 1S953
D5 1SV50

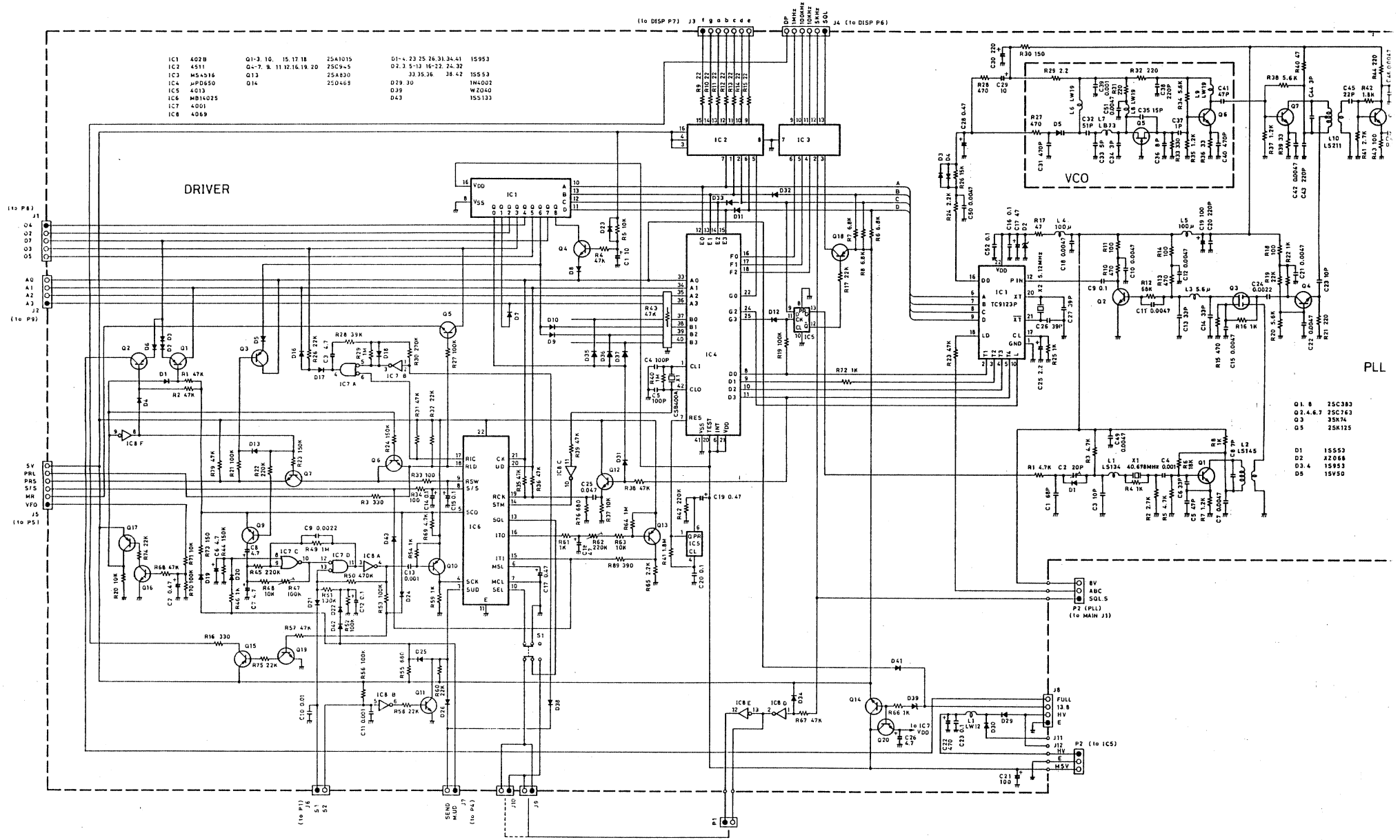
IC-25H

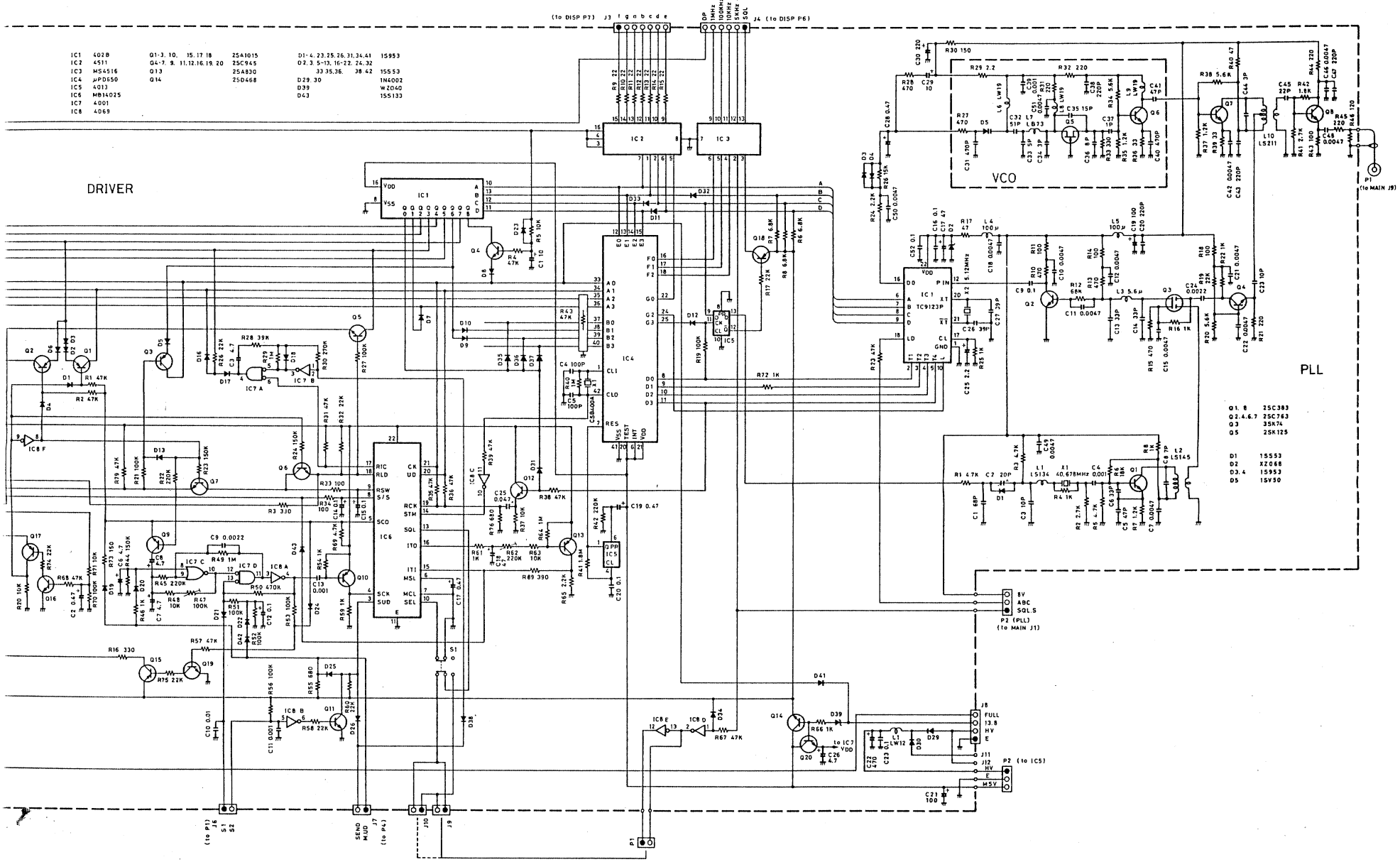
SCHEMATIC DIAGRAM



-25H SCHEMATIC DIAGRAM




DRIVER
VCO
PLL
IC1 4028
IC2 4511
IC3 MSA516
IC4 μPD650
IC5 4013
IC6 MB14025
IC7 4001
IC8 4069
Q1-3. 10. 15.17.18 2SA1015
Q4-7. 9. 11.12.16.19.20 2SC945
Q13 2SA830
Q14 2SD468
Q. 8 2SC383
Q2.4.6.7 2SC763
Q3 3SK74
Q5 2SK125
D1-4. 23.25.26.31.34.41 1S953
D2.3.5-13 16-22. 24.32 33.35.36 38.42 1SS53
D29.30 1N4002
D39 WZ040
D43 1SS133
D1 1SS53
D2 XZ068
D3.4 1S953
D5 1SV50
(to DISP P7)
(to DISP P6)
(to P8)
(to P9)
(to P1)
(to P4)
(to IC5)
(to IC7 VDD)
P1
P2 (PLL) (to MAIN J1)
P2 (to IC5)
SEND MUD
FULL 13.8 HV E
HV E MSV
8V ABC SQL.S


DRIVER
VCO
PLL
(to DISP P7) J3 f g a b c d e
J4 (to DISP P6)
DP 1MHz 100KHz 10KHz 1KHz SQL
IC1 402B
IC2 4511
IC3 MS4516
IC4 μPD650
IC5 4013
IC6 MB14025
IC7 4001
IC8 4069
Q1-3. 10. 15. 17 18 2SA1015
Q4-7. 9. 11.12.16.19. 20 2SC945
Q13 2SA830
Q14 2SD468
D1-4. 23.25.26.31.34.41 1S953
D2.3.5-13.16-22.24.32.33.35.36.38.42 1SS53
D29.30 1N4002
D39 WZ040
D43 1SS133
Q1.8 2SC383
Q2.4.6.7 2SC763
Q3 3SK74
Q5 2SK125
D1 1S953
D2 XZ068
D3.4 1S953
D5 1SV50
P1 (to MAIN J9)
P2 (PLL) (to MAIN J1)
8V
ABC
SQLS
J8 FULL 13.8 HV E
J11
J12 HV E M5V
P2 (to IC5)
J6 (to P1) S1 S2
J7 SEND MUD (to P4)
J10
J9
P1
S1
IC1 IC2 IC3 IC4 IC5 IC6 IC7 IC8
TC9123P
LS134
LS145
CSB400P
40.678MHz
5.12MHz