HF ALL BAND TRANSCEIVER

IC-740

MAINTENANCE MANUAL

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SECTION 1 SPECIFICATIONS

GENERAL

Number of Semiconductors:

Transistors	85
FET	18
IC (Includes CPU)	48
Diodes	247

Frequency Coverage:

1.8MHz ~ 2.0 MHz
3.5MHz ~ 4.0 MHz
7.0MHz ~ 7.3 MHz
10.0MHz ~ 10.5 MHz
14.0MHz ~ 14.35MHz
18.0MHz ~ 18.5 MHz (Receive Only)
21.0MHz ~ 21.45MHz
24.5MHz ~ 25.0 MHz (Receive Only)
28.0MHz ~ 29.7 MHz

Frequency Control:

CPU based 10Hz step PLL synthesizer.
Independent Transmit-Receive Frequency Available on same band.

Frequency Readout:

6 digit 100Hz readout.

Frequency Stability:

Less than 500Hz after switch on 1 min to 60 mins, and less than 100Hz after 1 hour. Less than 1KHz in the range of $-10^{\circ}C$ to $+60^{\circ}C$.

Power Supply Requirements:

DC 13.8V ±15% Negative ground Current drain 20A max. (at 200W input)
AC power supply is available for AC operation.

Antenna Impedance:

50 ohms Unbalanced

Weight:

8.0 Kg

Dimensions:

111mm(H) x 286mm (W) x 374mm(D)

TRANSMITTER

RF Power:

SSB (A_3J) 200 Watts PEP input
CW (A_1), RTTY (F_1), FM (F_3)*
200 Watts input
Continuously Adjustable Output power 10 Watts ~ Max.

Emission Mode:

A_3J	SSB (Upper sideband and Lower sideband)
A_1	CW
F_1	RTTY (FSK)
F_3*	FM

*When optional FM unit is installed.

Harmonic Output:

More than 50dB below peak power output

Spurious Output:

More than 50dB below peak power output

Carrier Suppression:

More than 50dB below peak power output

Unwanted Sideband:

More than 55dB down at 1000Hz AF input

Microphone:

Impedance 1300 ohms
Input Level 120 millivolts typical
Dynamic or Electret Condenser Microphone with Preamplifier

RECEIVER

Receiving System:

Triple Conversion Superheterodyne with continuous Pass-Band Shift Control.

Receiving Mode:

A_1, A_3J (USB, LSB), F_1, F_3*

IF Frequencies:

1st	39.7315MHz
2nd	9.0115MHz
3rd	455KHz

with continuous Pass-Band Shift Control.

Sensitivity:

SSB, CW, RTTY
Less than 0.3 microvolts for 10dB S+N/N (preamp ON)
Less than 0.15 microvolts for 10dB S+N/N
FM* (preamp ON)
Less than 0.3 microvolts for 20dB noise quieting

Selectivity:

SSB, RTTY	2.4KHz at –6dB
	4.5KHz at –60dB
(PBT max.)	2.2KHz at –6dB
	4.2KHz at –60dB
(PBT min)	700Hz at –6dB
	2.0KHz at –60dB
CW (AF Filter)	300Hz at –6dB
FM*	15KHz at –6dB
	30KHz at –60dB

Spurious Response Rejection Ratio:

More than 60dB

Audio Output:

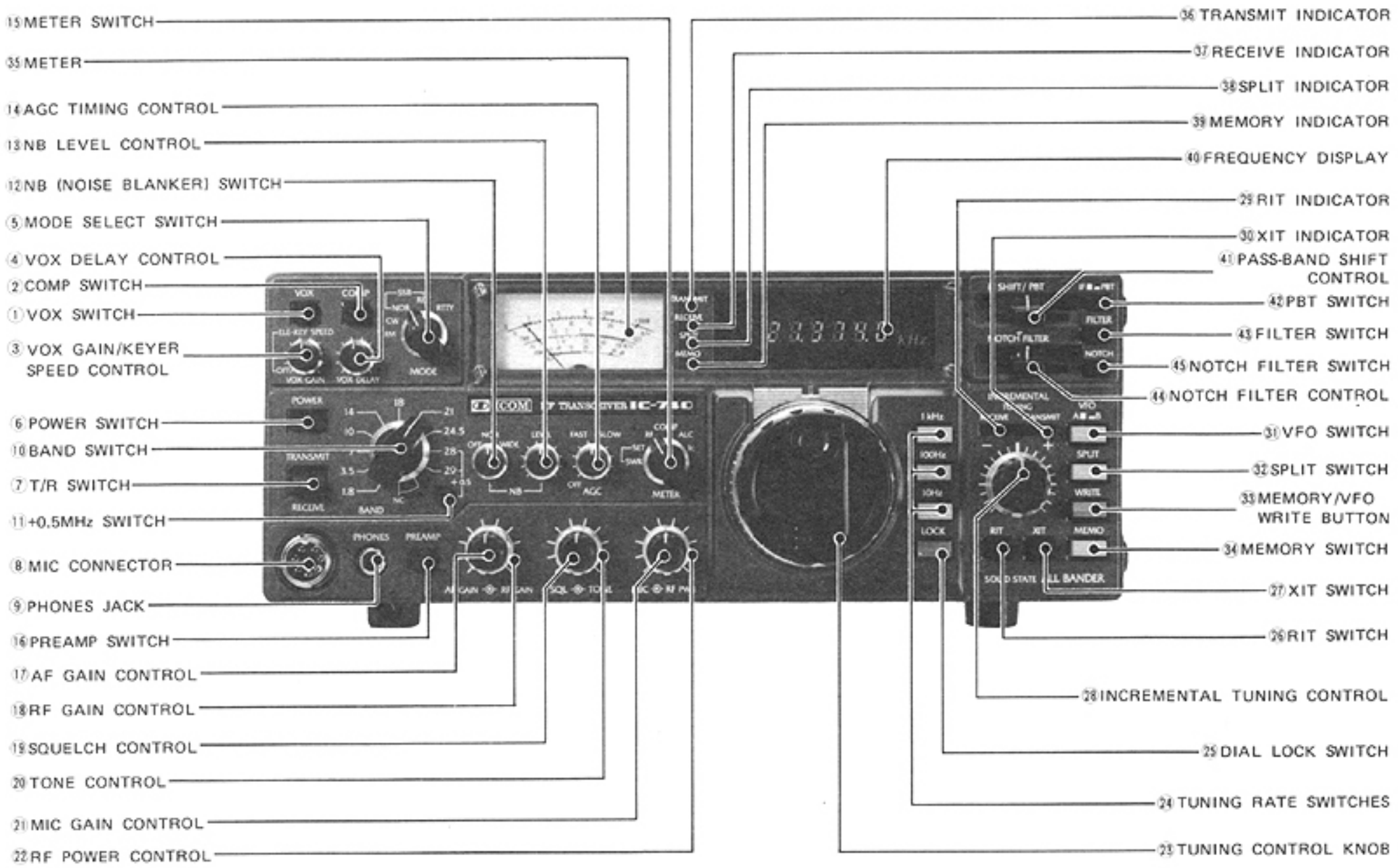
More than 2.6 Watts

Audio Output Impedance:

8 ohms

SECTION 2 OPERATING CONTROLS

2 - 1 FRONT PANEL



1. VOX SWITCH

This switches the VOX circuit ON and OFF. When it is in the ON (in) position, in SSB or FM, T/R switching is accomplished by means of a voice signal. In CW operation, semi-break-in switching by means of keying is possible.

2. COMP (SPEECH PROCESSOR) SWITCH

Switches the speech processor circuit ON and OFF. This circuit enables greater talk power and better results in DX operation.

3. VOX GAIN/KEYER SPEED CONTROL

This control adjusts input signal level via the microphone to the VOX circuit. For VOX operation in SSB and FM, adjust the control so that the VOX circuit will operate with normal speech.

When the optional electronic keyer unit is installed and the set is in CW mode, this control adjusts keying speed of the keyer.

4. VOX DELAY (VOX time constant) CONTROL

This controls the transmit to receive switching time. Adjust it so transmit to receive switching will not occur during short pauses in normal speech.

5. MODE SELECT SWITCH

Selects any one of four operating modes (FM is option). There are two modes in SSB mode as follows:

SSB-NOR: For normal SSB operation, upper sideband (USB) for 10MHz band and above, and lower sideband (LSB) for 7MHz band and below.

SSB-REV: For reverse SSB operation, lower sideband (LSB) for 10MHz band and above, and upper sideband (USB) for 7MHz band and below.

6. POWER SWITCH

The POWER SWITCH is a push-lock type switch which controls the input DC power to the IC-740. When the external AC power supply (IC-PS15) or optional built-in

AC power supply (IC-PS740) is used, the switch also acts as the AC power supply switch. When the switch is pushed in and locked, power is supplied to the set. When the switch is pushed again and released, power is cut to all circuits except the PA unit. When the BC-10A is used, power will also be supplied to the CPU.

7. T/R (TRANSMIT/RECEIVE) SWITCH

This switch is for manually switching from transmit to receive and vice versa. Set the switch to RECEIVE (down) and the IC-740 is in the receive mode. Set the switch to TRANSMIT (up) and it switches to transmit. When switching with the PTT switch on the microphone or with the VOX switch set to ON, the T/R switch must be in the RECEIVE position.

8. MIC CONNECTOR

Connect the supplied microphone or optional microphone, IC-SM5 or scanning microphone IC-HM10 to this jack.

9. PHONES JACK

Accepts a standard 1/4 inch headphone plug for headphones of 4 ~ 16 ohms. Stereo phones can be used without modification.

10. BAND SWITCH

The BAND SWITCH is a 10 position rotary switch used for selecting one of the 500KHz segments. The selectable bands are 1.8MHz, 3.5MHz, 7MHz, 10MHz, 14MHz, 18MHz, 21MHz, 24MHz and 28MHz. (28MHz band is separated to four 500KHz segments, and use ⑪ + 0.5MHz switch for upper 500KHz segments on 28MHz and 29MHz.)

11. +0.5MHz SWITCH

This switch is for selecting upper 500KHz segment on 28MHz or 29MHz band. This switch is negated when the other band is selected.

12. NB (NOISE BLANKER) SWITCH

When pulse type noise such as automobile ignition noise is present, set this switch to the NOR or WIDE position. The noise will be reduced to provide comfortable reception.

The blanking time can be selected NORMAL and WIDE by this switch. It will be effective against any type noises.

13. NB LEVEL CONTROL

Controls the threshold level of the noise blanker. Adjust the control so that incoming noises will be disappeared.

14. AGC TIMING CONTROL

For changing the time-constant of the AGC (Automatic Gain Control) circuit. By turning the control clockwise, the AGC voltage is released more slowly. Adjust the control to provide comfortable reception.

When the control is in the OFF position, the AGC function is turned OFF and the S-meter does not swing even if a signal has being received. (The AGC does not actuate on the FM mode.)

15. METER SWITCH

In the transmit mode, the meter has five functions.

1. Ic	Indicates the collector current of the final transistors.
2. ALC	Indicates the ALC level. The meter begins to function when the RF output power reaches a certain level.
3. COMP	Indicates the compression level when the speech processer is in use.
4. RF	Indicates an approximate RF output power.
5. SET/SWR	SWR can be measured by setting this switch to the SET position and calibrating the meter needle to the "SET" position with the RF POWER control, then setting this switch to the SWR position.

16. PREAMP SWITCH

Switches the preamplifier for the receiver.

17. AF GAIN CONTROL

Controls the audio output level in the receive mode. Clockwise rotation increases the level.

18. RF GAIN CONTROL

Controls the gain of the RF section in the receive mode. Clockwise rotation gives the maximum gain. As the control is rotated counterclockwise, the needle of the METER rises, and only signals stronger than the level indicated by the needle will be heard.

19. SQUELCH CONTROL

Sets the squelch threshold level. To turn OFF the squelch function, rotate this control completely counterclockwise. To set the threshold level higher, rotate the control clockwise.

20. TONE CONTROL

Controls the receiver audio tone. Ajust the control to provide comfortable reception.

21. MIC GAIN CONTROL

Adjusts the level of modulation according to the input of the microphone. Clockwise rotation increases the microphones gain. As the input will vary with different microphones and different voices, the knob should be turned until the Meter needle, in the ALC mode, begins to move slightly within the ALC zone. In the SSB mode when the speech processor is in use, the MIC GAIN CONTROL sets a clipping limit, while the RF POWER CONTROL sets the RF drive level to the maximum power level, where ALC starts at the saturation point of the amplifiers.

22. RF POWER CONTROL

Controls the RF output power 10 Watts to maximum (SSB: 100 Watts PEP, CW, RTTY: 100 Watts). Clockwise rotation increases the output power.

23. TUNING CONTROL KNOB

Rotating the TUNING CONTROL KNOB clockwise increases the frequency, while rotating it counterclockwise decreases the frequency. The frequency is changed in 10Hz, 100Hz or 1KHz steps which is according to the TUNING RATE switches. One complete rotation of the tuning knob results in a 1KHz frequency increase or decrease in 10Hz steps, 10KHz in 100Hz steps and 100KHz in 1KHz steps.

When the 10Hz steps tuning rate is selected, by turning the tuning control knob faster, the 100Hz steps tuning rate is automatically selected. This makes it very convenient to make a QSY over a wide frequency range.

24. TUNING RATE SWITCHES

The small vernier marks on the tuning knob are changed to correspond to 10Hz, 100Hz or 1KHz steps which is selected by pushing the switch either 10Hz, 100Hz or 1KHz.

25. DIAL LOCK SWITCH

After the IC-740 is set to a certain frequency for rag chewing, mobile operation, etc., by pushing the DIAL LOCK switch, the VFO is electronically locked at the displayed frequency, thus inactivating the operation of the tuning knob. To change frequency, the dial lock must first be disengaged by pushing and releasing the DIAL LOCK switch again.

26. RIT SWITCH

Switches the RIT (Receiver Incremental Tuning) circuit ON and OFF.

27. XIT SWITCH

Switches the XIT (Transmitter Incremental Tuning) circuit ON and OFF.

28. INCREMENTAL TUNING CONTROL

Shifts the receive frequency ±1.5KHz to either side of the transmit frequency when the RIT is ON, and shifts the transmit frequency to either side of the receive frequency when the XIT is ON. Rotating the control to the (+) side raises the receive or transmit frequency, and rotating to the (–) side lowers the receive or transmit frequency. The frequency shift by turning the control is not indicated on the frequency display.

When both the RIT and XIT switches are ON, the receive and transmit frequencies are the same, and this frequency can be shifted either side from the displayed frequency by the control.

29. RIT INDICATOR

Illuminates when RIT is turned ON.

30. XIT INDICATOR

Illuminates when XIT is turned ON.

31. VFO SWITCH

You can select either of the two built-in VFO's with this switch. It also selects the relationship of the two VFO's with the SPLIT switch. The switch performs the following operations according to its position.

A. (NORMAL) Selects the "A" VFO for both transmit and receive.

A. (SPLIT) Selects "A" VFO for receive and "B" VFO for transmit.

B. (NORMAL) Selects the "B" VFO in both transmit and receive.

B. (SPLIT) Selects "B" VFO for receive and "A" VFO for transmit.

32. SPLIT (TRANSCEIVE/SPLIT) SWITCH

Selects the relationship of the two VFO's. In the NORMAL (out) position, one VFO is for both transmit and receive. In the SPLIT (in) position, one VFO is for transmit and the other is for receive.

33. MEMORY/VFO WRITE BUTTON

By pushing this button, A VFO's frequency is written into Memory, or one VFO's frequency is transferred to the other VFO.

34. MEMORY SWITCH

Push this switch when you wish to write a frequency into a memory, or to call a memorized frequency.

35. METER

When in the receive mode the meter acts as an S-meter regardless of the position of the meter select switch. Signal strength is indicated on a scale of S1-S9, and S9 to S9+60dB.

In the transmit mode the meter has five functions which are selected by the Meter Switch (15).

36. TRANSMIT INDICATOR

Illuminates when the transceiver is in the transmit mode.

37. RECEIVE INDICATOR

Illuminates when the squelch is opened in the receive mode.

38. SPLIT INDICATOR

Illuminates when the transceiver is in the split frequency operation.

39. MEMORY INDICATOR

Illuminates when the memory switch is pushed ON.

40. FREQUENCY DISPLAY

The frequency of the IC-740 is displayed on a luminescent display tube. Since the 1MHz and 1KHz decimal points are displayed, the frequency can easily be read. The frequencies indicated are the carrier frequencies of each mode in, USB, LSB and CW, and the mark frequency in RTTY.

Remember, if you turn the RIT or XIT SWITCH ON to change the frequency and rotate the INCREMENTAL

TUNING CONTROL knob, the frequency displayed will not change.

41. PASS-BAND SHIFT (TUNING) CONTROL
Allows continuous shifting of the pass-band from upper or lower side in SSB, CW and RTTY. This will reduce interference by a nearby signal. When the PBT switch is pushed ON, this control allows continuous tuning of the pass-band selectivity by moving the filter up to 800Hz from the upper or lower side in SSB, CW and RTTY. This not only improves selectivity, but also can improve the audio tone. Normal position is in the center position and is 2.4KHz wide in SSB.

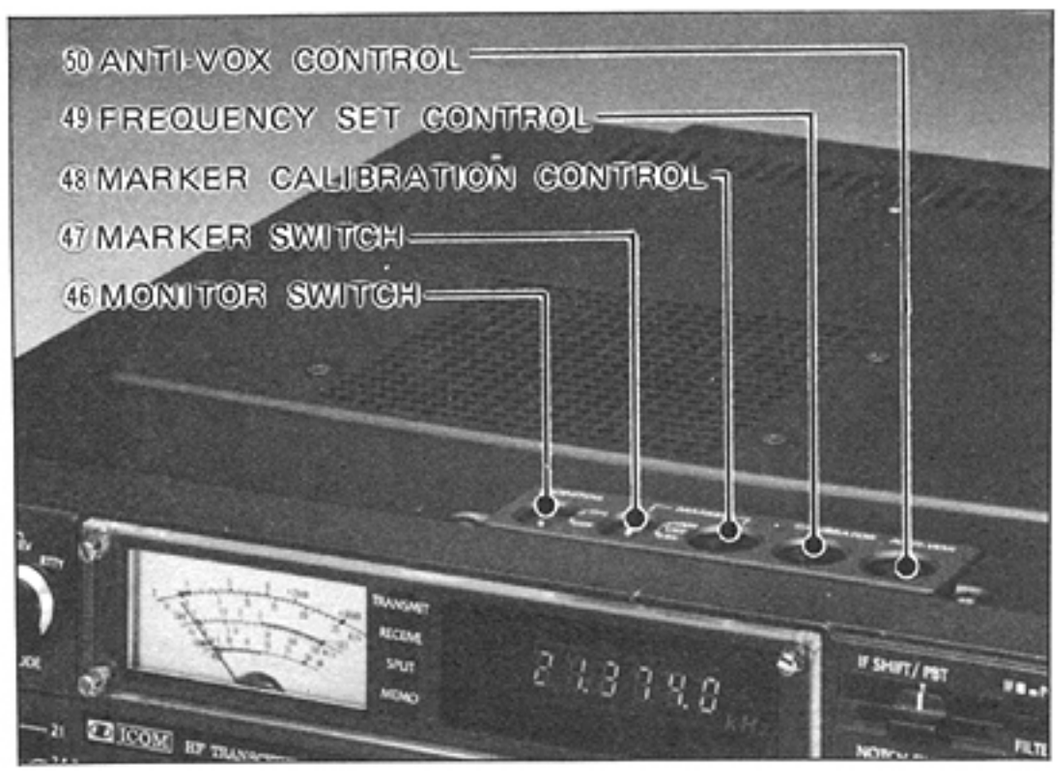
42. PBT SWITCH
Switches the IF SHIFT function and PASS-BAND TUNING function.

43. FILTER SWITCH
Selects the combination of the second IF (9MHz) filter and the third IF (455KHz) filter to improve the selectivity.

44. NOTCH FILTER CONTROL
Shifts the notch filter frequency. Adjust the control so that the interference is reduced.

45. NOTCH FILTER SWITCH
Switches the notch filter function ON and OFF.

2-2 TOP COVER



46. MONITOR SWITCH
In the SSB transmit mode, the transmitting IF signals can be monitored by turning this switch ON. At this time, use headphones or reduce receiver audio volume to prevent howling.

47. MARKER SWITCH
When an optional marker oscillator unit is installed, this switch turns the marker oscillator ON or OFF.

The marker frequency is available on every 25KHz or 100KHz step.

48. MARKER CALIBRATION CONTROL
Calibrates the marker frequency with a standard frequency such as WWV.

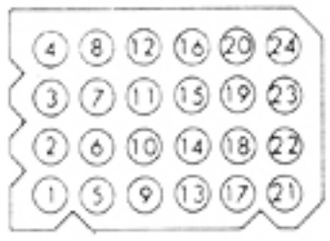
49. FREQUENCY SET CONTROL
This control is for fine adjustment of the reference frequency of the PLL unit, which is local oscillator frequency. Do not turn it unless you want to change the frequency.

50. ANTI-VOX CONTROL
In VOX (SSB) operation, the VOX circuit may be operated by sound from the speaker causing a switch to transmit. This trouble can be prevented by adjusting the input level of the ANTI-VOX circuit with this control along with the VOX gain control so that the VOX circuit only operates by the operator's voice, not by sound from the speaker.

2-3 REAR PANEL CONNECTIONS

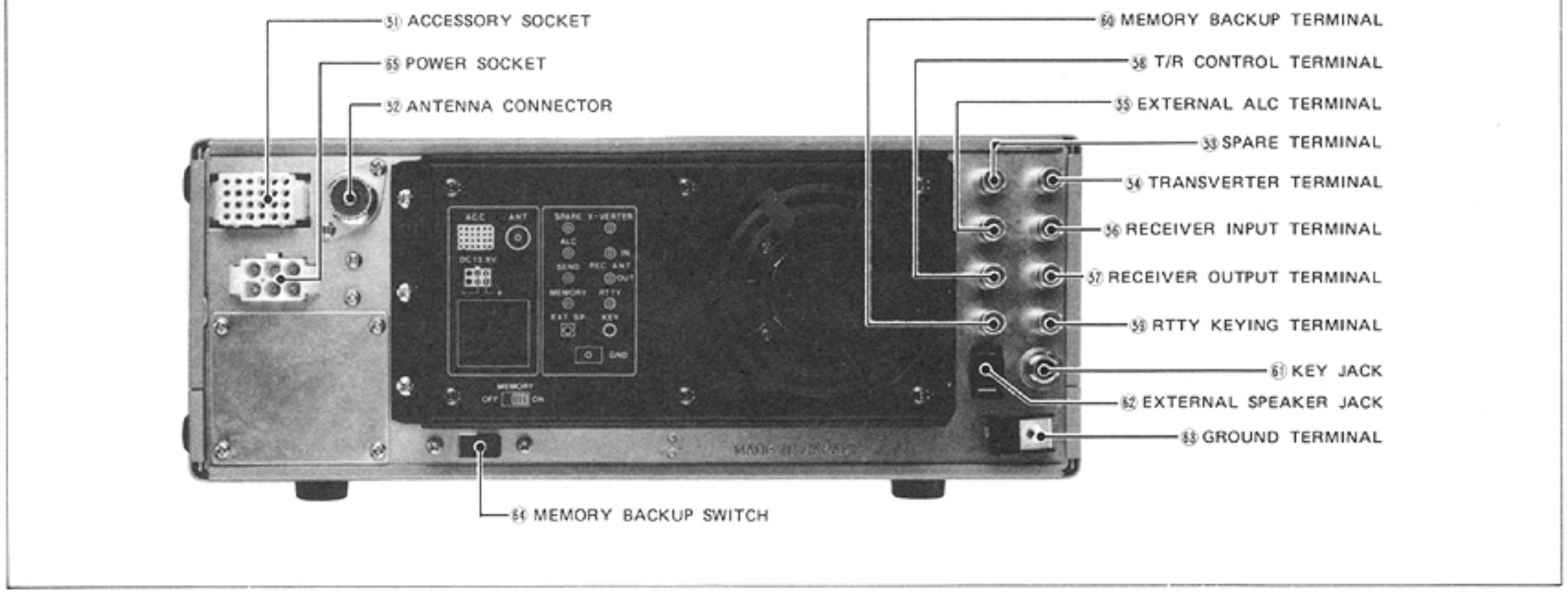
51. ACCESSORY (ACC) SOCKET
Various functions are available through the accessory socket such as modulation output, receiver output, T/R change-over, and so forth. The table below shows those terminals.

ACC SOCKET CONNECTIONS



Outside view

PIN No.	FUNCTION
1.	Output from the discriminator circuit (When optional FM unit is installed).
2.	13.8 Volts DC in conjunction with the power switch operation.
3.	Connected to Push-to-talk, T/R change-over switch. When grounded, the set operates in the transmit mode.
4.	Output from the receive detector stage. Fixed output regardless of AF output or AF gain.
5.	Output from Transmitter MIC amplifier stage. (Input for MIC gain control stage.)
6.	8 Volts DC available when transmitting. (relay can not be directly actuated. Max. 5mA).
7.	Input for external ALC voltage.
8.	Ground
9.	NC (no connection)
10.	8 Volts DC available when the 28MHz band is selected.
11.	Input for TRANSVERTER control. When 8 Volts DC is applied, the set can operate with a transverter.
12.	Output reference voltage for band switching.
13.	Output for external band switching.
14.~24.	NC



52. ANTENNA (ANT) CONNECTOR

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

53. SPARE TERMINAL

This terminal is available for your personal use, such as for adding accessory circuit, etc., if desired.

54. TRANSVERTER TERMINAL

VHF and UHF operation using a suitable transverter with the IC-740 is possible. This terminal is for Transverter connection. The output is a few milliwatts.

55. EXTERNAL ALC TERMINAL

This terminal can be used for input terminal of external ALC signal from a linear amplifier or transverter.
The ALC voltage should be in 0V ~ −4V.

56. RECEIVER INPUT TERMINAL

This is an input terminal which is connected directly to the receiver.

57. RECEIVER ANTENNA OUTPUT TERMINAL

This is a terminal to which received signals from the antenna connector are conducted after the signal passes through the transmit/receive antenna switching circuit. Usually the receiver IN and OUT terminals are jumpered. The receiver antenna output terminal is usually used when another receiver is used or a preamplifier is connected to the IC-740.

58. T/R CONTROL TERMINAL

Controls Transmit/Receive for an external linear amplifier or transverter. This terminal can be used to switch 24V 1A DC. Don't exceed this limit.

59. RTTY KEYING TERMINAL

This terminal is for RTTY keying (Frequency Shift Keying). The keying signals should be H-level (+5V) for the MARK and L-level (0V) for the SPACE.

60. MEMORY BACKUP TERMINAL

For connection of a 9 ~ 12V DC power supply. For mobile installation the current drain is low, so connection to the vehicle's battery can be made. For fixed installation use of the BC-10A is recommended.

61. KEY JACK

For CW operation, connect a key here using a standard 1/4 inch 3-P plug. For electronic keying the terminal voltage must be less than 0.4V DC.

When an optional electronic keyer unit is installed, an iambic keyer paddle can be used with a 1/4 inch 3-P plug.

62. EXTERNAL SPEAKER JACK

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

63. GROUND TERMINAL

To prevent electrical shock, TVI, BCI and other problems, be sure to ground the equipment through the GROUND TERMINAL. For best results use as heavy a gauge wire or strap as possible and make the connection as short as possible, even in mobile installations.

64. MEMORY BACKUP SWITCH

When this switch is in the ON position, the power to the CPU of the set is supplied continuously, if you use the optional built-in power supply or memory backup power source, even when the POWER switch on the front panel is turned OFF. At this time, the programmed frequencies in the memory channels, the operating frequencies of the two VFO's are also retained.

When this switch is set at the OFF position, all the power, including that to the CPU, is turned OFF by turning the POWER switch OFF, so that all frequencies are erased.

65. POWER SOCKET

This is for connection of the IC-PS15's DC power cord, or other suitable power supply.

Change to the receive mode by moving the T/R switch to receive, or release the microphone PTT switch.

3-2-9 HOW TO USE THE SPEECH PROCESSOR

The IC-740 has a low distortion AF speech processor which enables greater talk power and better results in DX operation. Follow the steps below for use of the Speech Processor:

MIC GAIN CONTROL	CENTER (12 o'clock)
RF POWER CONTROL	Fully Counterclockwise
COMP SWITCH	ON
METER SWITCH	COMP

Switch to transmit and turn the RF POWER CONTROL clockwise while speaking into the microphone until you obtain the desired RF "PEAK" output power of between 10 watts and 100 watts (approximately).

Adjust the MIC GAIN CONTROL to a point where the meter needle just begins to move.

The Speech Processor should be turned OFF or MIC GAIN CONTROL carefully set for minimum compression for all communication other than DX operation for a very natural voice quality.

3-2-10 HOW TO USE THE VOX CIRCUIT

The IC-740 has a built-in VOX (voice operated relay) which allows automatic T/R switching by voice signals into the microphone. For VOX use, set the knobs and switch as follows:

VOX GAIN CONTROL
FULLY COUNTERCLOCKWISE
VOX DELAY CONTROL
FULLY CLOCKWISE
ANTI VOX CONTROL (on the top)
FULLY COUNTERCLOCKWIS

Push the VOX switch on the front panel to the ON (in) position. Leaving the T/R switch in the RECEIVE position and without pushing the PTT switch, turn the VOX GAIN control clockwise while speaking into the microphone. At a certain point, the T/R switching circuit will be activated by your voice. This is the proper position for the VOX GAIN control. Set the VOX GAIN control at a level which provides for T/R switching at your normal voice level. Transmit-release time (the time delay before the set automatically returns to receive when you stop talking) is controlled by the VOX DELAY control. Turning the control counterclockwise makes the time shorter. Set it at a position which is comfortable and which allows for short pauses in normal speech.

Adjust the ANTI VOX control so that the VOX circuit is not activated by sounds from the speaker by turning the control clockwise while receiving a signal.

3-2-11 MONITOR

The transmitting IF signals can be monitored in the SSB mode. So you can check the quality of the transmitting signals and conditions of the speech processor and so on.

To use this function, turn the MONITOR switch on the top cover ON and adjust the AF GAIN control to a comfortable audio level. At this time, use headphones to prevent howling which will be caused by picking up sounds from the speaker.

3-3 CW OPERATION

3-3-1 RECEIVING

For CW reception, set the MODE Switch for CW mode.

Other switches and knobs are set the same as for SSB reception.

In addition to the crystal band-pass filter, Narrow filters are optional for this unit. When the FILTER Switch is set at the ON (in) position, this filter is activated and the total selectivity of CW reception is improved. With these filters, internal noise is reduced for comfortable CW reception and an improved signal to noise ratio (S/N).

Also, use the Noise Blanker, AGC switch and/or PREAMP Switch depending on the receiving conditions, the same as SSB reception.

3-3-2 TRANSMITTING

Insert the keyer plug into the KEY Jack on the rear panel of the unit, and set knobs and switches as follows:

RF POWER CONTROL	Fully counterclockwise
METER SWITCH	RF
VOX GAIN/KEYER SPEED CONTROL	OFF

Other knobs and switches are set the same as for CW reception.

By setting the T/R switch to TRANSMIT, the TRANSMIT indicator is lit and shows that you are ready for CW transmission. When you key the keyer, the meter needle moves and your CW signal is transmitted. To increase the transmitting power, turn the RF POWER Control clockwise to adjust while watching the meter needle on the Po scale for the desired output power.

When the optional keyer unit is installed, connect an iambic paddle with the supplied 3-P key plug to the KEY jack on the rear panel.

Then adjust keying speed by turning the VOX GAIN/ KEYER SPEED CONTROL clockwise for your favorite keying speed.

The other procedures are the same when using a hand keyer or an external electronic keyer.

3-3-3 CW SIDE-TONE (MONITOR)

When keying the side-tone oscillator is activated and an 800Hz tone will be heard. The loudness of the tone is controlled by the CW MONI Control located under the top cover. Rotating the control clockwise will increase the loudness. This tone is also audible in the receive mode and can be used for code practice, adjustment of the keyer, etc.

3-3-4 SEMI BREAK-IN OPERATION

The IC-740 has Semi Break-In CW capability when using the VOX function. When keying, the unit is automatically set in the transmit mode. After keying, it is returned to the receive mode, also automatically, after a given transmit-release delay time constant. Leave the T/R switch in the RECEIVE position, and set the VOX switch in the ON (IN) position.

The transmit release delay time constant is set by adjusting the VOX DELAY Control. Turning the VOX DELAY Control clockwise will make the transmit release time longer. Set it for your own keying speed.

3-4 RTTY OPERATION

For RTTY operation, a teletypewriter and a demodulator (terminal unit) which is operational with audio input are required. Any demodulator with 2125/2295Hz filters (narrow, 170Hz shift) can be used with the IC-740.

3-4-1 RECEIVING

Audio signals for the demodulator can be supplied from Pin 4 of the ACC socket on the rear panel, or from the PHONES jack on the front panel. The level of the audio signals from Pin 4 of the ACC socket does not vary by turning the AF GAIN Control, and the level is about 300mV P-P maximum.

Set the operating mode for RTTY, by setting the MODE SELECT switch to "RTTY". The other controls are the same as those for SSB reception. When tuning a RTTY signal, set the TUNING RATE SELECT switch in the 10Hz position, and tune to get audio signals of 2125Hz for MARK and 2295Hz for SPACE. (Use the tuning indicator of the terminal unit for easy tuning.) Also slide the P.B. Tune control for clear reception.

3-4-2 TRANSMITTING

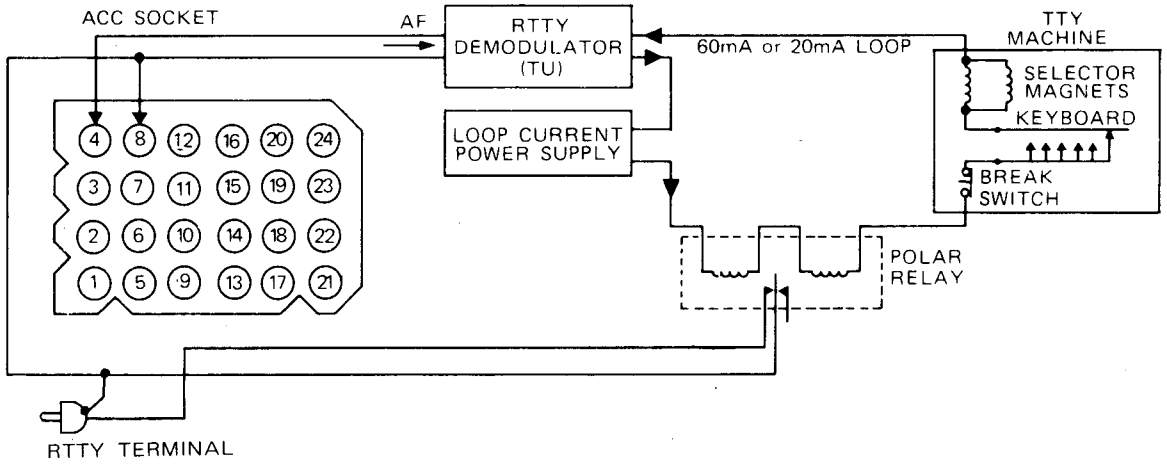
For keying of the Frequency Shift Keying (FSK) circuit insert a high speed relay's coil into the loop current circuit of the teletypewriter, and connect the relay contacts to the RTTY keying terminal on the rear panel. The relay contacts make during the Space and break during the Mark, as shown in the drawing. Fine adjustment of the MARK and SPACE frequencies can be done by adjusting the coil cores in the MAIN unit.

When a level converter for TTL level signals is used, connect the output of the converter to the RTTY keying terminal apply High level (5V) signals for the Mark, and Low (0V) for the Space.

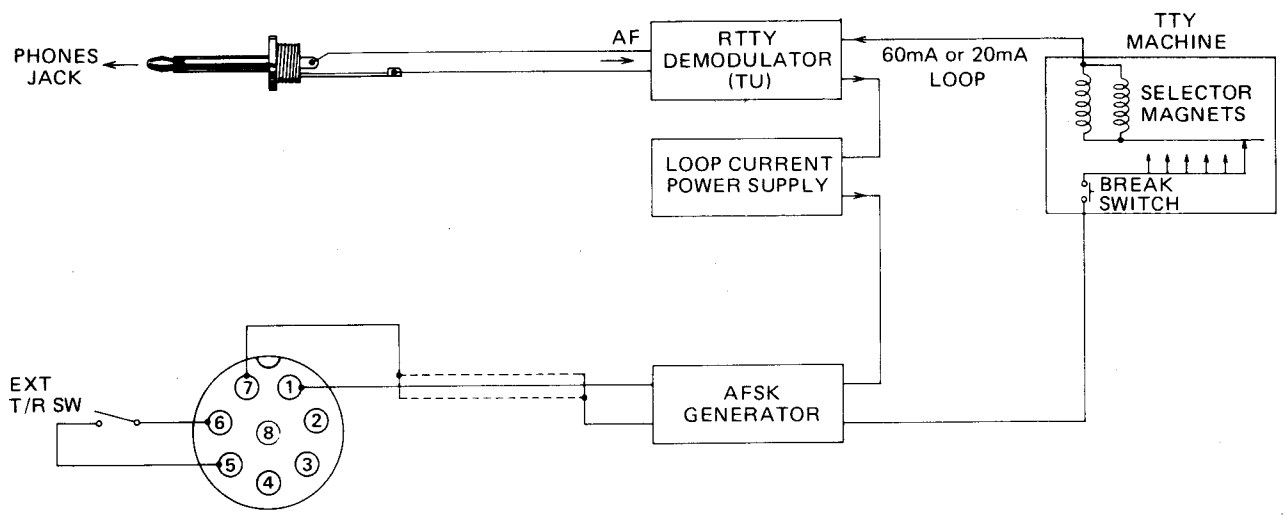
When using an AFSK generator that has 2125Hz for Mark and 2295Hz for Space, connect the output signals for the AFSK to the Mic connector on the front panel and set the Mode to LSB. (See Other Operations chapter.) Doing this, you can use the VOX operation available in this mode, and receive/transmit changeover is very easy.

If you wish to transmit continuously 10 minutes or more, reduce the output power to less than 70% of the full power, by rotating the RF POWER control on the front panel.

When a high speed relay is used



When a AFSK generator is used



3-5 FM OPERATION (OPTION)

3-5-1 RECEIVING

Set the operating mode for FM, by setting the MODE SELECT switch to "FM". The other controls are the same as those for SSB reception, however, the Pass Band Shift (Tune) control, Notch Filter, Noise Blanker and AGC circuits do not work in this mode.

When tuning an FM signal, tune for maximum signal strength as indicated on the meter and the clearest audio.

3-5-2 TRANSMITTING

Transmitting FM signals is essentially the same as SSB transmission.
Set knobs and switches the same as for SSB operation. However the speech processor can not be used on this mode.

When transmitting the FM signals, the meter (in RF position) will indicate the carrier power, but the meter needle does not move according to your voice such as SSB transmitting.

3-6 OTHER OPERATIONS

3-6-1 VSWR READING

The IC-740 has a built-in VSWR meter for checking antenna matching in order to avoid problems caused by VSWR. Set the METER SELECT switch to the SET position. Set the operating mode to RTTY, and turn the TRANSMIT/RECEIVE switch to TRANSMIT.

Adjust the RF POWER control so that the meter needle points to "SET" on the meter scale. Set the METER SELECT switch to the SWR position. With the switch in the SWR position, SWR reading can be seen on the meter. Although this unit is built to handle VSWR of up to 2:1, it is recommended that the antenna(s) be adjusted for the lowest possible VSWR. After taking the reading, return the switch to the other position. ALSO BE SURE THAT THE ANTENNA IMPEDANCE IS 50 OHMS OR THERE MAY NOT BE ANY OUTPUT. OTHERWISE THERE WILL BE DAMAGE TO THE TRANSCEIVER.

The final transistors used in the IC-740 are of good design and are protected to a reasonable extent by circuits incorporated in the set. These devices can be expected to have an indefinite lifetime since there are no cathodes to burn out. Under some conditions, however, they can be abused beyond tolerance and may have to be replaced.

When in doubt about antenna systems, use the lowest power setting possible to achieve meaningful readings. Use a good tuner or transmatch when necessary. Always use caution and exercise judgement when testing RF power generators.

3-6-2 WWV RECEPTION

To receive WWV (or other standard frequency station), set the operating band to 10MHz in the HAM band, and the MODE to any mode. Tune to 10.000.0MHz on the frequency display.

The WWV signal can be used for alignment of a frequency counter, marker oscillator, or the frequency display.

3-6-3 SIMPLE FREQUENCY ALIGNMENT

A very accurate frequency counter is necessary to align the frequency of the IC-740. However, the frequency can be aligned simply by receiving the WWV signal.

1. Set the frequency display to 10.000.0MHz and be sure that you are receiving the WWV signal.
2. Set the operating mode to CW. A 800Hz beat can be heard.
3. Short the KEY Jack on the rear panel so that the CW side-tone also becomes audible.
4. Rotate the CALIBRATOR Control, located on the top cover, so that the two tones are of the same pitch (in zero beat). If the tones are difficult to adjust because of a difference in their strengths, adjust the CW side-tone level with the CW MONI control, located on the MAIN unit (under the top cover), until the strengths are the same.

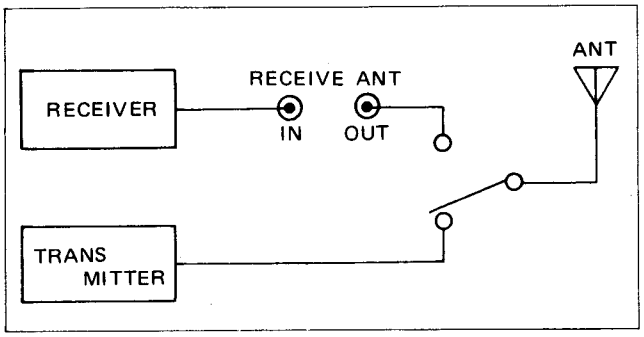
When the optional marker unit, IC-EX241 is installed, operating frequency can be calibrated each 25KHz or 100KHz on the all bands.

WHEN ALIGNING THE FREQUENCY, DO NOT PUT THE UNIT IN THE TRANSMIT MODE.

Be sure the T/R switch is in the Receive position, the VOX switch is OFF, and that you do not touch the PTT switch on the microphone.

3-6-4 RECEIVE ANTENNA TERMINALS

The RECEIVE ANT IN jack is connected to the input terminal of the receiving section, and the RECEIVE ANT OUT jack is connected to the antenna connector through the internal T/R antenna switching circuit.



These two jacks are normally jumpered with a cable, but can be used for:

1. A receiving preamplifier.
2. A separate receiver.
3. Separate receiver and transmitter antennas.

If you wish to use a receiver preamplifier, connect it between the receiver input and antenna output terminals.

If a separate receiver is used, connect it to the receiver antenna output terminal. For a separate receive antenna connect it to the receiver input terminal.

3-6-5 TRANSVERTER CONNECTION

When a transverter control signal (+8V) is applied to Pin 11 of the ACCESSORY socket, the TRANSVERTER terminal can be used for a VHF/UHF transverter INPUT/OUTPUT terminal.

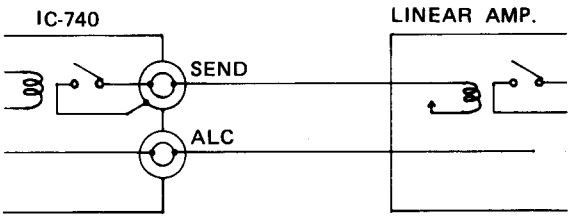
The transverter's input/output frequency and signal level should be as follows:

- Transverter INPUT/OUTPUT Frequency
  28 ~ 30MHz
- Input/Output Level
  Transmit (Output) : Max. 150mV across a 50 ohm load
  Receive (Input) : 1μV for S/N 10dB

3-6-6 LINEAR AMPLIFIER CONNECTION

The jacks on the rear panel marked "ALC" and "SEND" are a relay built-in for keying a linear amplifier, and the input for ALC from the linear amplifier. For linear amplifier hookup the SEND jack is for an internal relay and the ALC jack is for ALC input.

Internal Connections for Linear Amplifier



The optional linear amplifier IC-2KL and automatic antenna tuner IC-AT100/AT500 can be connected to the IC-740 with their accessory cables as same as other ICOM HF transceivers. Refer to their instruction manuals for detail.

The IC-740 puts out the band control voltage to change operating band automatically for external equipment such as linear amplifier and antenna tuner. The voltage is put out from Pin 13 of the accessory socket. (Refer to page 10.)

Band Control Voltage Chart

BAND (MHz)	Band Control Voltage
1.8	7.0 ~ 8.0V
3.5	6.0 ~ 6.5V
7	5.0 ~ 5.5V
14	4.0 ~ 4.5V
18 - 21	3.0 ~ 3.5V
24 - 28	2.0 ~ 2.5V
10	0 ~ 1.2V

SECTION 3 OPERATING INSTRUCTIONS

3-1 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.

3-1-1 FREQUENCY DISPLAY ON EACH MODE

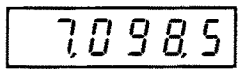
When the set is first turned ON, the following readouts will appear on the FREQUENCY DISPLAY.

Band	Displayed Frequency (MHz)		
	CW·RTTY·FM	LSB	USB
1.8MHz	1.600.0	1.601.5	1.598.5
3.5 "	3.600.0	3.601.5	3.598.5
7 "	7.100.0	7.101.5	7.098.5
10 "	10.100.0	10.101.5	10.098.5
14 "	14.100.0	14.101.5	14.098.5
18 "	18.100.0	18.101.5	18.098.5
21 "	21.100.0	21.101.5	21.098.5
24.5 "	24.600.0	24.601.5	24.598.5
28 "	28.100.0	28.101.5	28.098.5
28.5 "	28.600.0	28.601.5	28.598.5
29 "	29.100.0	29.101.5	29.098.5
29.5 "	29.600.0	29.601.5	29.598.5

EXAMPLE:

When the 7MHz band and LSB are selected, the display will be as follow:

When changing to other modes, the display will be as follows:

USB: 

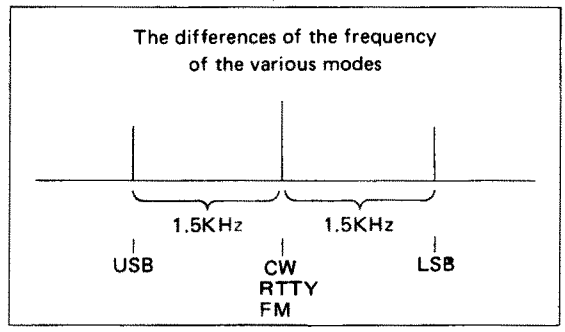
CW: 

RTTY: 

FM: 

The displayed frequency shows the carrier frequency. To avoid the trouble of recalibrating the dial when you change the operating mode, the displayed frequency is set to shift to the carrier frequency of each mode automatically. For the differences of frequency shifts of the various modes, refer to the following figure.

When changing to other bands, 100KHz and lower digits of the frequency display will remain as it had in the previous display.



EXAMPLE:

When the frequency display shows 14.255.5MHz, and if you switch to the 21MHz band, and the frequency display will show 21.255.5MHz. (When you switch to the 3.5MHz band, it will show 3.755.5MHz.)

3-1-2 TUNING CONTROL KNOB

The transmit or receive frequency is displayed on a 7 segment Electroluminescent display down to 100Hz digits. Rotating the tuning knob clockwise increases the frequency, while turning counterclockwise decreases the frequency in which stops are selected by the TUNING RATE switches, i.e., 10Hz, 100Hz or 1KHz steps.

When the 10Hz steps tuning rate is selected, by turning the tuning control knob faster, the 100Hz steps tuning rate is automatically selected.

One complete rotation of the tuning knob results in 1KHz with 10Hz steps, 10KHz with 100Hz steps, or 100KHz with 1KHz steps with a frequency increase or decrease.

Exact calibration is not necessary as the displayed frequency will always be correct but you may calibrate the scale on the tuning knob for use as an analog type frequency display.

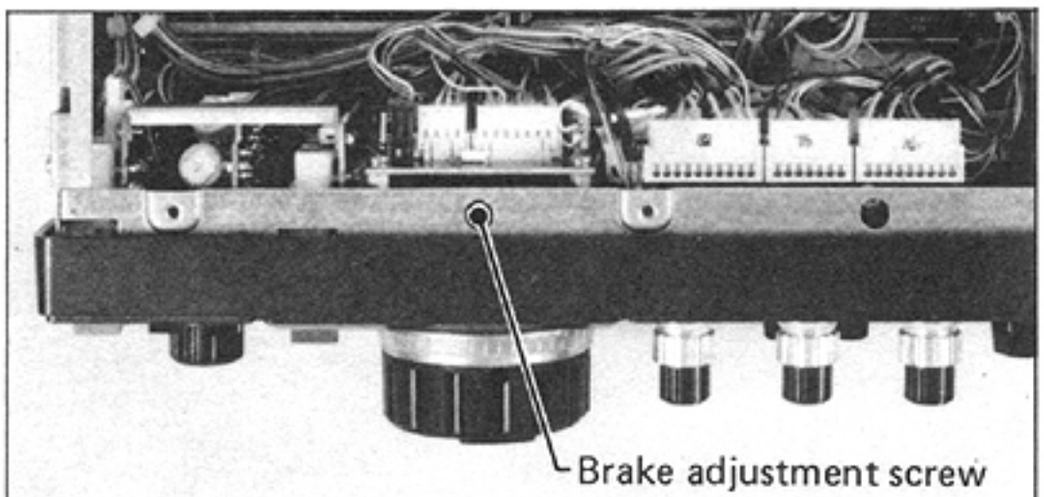
If you want to calibrate the scale during operation, set the frequency readout to 0.0KHz, push the dial lock switch, then set the large increment on the tuning scale to line up with the indicator arrow and then push the dial lock switch again.

The tuning knob scale may require recalibration if you:

1. Turn the knob while the frequency is locked by use of the Dial Lock switch.
2. Turn the knob beyond the band edge.

Brake Adjustment

If the knob is too loose or too stiff for comfortable use, you can adjust the torque by tightening or loosening the brake adjustment screw accessible from underneath the set.



(It is unnecessary to remove the bottom cover for the brake adjustment.)

The following instructions should be used to adjust the tension of the Tuning Knob.

1. The Tuning knob tension will become tighter by turning the brake adjustment screw clockwise, and will become looser by turning the screw counterclockwise.
2. While performing this adjustment, the Tuning knob must be turned continuously as the screw is adjusted in order to set the tension for a comfortable touch.

The displayed frequency will not go beyond the highest band edge even by turning the tuning knob clockwise, or beyond the lowest band edge by turning the knob counterclockwise.

The frequency range of each band is shown in the following chart.

Band	Frequency Range (MHz)
1.8	1.400.0 ~ 2.099.9*
3.5	3.400.0 ~ 4.099.9
7.0	6.900.0 ~ 7.599.9
10.0	9.900.0 ~ 10.599.9
14.0	13.900.0 ~ 14.599.9
18.0	17.900.0 ~ 18.599.9
21.0	20.900.0 ~ 21.599.9
24.0	24.400.0 ~ 25.099.9
28.0	27.900.0 ~ 28.599.9
28.5	28.400.0 ~ 29.099.9
29.0	28.900.0 ~ 29.599.9
29.5	29.400.0 ~ 29.999.9

***NOTE:** In the range of 2.000.0 ~ 2.099.9, the frequency display will show as 1.000.0 ~ 1.099.9.

3 - 1 - 3 TUNING RATE SWITCHES

Pushing one of the Tuning Rate switches will change the basic tuning rate of the set.

When the 10Hz switch is pushed, the tuning rate becomes 10Hz. The 10Hz may be read from the increments on the tuning knob.

When the 100Hz switch is pushed, the tuning rate becomes 100Hz.

When the 1KHz switch is pushed, the tuning rate is changed to correspond to 1KHz steps. The last significant-digit on the display will remain as the previous one. This position will allow you to quickly QSY over a great frequency range.

3 - 1 - 4 DIAL LOCK SWITCH

After the IC-740 is set at a certain frequency for rag chewing, mobile operation, etc., by pushing the Dial Lock switch the VFO is locked at the displayed frequency, thus inactivating the operation of the tuning knob. To change the frequency, the Dial Lock must first be disengaged by pushing and releasing the Dial Lock switch again.

3 - 1 - 5 VFO SWITCH

The CPU in the IC-740 contains two "VFO's" for both receiving and transmitting. The VFO's are labeled "A" VFO and "B" VFO and are selectible with the VFO Switch. This dual VFO system gives the IC-740 many very convenient features. Please read this section very carefully and perform the operation several times until you are comfortable with the system.

1. "A" VFO is for both transmitting and receiving and is selected by placing the VFO switch in the "A" position. The transmit and receive frequency will be controlled by "A" VFO, displayed on the frequency readout, 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" position. The transmit and receive frequency will be controlled by "B" VFO, displayed on the frequency readout, and stored in "B" memory.

EXAMPLE:
When the set is turned ON (7MHz and LSB are selected), 7.101.5 will be displayed on the readout.
This will occur whether the VFO switch is in either the "A" or "B". Rotating the tuning knob clockwise will increase the frequency in 100Hz (10Hz or 1KHz) steps. Rotating the tuning knob counterclockwise will decrease the frequency in 100Hz (10Hz or 1KHz) steps.

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

EXAMPLE:
If 14.125.0MHz is set with "A" VFO, and the VFO switch is set to "B" VFO, the frequency readout will show "B" VFO's frequency, but 14.125.0MHz is still stored in "A" VFO's memory. Returning the VFO switch to "A" VFO position, and 14.125.0 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!

3-1-6 SPLIT SWITCH

Pushing the SPLIT switch will change the relationship of the two VFO's. In the NORMAL (out) position, one VFO is for both transmit and receive. In the SPLIT (in) position, one VFO is for transmit and the other is for receive, so that this will allow you to operate split transmit/receive frequencies on the same band.

EXAMPLE:

Set "A" VFO to 7.085.0MHz and "B" VFO to 7.255.0 MHz.

Return the VFO Switch to "A" VFO then set the SPLIT Switch to the SPLIT position. 7.085.0MHz will be shown on the readout during receive ("A" VFO) and 7.255.0MHz during transmit ("B" VFO). You are now receiving on 7.085.0MHz and transmitting on 7.255.0MHz. Setting the VFO switch to "B" VFO to reverse the above.

5-1-7 RIT (RECEIVE INCREMENTAL TUNING)

By using the RIT circuit, you can shift the receive frequency ±1.5KHz either side of the transmit frequency without moving the transmit frequency itself. Therefore, when you get a call slightly off frequency, or when the other station's frequency has shifted, you can tune in the frequency without disturbing the transmitting frequency. By pushing the RIT switch the RIT circuit is turned ON and the RIT Indicator is lit.
The receive frequency can be shifted with the INCREMENTAL TUNING Control knob.

When the Control knob is in the "0" position, the transmitting and receiving frequencies are the same.

Rotating the control to the (+) side raises the receiving frequency, and rotating to the (−) side lowers the frequency. To turn OFF the RIT function, again push and release the RIT switch and the RIT Indicator will go OFF. When the RIT circuit is OFF, the transmit and receive frequencies are the same regardless of the setting of the control knob.

NOTE: The RIT circuit is operational when the frequency is locked with the dial lock switch. The frequency shifted by turning the INCREMENTAL TUNING control is not indicated on the frequency display. When the transmitting and receiving frequencies differ by more than 1.5KHz, use "A" and "B" VFOs.

3-1-8 XIT (XMITTER INCREMENTAL TUNING)

You can shift the transmit frequency ±1.5KHz on either side of the receive frequency without moving the receive frequency the same function as the RIT by using the XIT circuit.

By pushing the XIT switch, the XIT circuit is turned ON and the XIT Indicator is lit.
The transmit frequency can be shifted with the INCREMENTAL TUNING Control.

NOTE: When both the RIT and XIT switches are pushed, the receive frequency and transmit frequency become the same frequency, and it can be shifted to either side from the displayed frequency by the INCREMENTAL TUNING control.

3-1-9 MEMORY/VFO WRITE BUTTON

This button allows desired frequencies to be written into the memories for each band, and allows either VFO's to be brought to the exact frequency of the other VFO without turning the tuning knob. Therefore, it is very easy to make a few KHz split transmit/receive frequencies.

EXAMPLE:

When "A" VFO is 14.255.5MHz and "B" VFO is 14.355.0 MHz, 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 (14.255.5MHz). 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 (14.255.5MHz), switch back to the other VFO. It's very easy. Also, you can make several KHz split frequency operations with "A" VFO and "B" VFO, within a few moments. To reverse this (A the same as B), select "A" VFO first, then push the MEMORY/VFO WRITE button.

3-1-10 MEMORY OPERATION

MEMORY-WRITING

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

1. Set the TUNING CONTROL knob to the desired frequency, using "A" VFO. For example, set it for 14.255.5MHz on the display (when 14MHz and USB are selected).
2. Push the MEMORY Switch. If no frequency has been programmed since turning the power of the unit ON, 14.098.5 (14MHz, USB) will be shown on the display and the unit will receive on this frequency.
3. One push of the MEMORY/VFO WRITE Button erases the previous programmed frequency (14.098.5) and programs the new frequency (14.255.5) into memory.
4. Program any desired frequency into memory for each band in the same manner.
5. There is a memory for each band. The 28MHz band consists of four segments, and there is a memory for each one. However, the memory can be used for all segments. For example when 28.055.0 is written in the memory, it can be used for 28.555.0, 29.055.0 and 29.555.0MHz also.

Also, there is only one memory for 1.8MHz and 3.5MHz bands. However the memory can be used for the both bands. For example, when 1.805.5 is written in the memory, it can be used for 3.805.5 as well.

MEMORY-READING

Just push the MEMORY Switch. At whichever frequency the "A" or "B" VFO has been set, that previously programmed frequency is recalled. When the MEMORY Switch is pushed again and released, the previous operating frequency of that VFO will again be shown on the display.

The programmed frequencies in the memories are maintained as long as the power, including MEMORY BACKUP power, of the set is not turned OFF, or new frequency reprogrammed. When a MEMORY BACKUP power source is connected, all programmed frequencies in the memories and the operating frequencies of both "A" and "B" VFO's are retained even when the POWER Switch is turned OFF.

3 - 2 SSB OPERATION

3 - 2 - 1 RECEIVING

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

POWER SWITCH	OFF (OUT)
T/R SWITCH	RECEIVE (DOWN)
VOX SWITCH	OFF (OUT)
NOISE BLANKER (NB) SWITCH	OFF
NB LEVEL CONTROL	Completely Counterclockwise
AGC CONTROL	Center (12 o'clock)
PREAMP SWITCH	OFF (OUT)
VFO SWITCH	A (OUT)
TUNING RATE SWITCHES	Desired Rate
MODE SWITCH	SSB-NOR
AF GAIN CONTROL	Completely Counterclockwise
RF GAIN CONTROL	Completely Clockwise
SQUELCH CONTROL	Completely Counterclockwise
TONE CONTROL	Center (12 o'clock)
P.B. SHIFT CONTROL	Center position
BAND SWITCH	Desired Band
RIT SWITCH	OFF
XIT SWITCH	OFF
SPLIT SWITCH	OFF (OUT)
DIAL LOCK SWITCH	OFF (OUT)
MEMORY SWITCH	OFF (OUT)
PBT SWITCH	IF SHIFT (OUT)
FILTER SWITCH	OFF (OUT)
NOTCH FILTER SWITCH	OFF (OUT)

Now turn ON the power switch. The meter lamp will be illuminated and 7.015 will be shown on the FREQUENCY display (when 7MHz and LSB are selected).

In SSB operation there is both a USB (upper side band) and an LSB (lower side band). LSB is usually used on the 3.5 and 7MHz bands, while USB is usually used on the 10MHz band and above.

Slowly turn the AF GAIN control clockwise to a comfortable level. Rotate the tuning knob until a signal is received. The meter needle will move according to the signal strength, so tune for the highest possible meter reading and the clearest audio. If you cannot get a clear signal, you may be receiving in the opposite sideband. If so, change the mode to the proper sideband.

3 - 2 - 2 NB (NOISE BLANKER)

Set the NB (noise blanker) switch in the NOR position when there is pulse type noise, such as ignition noise from automobile motors, and turn the NB LEVEL control clockwise so that noise will be suppressed and even weak signals will be received comfortably.

When the NB switch is set in the WIDE position, the noise blanker will effectively work for "woodpecker's noise", however, if the receiving signal is too strong, the noise blanker may work with the receiving signal itself, and some distortion may cause in the receiving audio or keying form. At this time, set the N.B. Switch in the NOR position, or turn the NB switch OFF.

3 - 2 - 3 AGC (AUTOMATIC GAIN CONTROL)

The IC-740 has a fast attack/slow release AGC system which holds the peak voltage of rectified IF signals from the IF amp circuit for a certain period. Therefore, during the pauses in normal speech of the received signal, uncomfortable noise will not be heard. The meter indicates the peak value for a certain period, facilitating reading of the meter "S" function.

For normal SSB reception, turn the AGC control clockwise to the SLOW position. Turn the AGC control counterclockwise to the FAST position, when tuning or receiving signals with short interval fading. When in the FAST position, the time constant is shortened.

When this control is set at the OFF position, the AGC circuit is turned OFF, and the S-meter does not work even if a signal is received. However the RF GAIN control is still active and the needle of the meter moves depending on the control position.

3 - 2 - 4 PREAMP SWITCH

Turn the PREAMP Switch ON (in) when receiving weak signals. In the ON position, an RF preamplifier is inserted into the receiving antenna circuit, increasing sensitivity and giving easy reception.

3 - 2 - 5 PASS-BAND SHIFT CONTROL

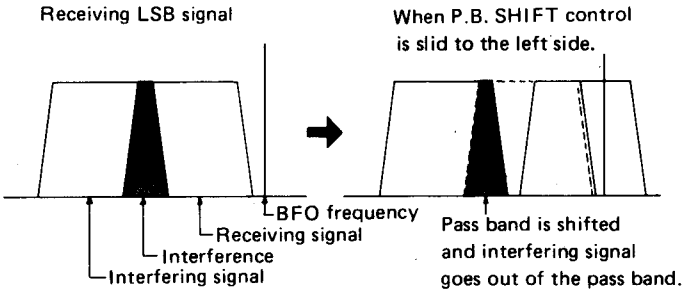
Pass-Band Shift Control is a system in the receive mode to shift the pass-band of the IF upper or lower side continuously. This is very effective in reducing interference from nearby signals.

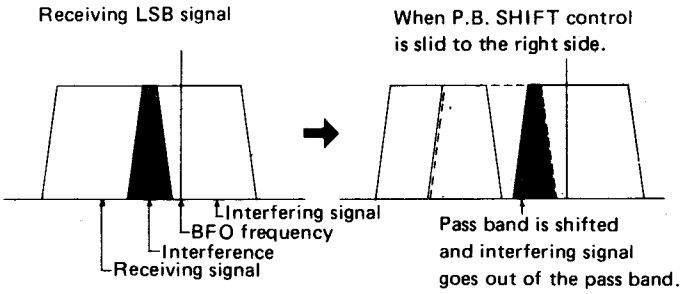
To use the Pass-Band (IF) Shift system, set the PBT switch in the IF (out) position and slide the control toward right or left side. The center position is the normal pass-band condition.

For example, while receiving in the LSB mode, if you get interference from a lower frequency (interfering signals are high pitched tones), shift the pass-band by sliding the P.B. SHIFT control to the left side. When the interfering signals are low-pitched tones, they are from a higher frequency, and you should shift the pass-band by sliding the P.B. SHIFT control to the right side.

When receiving in the USB mode, the pass-band is shifted in the opposite manner. Interference from a higher frequency will be high-pitched tones, and the P.B. SHIFT control should be slid to the right side. Interference from a lower frequency will be low-pitched tones and the P.B. SHIFT control is slid to the left side.

This control can also be used for audio tone adjustment, so it may be set for the most comfortable reception.

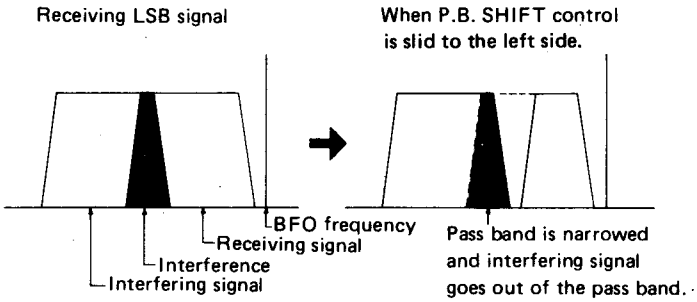


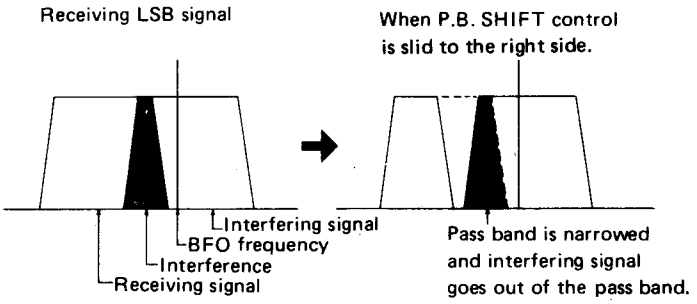


When the PBT switch is set in the PBT (in) position, the Pass-Band Shift system will be changed to the Pass-Band Tuning system.

The Pass-Band Tuning (PBT) is a system in the receive mode to narrow the band width (selectivity) of the frequencies that will pass through the crystal filter electronically from either the upper or lower side continuously by up to 800Hz. This is very effective in reducing interference from nearby signals.

To use the PBT system, slide the control the same as the Pass-Band Shift system.
The center position is the widest position and is equivalent to the normal SSB band width.





3-2-6 FILTER SWITCH

This switch selects the combination of the internal filters. When an optional filter is installed, this function will be more effective. Select and install the optional filter(s) to suit your favorite mode(s).

3-2-7 NOTCH FILTER

This circuit notches a frequency in the IF pass-band, so this is effective to reduce interference such as a beat-tone signal.

To use this function, push the NOTCH FILTER switch ON and slide the NOTCH FILTER control so that the interference is reduced.

3-2-8 TRANSMITTING

Before transmitting, listen in the receive mode to make sure your transmission will not interfere with other communications. If possible, use a dummy load for adjustment instead of an antenna. Set knobs and switches as follows.

MIC GAIN	CENTER (12 o'clock) position
RF POWER CONTROL	FULLY COUNTERCLOCKWISE
METER SWITCH	ALC

Other knobs and switches are left in the same positions as for receiving. When the T/R switch is moved to transmit, or when the PTT (push to talk) switch on the microphone is depressed, the TRANSMIT Indicator is illuminated. By speaking into the microphone, the meter needle will move according to the strength of your voice and SSB signals will be transmitted. Set the MIC GAIN control so that the meter needle stays well within the ALC zone at voice peaks. If you wish to increase the output power, turn the RF POWER Control clockwise and adjust to obtain the desired RF output power of between 10 watts and 100 watts (approximately).

SECTION 4 CIRCUIT DESCRIPTION

4 - 1 RECEIVER CIRCUITS

4 - 1 - 1 RF SECTION (RF Unit)

A receive signal from the antenna connector is fed to the RF unit through the FILTER unit.

The receive signal passes through a high-pass filter, consisting of L34, L35 and C80 - C84, which attenuates strong radio signals from the medium wave BC band. It then goes to one of the nine bandpass filters for various frequency ranges through contacts of RL1, C74 and D34.

When the PREAMP switch on the front panel is on, the emitter of Q9 is grounded which turns on RL1, and an RF preamplifier, Q6 and Q7.

When a transverter is in use, TRV8V is supplied to the base of Q10 and the base of Q9 is grounded to turn off RL1.

The gain of this preamplifier is greater than 8dB and the intercept point is +26dBm.

D34 is turned on by the bias voltages R8V and TRV8V through D38 and D39. In the transmit mode, Q5 is turned on to improve the isolation from transmit RF output signals.

The signal is fed to the first mixer.

4 - 1 - 2 IF SECTION (RF Unit)

The received signal is converted to a 39.7315MHz first IF signal in a double-balanced mixer. The first LO output signal from the VCO unit is amplified by Q1 to more than +10dBm before being applied to the mixer.

The image rejection ratio and spurious response rejection ratio are improved by use of the up-conversion mixer.

Q4 and Q3 comprise a two-stage first IF amplifier with about 20dB gain. The first IF signal is filtered by monolithic crystal filters FI1 and FI2 (39M1B) to improve the second image characteristics by removing strong signals in the same band. The 1st IF signal is then fed to the second mixer.

The second LO signal (30.71901 - 30.72000MHz) is fed to the second mixer to convert the 1st IF signal to a 9.0115 MHz second IF signal, which is fed through the noise blanker gate to J11 of the IF unit.

The 2nd local oscillator consisting of Q12, X1 and D41 oscillates at 30.7190MHz - 30.7200MHz with 10Hz steps. D41 varactor diode provides this frequency variation. A control voltage generated in the LOGIC unit and DC-amplified by IC9 in the MAIN unit is applied to D41. The oscillation frequency can be adjusted by L38.

(a) Noise Blanker Circuit (RF Unit)

The output signal from the second mixer fed through D47 and C106 is amplified by Q14 and IC1, and then rectified by D51. When the output voltage exceeds 0.6V RMS, the AGC voltage is supplied to Pin 3 of IC1 through Q16 and Q15. The AGC attack time constant is determined by R78 and C116 when the NB switch on the front panel is at WIDE and by R77 and C116 at NORMAL. The release time constant is determined by R77, R79, R80 and C116.

The output signal from D51 is also supplied to Pin 2 of IC2. When a pulse noise is received, IC2 outputs a high-level signal to drive Q17 which grounds R72.

The source voltage of Q14 is adjusted by the NB LEVEL control on the front panel to control the gain of the noise amplifier. L42 and L43 at the noise blanking gate comprise a dual-tuned circuit to suppress the spurious output from the second mixer.

A receive signal without noise components passes through D48 and D49, which are turned on by R69 - R71, and D50 is turned off by a bias voltage. However, a signal with noise passes through D50, which is turned on by R69, and D48 and D49 are turned off by a bias voltage.

The signal from the noise blanking gate is output at J6.

(b) PBT, IF SHIFT, NOTCH FILTER (IF Unit)

The second IF signal from J11 of the IF unit passes through D45. The appropriate filter is selected by the MODE and the PBT/IF SHIFT switches on the front panel.

When the IF SHIFT function is selected or when in the FM mode, 8V is applied to pin 4 of J9. This turns on D17 - D19 and the signal is fed to FI3 (9M15A ± 7.5kHz/–3dB). When the PBT function is chosen, 8V is applied to J1 - J5 or J6 - J8, depending on the selection of the filter selecting pins (P2 - P13).

When 8V is applied to J1 - J5, Q4 is turned on. D20 and D22 are also on to select FI1 (9M22D2 2.2kHz/–6dB). When 8V is applied to J6 - J8, Q5 is turned on, and D23 and D24 are on to select the optional filter installed.

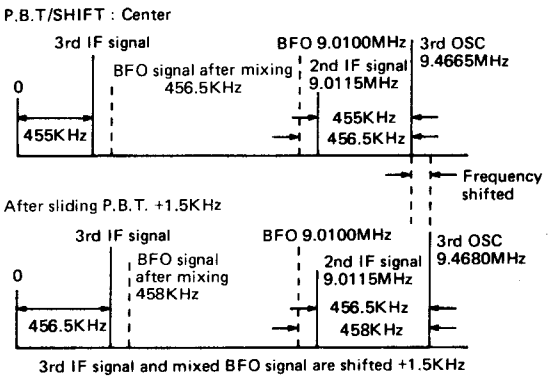
The signal from the filter is amplified by Q7, and the secondary coil L8 is used for a notch filter circuit. The notch frequency is shifted by the voltage change at the cathode of D31 controlled by the NOTCH FILTER CONTROL on the front panel. The frequency variation is 9.0115MHz ± 1.52kHz and the attenuation is more than 25dB.

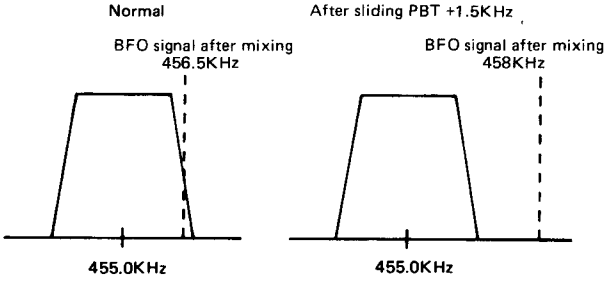
To obtain stable notch operation, the output impedance of Q7 is held high by use of the source follower Q8, and the signal is supplied to the third mixer IC2.

The LO signal which passes from Q10 to Pin 7 of the mixer IC2 can be varied by ± 1.5kHz from 9.4665MHz, thus the receive signal from Q8 is converted to a 455kHz third IF signal. The frequency of the converted signal is varied according to the frequency shift of the LO signal. The signal from Q10 is also applied to the BFO, and when the LO frequency is varied, the IF SHIFT is effected.

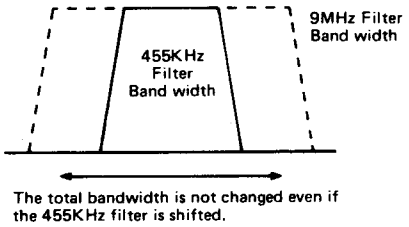
When the bandwidth of the 9MHz filter is wide enough for the bandwidth of the 455kHz filter and the SHIFT frequency, this system functions as an IF SHIFT circuit.

For example : LSB 9.0115MHz

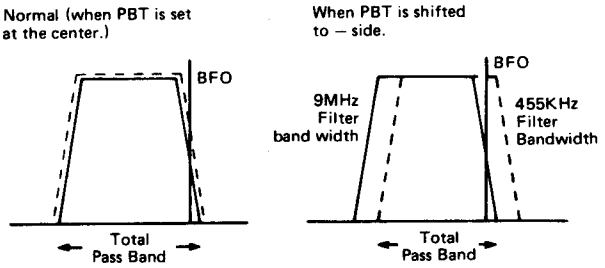




IF SHIFT FUNCTION



When the bandwidth of the 9MHz filter is as wide (narrow) as that of the 455kHz filter, the total bandwidth becomes narrower as the LO frequency is shifted, and the system functions as a PASS BAND TUNING circuit.



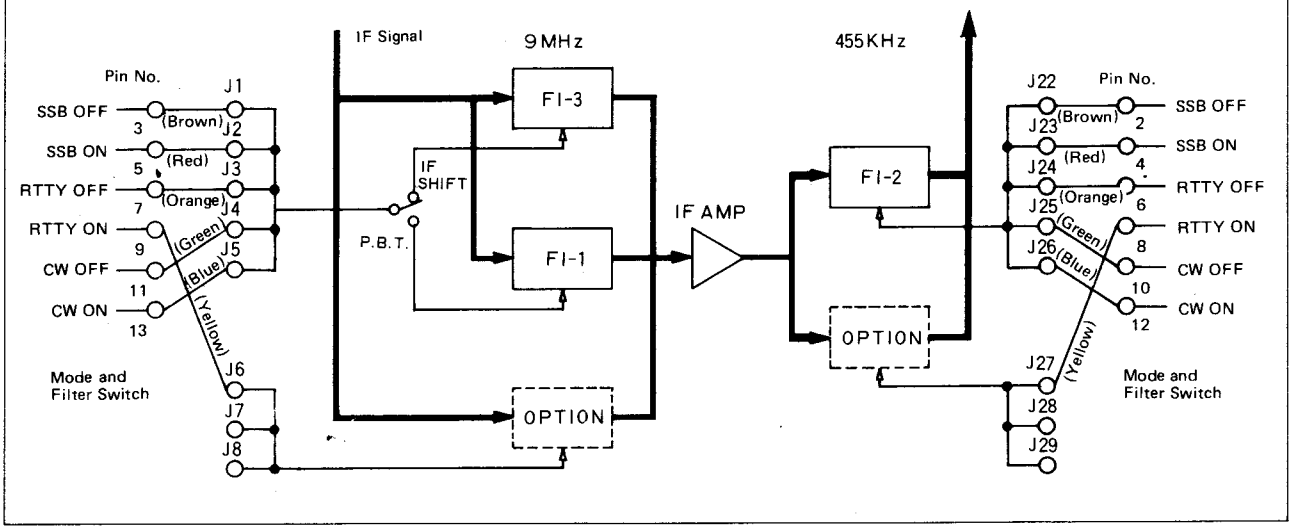
The receive signal from IC2 is fed through D32 to a 455kHz filter, which determines the selectivity, and then through an emitter follower Q1, for a low impedance output, to the MAIN unit through J2.

The following figure shows the connector connection when shipping; P18 is inserted to J20. In this condition, the FILTER SWITCH is effective for SSB and CW modes, but not for RTTY.
If P18 is inserted to J31, the FILTER SWITCH is effective for CW and RTTY, but not for SSB. Select the appropriate position for your requirements.

4 - 1 - 3 AF SECTION (MAIN Unit)

The 455kHz IF signal from the IF unit is input to J3 of the MAIN unit, amplified by IF amplifiers Q1 and Q2, and fed to Pin 5 of the double-balanced demodulator IC1.
The SSB, CW or RTTY signal is demodulated by the BFO signal fed into Pin 7 of IC1.

Pin connections (from factory) and signal flow



The detected signal passes through squelch circuit Q6 to the AF GAIN control on the front panel, which also controls the CW side-tone and SSB monitor audio levels. Q6 is turned on when the gate level is high and off when it is low.

The audio signal controlled by the AF GAIN control is amplified by Q18 in the CW mode and by Q19 in other modes. The output signal from the amplifier is selected by D16 and D17 and fed to Pin 1 of the AF power amplifier IC10 to drive a speaker. Q18 comprising a phase oscillator circuit functions as an active filter with the center frequency of about 800Hz.

Part of the demodulator output signal is amplified by Q7 and output to the ACC connector on the rear panel. It is unaffected by the AF GAIN control (Impedance: Approximately 5kohm and 0.4V p-p.)

(a) BFO Circuit (MAIN Unit)

The BFO signal is generated by Q13 with X1, X2 or X3; bufferd by Q14 and fed to Pin 5 of IC2, where the signal is mixed with the PBT LO (9.4665MHz) for the 455kHz (± SHIFT frequency) BFO signal. L8 and C53 comprise a low-pass filter.

In the USB mode, D9 is turned on by 8V supplied through R66, X2 oscillates at 9.0130MHz with C45, and the output signal is mixed at IC2 for the 453.5kHz ± PBT SHIFT frequency. At this time, D8 and D10 are reverse biased.

In the LSB mode, D10 is turned on by 8V supplied through R73, X3 oscillates at 9.0100MHz with C48, and the output signal is mixed at IC2 for the 456.5kHz ± PBT SHIFT frequency. At this time, D8 and D9 are reverse biased.

In the RTTY mode, for the space signal transmission, Q33 is turned on, Q12 is off, and Q11 is on. Thus C37 is grounded to oscillate with X1 at 9.01167MHz. The output frequency of IC2 is 454.83kHz ± PBT SHIFT frequency.

For the mark signal in the RTTY mode and for CW-T mode, Q33 is turned on and Q11 is off to turn D7 on by supplying 8V through R55. Thus, L7 is grounded to shift the oscillating frequency of X1 to 9.01150MHz. The output frequency of IC2 is 455.00kHz ± PBT SHIFT frequency.

In CW-R, Q12 is on and Q11 is off to supply 8V to turn on D6 through R54. Thus, L6 is grounded, as well as L7, to shift the X1 frequency to 9.01070MHz. The IC2 output frequency is 455.70kHz ± PBT SHIFT frequency.

In the RTTY-R mode, Q12 is on and Q11 is off while Q10 is turned on by 8V supplied to its base through R53. Thus, the frequency of X1 as determined by L5, L6 and L7 is 9.009375MHz. At this time D9 and D10 are reverse biased. The output frequency of IC2 is 457.125kHz ± PBT SHIFT frequency.

(b) Squelch Circuit (MAIN Unit)

The AGC voltage is supplied to Pin 6 of IC6 and the voltage controlled by the SQUELCH control on the front panel is supplied to Pin 5. IC5 comprises a comparator for the voltages at Pins 5 and 6. The output voltage of IC5 turns on Q22 and Q23, making the gate level of Q6 high to drive the squelch circuit.

(c) AGC Circuit (MAIN Unit)

The output signal from Q2 is buffer-amplified by Q3 and rectified by D1 and D2. The rectified signal charges the peak-hold circuit of R14 and C13. The delay time constant can be varied by adjusting the AGC TIMING control on the front panel.

The resulting voltage is combined with the voltage set by the RF GAIN control, and then output to the MAIN, IF and RF units as the AGC voltage.

(d) S-meter

The AGC voltage is input to Pin 2 of IC5 through R122 for inverting amplification, and its output signal is fed through the SW-C unit to the meter after the level is adjusted by R127 and R128. These controls set the S9 and full-scale levels respectively.

4 - 2 TRANSMITTER CIRCUITS

4 - 2 - 1 AF SECTION (MAIN Unit)

AF signal from the mic connector is amplified by IC3, and then fed to the VOX GAIN control and the MIC GAIN control.

For use with microphones without built-in amplifiers, such as the IC-SM6, the gain of the amplifier (IC3) can be increased to approximately 32dB by removing R77.

The signal through the MIC GAIN control is amplified by Q15 and fed to Pin 5 of the balanced modulator IC1. Pin 7 of IC1 is for the BFO input and Pin 5 is for the DSB output to the IF unit through J8.

The output is muted by Q4 in the receive mode or in the CW or RTTY mode. In CW or RTTY mode, a voltage is supplied to Pin 5 of IC1 through R17 and D3. Thus, the modulator is unbalanced and outputs the BFO signal as the carrier signal.

(a) VOX Circuit (MAIN Unit)

The signal from IC3 is adjusted by the VOX GAIN control and fed to IC4. The IC4 output is rectified by D11 and charges C63.

A portion of the output signal from the AF power amplifier passes through the ANTI VOX GAIN control and is amplified by amplifier IC4 (Pins 1, 2 and 3) and rectified by D13 and charges C65. Approximately 4V is applied to C65 by R97 and R98, and 3.3V to C63 when there is no signal.

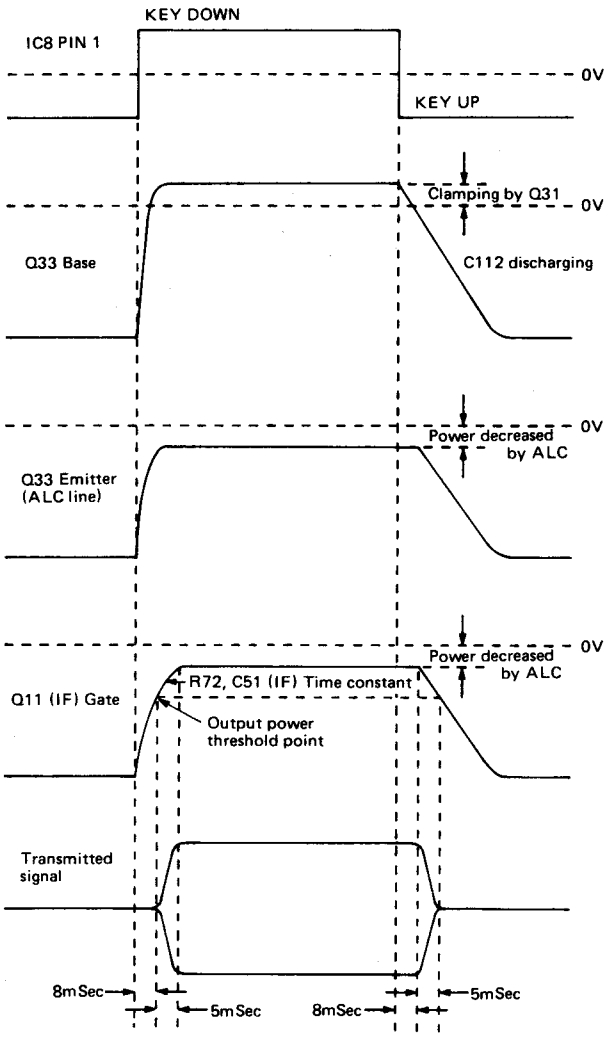
IC3 is a comparator to compare the output voltages of the VOX and ANTI VOX amplifiers. At no signal, the ANTI VOX output voltage becomes higher than that of the VOX, and the level of IC3 Pin 7 becomes low. While both of the signals from the mic and AF amplifier vary, when the voltage at Pin 5 (VOX) of IC3 becomes higher than that of Pin 6 (ANTI VOX), Pin 7 becomes high to turn Q16 and Q17 on. When the VOX switch is on, the SEND line is

grounded for the transmit mode.
In the CW mode, when key is down, pin 1 of IC9 becomes high level and it charges C64 through D14.
The delay time constant is to be adjusted by the VOX DELAY control on the front panel.

(b) Keying Circuit

The voltage at Pin 2 of comparator IC9 is higher than that of Pin 3 when the CW key is up, and the output voltage at Pin 1 is negative. The output feeds into the base of Q29 to set the ALC voltage negative. This operation suppresses the carrier signal more than 100dB.
When the key is down, Pin 2 becomes low and the output from Pin 1 becomes high to drive the side-tone oscillator circuit, to charge C116 to operate the break-in circuit, and to set the base of Q29 positive. When the base of Q29 is positive, the ALC voltage immediately becomes 0V. However, the delay time constant of the ALC circuit for the IF and RF stages is set by R197 and C116, and provides a proper attack time for CW transmission.

Keying Timing Chart



When the key is up, Pin 1 of IC9 becomes negative to turn off Q24 which stops the oscillation of the side-tone and the charging of C116. The base of Q29 becomes negative with some delay caused by the discharge of C116. In all modes but CW, Q28 turns off the ALC keying and prevents the ALC from excessive delay caused by high voltage at the base of Q29. By use of the base voltage of Q29, the voltage of Pin 3 of IC6 is kept negative to prevent the ALC meter from moving out of the scale when the CW key is up.
C116 and R197 are to set the time constant, and R223 is to determine the carrier suppression.

(c) Ic meter

The collector current of the PA transistors Q4 and Q5 flow through R27. The voltage across R27 is fed to pins 5 and 6 of IC6 on the MAIN unit and inverting amplified.
The amplified voltage is adjusted in level by R146 and R147, and fed to the meter when the METER switch is set to the Ic position. R146 is for meter deflection adjustment and R147 is for APC threshold adjustment.

(d) RF, SWR meter

The forward (FOR) and reflected (REF) voltages detected by the FILTER unit are fed to IC9.
For the RF meter and the SWR set, the forward voltage is fed to Pin 3 of IC7 and its output voltage is adjusted by R23 of the SW-C unit and fed through the METER switch to the meter.
For the SWR, the reflected voltage is input to Pin 5 of IC7 and its output voltage is fed through the SW-C unit and the METER switch to the meter.

(e) ALC meter

The ALC voltage is fed to Pin 2 of IC6. The amplified output voltage is adjusted by R180, and supplied to the meter through the METER switch on the SW-C unit.

(f) ALC circuit (MAIN Unit)

The forward and reflected voltages detected by L17 in the FILTER unit are supplied to J18 on the MAIN unit.
The forward voltage is compared with the voltage set by the RF POWER control on the front panel by IC8 (Pins 5, 6 and 7), and then fed to the IF and RF units as ALC voltage. Both forward and reflected voltages are input to IC8 (Pins 1, 2 and 3) to protect the final transistors by reducing the RF output power when the VSWR of the antenna load exceeds 3-to-1. A portion of the output for the Ic meter is adjusted by R147 and input to Pin 2 of IC8 to control the ALC voltage through the increase of the final transistor collector current.
When the temperature of the final transistors rises, Q30 is turned on by D29 - D31 to control the power control voltage. R206 is for HIGH POWER adjustment and R164 is for LOW POWER.

4 - 2 - 2 IF SECTION

(a) IF Unit

The carrier frequency from the MAIN unit varies depending on the mode: DSB for LSB, 456.5kHz: DSB for USB, 453.5kHz: CW, 455kHz: RTTY (mark), 455kHz: and RTTY (space), 454.83kHz.

The DSB signal output from J17 of the IF unit passes through D33 and FI2 to remove the unwanted sideband resulting in an SSB signal.

After going through the emitter follower Q1, when the COMP switch on the front panel is off, the signal passes through C3 to the RF POWER control on the front panel.

When the COMP switch is on, the signal is fed to an amplifier Q2, and then clipped by D1 and D2. To remove the distortion in the clipped signal, a 9MHz filter is provided before the adjustment of the output level by the RF POWER control on the front panel.

The output signal is mixed with the 9.4665MHz local oscillator signal to 9.0115MHz, and fed through D16 to FI3 when the COMP switch is off and to FI1 when it is on.

The signal is amplified by Q6 and fed to the RF unit through J16. The ALC voltage is supplied to the gate of Q6, and the attack time constant is determined by R34 and C33 in the CW mode.

A receive IF amplifier Q7 functions as a monitor amplifier during the transmit mode, and the amplified signal is converted into 455kHz by IC2, then fed to the monitor circuit.

(b) RF Unit

The signal from the IF unit is passed through D46 to the second mixer. Q13 is turned on to prevent the IF signal from being fed back to the noise blanker gate.

The input signal to the double-balanced mixer D42 - D45 is mixed with the 30.71901 - 30.7200MHz second LO signal for a 39.7305 - 39.7315MHz signal, which passes through a switching diode D1 and a dual-tuned filter L2 and L3 to eliminate spurious components. It is then fed to a 20dB amplifier Q2.

The output signal from Q2 is fed through D2 to the first mixer, which converts the signal to the desired frequency. The converted signal is fed through a band-pass filter for the band of operation and D40 to a 20dB amplifier Q11. The Q11 output, approximately +13dBm, is passed to the PA unit through J8.

The ALC voltage is supplied to the gate of Q2, and the ALC attack time constant is determined by R6 and C9.

4 - 2 - 3 RF SECTION (PA Unit)

The RF signal input from the RF unit through P1 is amplified by class A amplifier Q1. The output from Q1 is converted to a balanced output by L2 and amplified by the class AB push-pull amplifier Q2 and Q3. The negative feedback circuit, consisting of R10, C5, R11 and C6 inserted between the collectors and the bases of Q2 and Q3, prevents the amplification factor from changing for various frequencies.

The idling current of Q2 and Q3 is controlled by the junction voltage of D1. The current is set at about 100mA by R6. D1 senses the heat of Q3 for temperature compensation by Q2 and Q3.

The output of Q2 and Q3 is fed to the impedance-matching section L4 and amplified by the class AB push-pull amplifier Q4 and Q5 to provide 100 watts of output power.

Q6 comprises the bias circuit for Q4 and Q5 using the regulated voltage. The idling current is set at about 600mA by R21.

A portion of the output power from Q4 and Q5 is applied to the bases of these transistors through the negative feedback transformer L7 to reduce the variations in the gain factor over the frequency range from 1.9MHz to 30MHz.

The output from Q4 and Q5 is then fed to L8 for impedance conversion and output to the FILTER unit from P2.

Thermal switches S1 and S2 detect the Q4 and Q5 temperatures and control the cooling fan and the output power reduction circuit.

If the temperature increases, S1 is turned on at about 70 deg. C which places the cooling fan in the high-speed mode. When the temperature reaches about 80 deg. C, S2 is turned on and sends a signal to the MAIN unit to reduce the transmit power to 50 watts.

In the transmit mode, a voltage is applied to the base of Q7 which turns it on, and a voltage is also applied to the fan motor through R23 which places the fan in the low-speed mode.

4 - 2 - 4 FILTER UNIT

The RF output from the PA unit is fed to the FILTER unit to eliminate harmonic components. The desired filter is selected by the BAND switch on the front panel.

The filtered output signal passes through the SWR detecting transformer L17 to the antenna connector on the rear panel.

4 - 3 PLL CIRCUITS

4 - 3 - 1 PLL CIRCUIT

This unit contains a down conversion type PLL circuit.

Q1 oscillates at 13.666MHz, which is multiplied 9 times by two triplers Q2 and Q3, and is then fed to the mixer Q4.

The signal from the VCO, Q6, is input to Q4 through the buffer amplifiers Q7 and Q8. The output signal (9 — 16MHz) from Q4 is amplified by Q5 and fed to IC1, which is a PLL IC consisting of a programmable divider, reference frequency oscillator, divider, and phase detector.

A 9MHz signal generated by crystal X1 at Pins 2 and 3 is divided by the internal divider for a 10kHz reference frequency signal, which is then input to the phase detector.

The signal applied through Pin 9 is fed to the programmable divider, and the frequency data are fed through Pins 4 — 8 from the CPU. The output signal is input to the phase detector.

The output signal from the phase detector is fed through Pin 14 to a loop-filter of R29, R30, and C36, where the

signal is converted to a DC signal and fed to a varactor diode D2.
The VCO puts out a 10kHz step signal between 132 – 139 MHz from Q7 to IC2, where the signal is divided by 10 to make 1kHz-step signals between 13.2 – 13.9MHz.
This unit controls the frequency between the 100kHz digit and the 1kHz digit of the operating frequency. 13.2MHz is for the bottom of the 700kHz band and 13.9MHz is for the top.

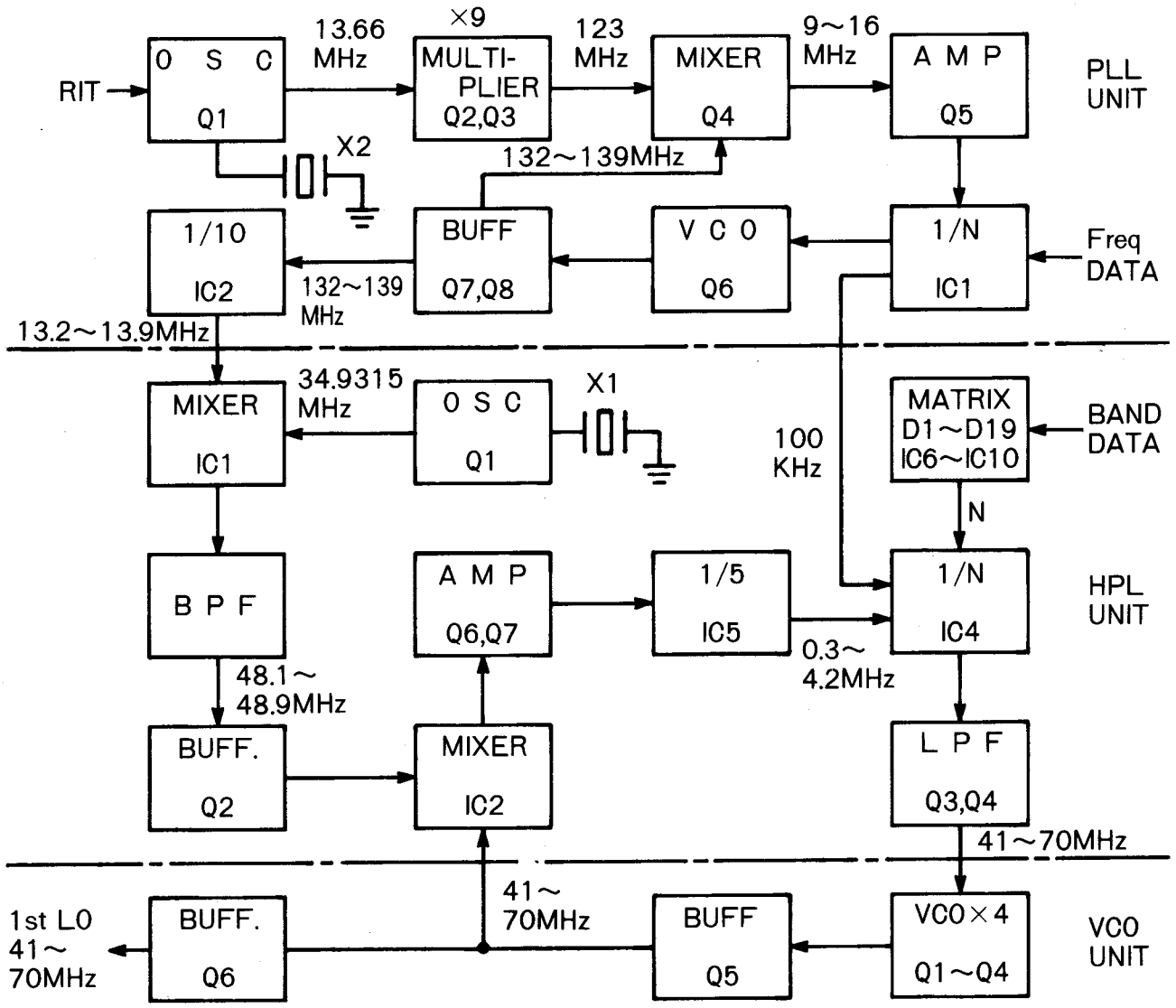
4-3-2 VCO CIRCUITS

This unit is the last stage of the local oscillator section and is very important to keep the output signal clean from spurious and sideband noise.
The VCO circuit is divided into four segments: Q1 controls the local oscillator for the 1.8, 3.5 and 7MHz bands, Q2 is for 10 and 14MHz, Q3 is for 18 and 21MHz, and Q4 is 24.5, 28, and 29MHz. To cover a wide frequency range, C5 is switched by applying a voltage to Q1 through D3.
Diodes D4, D6, D8 and D10 switch the signal from each segment. The signal is fed through an emitter follower Q5, for impedance matching, to Q6. The emitter follower allows stable VCO operation against external impedance variation.
The output signal from Q6 passes through an HPF and LPF L12 – L14, C46 – C52, and C58 to suppress spurious radiation.
A portion of the output signal from Q5 is fed through C57 to the HPL unit.

4-3-3 HPL UNIT

The PLL output signal which passes through J1 to Pin 3 of IC1 and the offset oscillator signal from Q1 to Pin 7 are mixed in IC1. A 48MHz signal is filtered by BPF L2 – L4, C9, C11, C15 – C17, and is fed through Q2 and C19 to Pin 3 of IC2.
The VCO output signal through J2 is amplified by Q5 and fed through C20 to Pin 7 of mixer IC2, from which the mixed signal passes through matching transformer L6 to an LPF to suppress unwanted spurious signals. The signal is fed to IC5, through amplifier Q7 and level converter Q6, where the signal is divided by five and output to Pin 11 of IC4.

BLOCK DIAGRAM



IC4 is a PLL IC with a programmable divider, reference frequency oscillator, divider and phase detector. In this circuit, the reference frequency oscillator and divider are not used. The signal divided by the programmable divider is fed to the phase detector.
The signal from the band switch is input through P2 and P3 from the matrix unit, converted to the desired divider data for the band of operation by D7 – D19 and IC6 – IC10, and fed to Pin 13 – 19 of IC4.

As the reference frequency signal, a 100kHz signal is obtained from Pin 12 of IC1 in the PLL unit and input to P1 on the HPL unit. The signal is fed through voltage divider R42 and R43 to the phase detector from Pin 5 of IC4. The phase detector output signal from Pin 2 is smoothed by a loop filter comprised of Q3, Q4, R12, R13, R15 and C27, and fed to a varactor diode of the VCO unit through J3.
D1 through D6 are encoders to set the VCO division for each band.

FREQUENCY CHART

BAND (MHz)	HPL IC4N-DATA	VCO	VCO FREQUENCY	HPL IC2 OUTPUT
1.8	14	Q1	41.1315MHz ~ 41.8315MHz	7.0MHz
3.5	10		43.1315MHz ~ 43.8315MHz	5.0MHz
7	3		46.6315MHz ~ 47.3315MHz	1.5MHz
10	3	Q2	49.6315MHz ~ 50.3315MHz	1.5MHz
14	11		53.6315MHz ~ 54.3315MHz	5.5MHz
18	19	Q3	57.6315MHz ~ 58.3315MHz	9.5MHz
21	25		60.6315MHz ~ 61.3315MHz	12.5MHz
24.5	32	Q4	64.1315MHz ~ 64.8315MHz	16.0MHz
28	39		67.6315MHz ~ 68.3315MHz	19.5MHz
28.5	40		68.1315MHz ~ 68.8315MHz	20.0MHz
29	41		68.6315MHz ~ 69.3315MHz	20.5MHz
29.5	42		69.1315MHz ~ 69.8315MHz	21.0MHz

4 - 4 LOGIC CIRCUIT

This unit provides frequency control, output of the band signal, PLL data, and display data. For lower power consumption and higher speed operation, a 4-bit C MOS CPU is employed.

4 - 4 - 1 CPU

The 42-pin plastic package IC1 is a CPU with a 400kHz cera-lock (ceramic oscillator unit) connected to clock terminals CL0, Pin 1, and CL1, Pin 42.

Port A: a 4-bit input port from the matrix circuit
Port B: a 4-bit input port from the rotary encoder
Port C: a 4-bit port for the D/A outputs
Port D: a 4-bit port for the D/A outputs
Port E: a 4-bit output port for various applications
Port F: a 2-bit port for the strobe output
Port G: not used
Port H: not used
Port I: an output port for the rotary encoder reset

When the power is turned on, the regulated 5V is applied by voltage regulator IC10 to IC1. The voltage integrated by C20 and R35 is fed to Pin 13 of IC9 to generate an initial reset signal for the CPU. On receiving the reset signal, the CPU outputs the necessary signals to initialize all the ports, and then starts the main routine.

4 - 4 - 2 ROTARY ENCODER CIRCUIT

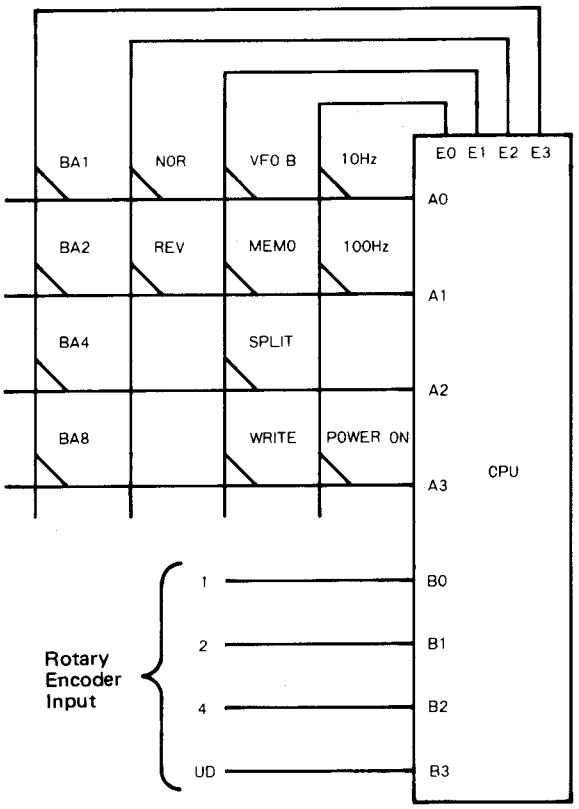
Two signals from the rotary encoder are input to SENS1 and SENS2 terminals, then waveform shaped by the two Schmitt trigger circuits consisting of IC2, R2, R3, R5 and R6. One of the two signals is fed to pin 5 of IC3 and the other signal is time delayed by R7 and C1, then fed to pin 6. IC3 puts out two pulses at the leading edge and the trailing edge. The circuit, consisting of an IC3 gate pins 1, 2, 3, and R8 and C2, works the same as above. Chattering that appears on the output signals of IC3 pins 3 and 4 is removed by IC4.
The leading edge and trailing edge of the signal is detected by C3 and R9, and C4 and R10, then fed to an OR gate consisting of IC3 pins 12 and 13. This output is fed to a three bit counter consisting of IC6 and IC7, then IC9 pin 8 through an OR gate consisting of D16, D17 and D18. The signal is inverted at IC9 and fed to the CPU pin 6 (INT terminal).

The INT terminal of the CPU is an interrupt terminal. The CPU works prior to other functions with the I/O port inputs of B0 – B3. It puts a reset signal for resetting the three bit counter and the up/down latch.

4-4-3 INPUT MATRIX CIRCUIT

BA1–BA8 are used to send a band select signal in hexadecimal to the CPU. This signal is input to J10 on the LOGIC unit through the matrix circuit board. The level of the signal is converted from 13.8V to 5V by R23 through R26 and by D1 through D4, and the signal is fed to A0 through A3 terminals of the CPU.

NOR and REV matrices select USB or LSB automatically according to the band setting. When the mode switch on the front panel is at NOR, LSB is selected below 10MHz; when it is at REV, USB is selected.



BAND DATA

BAND (MHz)	FREQUENCY RANGE	CPU INPUT				
		BCD				HEX
1.8	1.4000 ~ 2.0999	0	1	0	0	2
3.5	3.4000 ~ 4.0999	0	1	0	0	2
7	6.9000 ~ 7.5999	1	1	0	0	3
10	9.9000 ~ 10.5999	0	0	1	0	4
14	13.9000 ~ 14.5999	1	0	1	0	5
18	17.9000 ~ 18.5999	0	1	1	0	6
21	20.9000 ~ 21.5999	1	1	1	0	7
24.5	24.4000 ~ 25.0999	0	0	0	1	8
28	27.9000 ~ 28.5999	1	0	0	1	9
28(28.5)	28.4000 ~ 29.0999	0	1	0	1	A
28(29)	28.9000 ~ 29.5999	1	1	0	1	B
28(29.5)	29.4000 ~ 30.0999	0	0	1	1	C

4-4-4 TUNING RATE CIRCUIT

The tuning rate signal from the front panel is fed through J3 to IC11. When the generation speed of the signals from the rotary encoder is slow, R31 and D23 keep the voltage of C26 from becoming high enough to drive the Schmitt trigger circuit of Pins 4 – 6 of IC12, R30 and R32. For this reason, the tuning rate signal passes through Pins 4 – 6 or Pins 1 – 3 of IC11 for the selected tuning rate (10Hz or 1kHz). When the tuning control knob is rotated quickly while the tuning rate of 10Hz is selected, the signal frequency at D23 becomes high so that the voltage at C26 becomes high enough to drive the Schmitt trigger circuit of IC12. The level at Pin 4 of IC12 becomes high and drives Pins 2, 5, 12 and 13 of IC11. An edge trigger, Pins 11 – 13 of IC11, detect leading edges to stop the interrupt operation temporarily through D12. The sensor signal is read by interrupts so that no other signals are accepted during this operation. At the same time, the level of Pin 4 of IC11 is changed to low by the signal at Pin 5 and the rate is set at 1kHz for the fast tuning speed.

4-4-5 SPLIT FREQUENCY CIRCUIT

T8V from Pin 5 of J10 is divided by R27 and R18 and input to Pin 8 of IC5. The VFO select signal is read through Pin 35 (A2) of the CPU, and the VFO is switched between A and B according to the T/R switch.

4-4-6 CPU RESET CIRCUIT

When the power switch is turned on, the power voltage rise is delayed by R38 and C16 and input to Pin 9 of IC12 through a Schmitt trigger of Pins 4 – 6 of IC9. IC12 outputs a signal with the proper timing as a power-on signal for the CPU through D11.

The output signal from Pin 4 of IC9 is input to Pin 2, and then its output signal from Pin 3 is used as a reset signal for the display IC.

4-6-7 MIC UP/DOWN CONTROL CIRCUIT

The voltage at the UD terminal is about the same as the power voltage level when neither the UP nor DOWN switch is pushed; it becomes ground level when the UP switch is pushed; and mid-level when DOWN is pushed. When the UP or DOWN switch is pushed, a multi-vibrator Q2 outputs signals which are fed through a differentiator comprised of C11 and R46 to Pin 6 of IC7 in a like manner as when the CPU reads the signals from the tuning control encoder.

When the UD terminal becomes high or medium level, Q1 is turned on and its output becomes low. When the UD terminal becomes low, the output of Q1 becomes high to drive Pin 8 of IC7 to obtain the UD signal to the CPU through B3.

R17, C9 and D14 change the frequency shift timing rate between the first shift and following shifts.

Pins 8 – 10 of IC7 connect to a malfunction protection circuit for the end of the Mic Up/Down operations. When the collector of Q1 is switched from high to low, the signal

from a differentiator comprised of C10 and R20 is input to Pin 9 to reset Pin 10 of IC7 when Q2 stops oscillation.

4 - 5 OTHER UNITS

4 - 5 - 1 REGULATOR UNIT

IC1 is a voltage regulator with an output switching circuit, with three output terminals at Pins 1, 6 and 8. Pin 1 outputs 8V (8.2V ± 0.4V) constantly, Pin 6 outputs R8V (8.2 ± 0.4V) in the receive mode by applying more than 2V at Pin 5, and Pin 8 outputs T8V (8.2V ± 0.4V) in the transmit mode by grounding Pin 5. The maximum current drain from each output is 100mA.

A protector circuit is provided to protect against overheating and excess current drain.

The constantly supplied 8V is boosts its current capacity by Q1 and it outputs from the 8A terminal.

4 - 5 - 2 DISPLAY UNIT

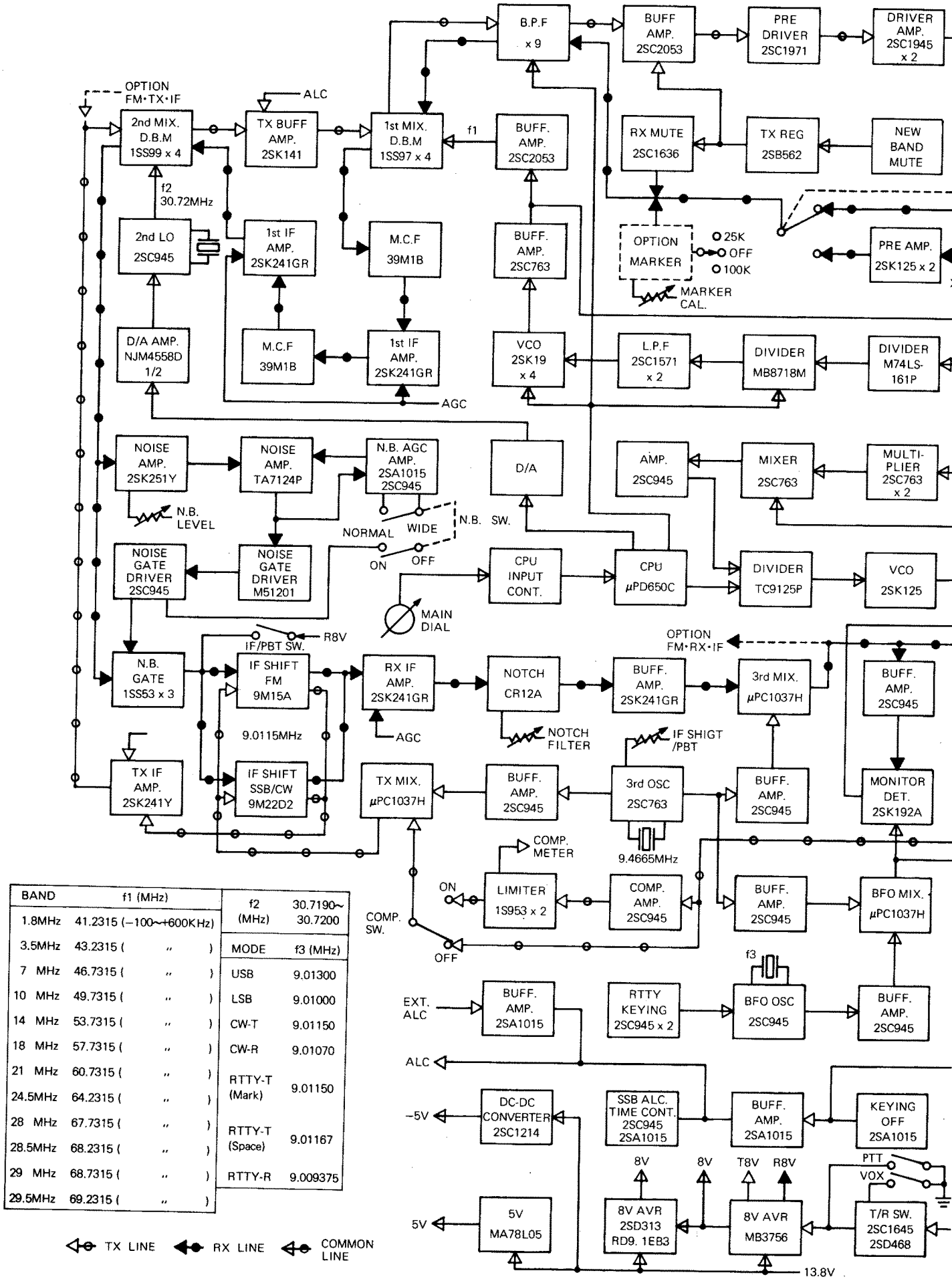
This unit consists of a DC-DC converter section (L1 and Q9) and a DS1 driver unit (IC1 and Q1 – 6). The DC-DC converter unit supplies –14V and heater voltage for the display tube and –5V for the other circuits.

The luminescent display tube (DS1) is driven by the driver IC1, and lights dynamically. IC1 contains such functions as input data latch, clock oscillator, data memory, segment decoders, etc.

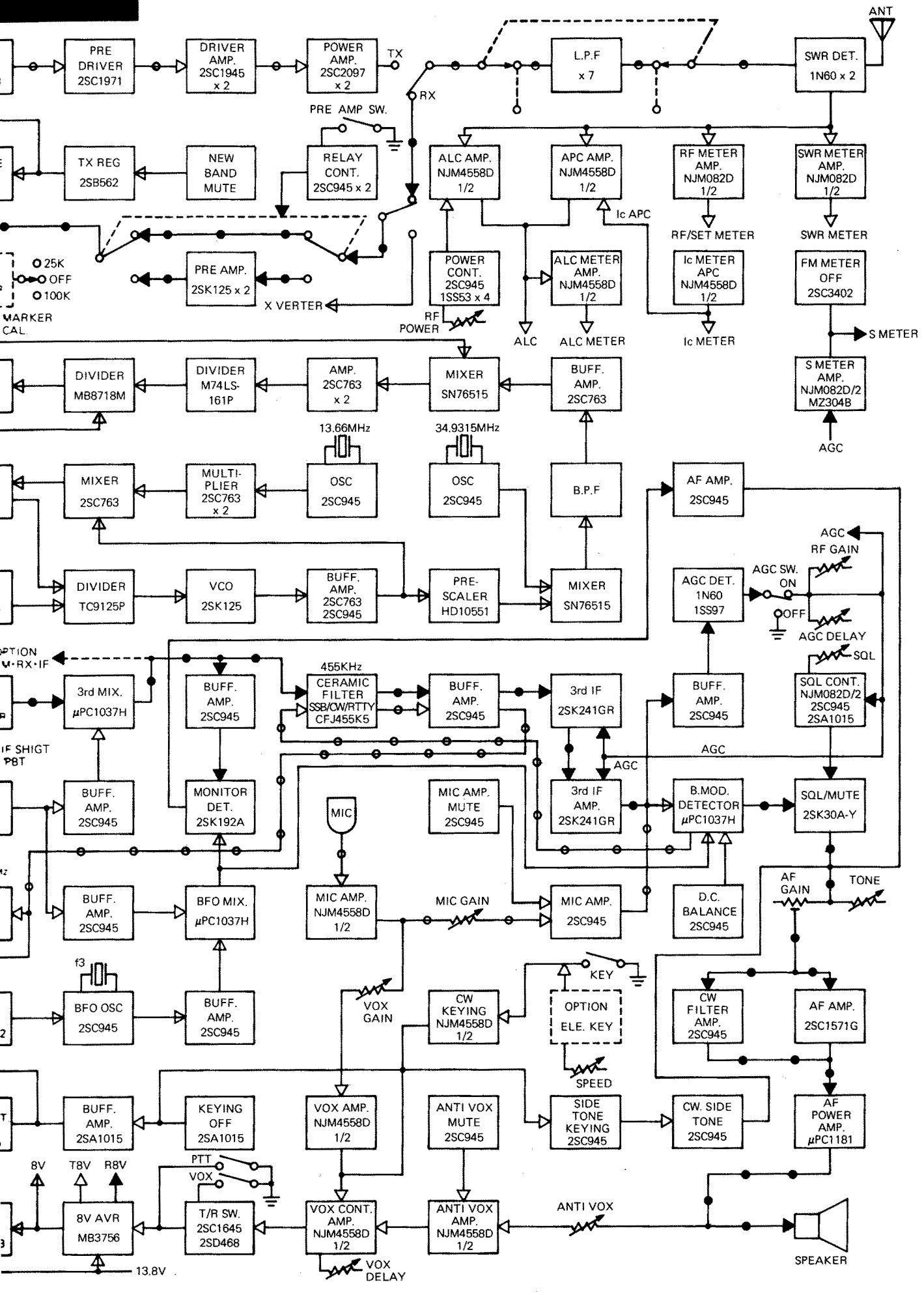
D1 and D2 light the decimal points.

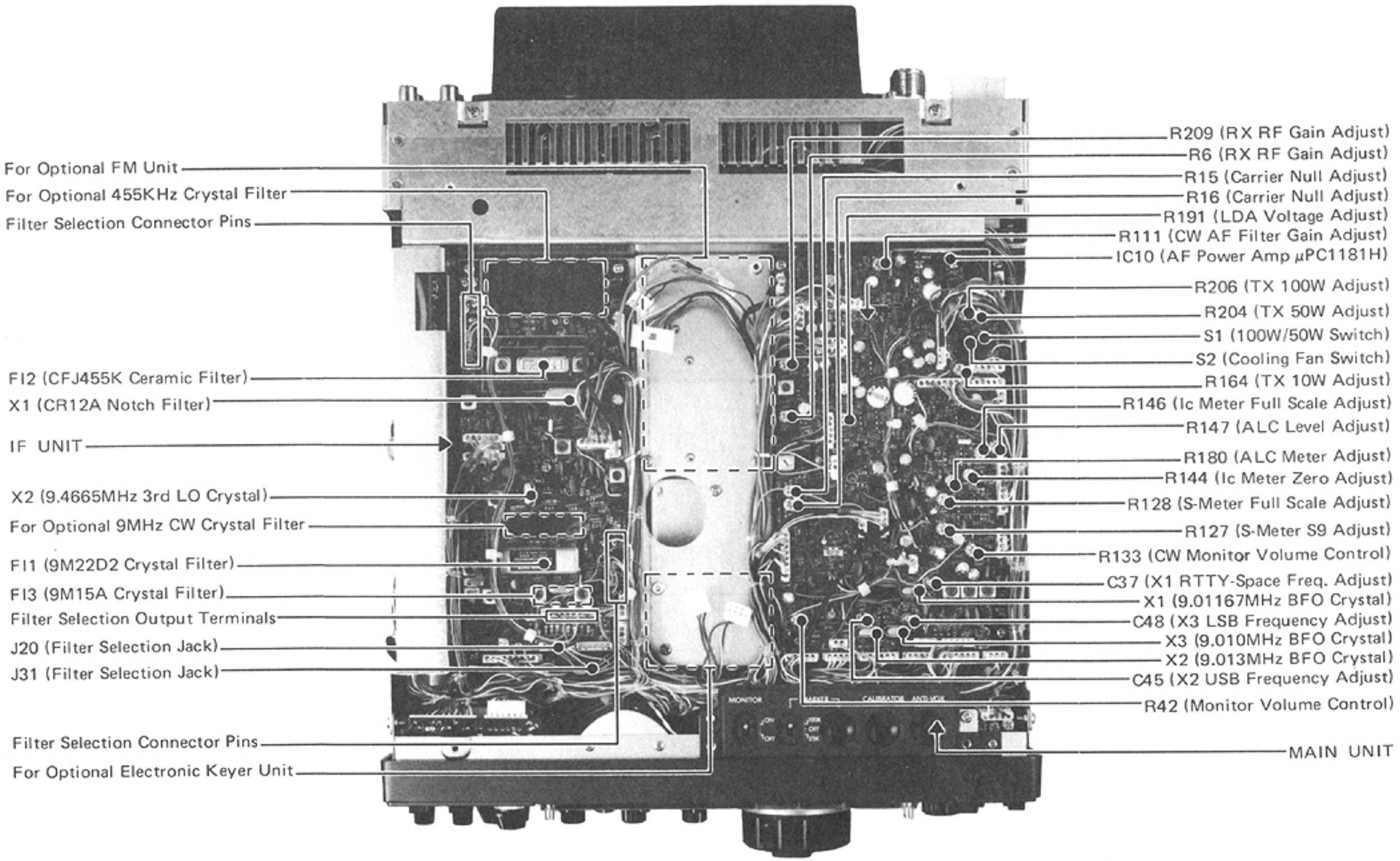
Both 1.8MHz and 3.5MHz bands are recognized as the 3.5MHz band by the CPU. Therefore the band data signals for 1.8MHz are input to Q1 and Q2, which control Q3 – 6 to turn off segments a, d, f and g of the 1MHz digit display.

SECTION 5 BLOCK DIAGRAM

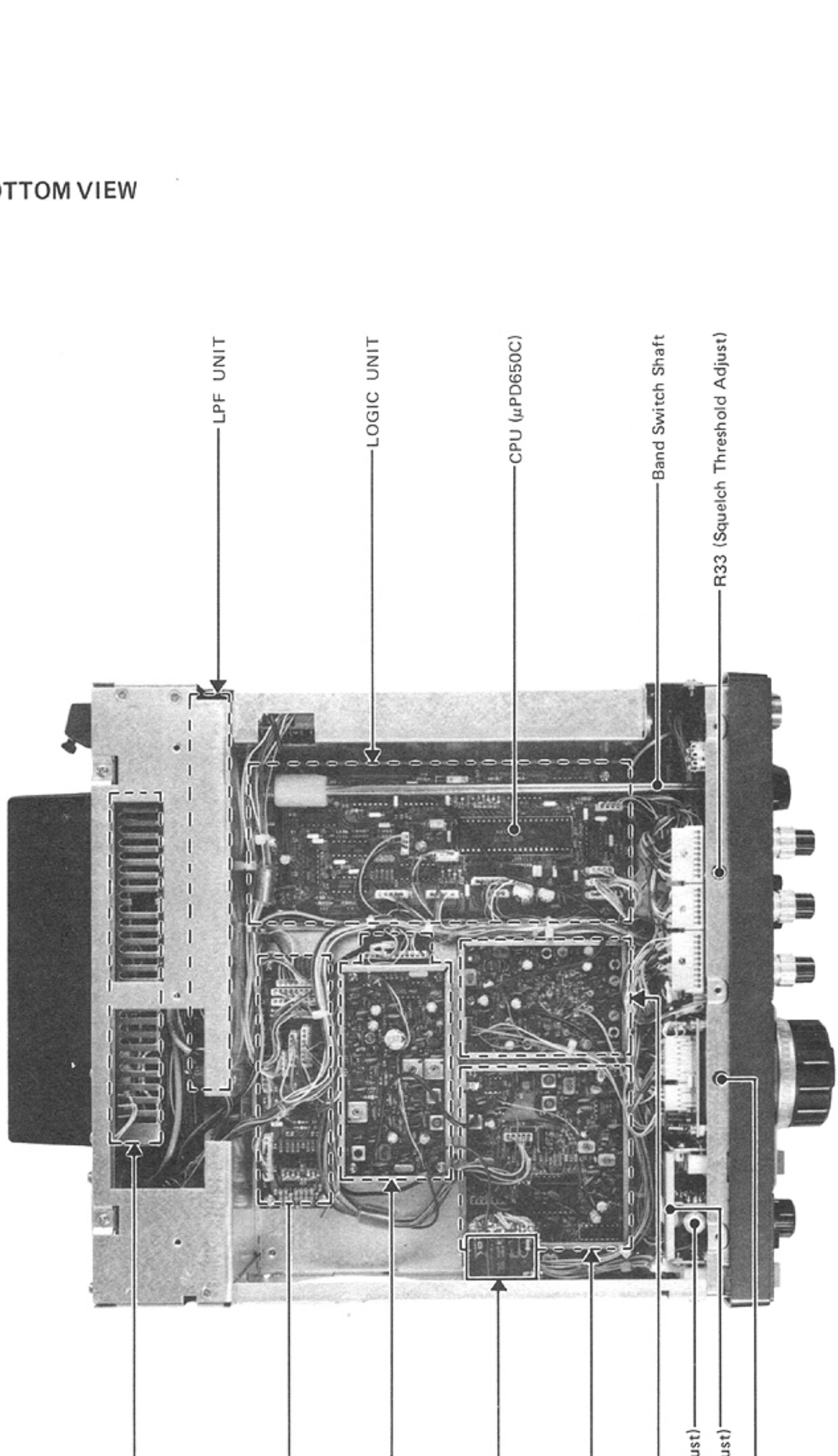


BAND	f1 (MHz)	f2 (MHz)	30.7190~ 30.7200
1.8MHz	41.2315 (−100~+600KHz)		
3.5MHz	43.2315 (,,)	MODE	f3 (MHz)
7 MHz	46.7315 (,,)	USB	9.01300
10 MHz	49.7315 (,,)	LSB	9.01000
14 MHz	53.7315 (,,)	CW-T	9.01150
18 MHz	57.7315 (,,)	CW-R	9.01070
21 MHz	60.7315 (,,)	RTTY-T (Mark)	9.01150
24.5MHz	64.2315 (,,)		
28 MHz	67.7315 (,,)	RTTY-T (Space)	9.01167
28.5MHz	68.2315 (,,)		
29 MHz	68.7315 (,,)	RTTY-R	9.009375
29.5MHz	69.2315 (,,)		

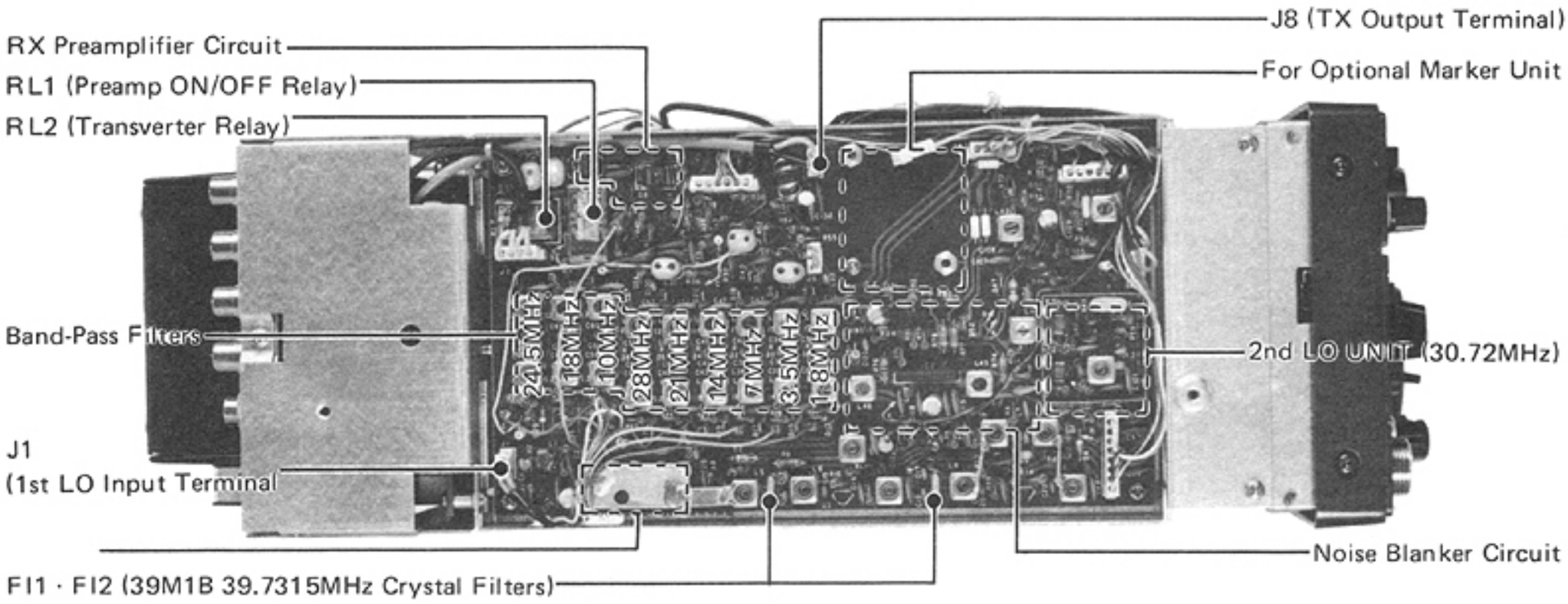

ANT
PRE DRIVER 2SC1971
DRIVER AMP. 2SC1945 x 2
POWER AMP. 2SC2097 x 2
TX
RX
L.P.F x 7
SWR DET. 1N60 x 2
PRE AMP SW.
TX REG 2SB562
NEW BAND MUTE
RELAY CONT. 2SC945 x 2
ALC AMP. NJM4558D 1/2
APC AMP. NJM4558D 1/2
RF METER AMP. NJM082D 1/2
SWR METER AMP. NJM082D 1/2
Ic APC
RF/SET METER
SWR METER
25K
OFF
100K
MARKER CAL.
PRE AMP. 2SK125 x 2
X VERTER
POWER CONT. 2SC945 1SS53 x 4
ALC METER AMP. NJM4558D 1/2
Ic METER APC NJM4558D 1/2
FM METER OFF 2SC3402
RF POWER
ALC
ALC METER
Ic METER
S METER
DIVIDER MB8718M
DIVIDER M74LS-161P
AMP. 2SC763 x 2
MIXER SN76515
BUFF. AMP. 2SC763
S METER AMP. NJM082D/2 MZ304B
AGC
13.66MHz
34.9315MHz
MIXER 2SC763
MULTI-PLIER 2SC763 x 2
OSC 2SC945
OSC 2SC945
B.P.F
AF AMP. 2SC945
AGC
RF GAIN
DIVIDER TC9125P
VCO 2SK125
BUFF. AMP. 2SC763 2SC945
PRE-SCALER HD10551
MIXER SN76515
AGC DET. 1N60 1SS97
AGC SW. ON
OFF
AGC DELAY
SQL
455KHz
3rd MIX. μPC1037H
BUFF. AMP. 2SC945
CERAMIC FILTER SSB/CW/RTTY CFJ455K5
BUFF. AMP. 2SC945
3rd IF 2SK241GR
BUFF. AMP. 2SC945
SQL CONT. NJM082D/2 2SC945 2SA1015
AGC
BUFF. AMP. 2SC945
MONITOR DET. 2SK192A
MIC AMP. MUTE 2SC945
3rd IF AMP. 2SK241GR
B.MOD. DETECTOR μPC1037H
SQL/MUTE 2SK30A-Y
MIC
AF GAIN
TONE
BUFF. AMP. 2SC945
BFO MIX. μPC1037H
MIC AMP. NJM4558D 1/2
MIC GAIN
MIC AMP. 2SC945
D.C. BALANCE 2SC945
f3
KEY
BFO OSC 2SC945
BUFF. AMP. 2SC945
VOX GAIN
CW KEYING NJM4558D 1/2
OPTION ELE. KEY
CW FILTER AMP. 2SC945
AF AMP. 2SC1571G
SPEED
BUFF. AMP. 2SA1015
KEYING OFF 2SA1015
VOX AMP. NJM4558D 1/2
ANTI VOX MUTE 2SC945
SIDE TONE KEYING 2SC945
CW. SIDE TONE 2SC945
AF POWER AMP. μPC1181
8V
T8V
R8V
PTT
VOX
8V AVR MB3756
T/R SW. 2SC1645 2SD468
VOX CONT. AMP. NJM4558D 1/2
ANTI VOX AMP. NJM4558D 1/2
ANTI VOX
SPEAKER
13.8V
VOX DELAY


For Optional FM Unit
For Optional 455KHz Crystal Filter
Filter Selection Connector Pins
FI2 (CFJ455K Ceramic Filter)
X1 (CR12A Notch Filter)
IF UNIT
X2 (9.4665MHz 3rd LO Crystal)
For Optional 9MHz CW Crystal Filter
FI1 (9M22D2 Crystal Filter)
FI3 (9M15A Crystal Filter)
Filter Selection Output Terminals
J20 (Filter Selection Jack)
J31 (Filter Selection Jack)
Filter Selection Connector Pins
For Optional Electronic Keyer Unit
R209 (RX RF Gain Adjust)
R6 (RX RF Gain Adjust)
R15 (Carrier Null Adjust)
R16 (Carrier Null Adjust)
R191 (LDA Voltage Adjust)
R111 (CW AF Filter Gain Adjust)
IC10 (AF Power Amp μPC1181H)
R206 (TX 100W Adjust)
R204 (TX 50W Adjust)
S1 (100W/50W Switch)
S2 (Cooling Fan Switch)
R164 (TX 10W Adjust)
R146 (Ic Meter Full Scale Adjust)
R147 (ALC Level Adjust)
R180 (ALC Meter Adjust)
R144 (Ic Meter Zero Adjust)
R128 (S-Meter Full Scale Adjust)
R127 (S-Meter S9 Adjust)
R133 (CW Monitor Volume Control)
C37 (X1 RTTY-Space Freq. Adjust)
X1 (9.01167MHz BFO Crystal)
C48 (X3 LSB Frequency Adjust)
X3 (9.010MHz BFO Crystal)
X2 (9.013MHz BFO Crystal)
C45 (X2 USB Frequency Adjust)
R42 (Monitor Volume Control)
MAIN UNIT

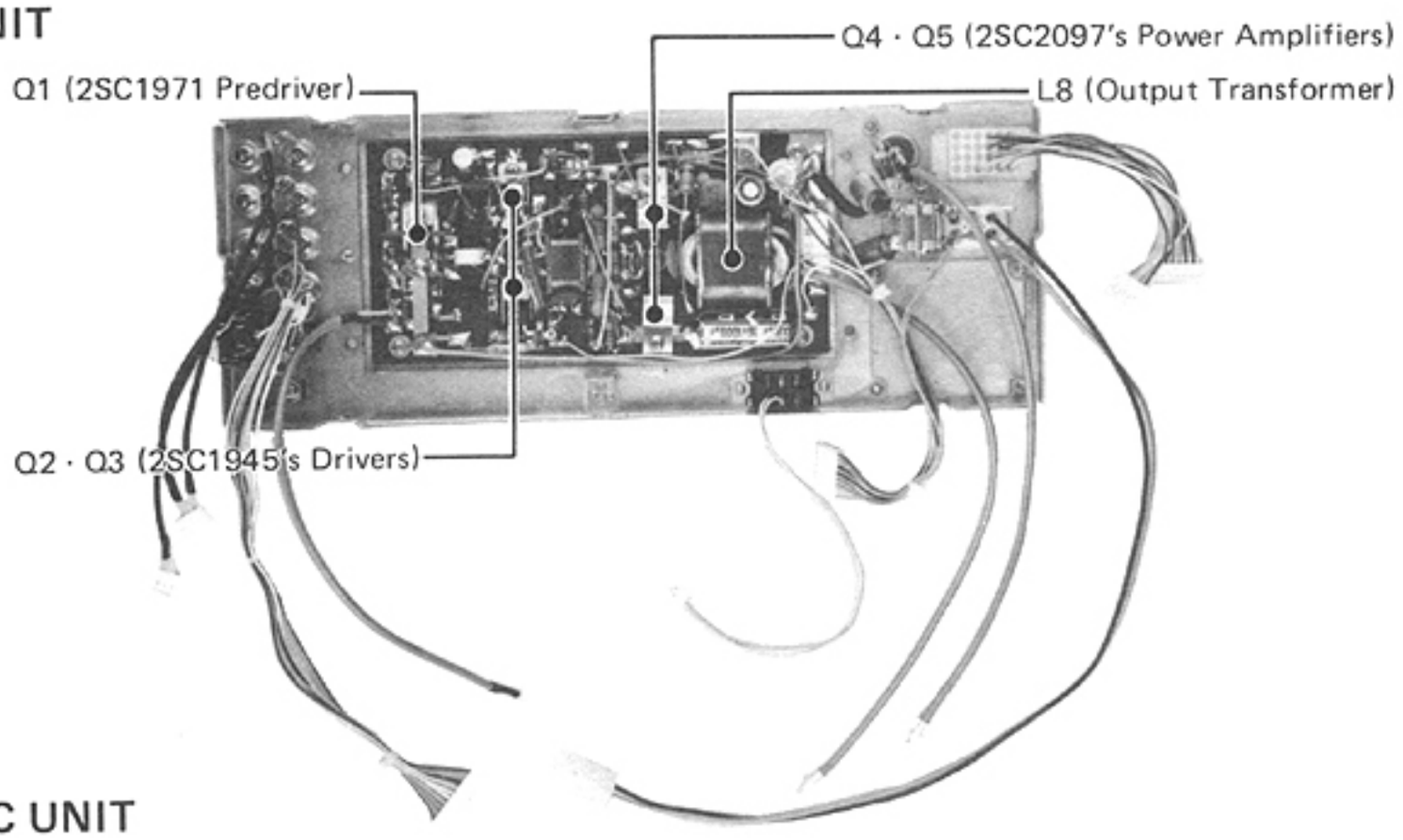
6 - 2 BOTTOM VIEW



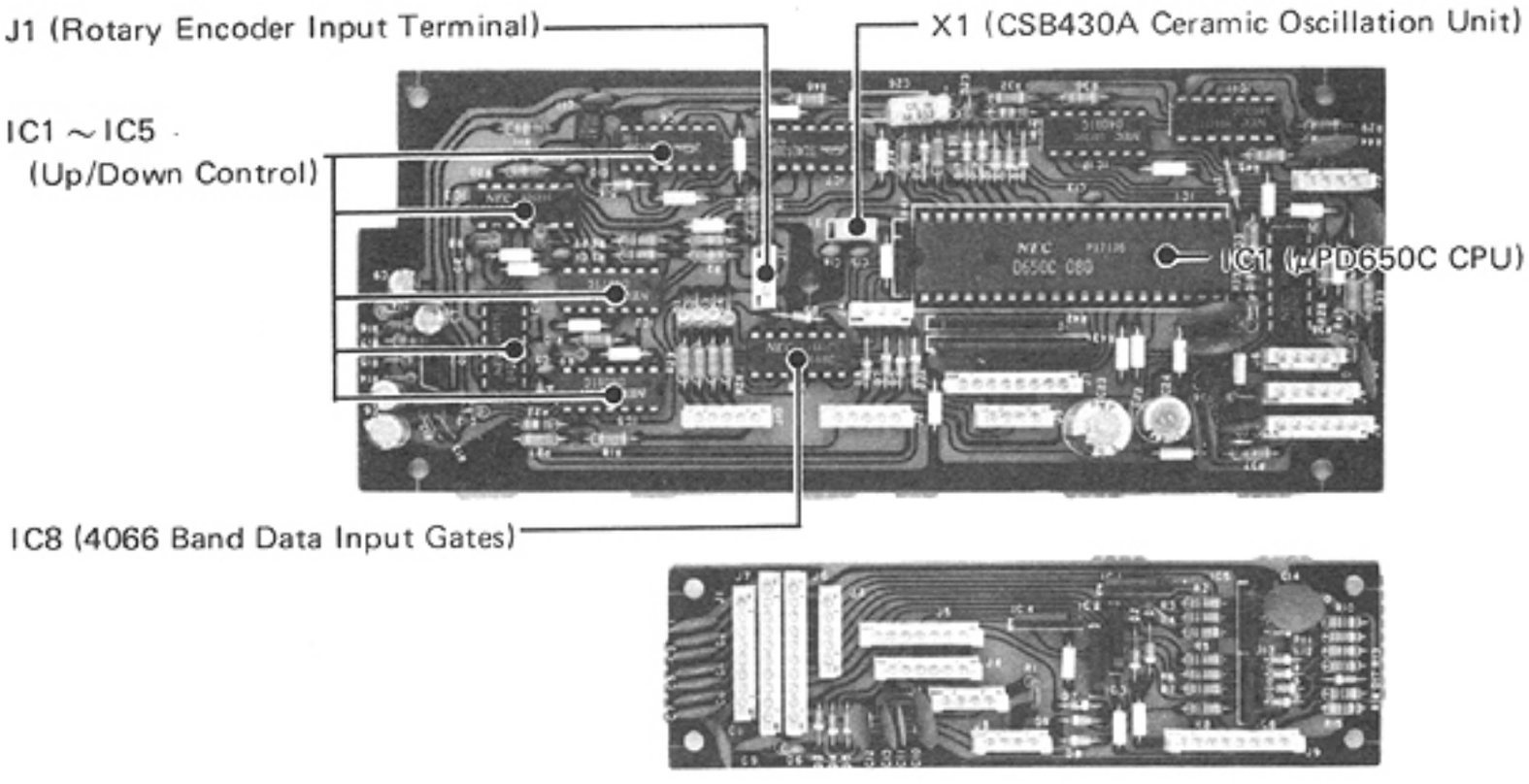
6 - 3 RF UNIT



6 - 4 PA UNIT

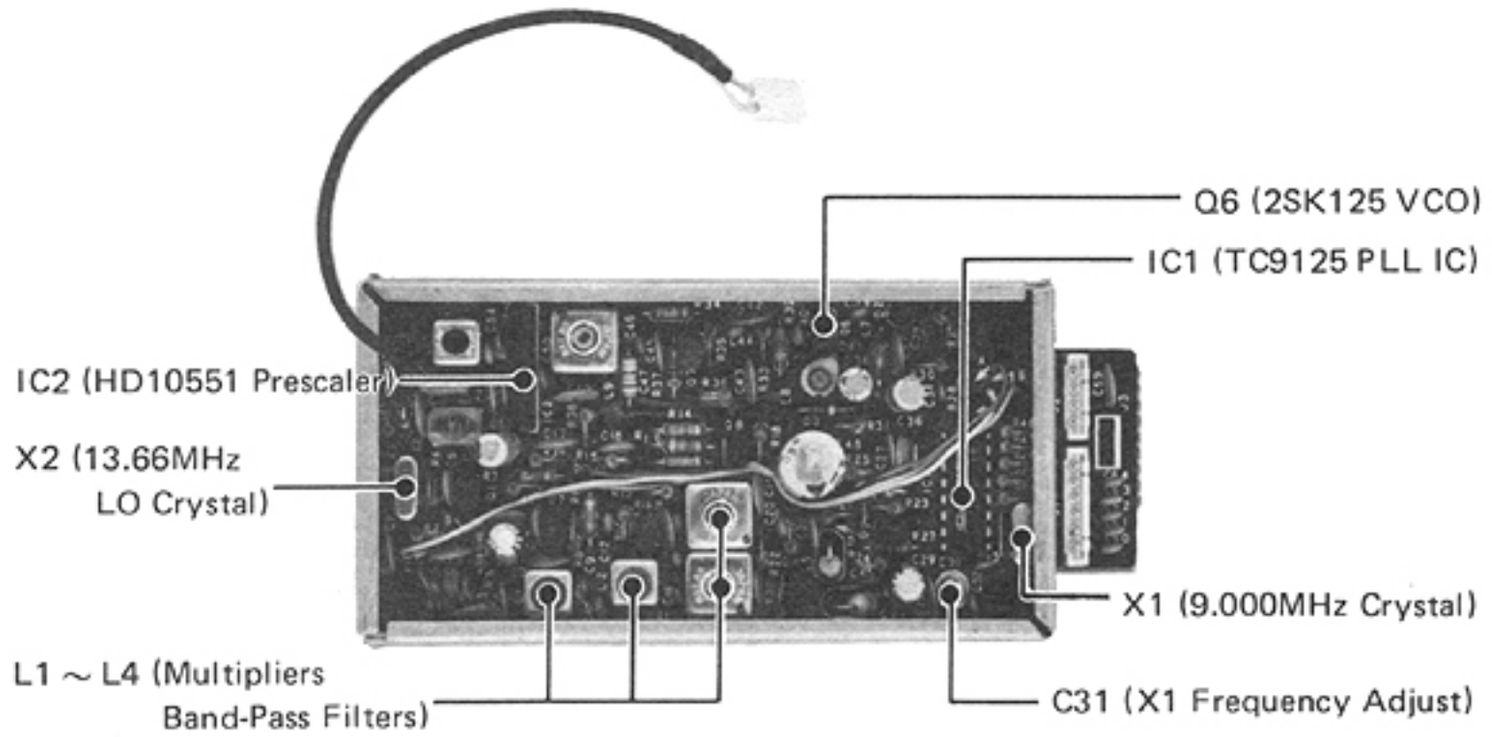


6 - 5 LOGIC UNIT

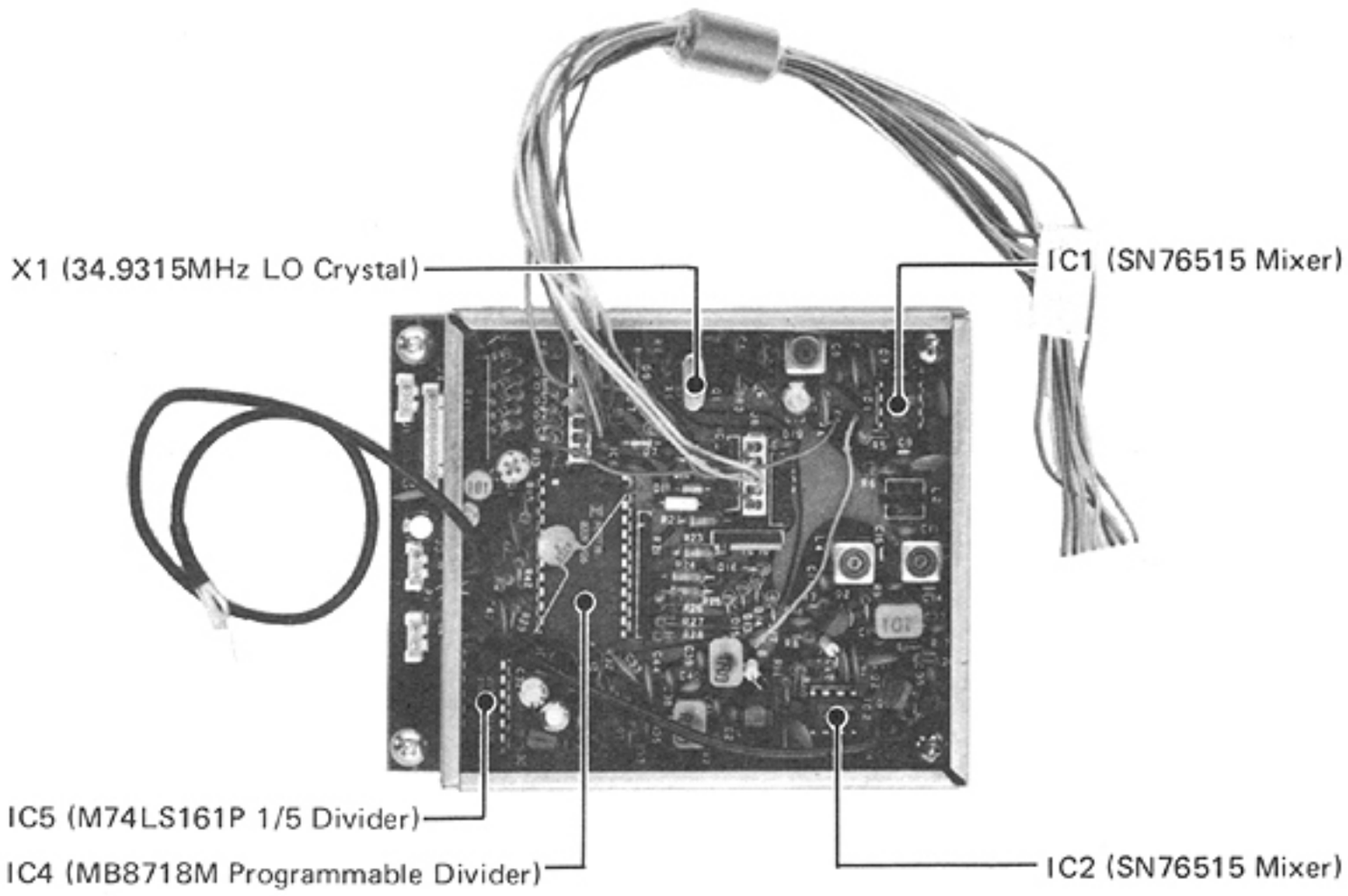


BAND MATRIX UNIT

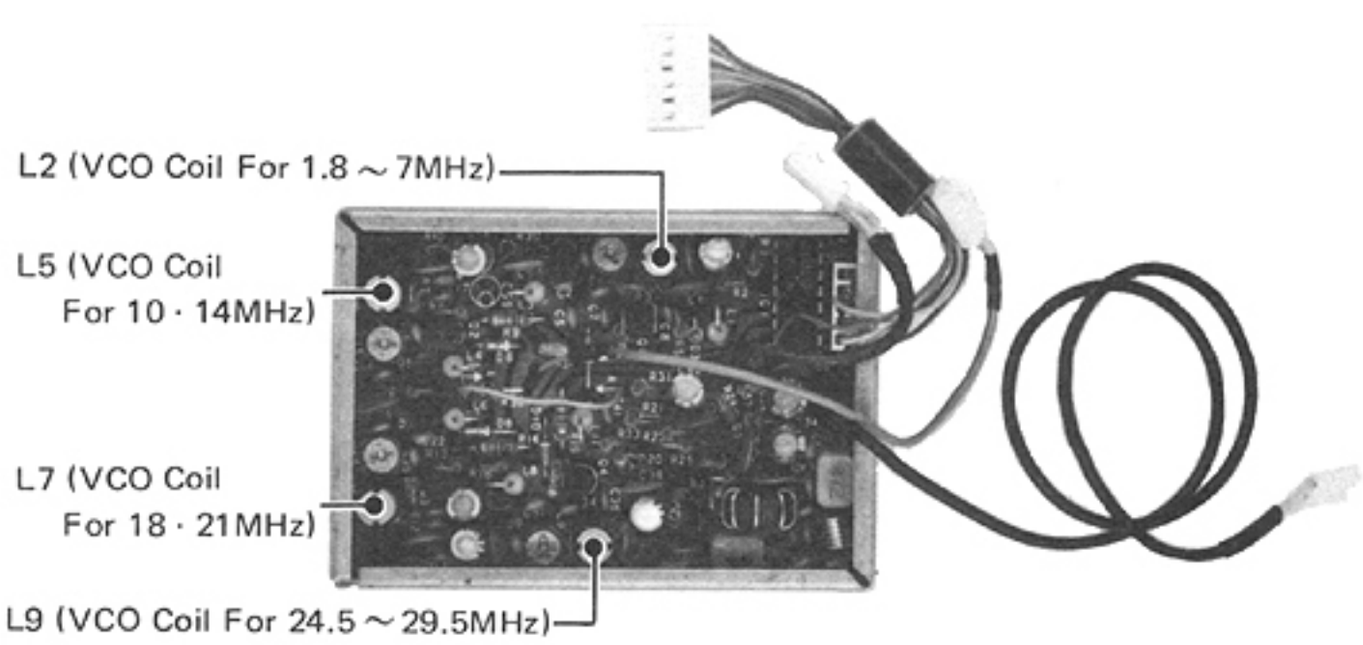
6 - 6 PLL UNIT



6 - 7 HPL UNIT



6 - 8 VCO UNIT



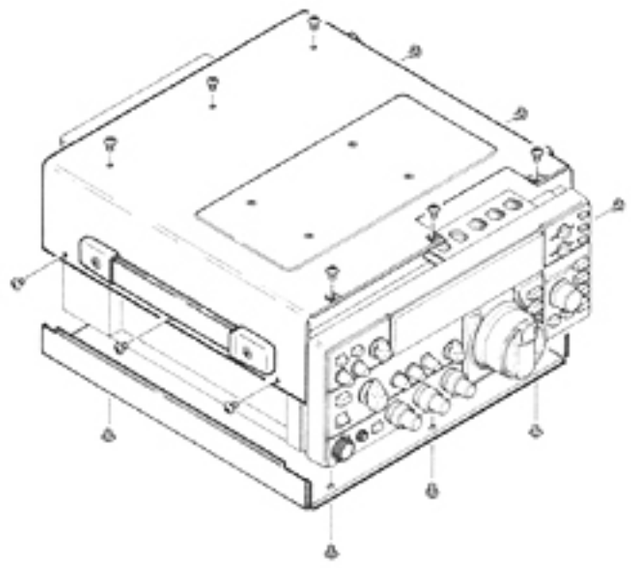
SECTION 7 OPTION INSTALLATION

The following tools are needed for the installation of the options:

Phillips Screwdriver	Diagonal cutters
Screwdriver	Soldering Iron (40W)
Solder	Soldering tool
De-soldering braid	

Before performing any work on the set, make sure that the power cord is detached from the transceiver.

Remove the top and bottom covers by unscrewing the six screws each on the top and bottom, and the three screws on each side, while taking care not to damage the internal speaker, and unplug its connector.



7 - 1 INSTALLATION OF OPTIONAL FILTER

We have prepared various optional filters as follows.

	CENTER FREQUENCY	CHARACTERISTICS	USABLE MODE
FL-45	9.0115MHz	±250Hz/–6dB, ±800Hz/–60dB	CW·RTTY
FL-54	9.0115MHz	±135Hz/–6dB, ±550Hz/–60dB	CW
FL-44A	455.0KHz	±1.2KHz/–6dB, ±2.1KHz/–60dB	SSB
FL-52A	455.0KHz	±250Hz/–6dB, ±500Hz/–60dB	CW·RTTY
FL-53A	455.0KHz	±125Hz/–6dB, ±240Hz/–60dB	CW

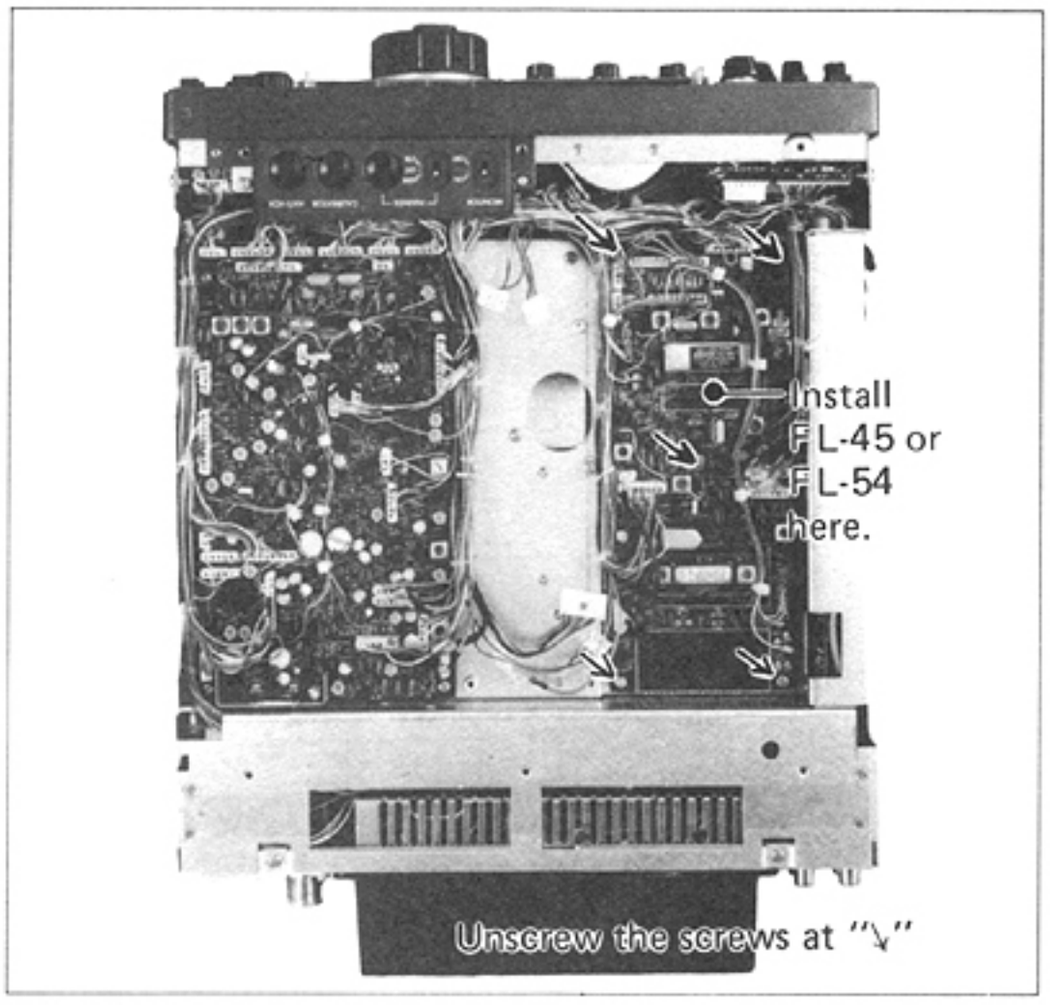
7 - 1 - 1 INSTALLATION OF FL-45/FL-54

1. Unscrew the five screws retaining the IF unit board shown in the photo. Then turn the board over to the front side so that the foil side of the board can be seen.

2. The location for the filter is shown in the photo. The holes for mounting the legs and the leads of the filter are predrilled. Be sure to orient the filter so that the label on the top of the unit is facing the same direction as the other filter already mounted in the set. Insert the filter flush with the board, bend the leads and legs flush with the opposite side of the board and solder them in. Trim the leads even with the solder points. This completes the installation. Replace the IF Unit, and the screws.

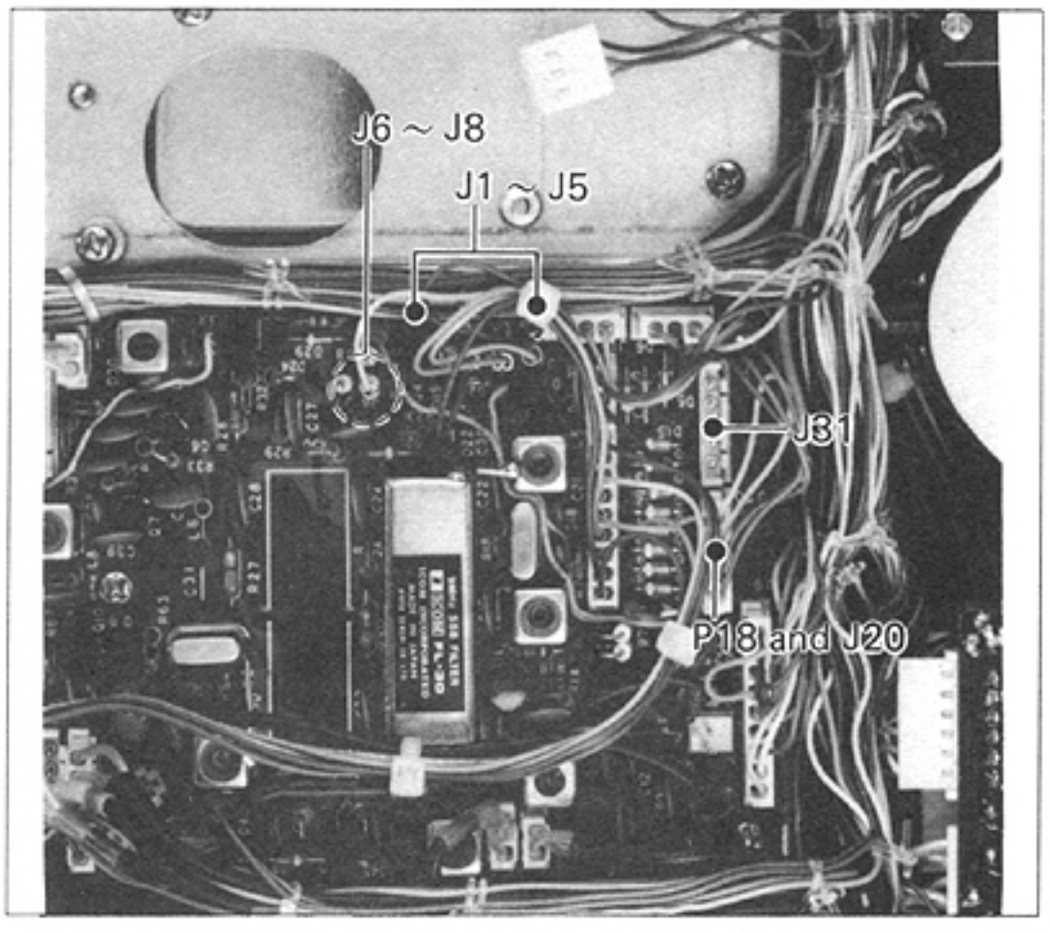
3. When you would like to use the installed filter (FL-45 or FL-54) on the CW mode only, unplug P13 (BLUE wire) from J5, then plug it into J6 or J7.

   In the CW mode, the installed filter is selected when the FILTER switch on the front panel is pushed in, and the filter gives 500Hz/–6dB or 250Hz/–6dB pass-band.



4. When you would like to use FL-45 on CW and RTTY modes (FL-45 cannot be used on RTTY mode, because its pass-band is too narrow for RTTY), unplug P18 (5 pins plug) from J20 and plug it into J31, and unplug P13 and plug it into J6 or J7 the same as (3).

   In the CW and RTTY modes, the FL-45 is selected when the FILTER switch on the front panel is pushed in, and the filter gives 500Hz/–6dB pass-band for both the CW and RTTY modes.



NOTE: 1. The installed filter will function when the PBT switch on the front panel is pushed in.

2. When you have installed the FL-52A or FL-53A 455KHz crystal filter and you would like to switch the 455KHz filter and the newly installed 9MHz filter by the FILTER switch, unplug P11 (GREEN wire), instead of P13, from J4 then plug it into J6 or J7.

The 455KHz filter is selected when the FILTER switch is pushed in and the 9MHz filter is selected when the FILTER switch is in the out position.

7 - 1 - 2 INSTALLATION OF FL-44A

A. When replacing the original ceramic filter by FL-44A

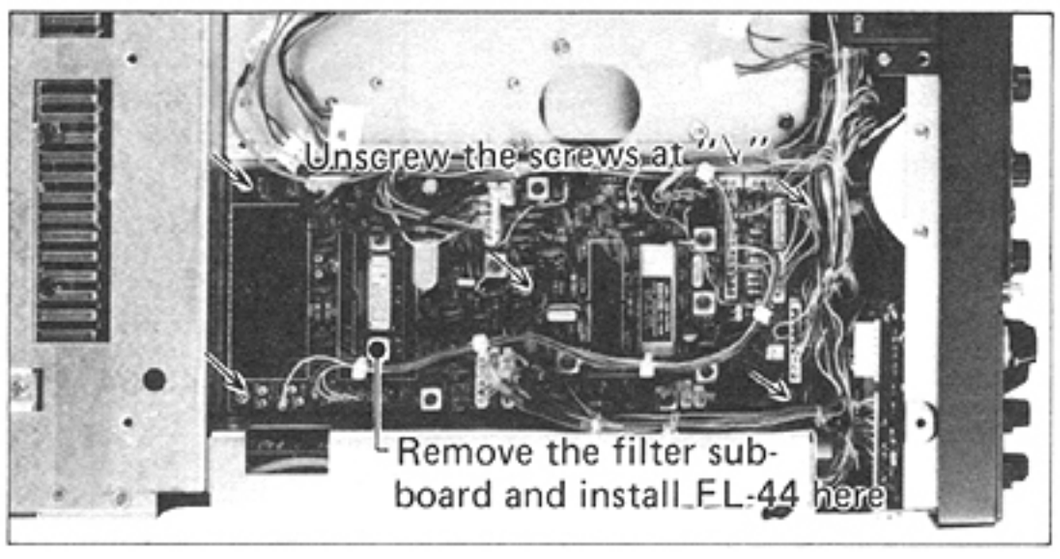
1. Unscrew the five screws retaining the IF unit board shown in the photo. Then turn the board over to the front side so that the foil side of the board can be seen.

2. Remove the solder from the ceramic filter sub-board on the IF unit board shown in the photo below, using a de-soldering braid, then remove the sub-board.

3. Insert the FL-44A to the position where the ceramic filter was installed (shown in the photo below) and retain it by using the two supplied nuts, then solder its terminal pins.

4. Replace the IF unit board, and top and bottom covers.

5. No adjustment is required for operation.



B. When installing FL-44A onto the position for an optional filter

1. Follow step 1 of the above instructions.

2. Insert the FL-44A to the position where is shown as "OPTION FILTER" for FL-52A and FL-53A, and retain it by two supplied nuts then solder its terminal pins.

3. Unplug P4 (RED wire) from J23, then plug it into J28 or J29.
   Replace the IF unit board, and top and bottom covers.

4. In the SSB mode, the original ceramic filter and FL-44A can be selected by the FILTER switch on the front panel.
   When the FILTER switch is pushed in, the FL-44A is selected and gives its higher selectivity.

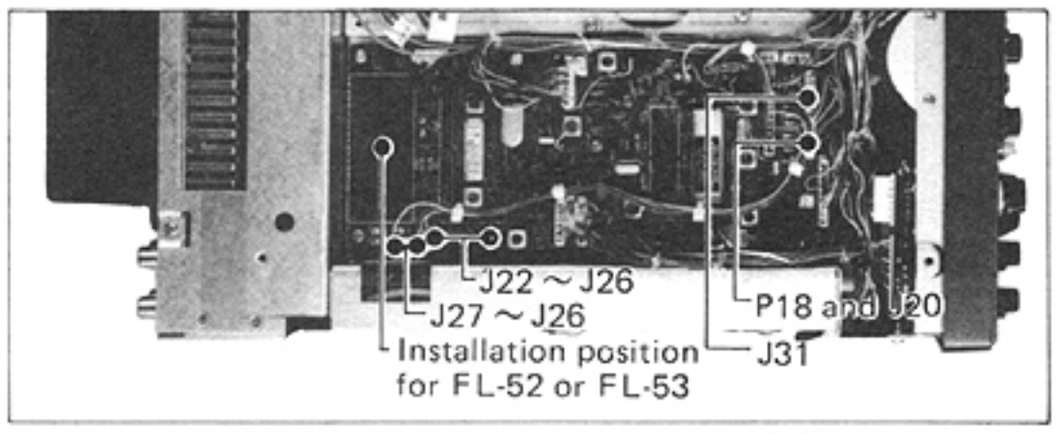
7 - 1 - 3 INSTALLATION OF FL-52A/FL-53A

1. Unscrew the five screws retaining the IF unit board shown in the photo. Then turn the board over to the front side so that the foil side of the board can be seen.

2. Insert the FL-52A or FL-53A to the position where is shown as "OPTION FILTER" for FL-52 and FL-53, and retain it by using the two supplied nuts then solder its terminal pins.

3. When you would like to use the installed filter (FL-52A or FL-53A) in the CW mode only, unplug P12 (BLUE wire) from J26, then plug it into J28 or J29.
   In the CW mode, the installed filter is selected when the FILTER switch on the front panel is pushed in, and the filter gives 500Hz/–6dB or 250Hz/–6dB pass-band.

4. When you would like to use FL-52A on CW and RTTY modes (FL-53A cannot be used on RTTY mode, because its pass-band is too narrow for RTTY), unplug P18 (5 pins plug) from J20 and plug it into J31, and unplug P12 from J26 and plug it into J28 or J29 the same as (3).
   In the CW and RTTY modes, the FL-52A is selected when the FILTER switch on the front panel is pushed in, and the filter gives 500Hz/–6dB pass-band for both the CW and RTTY modes.



7 - 2 MARKER UNIT IC-EX241

This unit generates marker signals to calibrate IC-740's operation frequency. The marker generator puts out accurate 100KHz or 25KHz signals on the entire band, and gives easy and accurate frequency calibration.

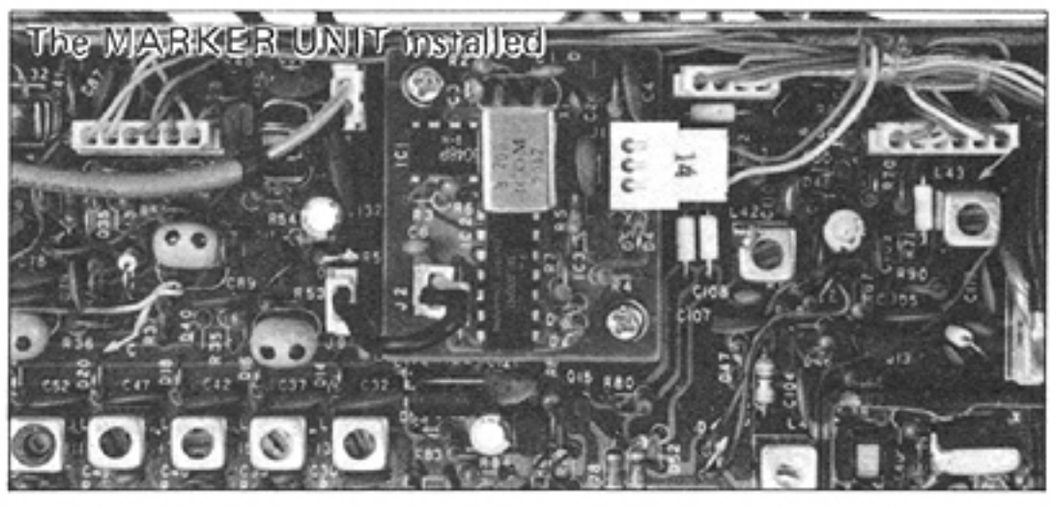
7 - 2 - 1 ASSEMBLY PROCEDURE

1. Install this unit in the position as shown in the photo on page 26, using the attached screws.

2. Plug P14 (3 pins) of the set to J1 of this unit.

3. Plug P1 (2 pins) of this unit to J9 of the RF unit.

4. Replace the speaker cord connector, and top and bottom covers.



7 - 2 - 2 CALIBRATION OF THE MARKER

1. Set the MODE Switch in the CW position and BAND switch in the 10MHz position, then turn ON the POWER switch.

2. The FREQUENCY DISPLAY will show "10.100.0". Turn the TUNING CONTROL knob to tune to WWV (or other standard frequency station) on 10.000MHz, and a 800Hz beat tone will be heard. Set the TUNING RATE switch in 10Hz steps for fine tuning.

3. Set the MARKER Switch on the top cover in the "100K" or "25K" and adjust the MARKER CALIBRATION CONTROL on the top cover, so that the two tones are of the same pitch (in zero beat).

7 - 2 - 3 CALIBRATION OF THE TRANSCEIVER

1. Set the MODE switch in the CW position and the TUNING RATE switch in 100Hz position. Tune to the lower band edge of the band you want to calibrate, as an example, "21.000.0".

2. Ground the KEY jack on the rear panel so that the CW sidetone becomes audible. (Don't transmit.)

3. Set the MARKER switch in the "100K" or "25K", and adjust the FREQUENCY SET CONTROL of the set so that the two tones are of the same pitch (in zero beat).

4. The frequency calibration is sufficient on a frequency on the same band, but it is required for each band.

7 - 3 FM UNIT IC-EX242

This unit has a 9.0115MHz FM generator, 2nd IF amplifier, and FM detector circuits that will upgrade the IC-740 to a complete all-mode transceiver. The unit provides a clear, powerful FM signal, and interference-free steady reception for 29MHz FM and/or a VHF/UHF transverter.

7 - 3 - 1 ASSEMBLY PROCEDURE

1. Install this unit into the position shown in the photo on page 6 — 1, using the attached screws.

2. Unplug P25 (2 pins with a coaxial cable) which is plugged into J16 of the IF unit, and then plug it into J4 to this unit.

3. Plug P26 (3 pins with a shielded wire and red wire) from the IF unit, into J1 of this unit.

4. Plug P28 (7 pins with white, gray, yellow, purple, red, black, and brown wires) from the front panel, into J2 of this unit.

5. Plug P29 (3 pins with brown, blue and yellow wires) from the front panel, into J3 of this unit.

6. Plug P1 (2 pins with a coaxial cable) of this unit, into, J16 of the IF unit.

7. Plug P2 (3 pins with a coaxial cable and green wire) of this unit into J12 of the IF unit.

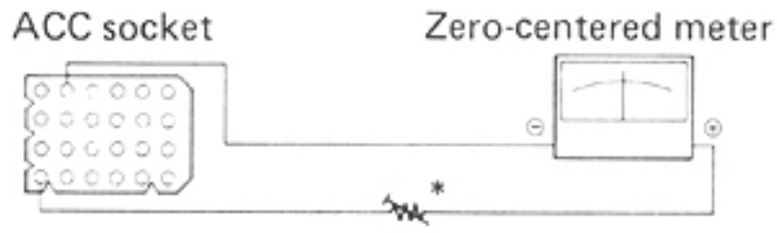
8. Plug P3 (2 pins with a shielded wire) of this unit, into J25 of the MAIN unit.

9. Replace the speaker cord connector, and top and bottom covers.

10. No adjustment is required, and the unit provides a complete FM operation.

7 - 3 - 2 OPERATION

Refer to page 3 — 8 for the FM operations. When you would like to use a discriminator-meter, connect a zero-centered meter (±50μA - 100μA) across Pin 1 and Pin 8 (ground) of the ACCESSORY socket on the rear panel of the set.



* Insert a trimmer resistor if the meter swings too much.

7 - 4 ELECTRONIC KEYER UNIT IC-EX243

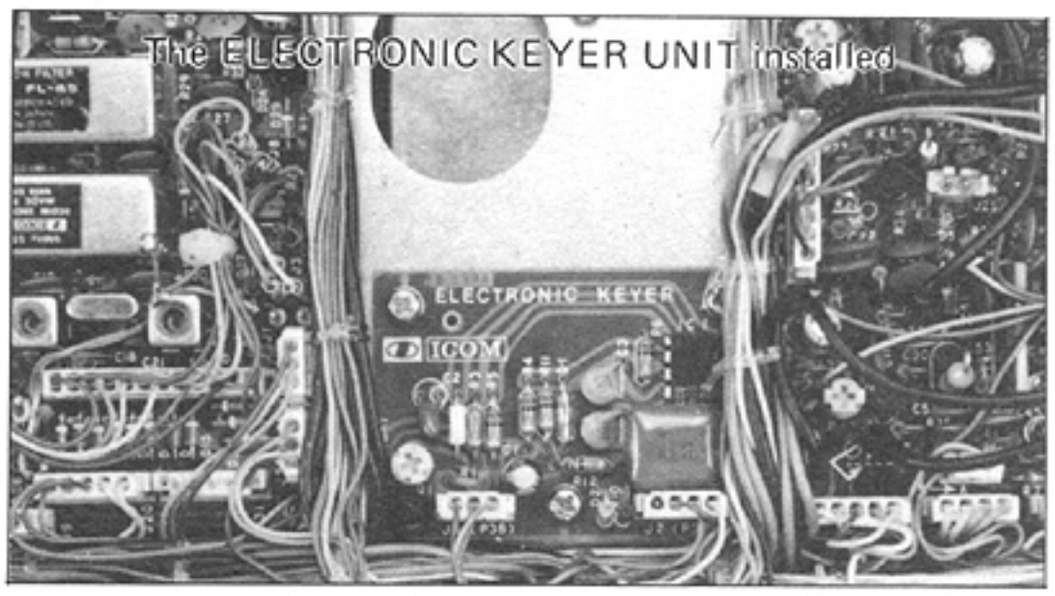
This unit provides automatic keying function with an iambic paddle. This unit is built with a single CMOS IC.
Features designed into this IC include contact debouncing, RF immunity, self-completing character generation, dot memory and weight control.
The keying speed can be changed between 5 - 45 wpm by the VOX GAIN/KEYER SPEED CONTROL on the front panel of the set.

7 - 4 - 1 ASSEMBLY PROCEDURE

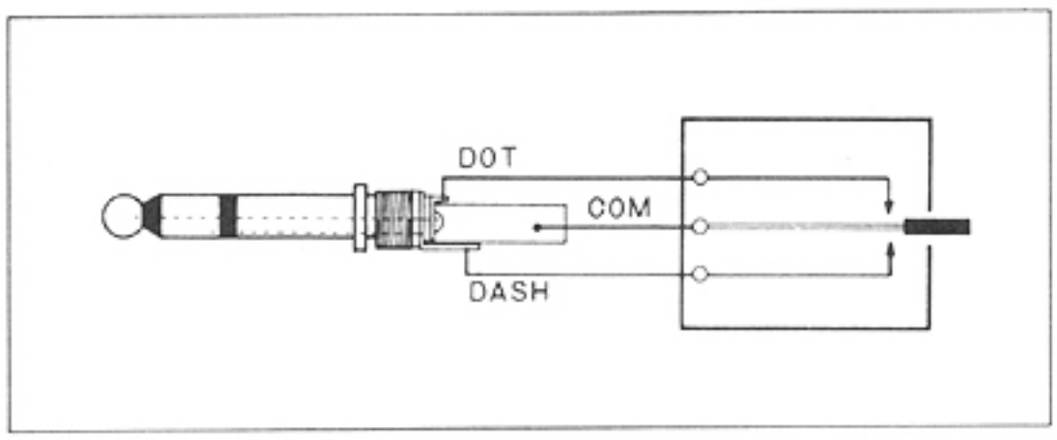
1. Install this unit into the position shown in the photo on page 6 — 1 using the attached screws.

2. Plug P36 (3 pins) from the front panel, into J1 of this unit.

3. Plug P37 (4 pins) from the front panel, into J2 of this unit.



4. Connect an iambic paddle with a 3-p 1/4 inch key plug as shown in the following illustration.



5. Plug the key plug to the KEY JACK on the rear panel.

6. Check the operation of the keyer. If you would like to increase the weight (to alter the dot-space ratio), turn the weight control on this unit clockwise for your favorite position.

7. Replace the speaker cord connector, and top and bottom covers.

7-4-2 OPERATION

Turn the VOX GAIN/KEYER SPEED CONTROL click on, and adjust keying speed by turning the control further clockwise for the most comfortable speed for you.

When you don't wish to use the keyer, turn the VOX GAIN/KEYER SPEED CONTROL completely counter-clockwise and click off. Then connect a hand key to the KEY JACK on the rear panel.

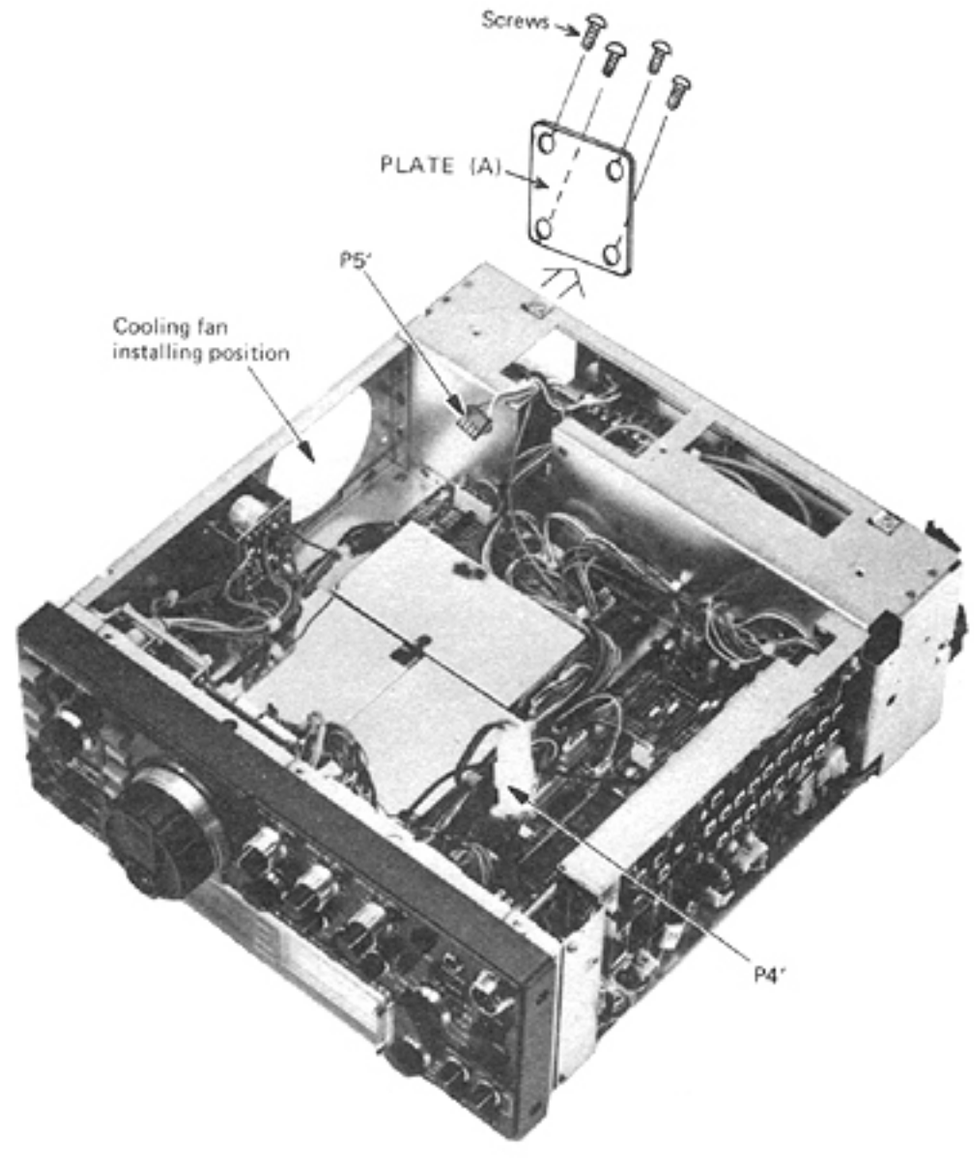
7-5 BUILT-IN POWER SUPPLY UNIT IC-PS740

7-5-1 SPECIFICATIONS

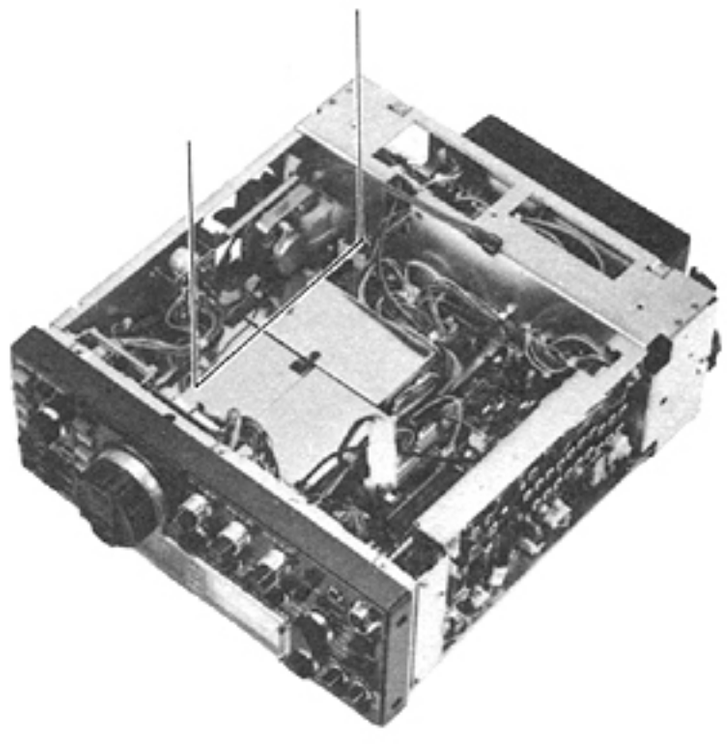
Number of Semiconductors	Transistor	5
	IC	2
	Diode	6
Input Voltage	110/220V AC (50/60Hz)	
Allowable Voltage Fluctuation	±10% of input voltage (suitable line voltage)	
Input Capacity	550VA (at 20A load)	
Output Voltage	13.8V DC Negative ground	
Max. Load Current	20A (10 mins ON/10 mins OFF)	
Dimentions	194(W) x 50(H) x 186(D) mm (excluding cooling fan)	
Weight	Approx. 2.5kg (including cooling fan)	
Kit Included	Main Unit	1
	Cooling Fan	1
	Power Socket Unit	1
	AC Power Cord	1
	Spare Fuse	2
	Installation Screws	10

7-5-2 ASSEMBLY PROCEDURE

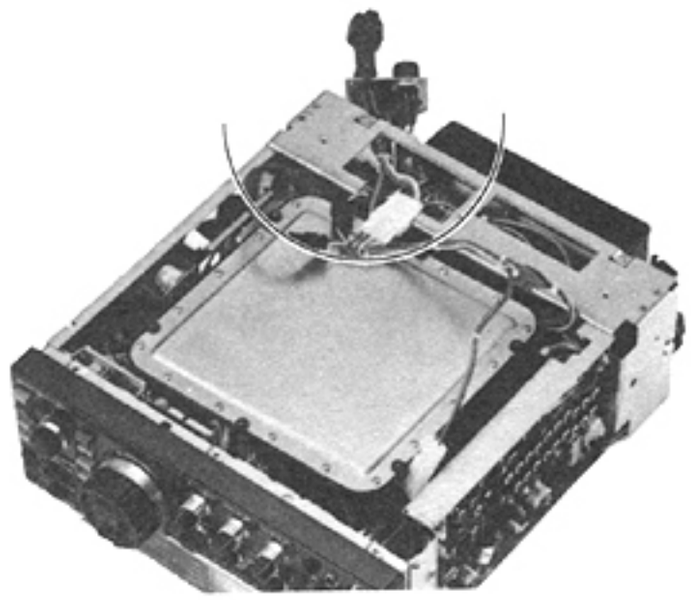
1. Turn the IC-740 upside down. Remove the "PLATE (A)" attached to the rear panel by unscrewing four screws. These screws will be used later.
   Unplug the connector P4' and leave the unpluged connector which is attached with wired from the rear panel to the space between the front panel and chassis.

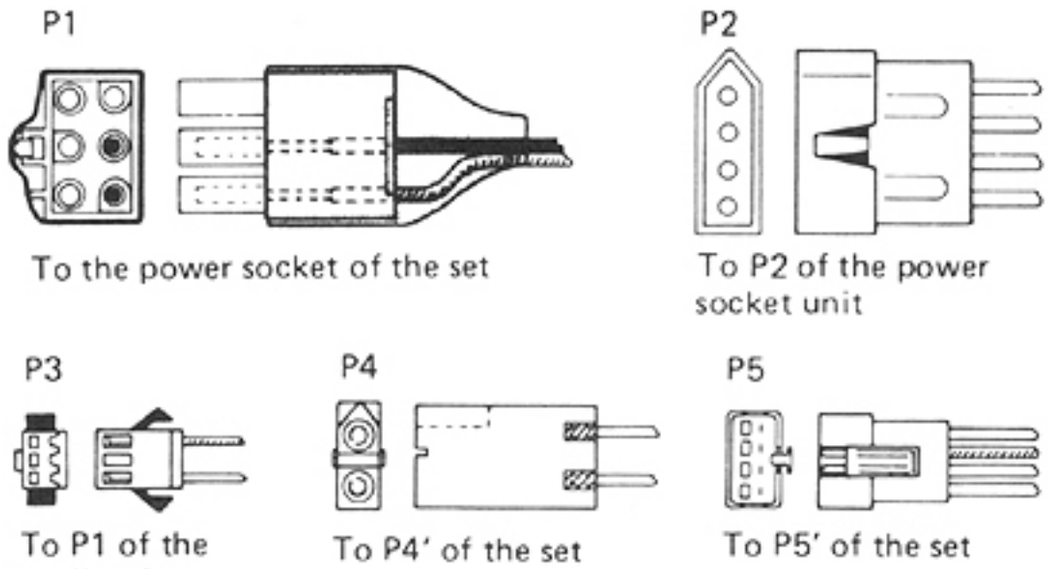


2. Place the cooling fan onto the installing position so that the motor coil is toward the rear as shown in the photo. Fix it with the four screws from the outer side of the chassis.

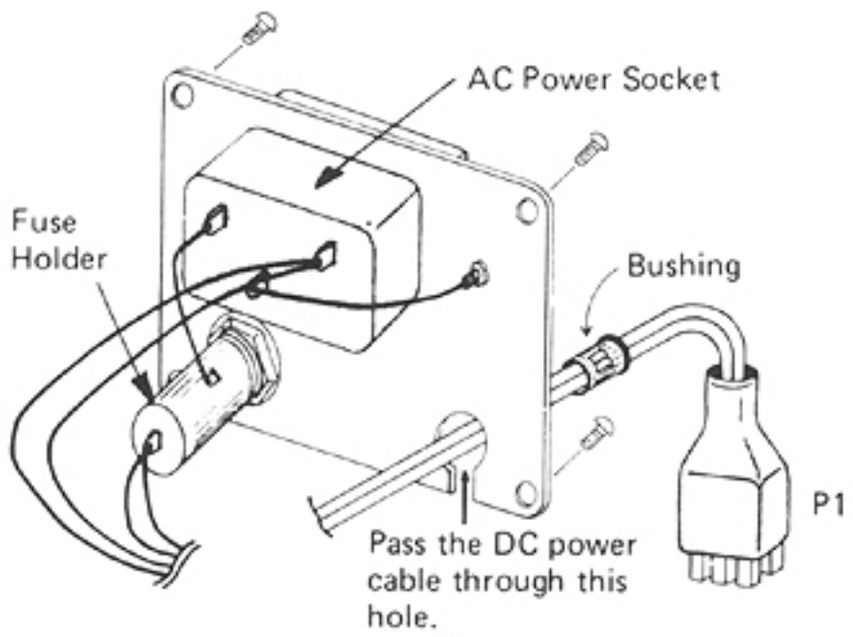


3. Put the power supply unit into the set so that its cables are toward the rear as shown in the photo.
   Connect the connectors with the appropriate one.
   Pass the DC power connector, P1, through the hole which was closed by the PLATE (A) before.

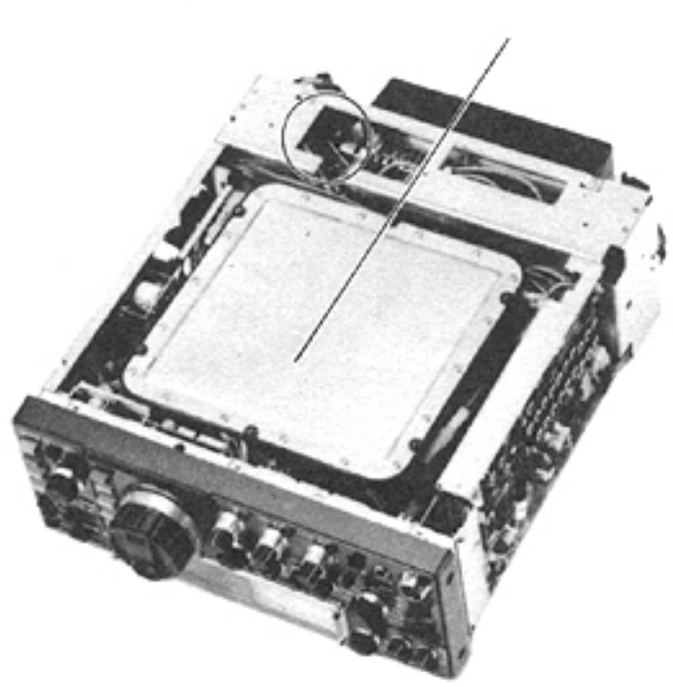




4. Pass the DC power cable attached to P1 through the hole of the AC power socket plate as shown in the illustration, then insert the bushing into the hole.
   Attach the AC power socket plate to the position where the PLATE (A) was attached before, by using the screws described in 1, so that the AC power socket is toward the bottom of the set.



5. Put P2 and P5 into the space under the chassis (indicated by a circle in the photo), and other connectors into the space between the power supply unit and the chassis of the set.
   Adjust the position of the power supply unit so that the center screw holes become centered with the center screw holes for the bottom cover.



6. Put the bottom cover of the set onto the power supply unit so that the screw holes of the bottom cover are fitted on the holes of the unit.
   Then fix the power supply unit to the bottom cover with the supplied six screws.

7. Connect the internal speaker connector and replace the bottom and top covers of the set.
   Plug P1 of the power supply unit to the DC Power Socket of the set.

7-5-3 OPERATION

1. Connect the DC output plug, P1, of this unit into the transceiver DC Power Socket securely. At this time, make sure that:

   A. The power switch on the transceiver is OFF.
   B. The T/R switch is in the RECEIVE position.
   C. The PTT switch on the microphone is not depressed.
   D. The VOX switch is in the OFF (out) position.

2. Connect the supplied AC power cord into the AC power socket (newly installed) on the rear panel of the transceiver.
   Then connect the AC power plug into an AC power outlet.

3. By turning the transceiver power switch ON, this unit will be turned ON and supply a 13.8V DC to the transceiver.

4. When the AC power plug is connected to an active AC line, the power to the CPU of the set is continuously supplied even when the power switch of the transceiver is turned OFF, to retain all the programmed frequencies in the memory channels, the operating frequencies of the VFO's, operating mode, etc.

7-5-4 CAUTION

1. Ground the GROUND TERMINAL of the set with as short a wire as possible to prevent electrical shock, TVI, BCI and other problems.

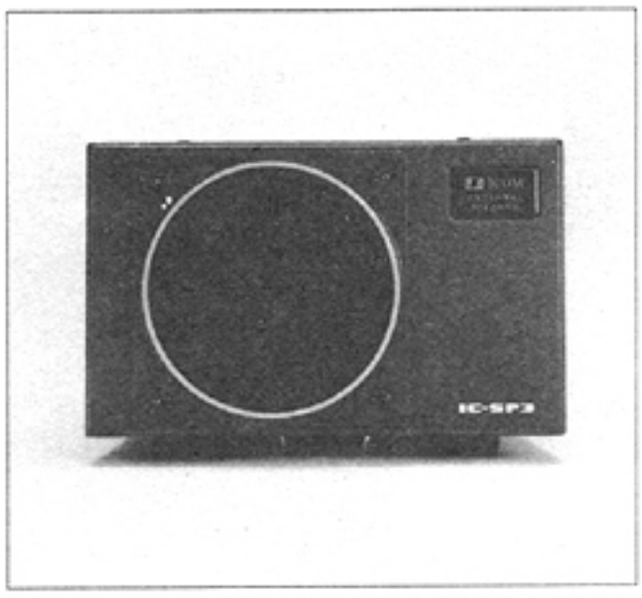
2. This unit stops the output voltage with a protection circuit, when output voltage is shorted or consumed load current exceeds 25A. When the output voltage is stopped, turn the power switch of the transceiver OFF and remove the cause of the problem.

3. If the fuse blows, replace it with a 10A (at 117V) or 5A (at 240V) fuse after checking the cause of the problem. Use a Philips (+) screwdriver to open the holder. The outside ring of the holder cannot be rotated.

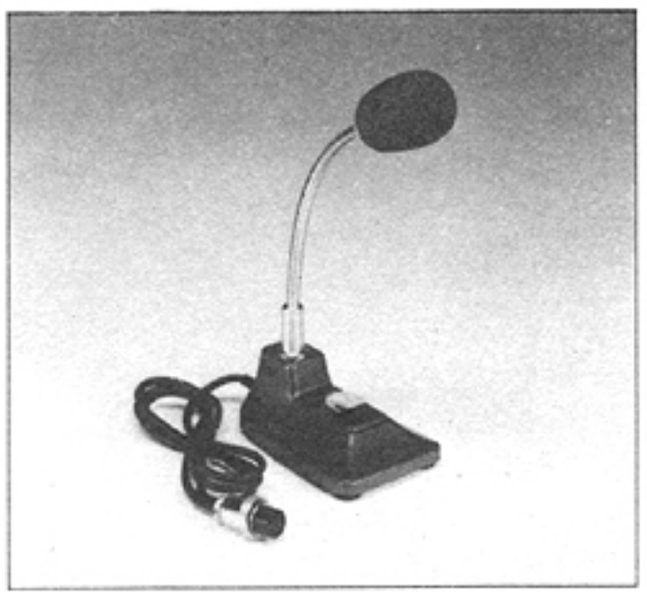
4. The optional IC-PS15 power supply however cannot be used with the IC-740 which has already had the IC-PS740 unit installed.

7 - 6 OTHER OPTIONS

IC-PS15
AC POWER SUPPLY



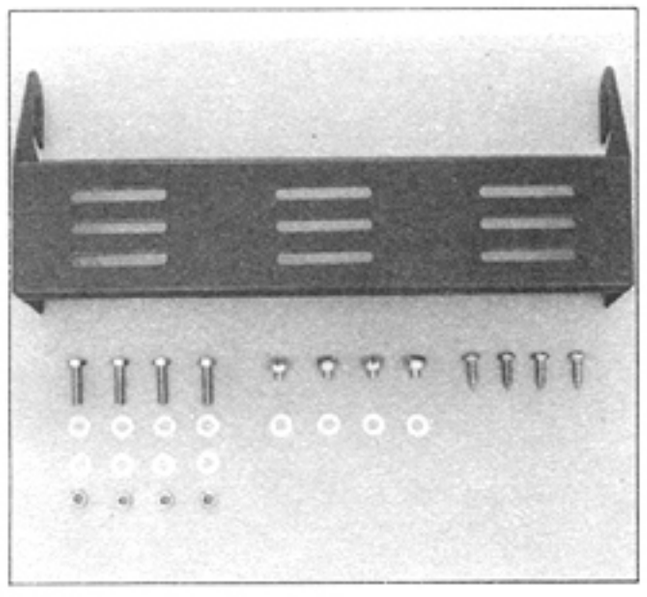
IC-SP3
EXTERNAL SPEAKER



IC-SM5
ELECTRET CONDENSER TYPE
DESK MICROPHONE

IC-HM10
SCANNING MICROPHONE

IC-HP1
HEADPHONES



IC-MB12
MOBILE MOUNTING
BRACKET

BC-10A
MEMORY BACKUP
AC POWER SUPPLY

IC-2KLPS
ATTENDANT POWER SUPPLY
FOR IC-2KL

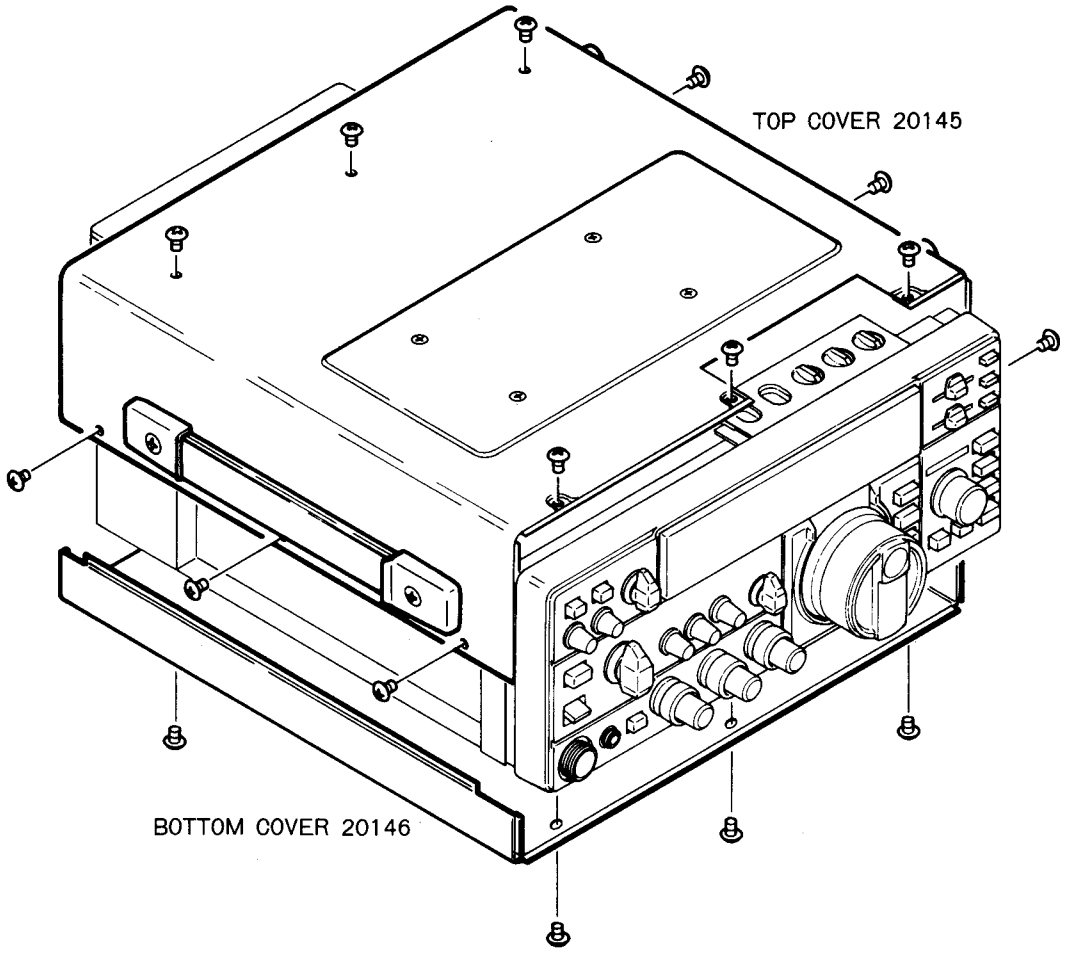
IC-2KL
500W SOLID-STATE
LINEAR AMPLIFIER

IC-AT100
(100W)
IC-AT500
(500W)

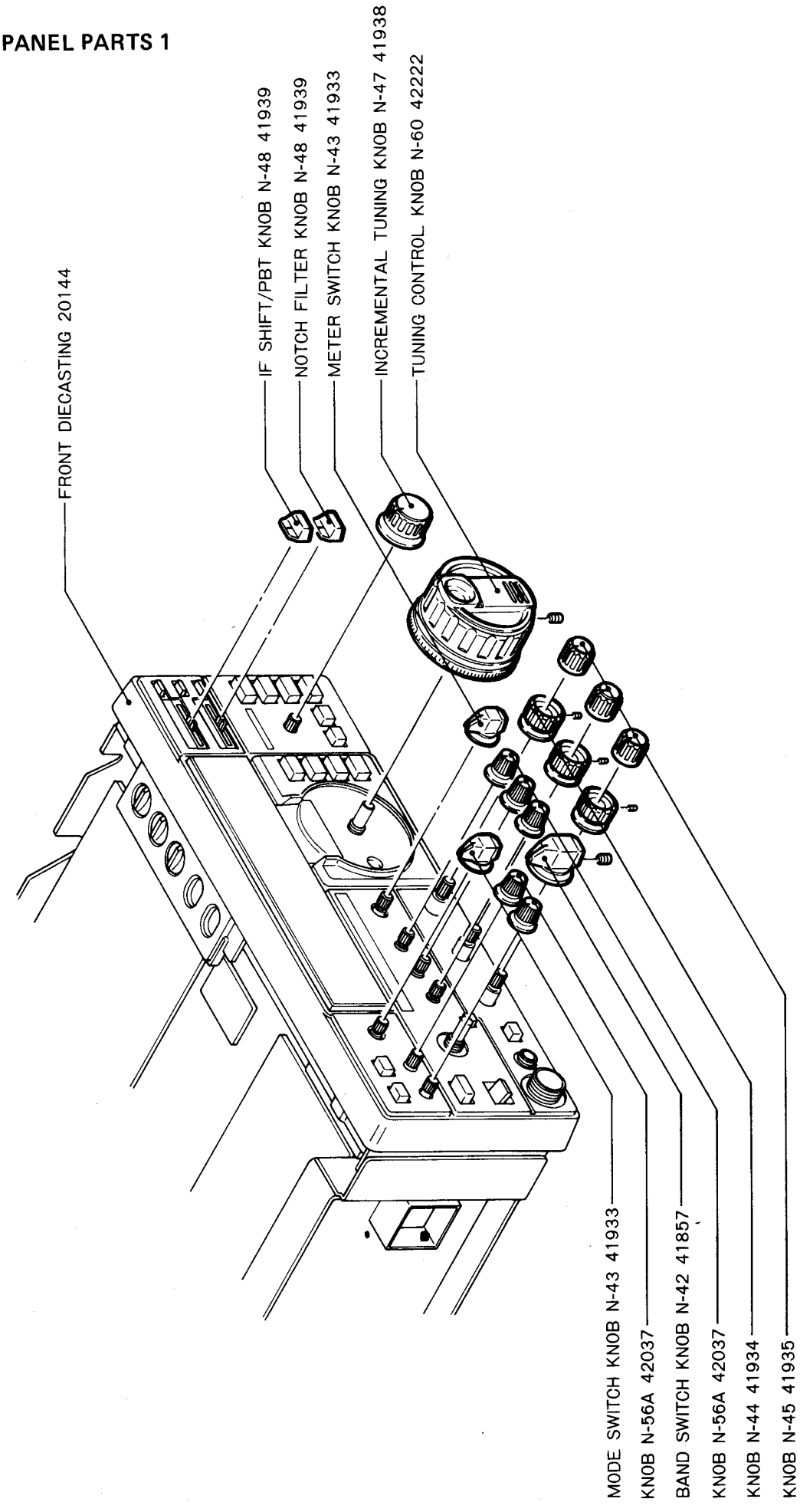
AUTOMATIC
ANTENNA TUNER

SECTION 8 MECHANICAL PARTS AND DISASSEMBLY

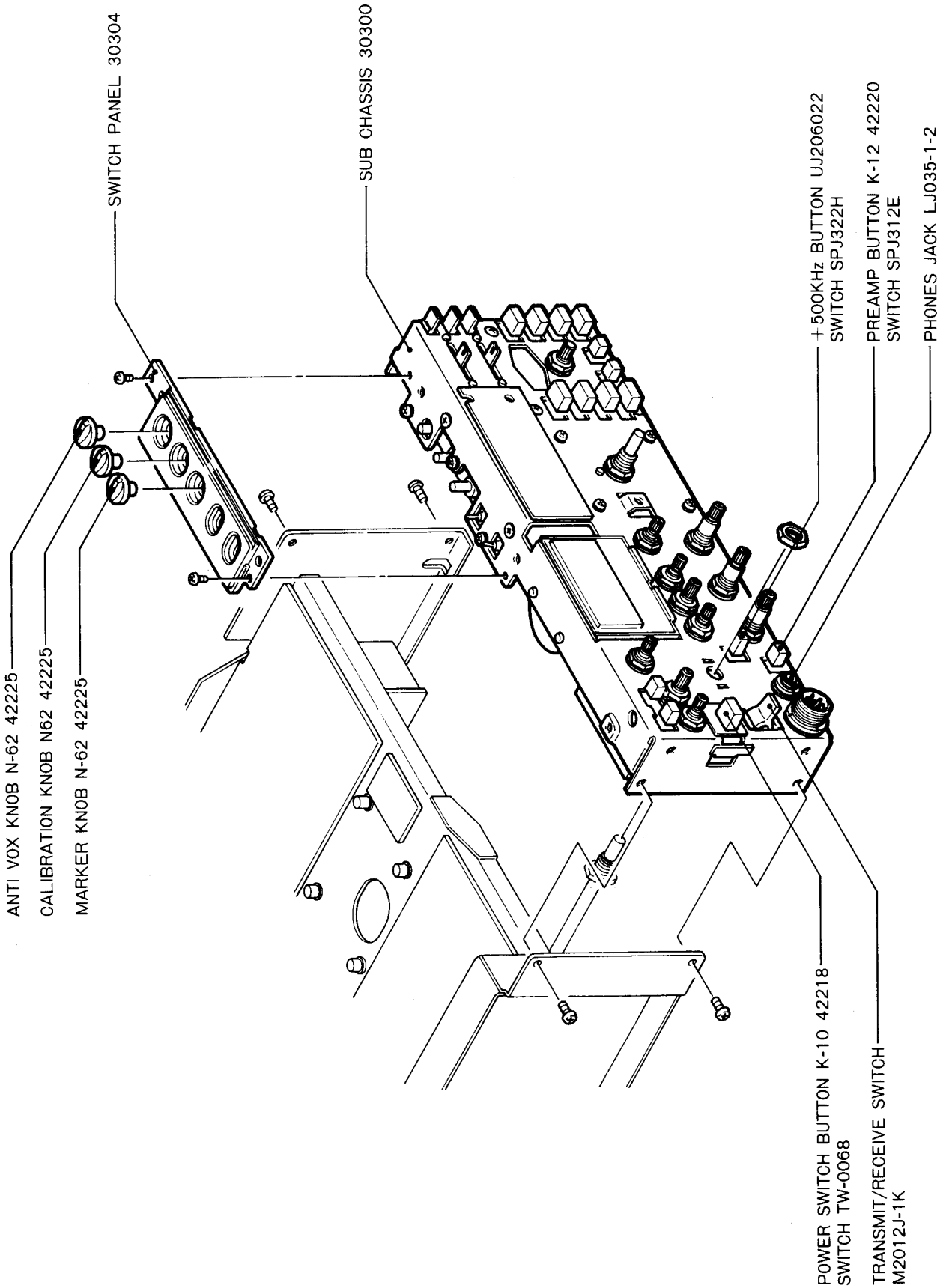
COVERS DISASSEMBLY



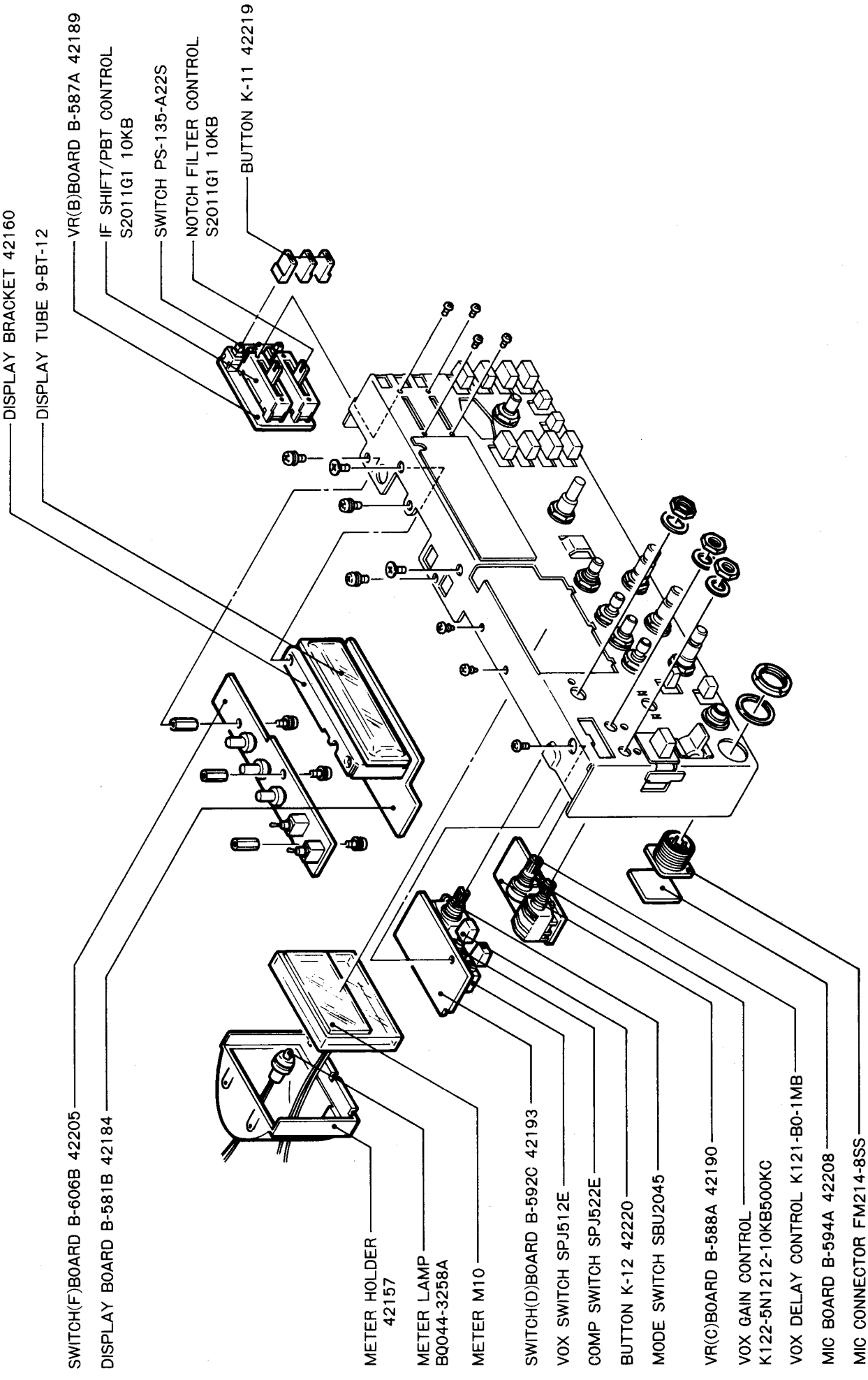
FRONT PANEL PARTS 1



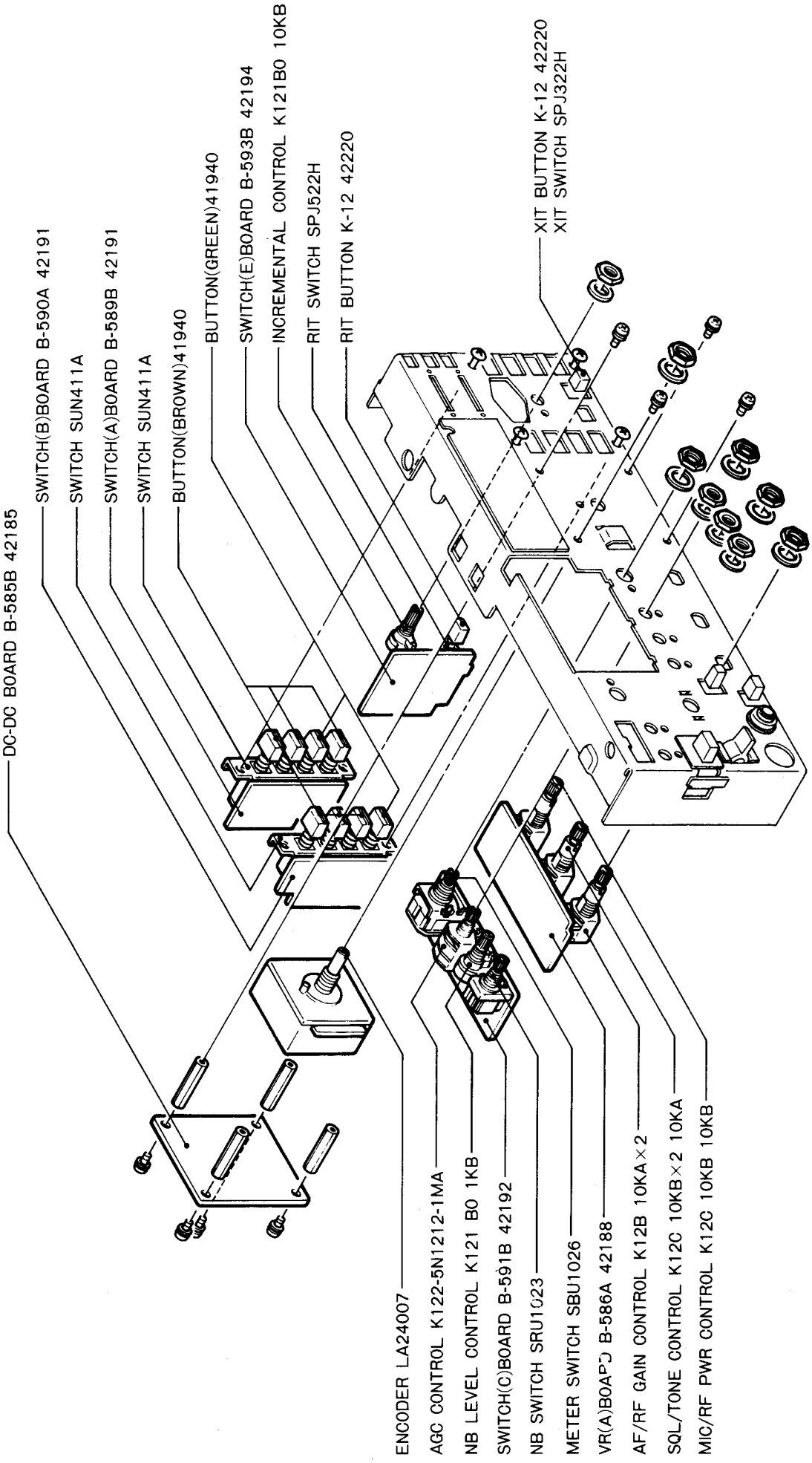
FRONT PANEL PARTS 2



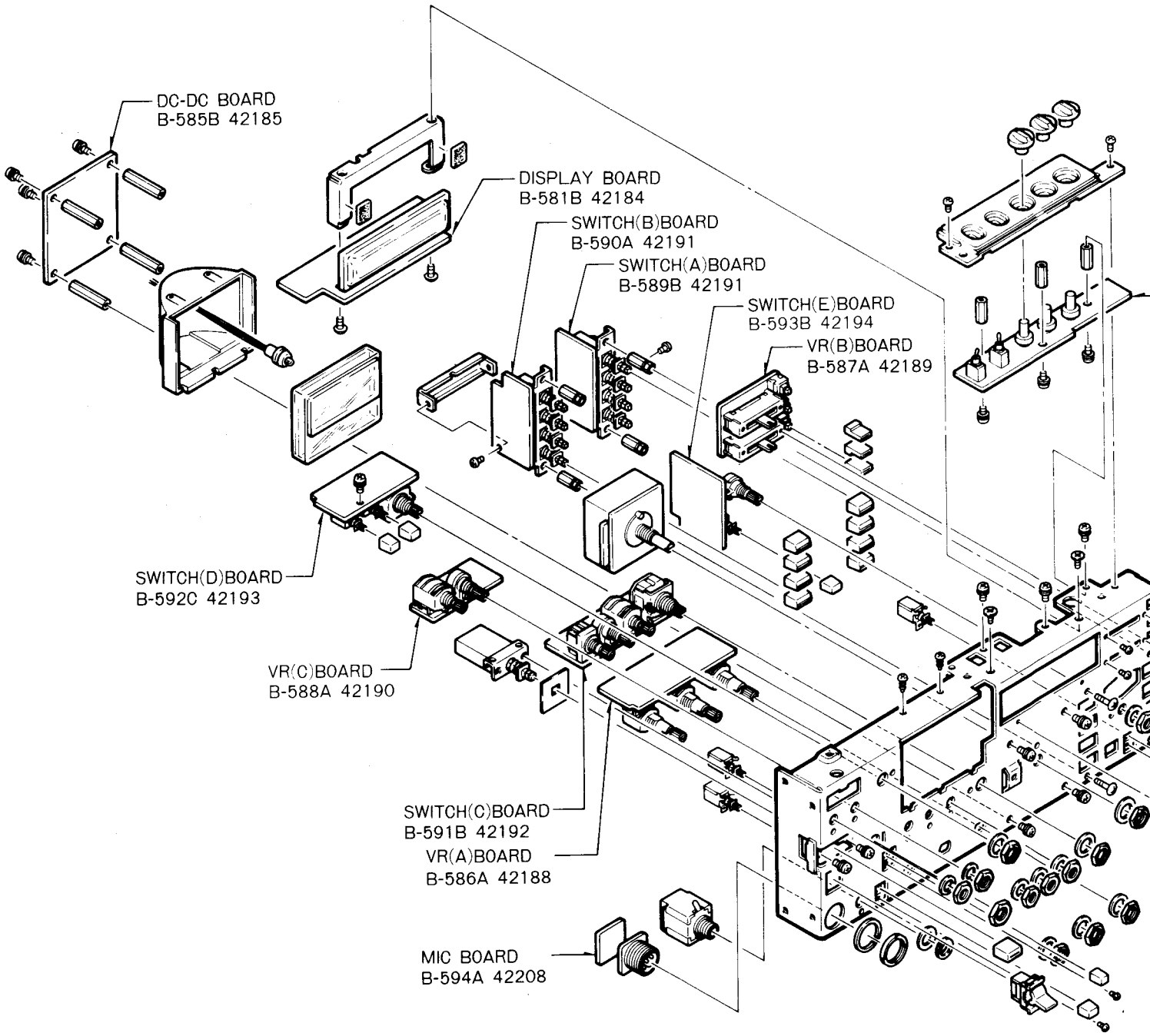
FRONT PANEL PARTS 3

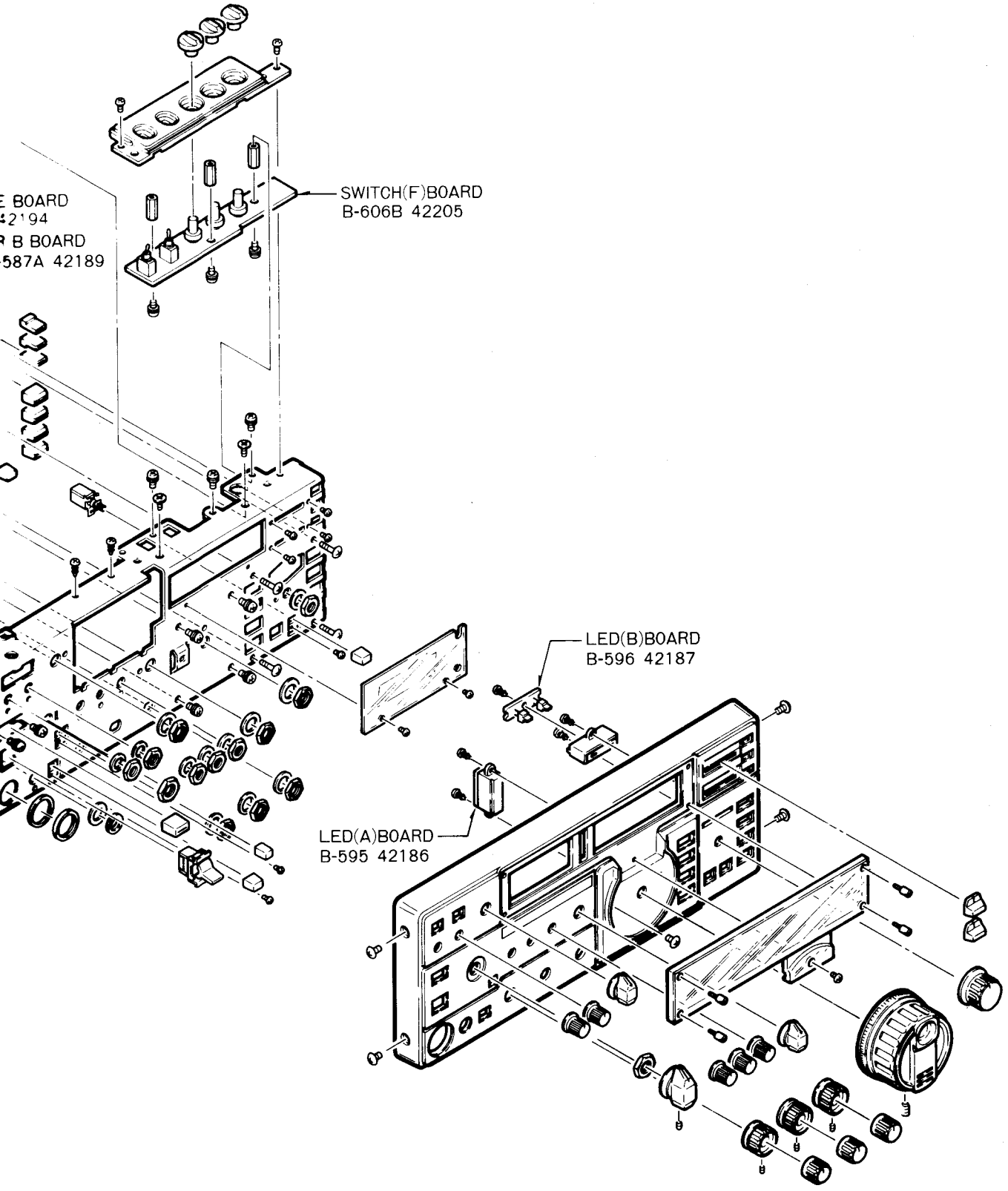


FRONT PANEL PARTS 4

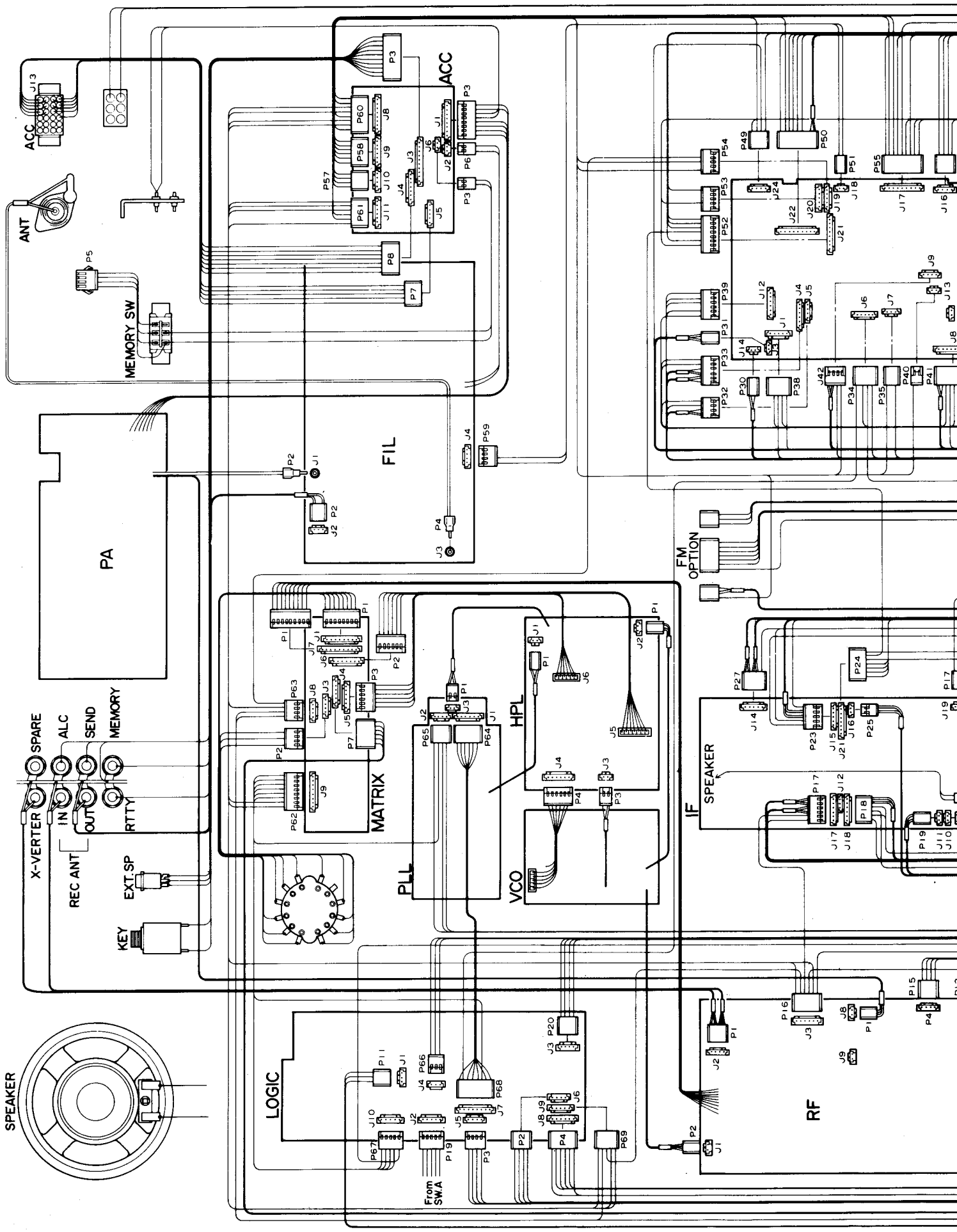


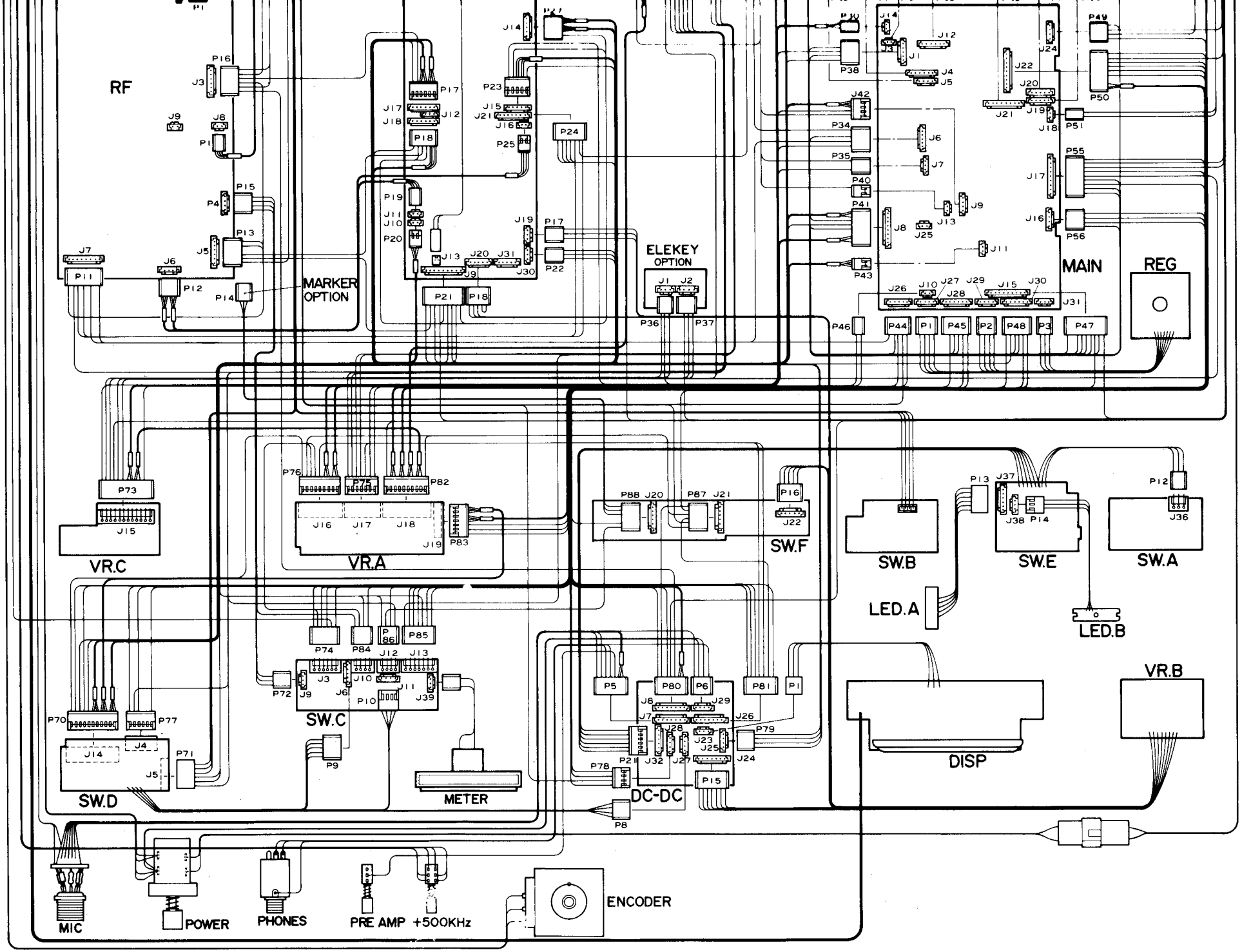
FRONT PANEL PC BOARDS



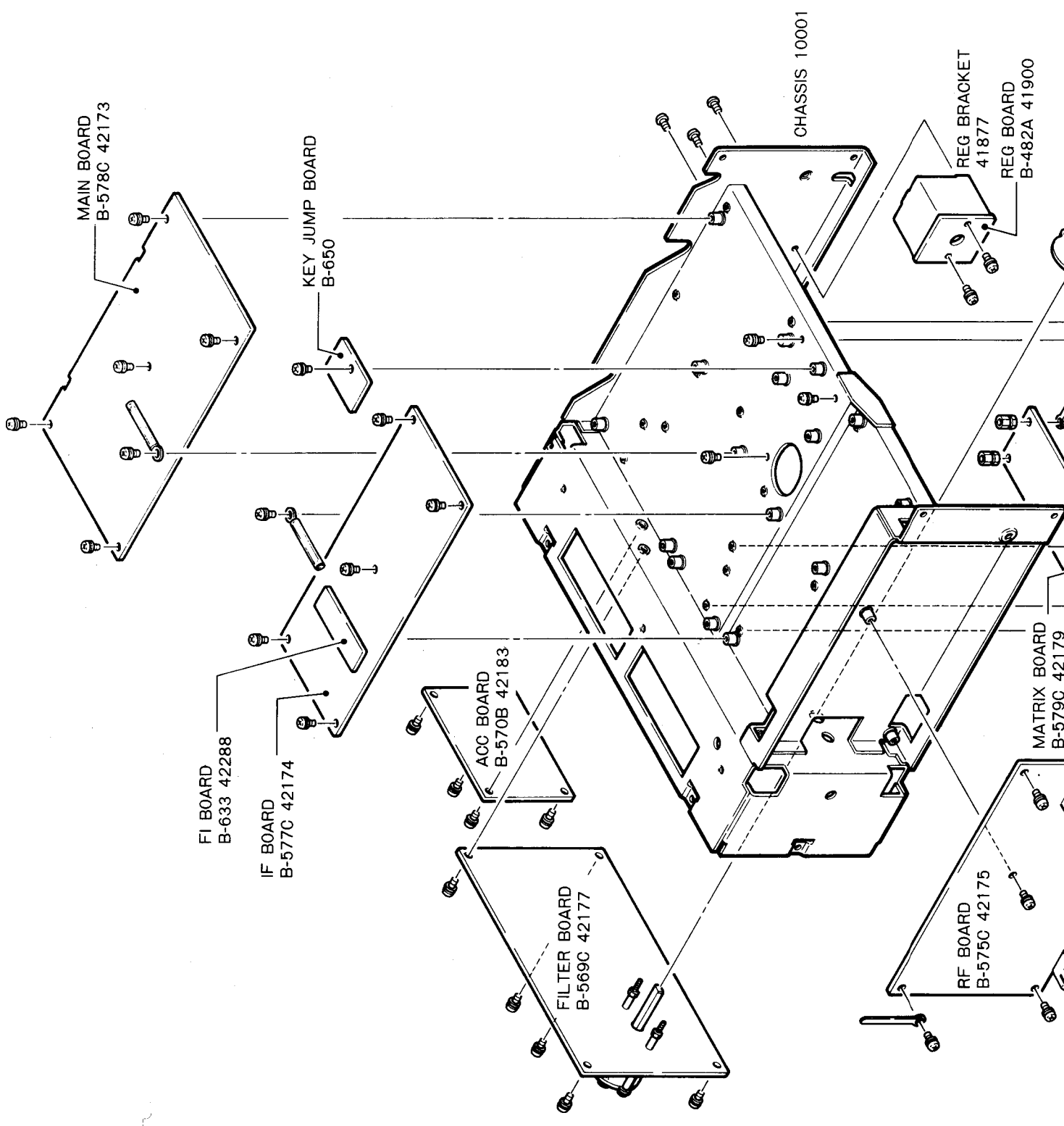

E BOARD
2194
R B BOARD
587A 42189
SWITCH(F)BOARD
B-606B 42205
LED(B)BOARD
B-596 42187
LED(A)BOARD
B-595 42186

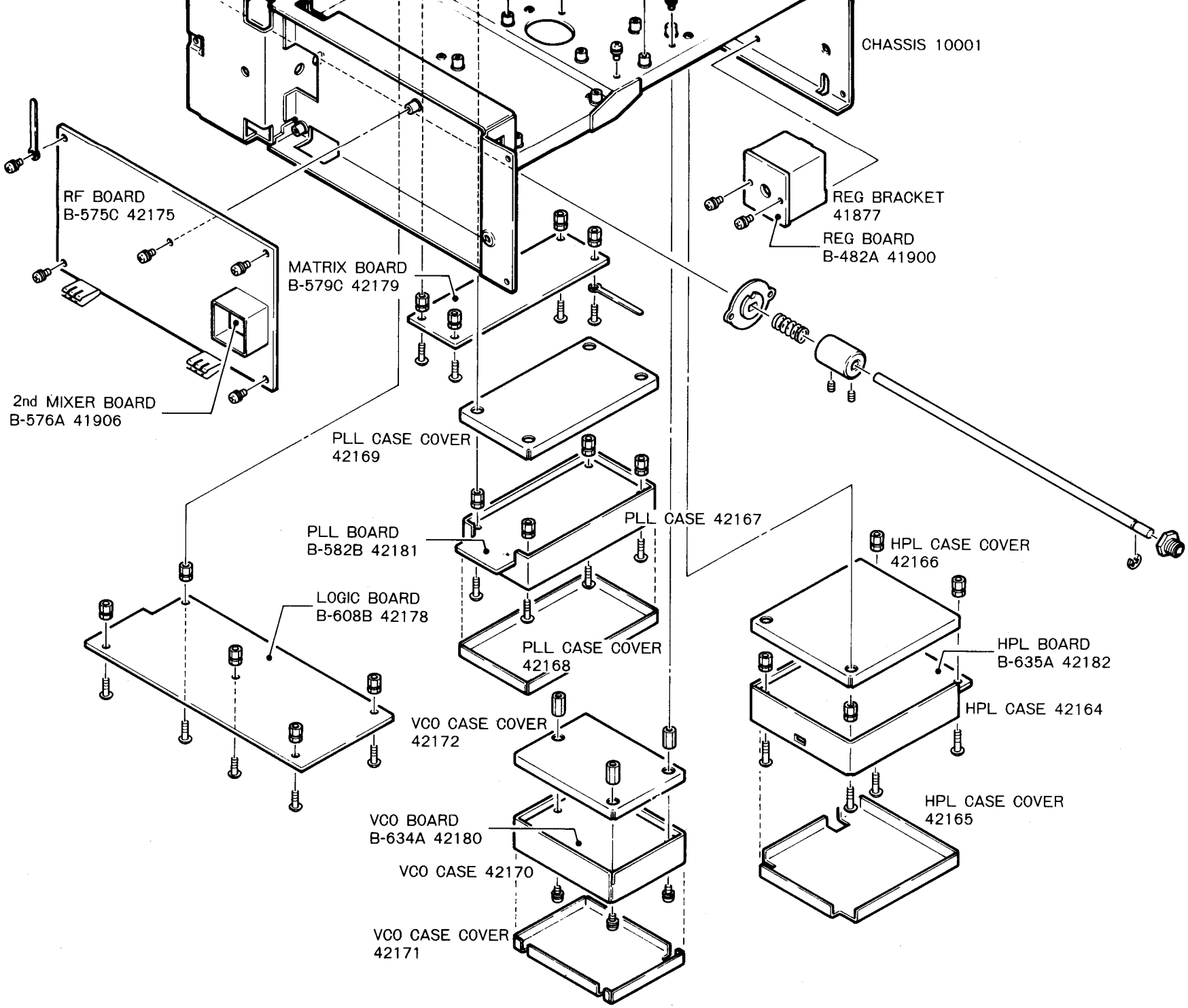
WIRING AND CONNECTOR CONNECTIONS



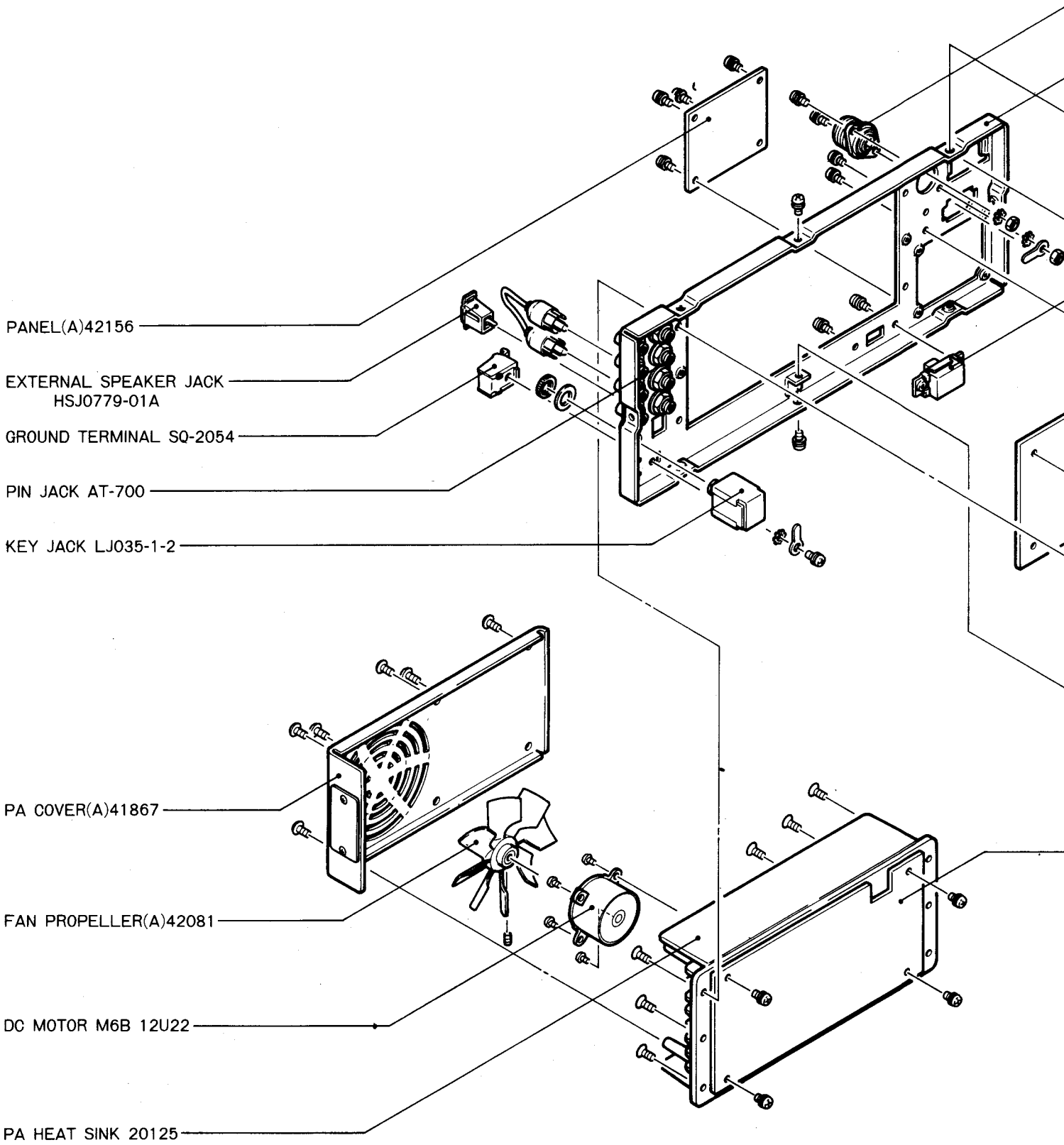

RF
MARKER OPTION
ELEKEY OPTION
MAIN
REG
VR.C
VR.A
SW.F
SW.B
SW.E
SW.A
LED.A
LED.B
VR.B
SW.C
SW.D
METER
DC-DC
DISP
MIC
POWER
PHONES
PRE AMP +500KHz
ENCODER

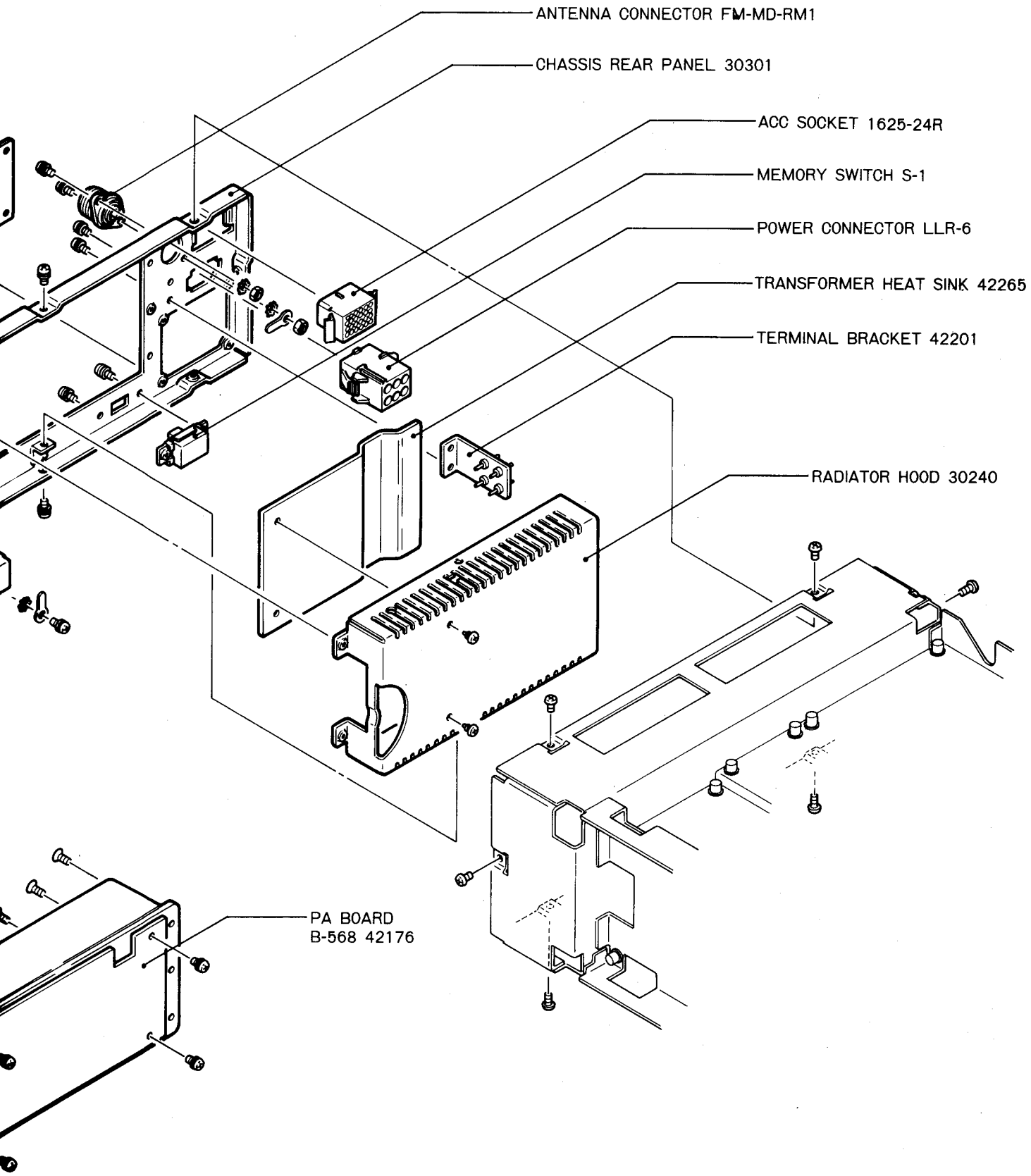
PC BOARDS MOUNTED ON CHASSIS




CHASSIS 10001
RF BOARD
B-575C 42175
REG BRACKET
41877
REG BOARD
B-482A 41900
MATRIX BOARD
B-579C 42179
2nd MIXER BOARD
B-576A 41906
PLL CASE COVER
42169
PLL CASE 42167
PLL BOARD
B-582B 42181
HPL CASE COVER
42166
LOGIC BOARD
B-608B 42178
PLL CASE COVER
42168
HPL BOARD
B-635A 42182
HPL CASE 42164
VCO CASE COVER
42172
HPL CASE COVER
42165
VCO BOARD
B-634A 42180
VCO CASE 42170
VCO CASE COVER
42171

REAR PANEL PARTS AND DISASSEMBLY



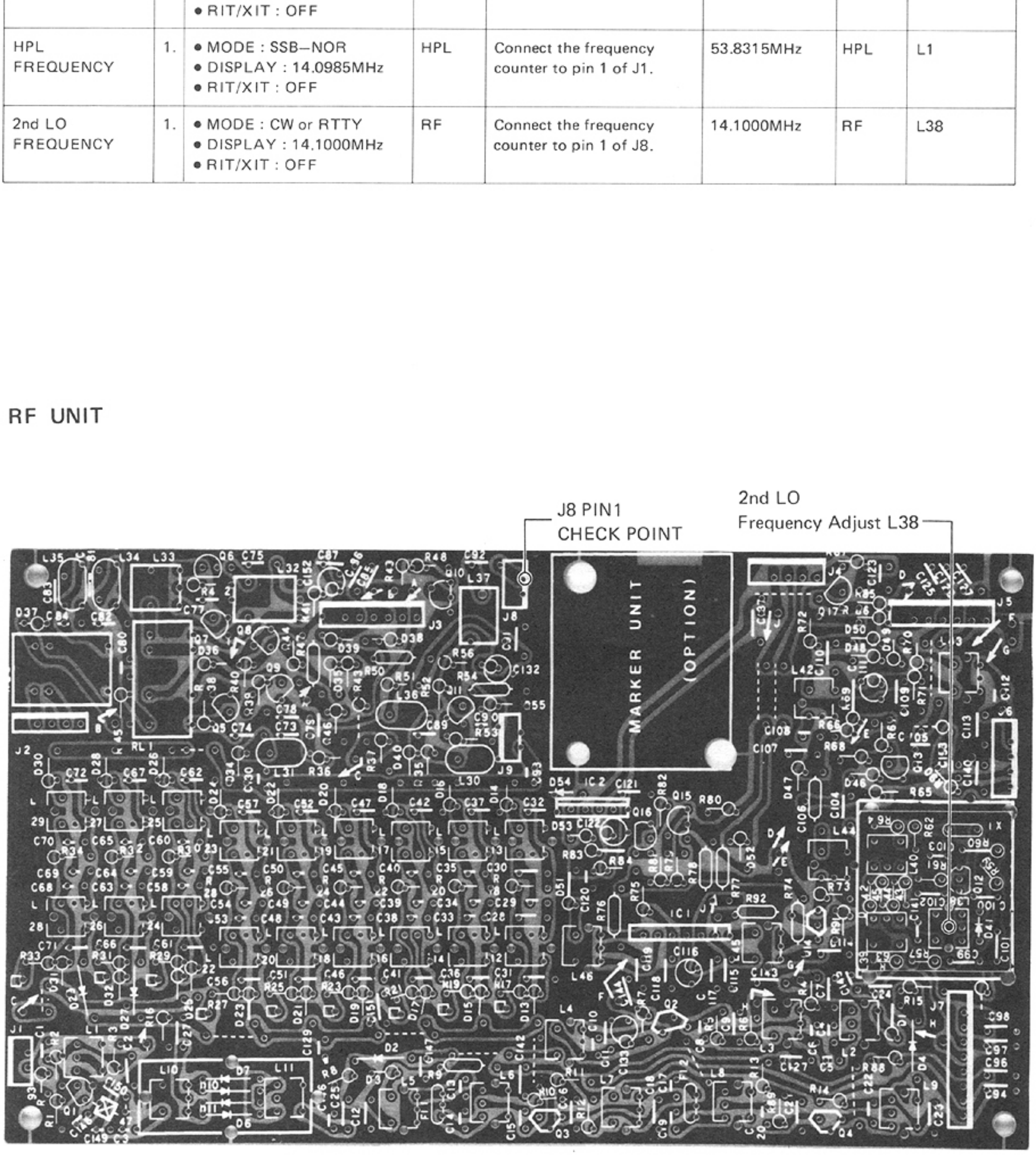

ANTENNA CONNECTOR FM-MD-RM1
CHASSIS REAR PANEL 30301
ACC SOCKET 1625-24R
MEMORY SWITCH S-1
POWER CONNECTOR LLR-6
TRANSFORMER HEAT SINK 42265
TERMINAL BRACKET 42201
RADIATOR HOOD 30240
PA BOARD
B-568 42176

SECTION 9 MAINTENANCE AND ADJUSTMENT

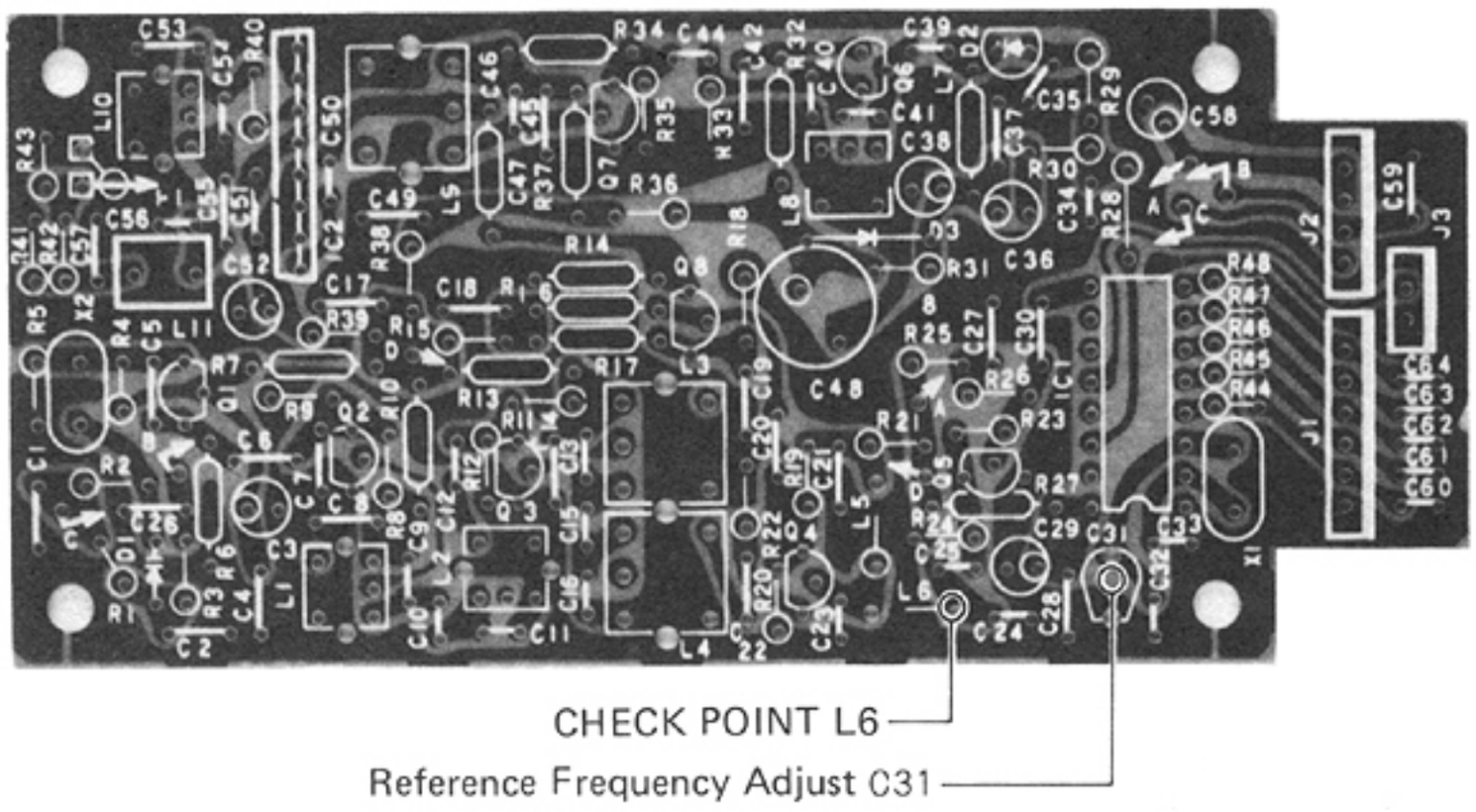
9 - 1 PLL ADJUSTMENT

Adjustment		Conditions	Unit	Measuring Points	Instrument Reading	Unit	Adjust Points
REFERENCE FREQUENCY	1.	• MODE : CW • DISPLAY : 14.1000MHz • RIT/XIT : OFF	PLL	Connect a frequency counter to L6.	11.0000MHz	PLL	C31
HPL FREQUENCY	1.	• MODE : SSB–NOR • DISPLAY : 14.0985MHz • RIT/XIT : OFF	HPL	Connect the frequency counter to pin 1 of J1.	53.8315MHz	HPL	L1
2nd LO FREQUENCY	1.	• MODE : CW or RTTY • DISPLAY : 14.1000MHz • RIT/XIT : OFF	RF	Connect the frequency counter to pin 1 of J8.	14.1000MHz	RF	L38

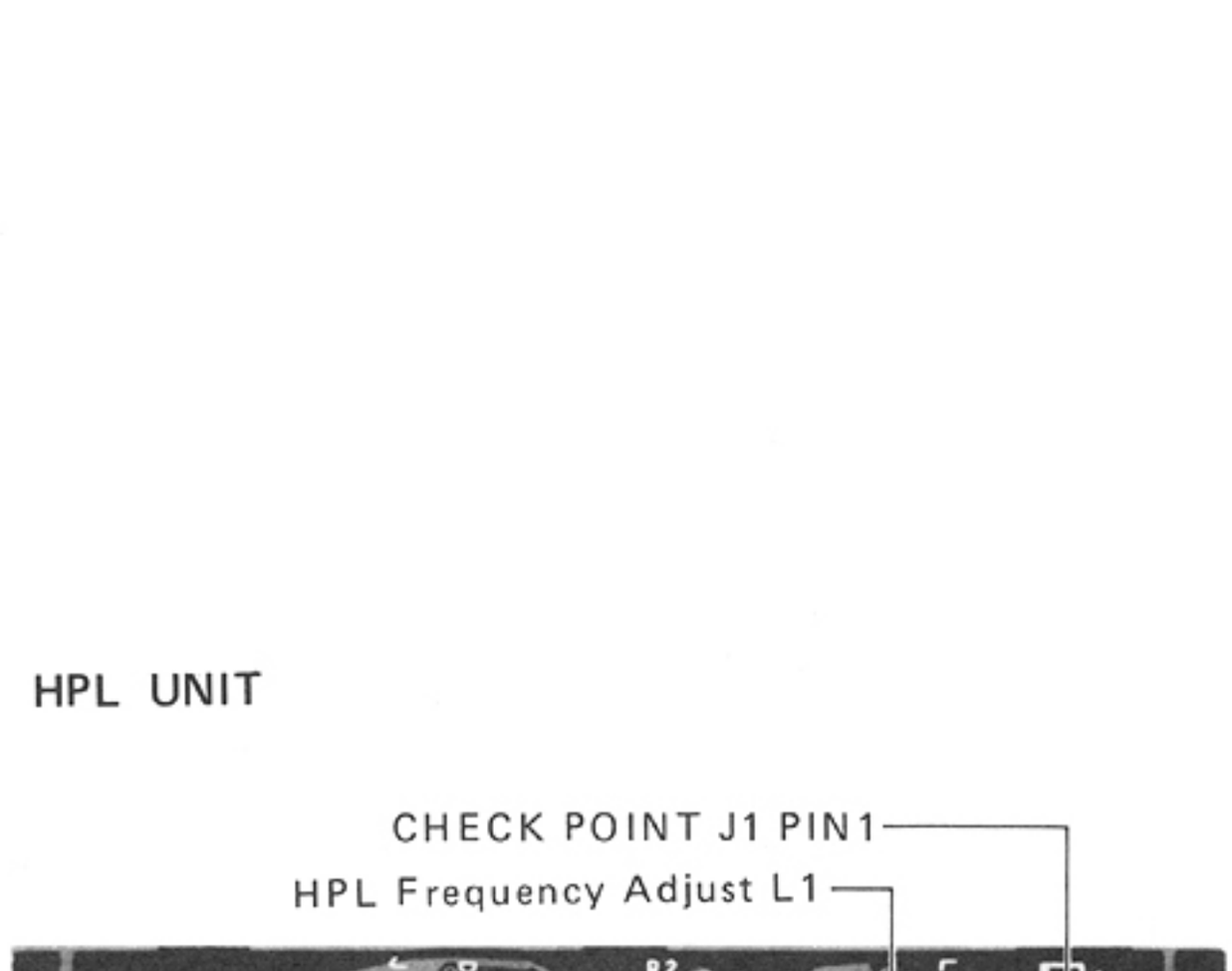
RF UNIT



PLL UNIT



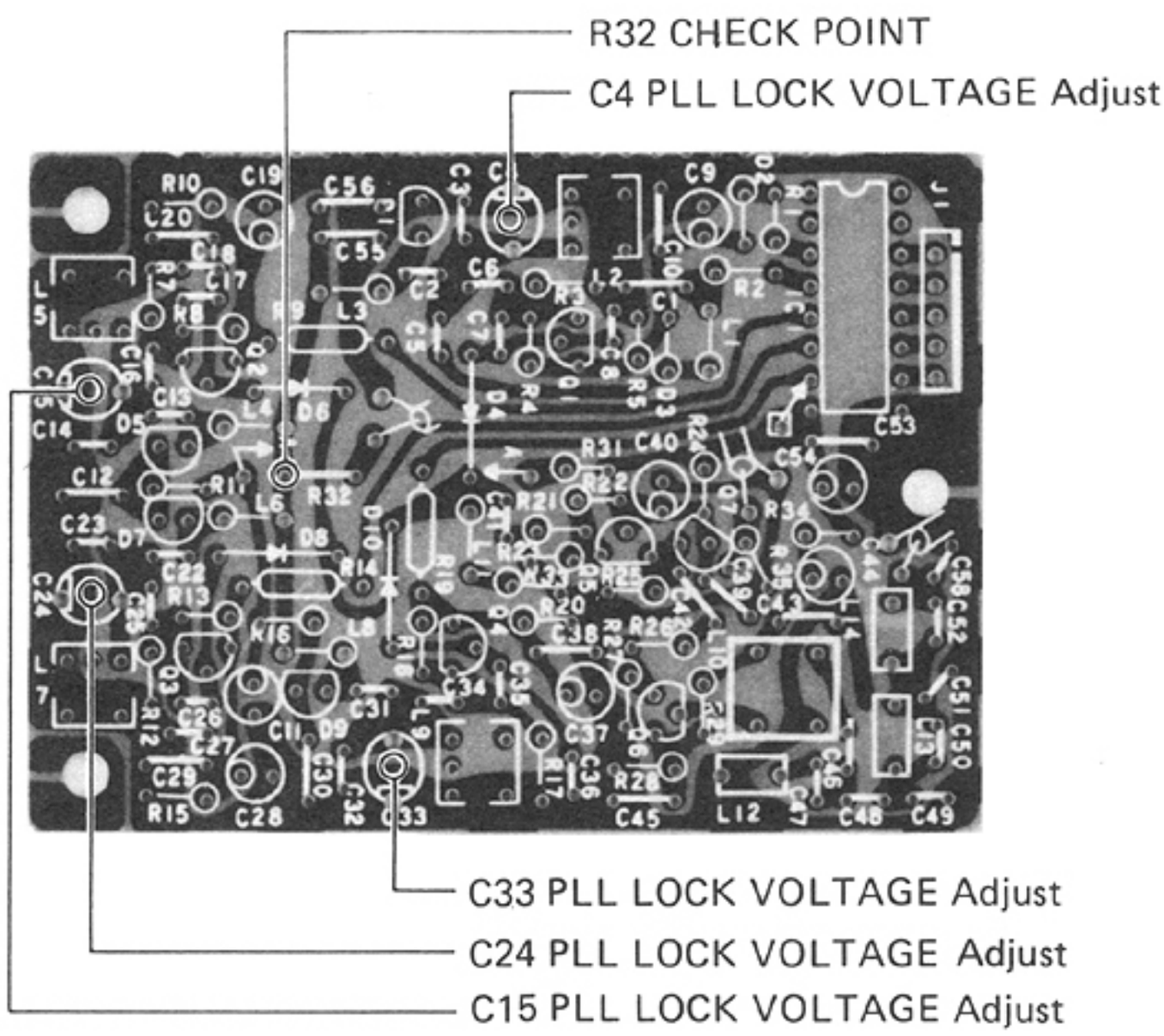
HPL UNIT



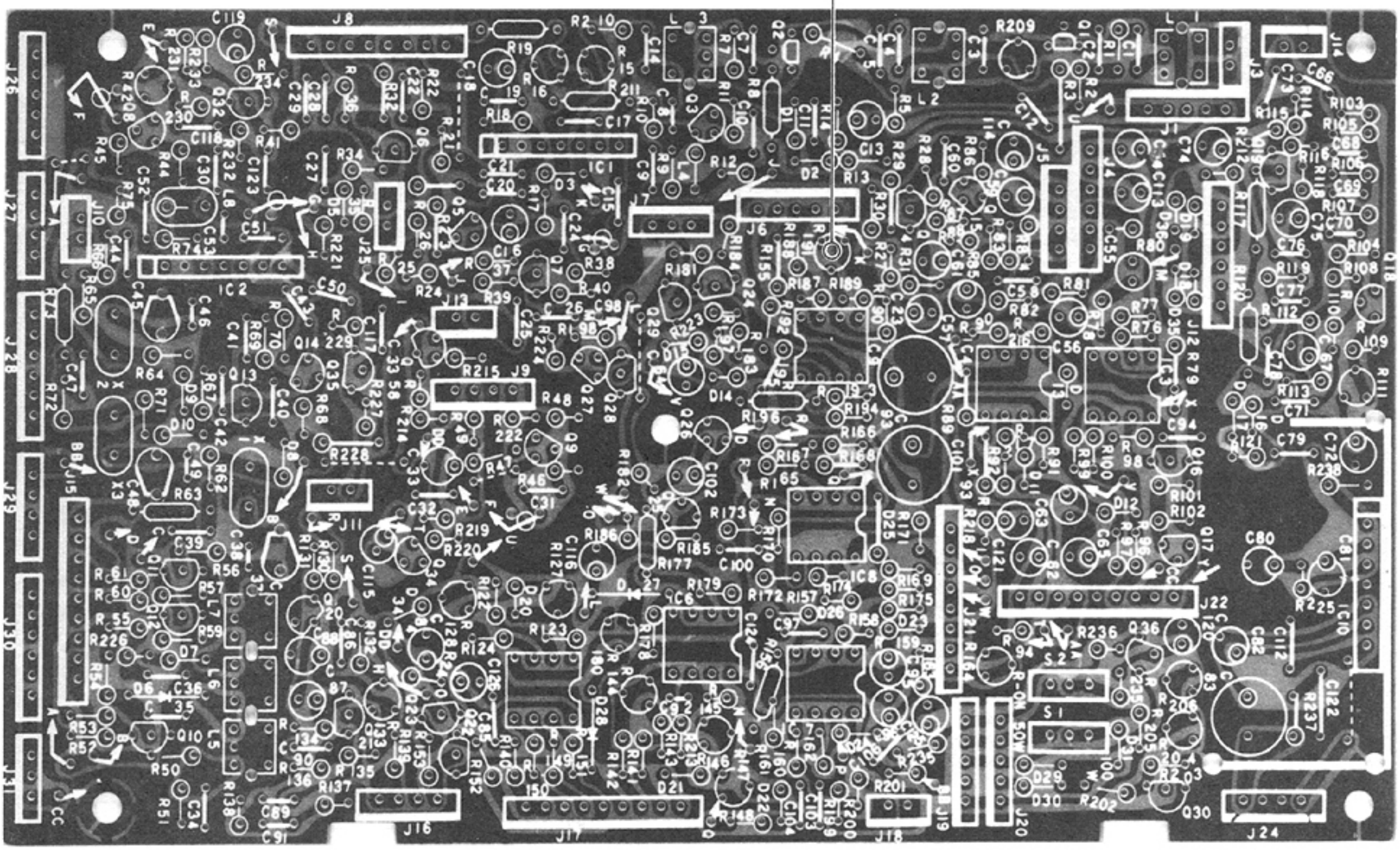
9 - 1 PLL ADJUSTMENT (Continued)

Adjustment		Conditions	Unit	Measuring Points	Instrument Reading	Unit	Adjust Points
PLL LOCK	1.	• MODE : SSB–NOR • DISPLAY : 1.4000MHz	VCO	Connect a multimeter (10V range) or an oscilloscope to R32.	1.8V	VCO	C4
	2.	• DISPLAY : 14.5999MHz					C15
	3.	• DISPLAY : 21.5999MHz					C24
	4.	• DISPLAY : 30.0999MHz					C33
	5.	• DISPLAY : 4.0999MHz			5.6V		Confirming
	6.	• DISPLAY : 9.9000MHz					
	7.	• DISPLAY : 17.9000MHz					
	8.	• DISPLAY : 24.4000MHz					
	9.	• DISPLAY : 7.5999MHz			2V ~ 6V		
	10.	• DISPLAY : 6.9000MHz					
LDO (10Hz steps)	1.	• MODE : CW • DISPLAY : 14.1000MHz • T/R SWITCH : TRANSMIT • Connect an RF power meter to ANT connector.		Couple a frequency counter to the RF power meter connected to the ANT connector.	14.10000MHz	TOP PANEL	CALIBRAT-OR Control
	2.	• DISPLAY : 14.0999MHz			14.09999MHz	MAIN	R191

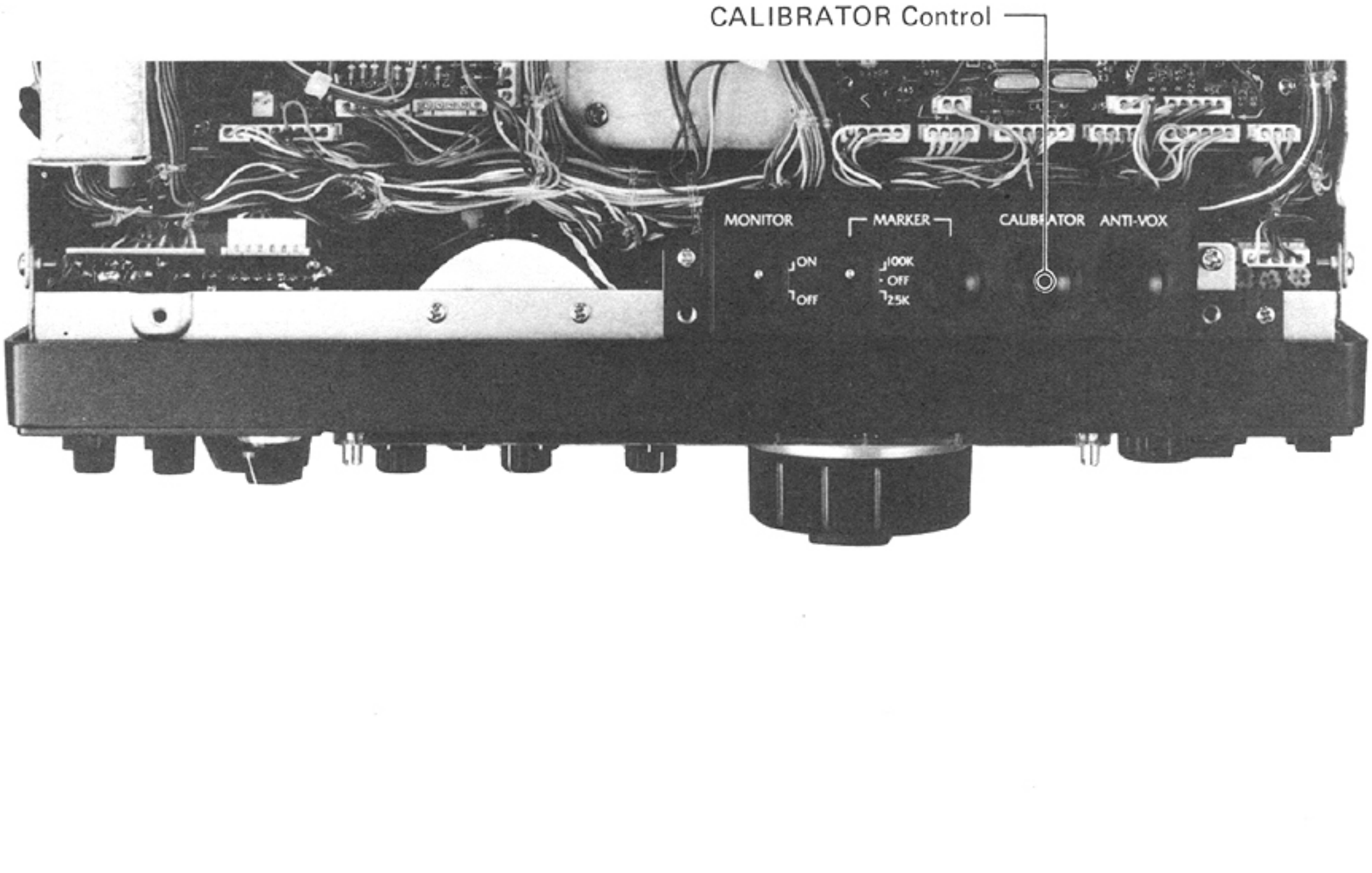
VCO UNIT



MAIN UNIT



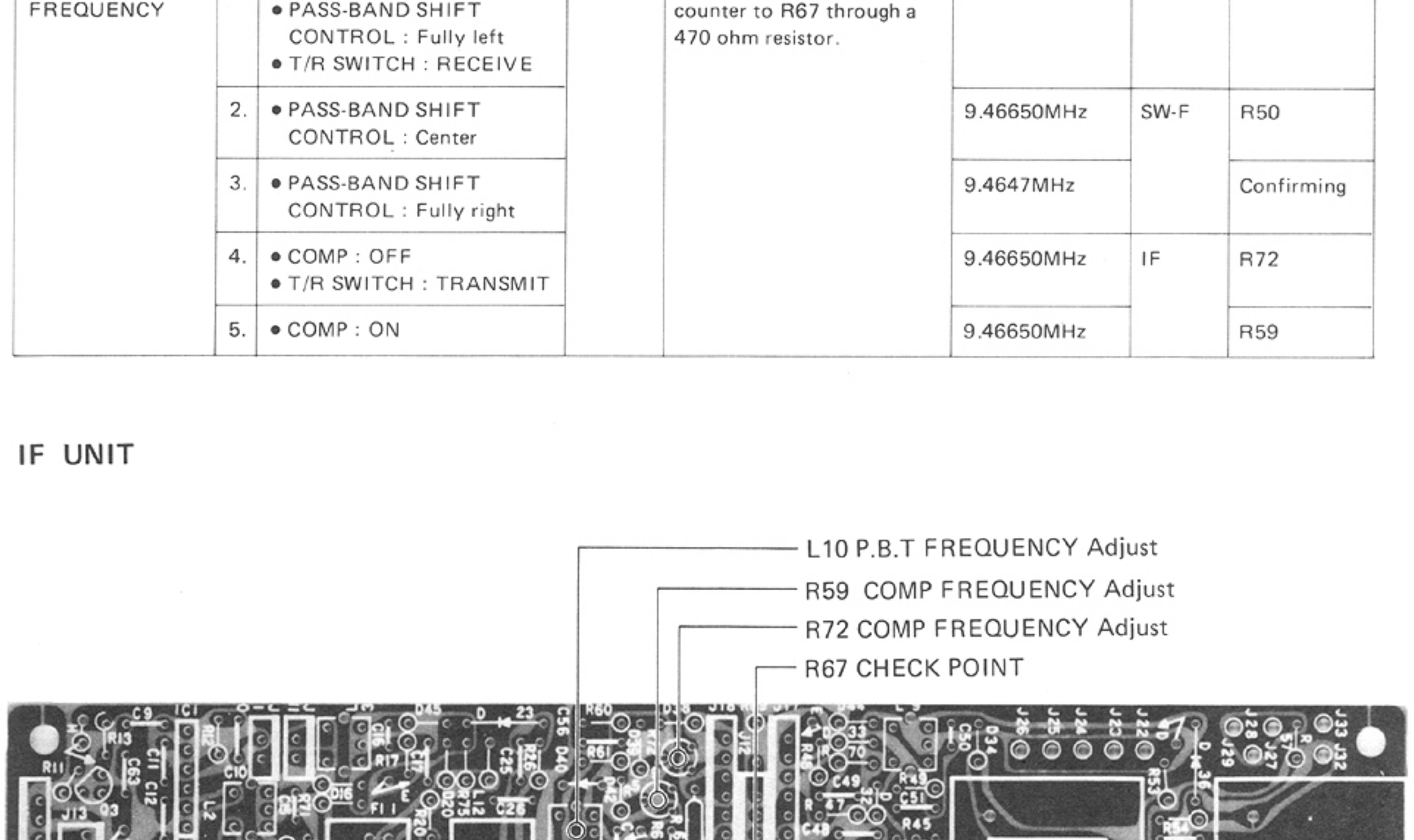
TOP PANEL



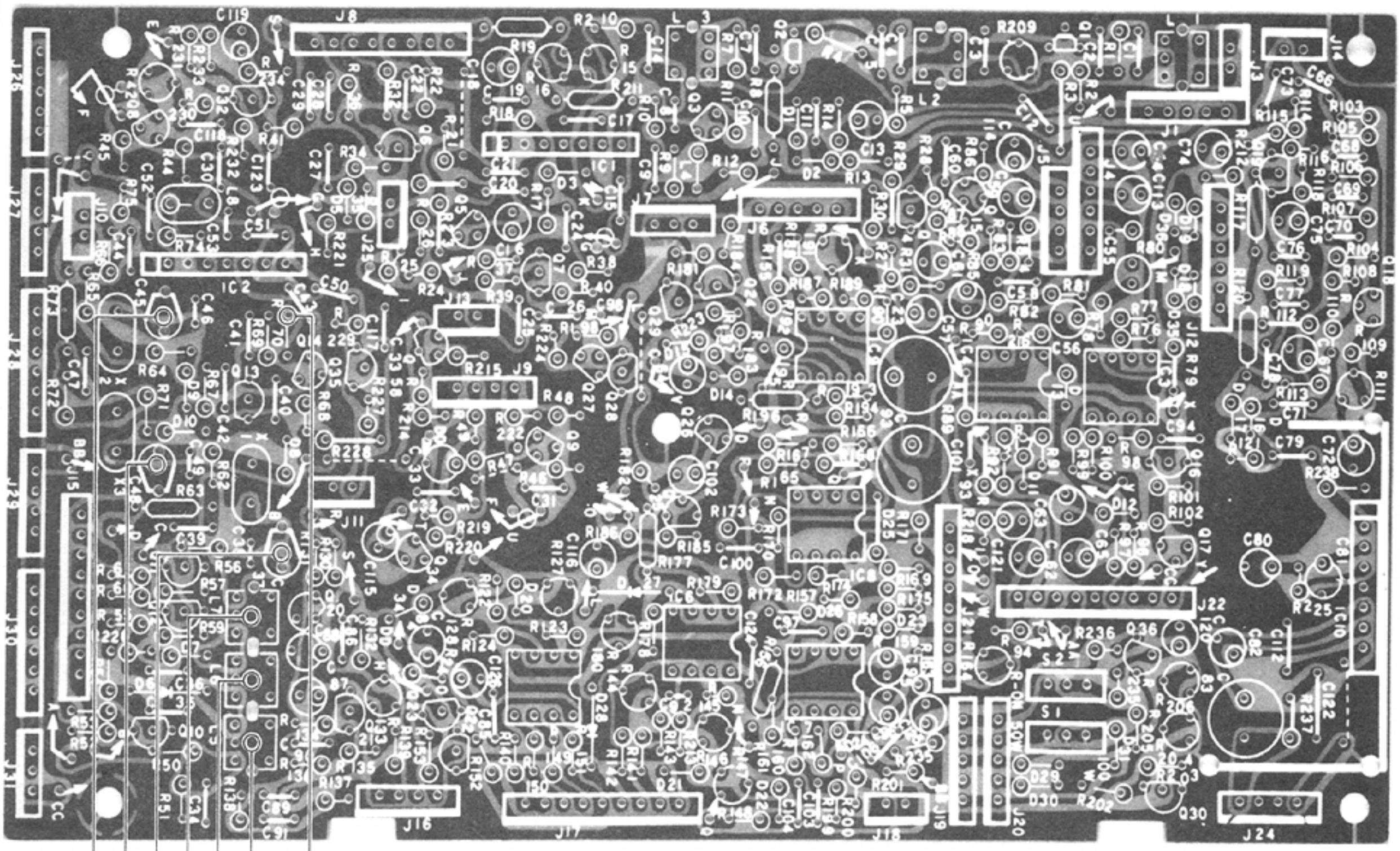
9 - 2 COMMON CIRCUITS ADJUSTMENT

Adjustment		Conditions	Unit	Measuring Points	Instrument Reading	Unit	Adjust Points
BFO FREQUENCY	1.	• BAND : 14MHz • MODE : USB (NOR) • T/R SWITCH : RECEIVE	MAIN	Connect a frequency counter to R70 through a 470 ohm resistor.	9.01300MHz	MAIN	C45
	2.	• MODE : LSB (REV)			9.01000MHz		C48
	3.	• MODE : RTTY • T/R SWITCH : TRANSMIT Jumper between pin 1 of J9 and ground.			9.01167MHz		C37
	4.	Remove the jumper wire between pin 1 of J9 and ground.			9.01150MHz		L7
	5.	• MODE : CW			9.01150MHz		Confirming
	6.	• T/R SWITCH : RECEIVE			9.01070MHz		L6
	7.	• MODE : RTTY			9.009375MHz		L5
P.B.T./COMP. FREQUENCY	1.	• P.B.T. SWITCH : P.B.T. • PASS-BAND SHIFT CONTROL : Fully left • T/R SWITCH : RECEIVE	IF	Connect the frequency counter to R67 through a 470 ohm resistor.	9.46830MHz	IF	L10
	2.	• PASS-BAND SHIFT CONTROL : Center			9.46650MHz	SW-F	R50
	3.	• PASS-BAND SHIFT CONTROL : Fully right			9.4647MHz		Confirming
	4.	• COMP : OFF • T/R SWITCH : TRANSMIT			9.46650MHz	IF	R72
	5.	• COMP : ON			9.46650MHz		R59

IF UNIT



MAIN UNIT



R70 CHECK POINT

L5 BFO FREQUENCY Adjust RTTY-R 9.009375MHz

L6 BFO FREQUENCY Adjust CW-R 9.01070MHz

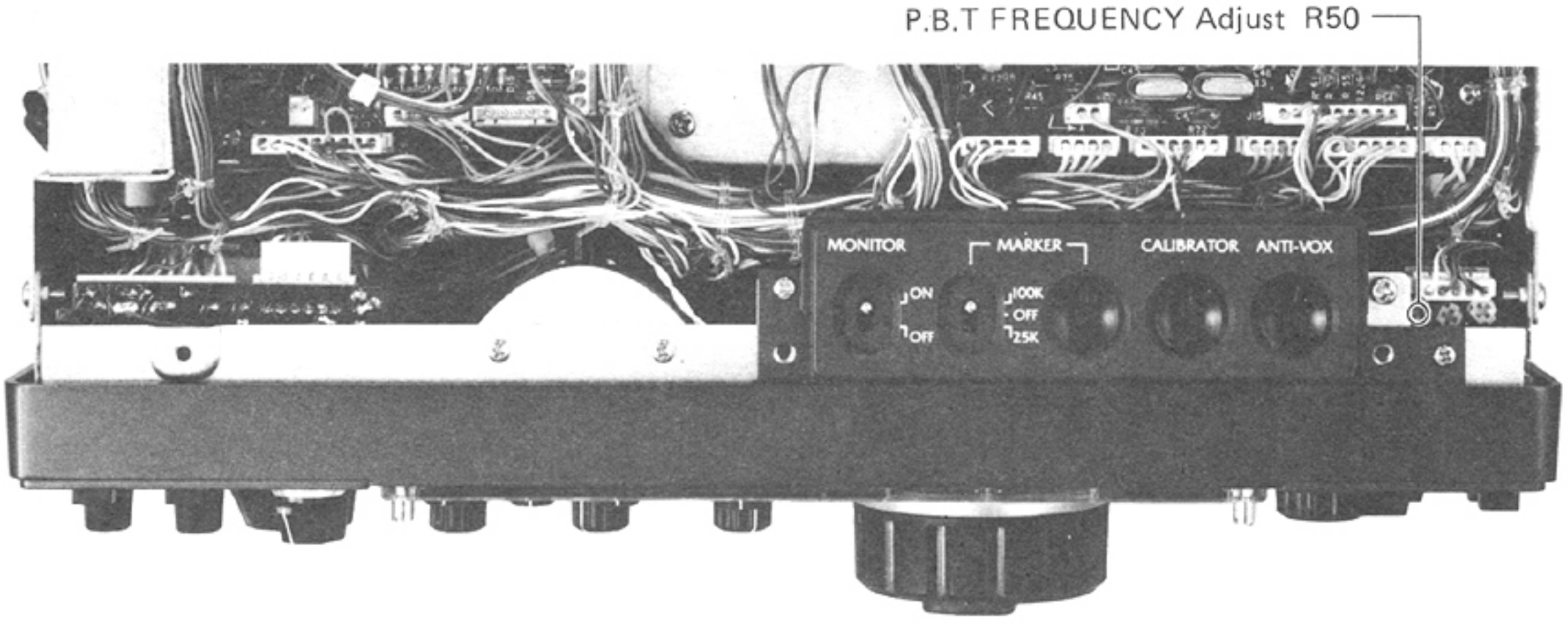
L7 BFO FREQUENCY Adjust RTTY-T 9.01150MHz

C37 BFO FREQUENCY Adjust RTTY-T 9.01167MHz

C48 BFO FREQUENCY Adjust LSB 9.01000MHz

C45 BFO FREQUENCY Adjust USB 9.01300MHz

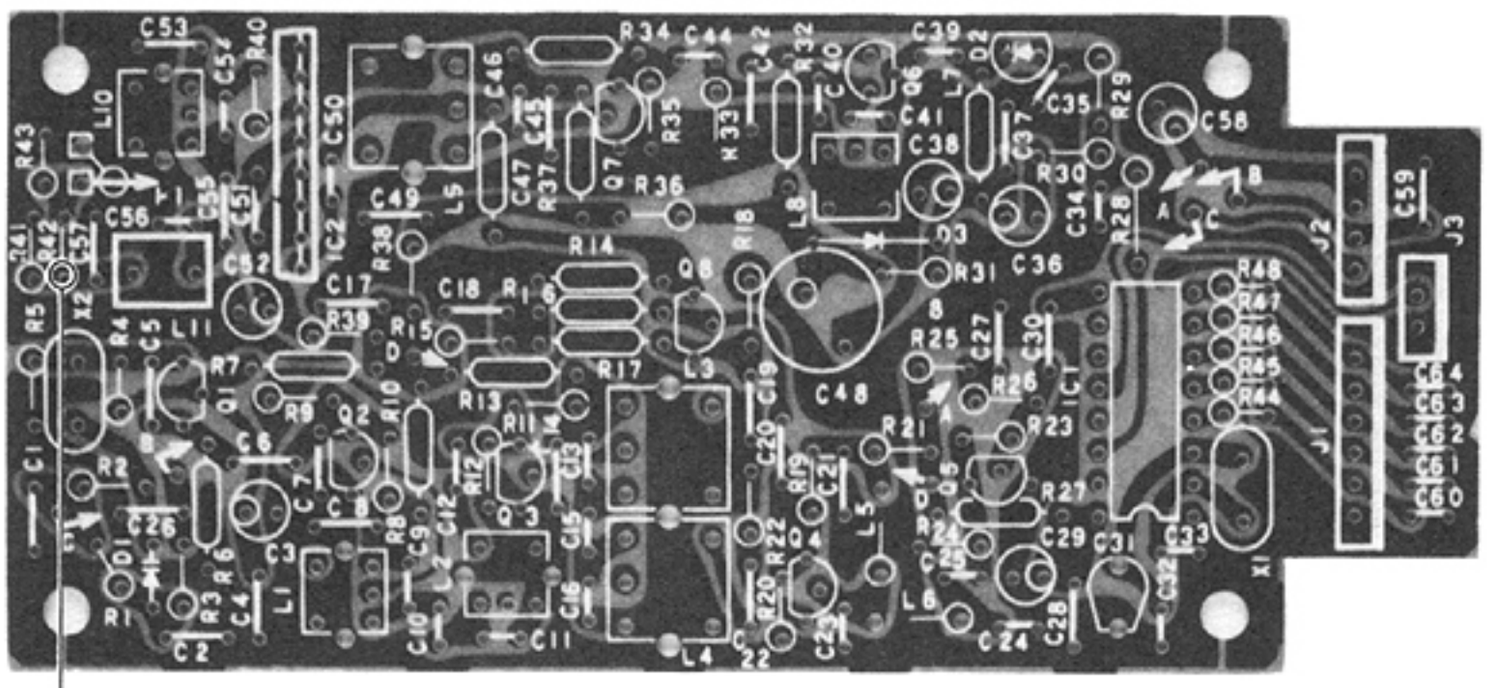
SW-F UNIT



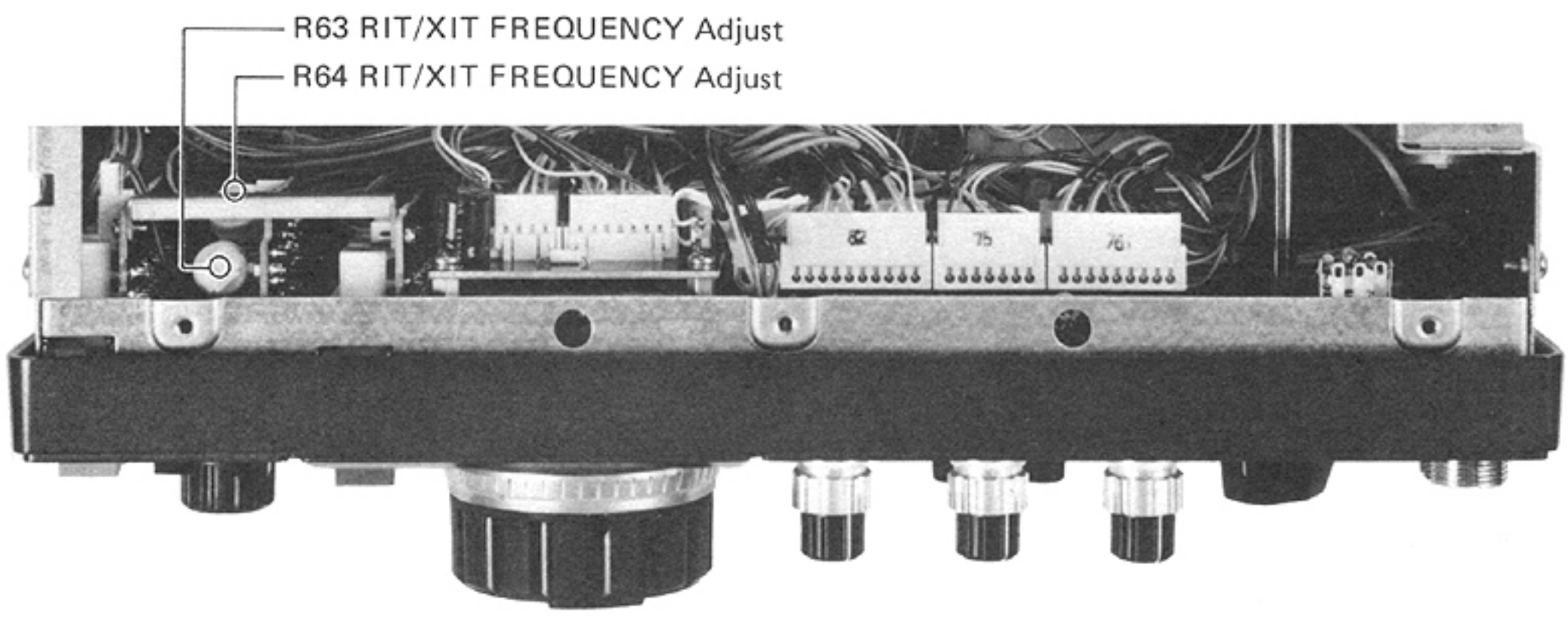
9 - 2 COMMON CIRCUITS ADJUSTMENT (Continued)

Adjustment		Conditions	Unit	Measuring Points	Instrument Reading	Unit	Adjust Points
RIT/XIT FREQUENCY	1.	• CALIBRATOR : Center • T/R SWITCH : RECEIVE • DISPLAY : 6.9000MHz • MODE : CW • RIT : OFF	PLL	Connect the frequency counter to R42.	13.2000MHz	SW-E	R63
	2.	• RIT : ON • RIT/XIT CONTROL : Center					R64

PLL UNIT



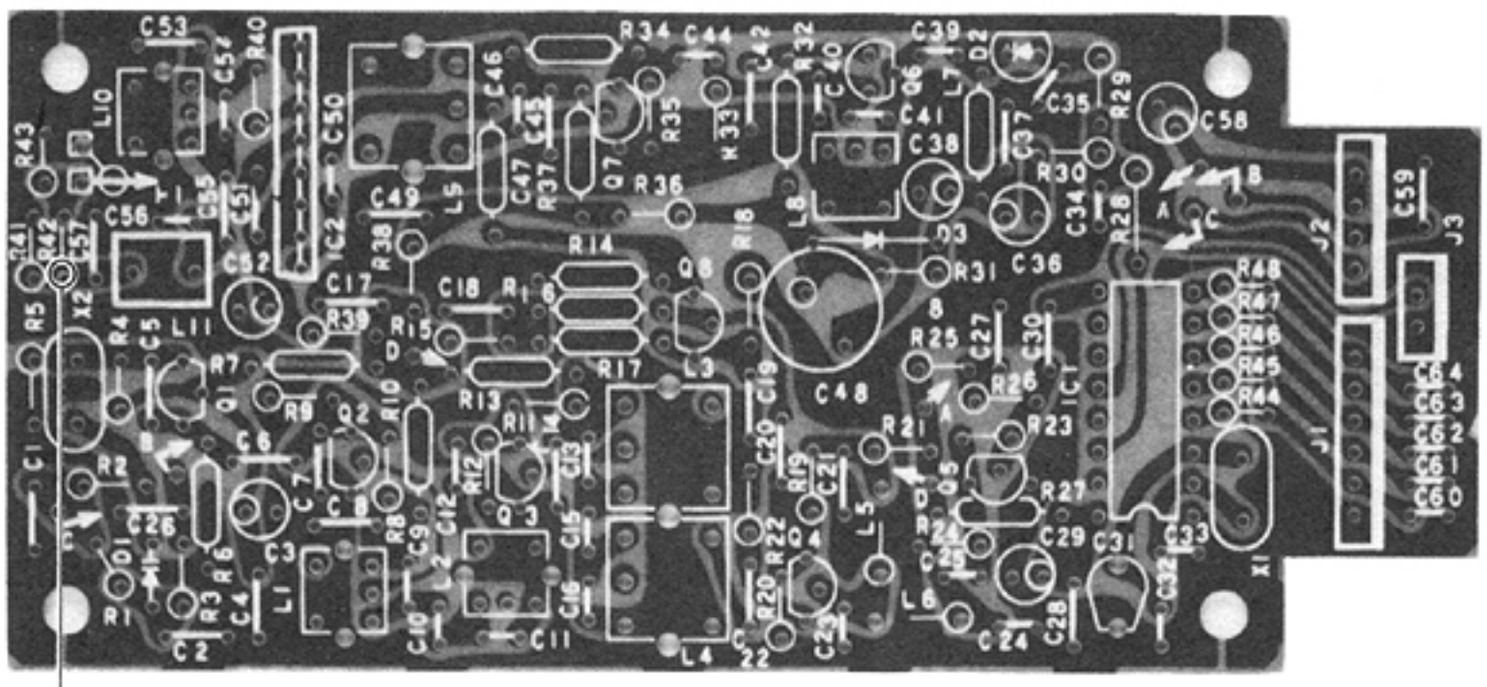
SW-E UNIT



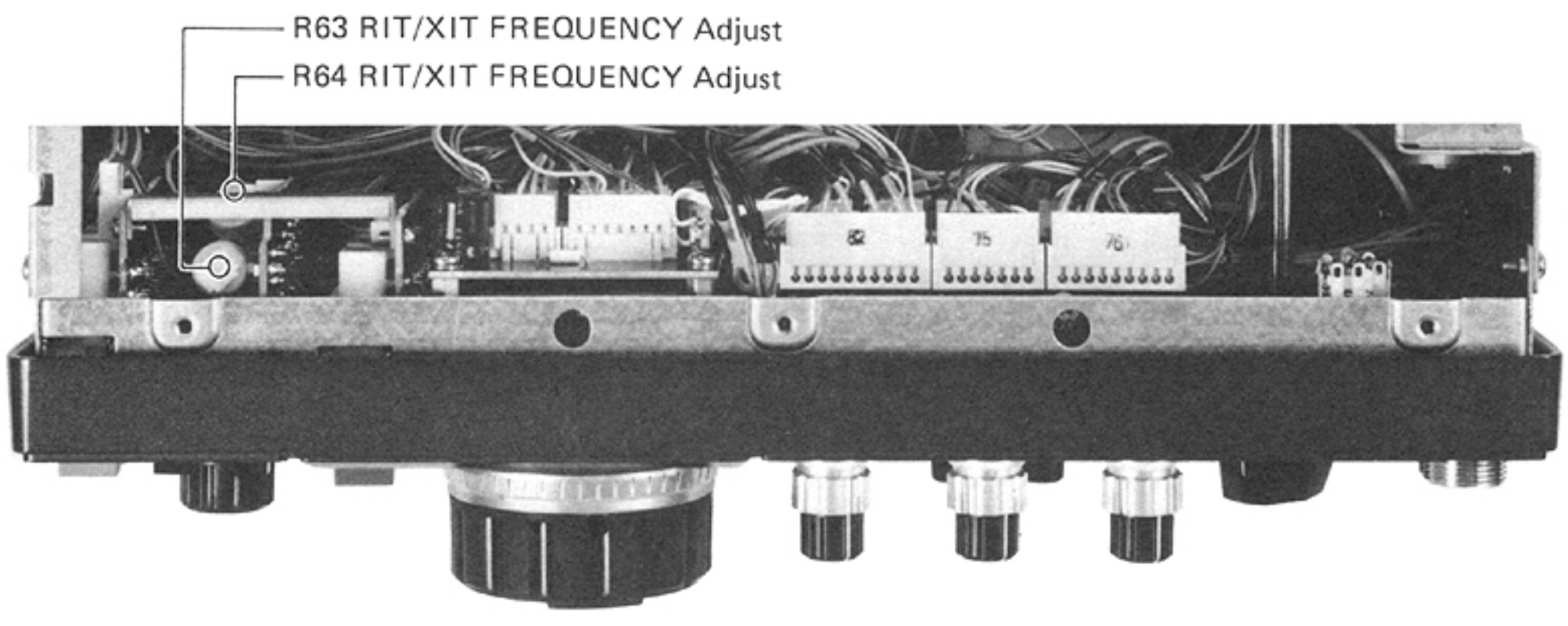
9 - 2 COMMON CIRCUITS ADJUSTMENT (Continued)

Adjustment		Conditions	Unit	Measuring Points	Instrument Reading	Unit	Adjust Points
RIT/XIT FREQUENCY	1.	• CALIBRATOR : Center • T/R SWITCH : RECEIVE • DISPLAY : 6.9000MHz • MODE : CW • RIT : OFF	PLL	Connect the frequency counter to R42.	13.2000MHz	SW-E	R63
	2.	• RIT : ON • RIT/XIT CONTROL : Center					R64

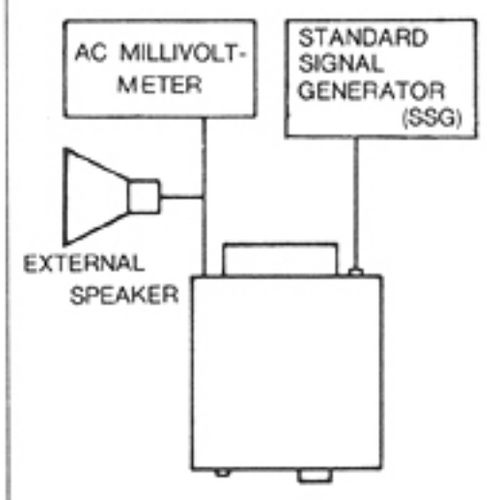
PLL UNIT



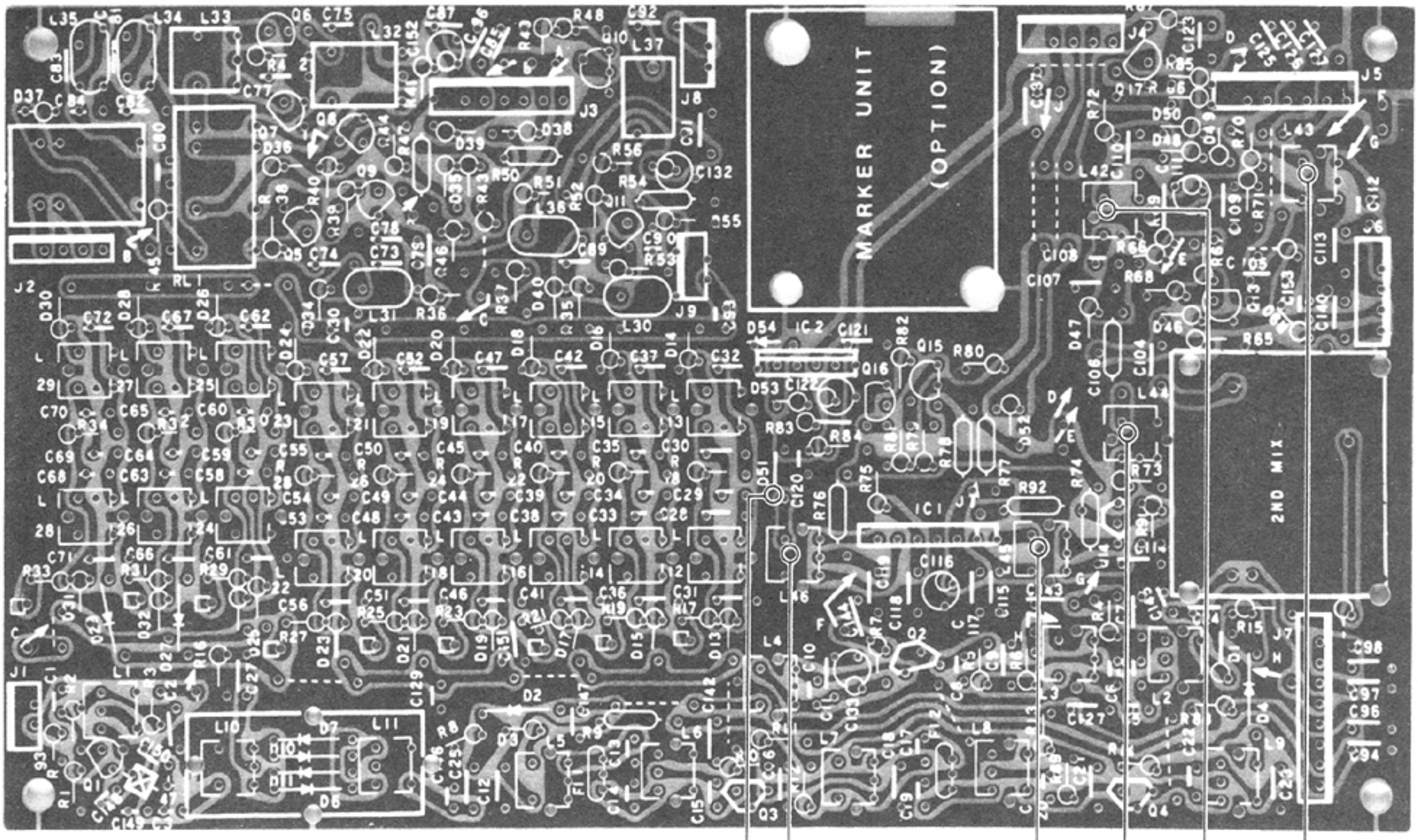
SW-E UNIT



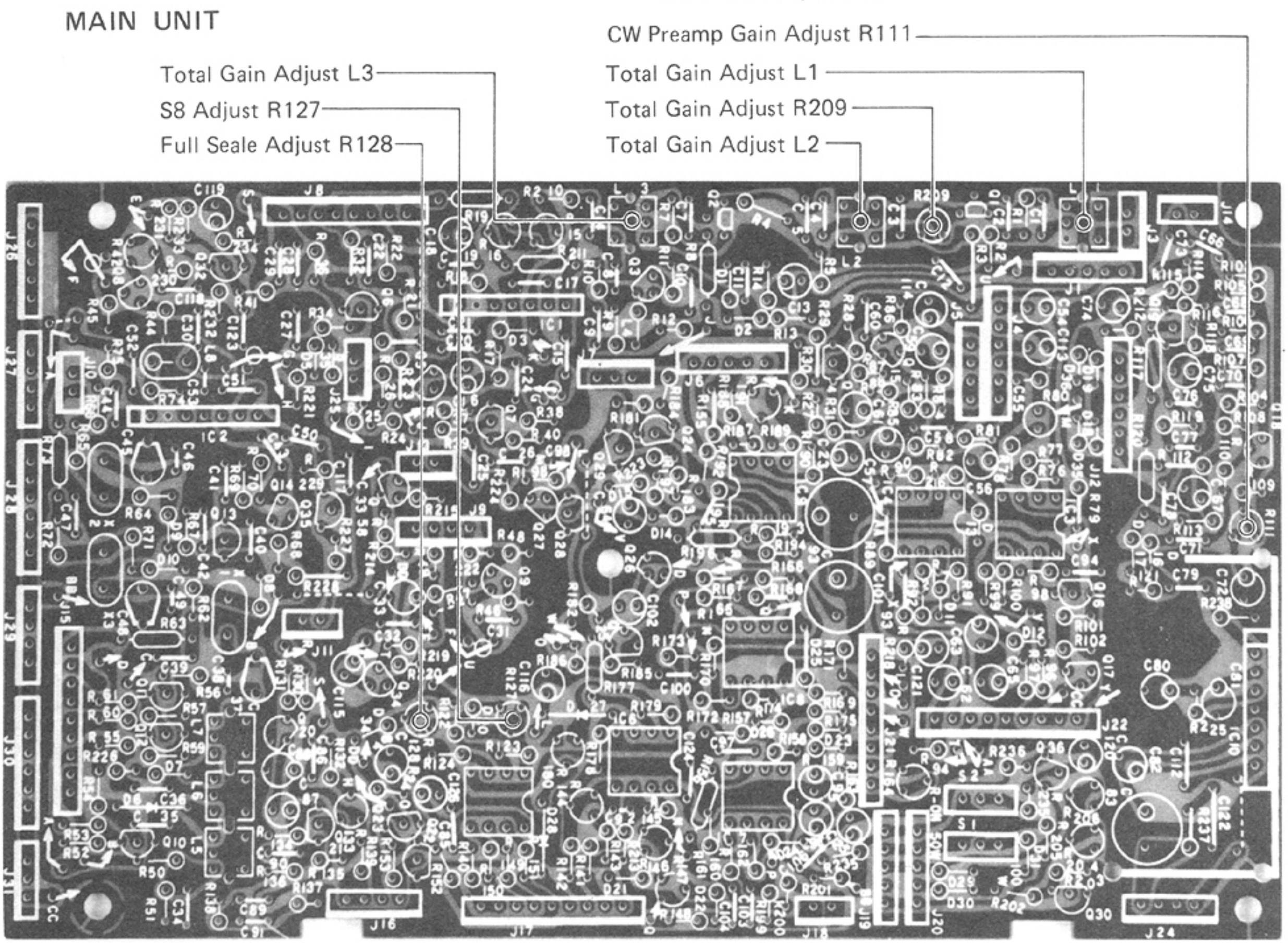
9-3 RECEIVER ADJUSTMENT

Adjustment		Conditions	Unit	Measuring Points	Instrument Reading	Unit	Adjust Points
INSTRUMENTS REQUIRED		(1) STANDARD SIGNAL GENERATOR (SSG) FREQUENCY RANGE 0.1 ~ 40MHz OUTPUT LEVEL (loaded value) −20 ~ +100dB (0dB=1μV) (2) AC MILLIVOLT METER MEASURING RANGE 10mV ~ 3V (3) EXTERNAL SPEAKER IMPEDANCE 8 ohms					
TOTAL GAIN	1.	• MODE : SSB • BAND : 14MHz • PREAMP : OFF • P.B.T. : Center • NOTCH : OFF • NB : OFF • SQL : MIN • RF GAIN : MAX • TONE : Fully clockwise • AGC : Fully counter-clockwise (not OFF) • Set the output level of the SSG to −10dBμ.		• Connect the SSG to the ANT connector. • Connect the AC millivolt meter and external speaker to the EXT SP jack.	Adjust to maximum AF output.	RF IF MAIN	L42, L43 L8 L1, L2, L3
	2.	• Set the output level of the SSG to +40 ~ 60dBμ.			Adjust the AF GAIN control to get 2.5V AF output.	FRONT PANEL	AF GAIN
	3.	• Turn off the output of the SSG.			Adjust R209 so that the noise level is 30dB down (about 80mV) from 2.5V.	MAIN	R209
CW PREAMP GAIN	1.	• MODE : USB • Set the output level of the SSG to +40 ~ 60dBμ.		• Connect the SSG to the ANT connector. • Connect the AC millivolt meter and external speaker to the EXT SP jack.	Tune to get maximum AF output.	FRONT PANEL	Tuning Control
	2.	Keep the condition of 1., and adjust the AF GAIN control to get 1V AF output.					
	3.	• MODE : CW • Set the output level of the SSG to +40 ~ 60dBμ.			Tune to get 800Hz beat tone and maximum AF output.	FRONT PANEL	Tuning Control
	4.				Keep the condition of 3., and adjust R141 to get 1V AF output.	MAIN	R111
S-METER	1.	• MODE : USB • BAND : 14MHz • PREAMP : OFF • P.B.T. : Center • AGC : Center • Set the output level of the SSG to +20dBμ.		S-METER of the set.	S8	MAIN	R127
	2.	• Set the output level of the SSG to +80dBμ.			S9 + 60dB		R128
	3.	Repeat adjustments of 1. and 2. several times. Confirm that the meter is full-scaled when the RF GAIN control is turned fully counterclockwise, and does not deflect in the FM mode.					
NOISE BLANKER	1.	• MODE : USB Apply pulse noise to the ANT connector.	RF	Connect and oscilloscope to D51.	Adjust to get maximum.	RF	L44 ~ L46
	2.	When the NB switch is set at the NOR position, the noise blanker should not work for wide noises (pulse width: about 5 milliseconds). When the NB switch is set at the WIDE position, the noise blanker should work for either narrow noises (pulse width: about 0.4 ~ 0.5 milliseconds) or wide noises. Confirm that the NB amplifiers do not oscillate when the NB LEVEL control is turned fully clockwise.					

RF UNIT



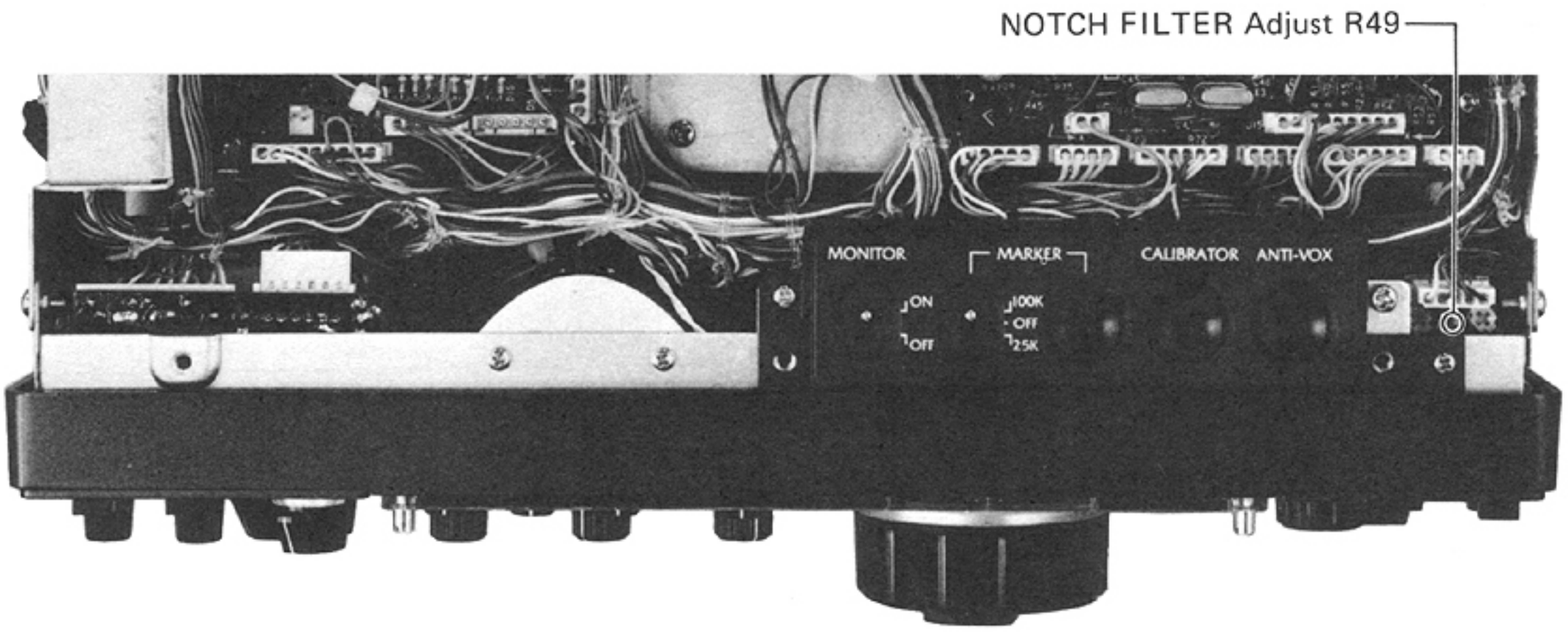
MAIN UNIT



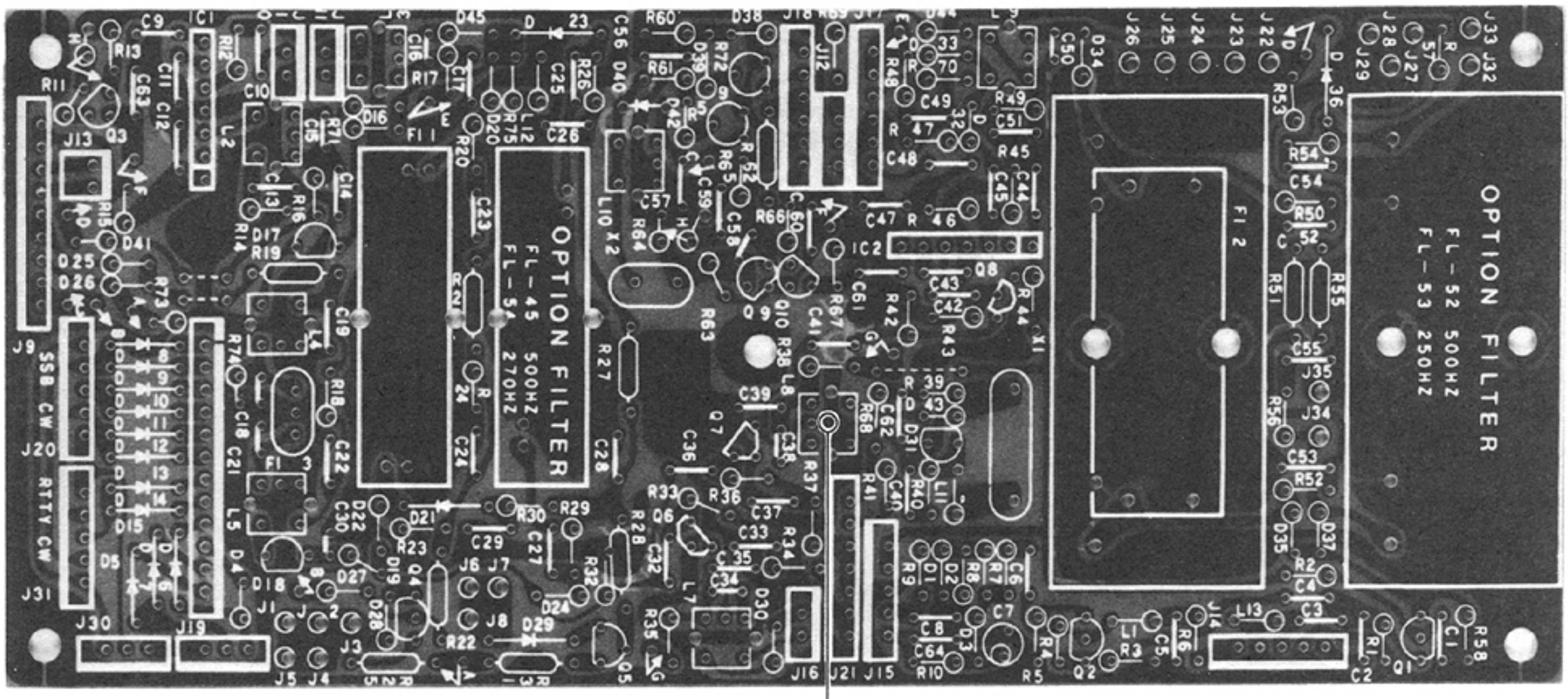
9-3 RECEIVER ADJUSTMENT (Continued)

Adjustment		Conditions	Unit	Measuring Points	Instrument Reading	Unit	Adjust Points
NOTCH FILTER	1.	• MODE : USB • BAND : 14MHz • IF/P.B.T. : IF • IF SHIFT/P.B.T. CONTROL : Fully Left • NOTCH : OFF • NOTCH FILTER : Fully Left • Set the output level of the SSG to +34dBμ.			Tune to make zero-beat.	FRONT PANEL	Tuning Control
	2.	• NOTCH : ON		S-METER	Adjust R49 to get minimum meter deflection.	SW-F	R49
	3.	• MODE : LSB • IF SHIFT/P.B.T. CONTROL : Fully Right • NOTCH : OFF • NOTCH FILTER : Fully Right • Set the output level of the SSG to +34dBμ.			Tune to make zero-beat.	FRONT PANEL	Tuning Control
	4.	• NOTCH : ON		S-METER	Adjust R45 to get minimum meter deflection.	SW-F	R45
	5.	Repeat adjustment of 1.～4. several times. The notch deep will be more than 25dB.					
SQUELCH	1.	• MODE : SSB • RF GAIN : Fully counterclockwise • AGC : OFF • SQL CONTROL : At 10 o'clock position • Turn off the output of the SSG.			Adjust R33 to close the squelch.	VR-A	R33
	2.	• Confirm that the squelch will be opened by turning the RF GAIN control clockwise. • The squelch should be closed by turning the control clockwise when a S9 + 40dB signal is applied or the RF GAIN control is turned counterclockwise to deflect the S-METER. • Confirm that the RECEIVE indicator is lighted when the squelch is opened.					

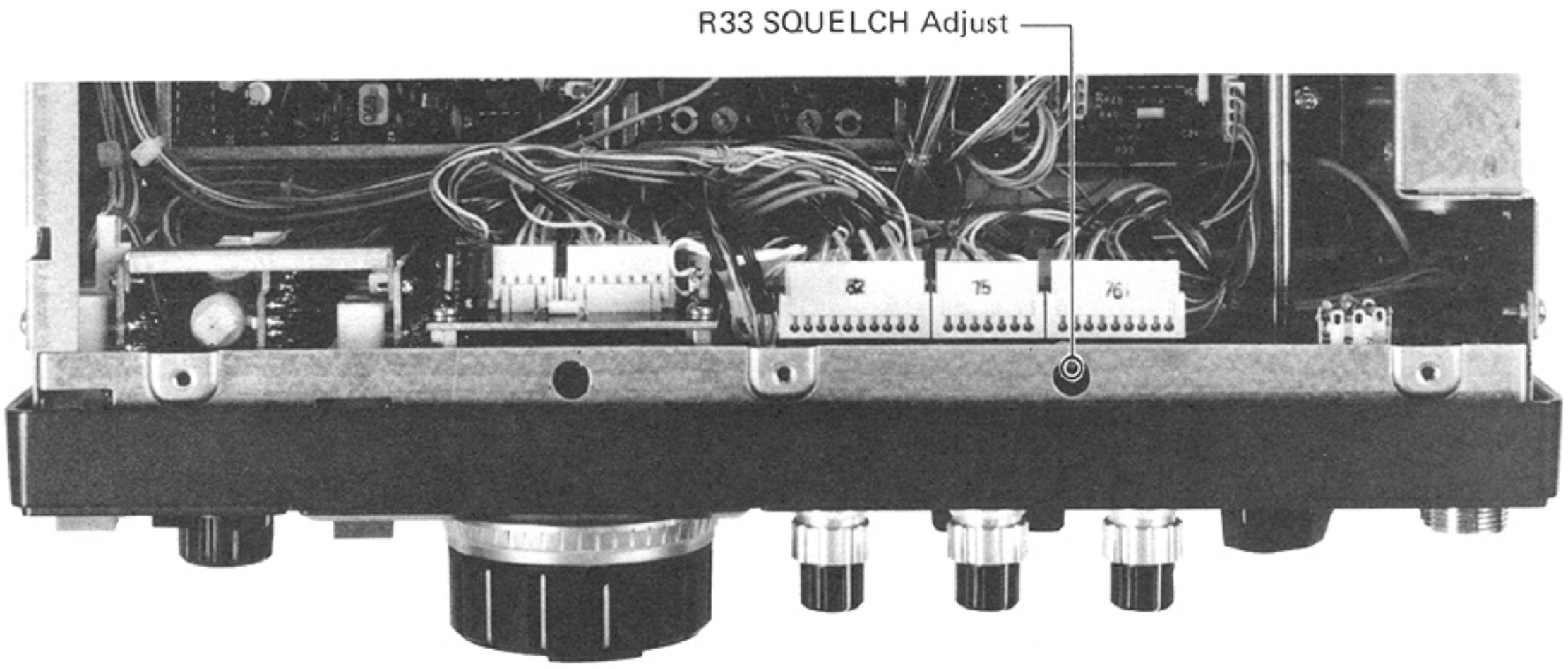
SW-F UNIT



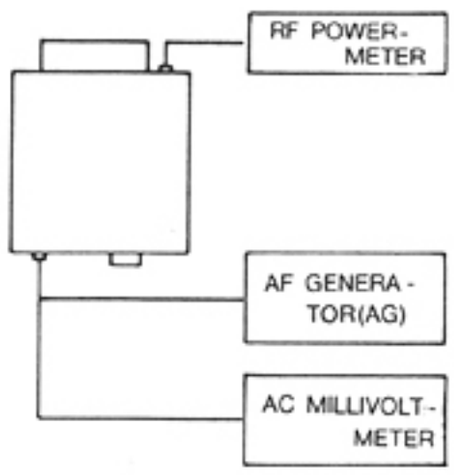
IF UNIT



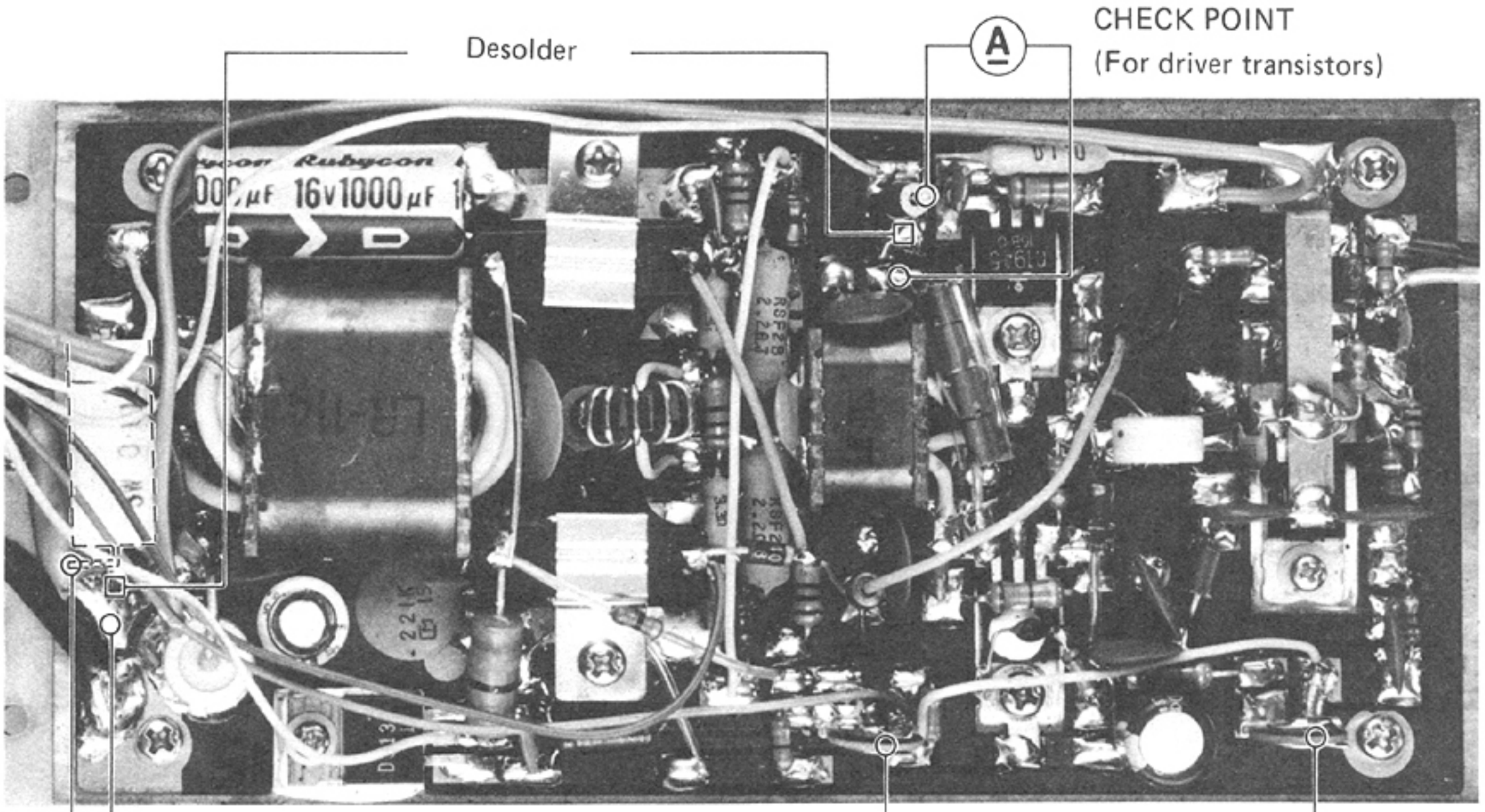
VR-A UNIT



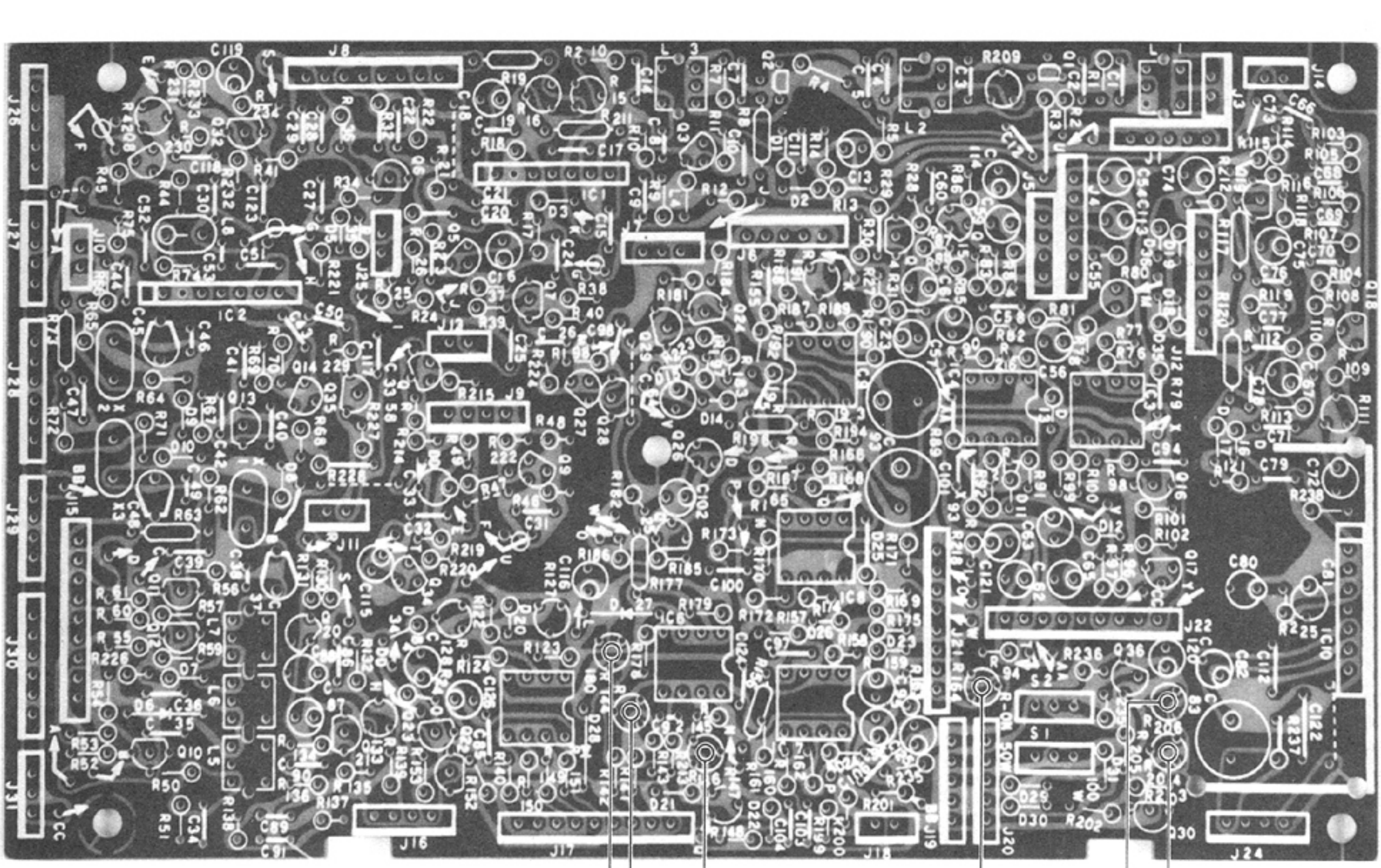
9-4 TRANSMITTER ADJUSTMENT

Adjustment		Conditions	Unit	Measuring Points	Instrument Reading	Unit	Adjust Points
INSTRUMENTS REQUIRED	1.	(1) RF POWER METER (TERMINATED TYPE) MEASURING RANGE 20～200W FREQUENCY RANGE 1.8～30MHz IMPEDANCE 50 ohms SWR Less than 1.1 (2) AF GENERATOR (AG) FREQUENCY RANGE 200～3000Hz OUTPUT LEVEL 0～300mV (3) AC MILLIVOLTMETER MEASURING RANGE 10mV～3V					
BIAS VOLTAGE	1.	• MODE : SSB • BAND : 14MHz • MIC GAIN : MIN (Fully counterclockwise)	PA	Desolder at the center of jumper wire with 2 bead cores, and connect a DC ammeter there in series.	100mA	PA	R6 (For driver transistors)
	2.	• T/R SWITCH : TRANSMIT		Desolder D4 side lead of R27, and connect a DC ammeter between the tab and R27.	600mA		R21 (For final transistors)
ALC	1.	• MODE : RTTY • BAND : 14MHz • COMP : OFF • RF POWER : MAX (Fully clockwise)		RF POWER METER	100W	MAIN	R206
	2.	• RF POWER : MIN (Fully counterclockwise)			5～10W		R164
	3.	• RF POWER : MAX • Set S1 on the MAIN unit to "50W" position.			50W		R204
Ic METER	1.	• MODE : CW • METER SWITCH : Ic • Set in TRANSMIT mode and key up.	FRONT PANEL	Ic METER	600mA	MAIN	R144
	2.	• MODE : RTTY • METER SWITCH : Ic • RF POWER : Fully clockwise		Connect a DC ammeter to the power cable in series.	Adjust to total current minus 3A.		R146
ALC METER	1.	• MODE : USB • BAND : 14MHz • COMP : ON • RF POWER : MAX (Fully clockwise) • MIC GAIN : MAX (Fully clockwise) • METER SWITCH : ALC • Apply 1.5KHz/100～300mV signal from the AG.	FRONT PANEL	ALC METER	ALC ZONE Full level (Center of the meter scale)	MAIN	R180
	2.	• COMP : OFF			Meter deflection will be overscale from the ALC zone.		Confirming

PA UNIT



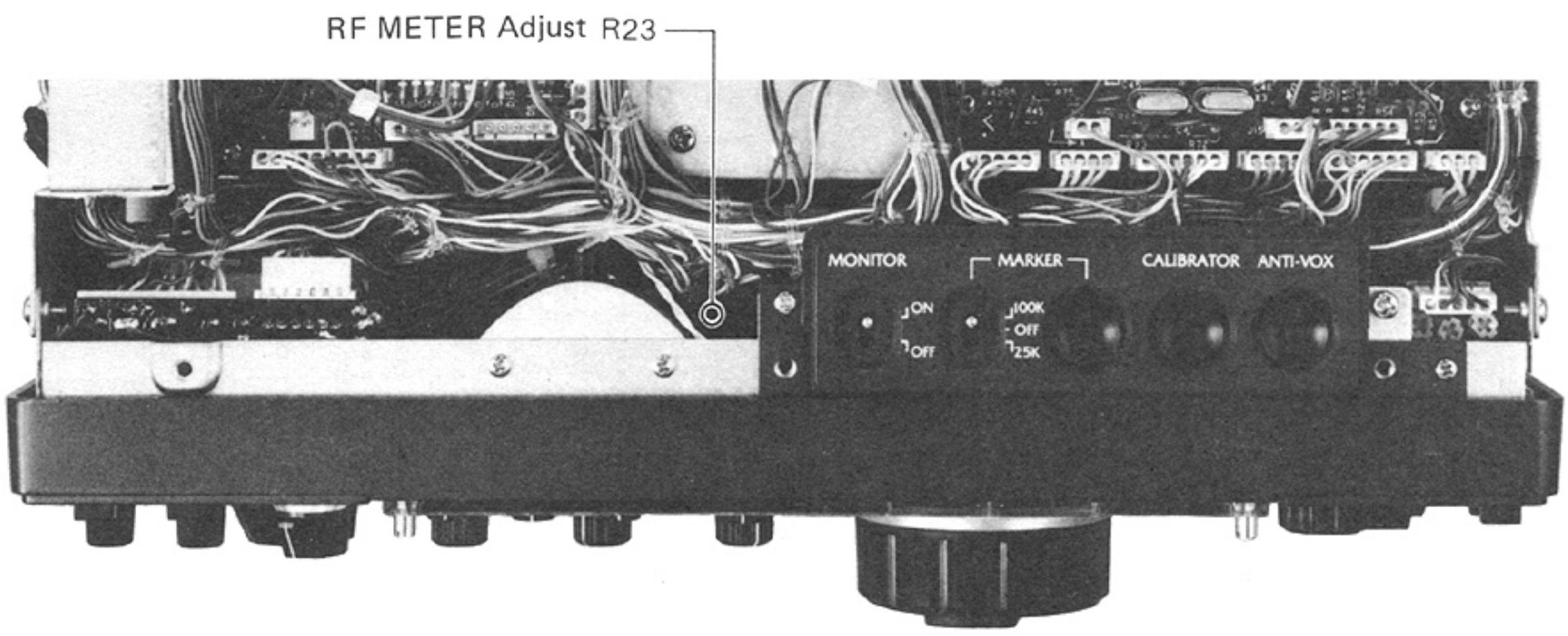
MAIN UNIT



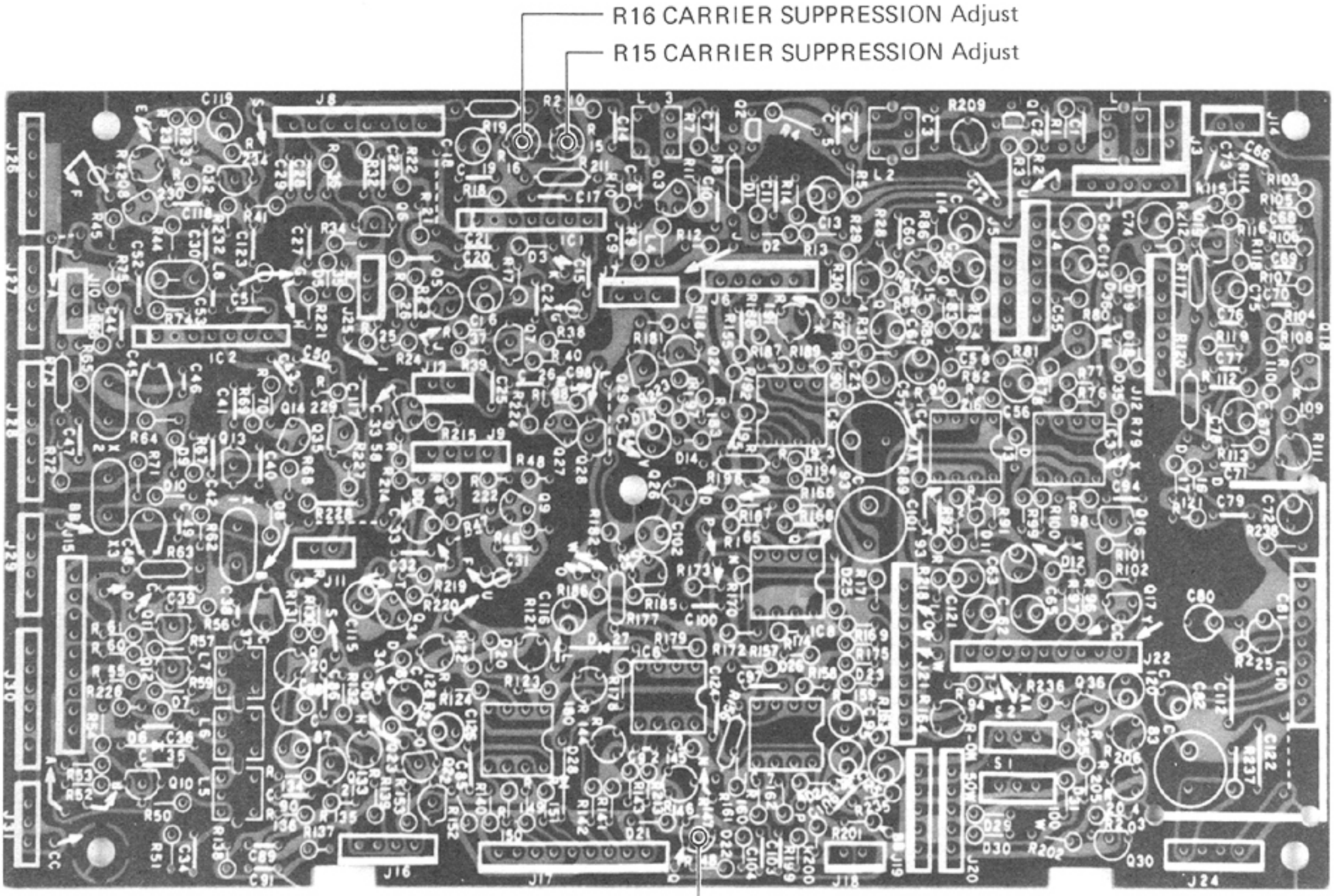
9 - 4 TRANSMITTER ADJUSTMENT (Continued)

Adjustment		Conditions	Unit	Measuring Points	Instrument Reading	Unit	Adjust Points
COMP METER	1.	• MODE : RTTY • COMP : ON • METER SWITCH : COMP • RF POWER : Fully clockwise	FRONT PANEL	S-METER	Meter deflection will be about 20dB on the COMP scale.		Confirming
	2.	• MODE : USB • Apply 1.5KHz/100～300mV signal from the AC.			Meter deflection will be over 20dB on the COMP scale.		
RF METER	1.	• MODE : RTTY • METER SWITCH : RF	FRONT PANEL	Po METER	80%	SW-C	R23
SWR METER	1.	• MODE : RTTY • RF POWER : Set to get 35～45W output power. • METER SWITCH : SET	FRONT PANEL	SWR METER	Adjust the RF POWER control so that the meter points "SET" mark.	FRONT PANEL	RF POWER Control
	2.	• BAND : EACH BAND • METER SWITCH : SWR			SWR should be less than 1.2 on each band.		Confirming
APC	1.	• MODE : RTTY • BAND : 14MHz • RF POWER : Fully clockwise • COMP : OFF		Read the ammeter provided in the power supply, or connect an ammeter to the power cable in series.	20A	MAIN	R147
	2.	• BAND : EACH BAND • Set in TRANSMIT mode with full output power, and do not connect anything to the ANT Connector.			Less than 12A		Confirming
CARRIER POINT	1.	• MODE : USB/LSB • BAND : 14MHz • COMP : OFF • TX TONE CONTROL (MAIN/R42) : MAX (Fully clockwise) Apply 2.7KHz/100mV signal from the AG then adjust the MIC GAIN control to get 20～30W output power.		Connect the RF POWER METER to the ANT connector.	Change the operating mode for USB and LSB alternately, and adjust R72 and R59 to get same output power in either mode.	IF	R72
	2.	• COMP : ON Apply 2.7KHz/30～100mV signal from the AG.					R59
CARRIER SUPPRESSION	1.	• MODE : USB/LSB • BAND : 14MHz • COM : OFF • MIC GAIN : MIN		Connect an RF voltmeter or spectrum analyzer to the ANT connector.	Change the operating mode for USB and LSB alternately, and adjust R15 and R16 to get minimum output (less than −50dB).	MAIN	R15 R16
	2.	• COMP : ON			Less than −50dB		Confirming

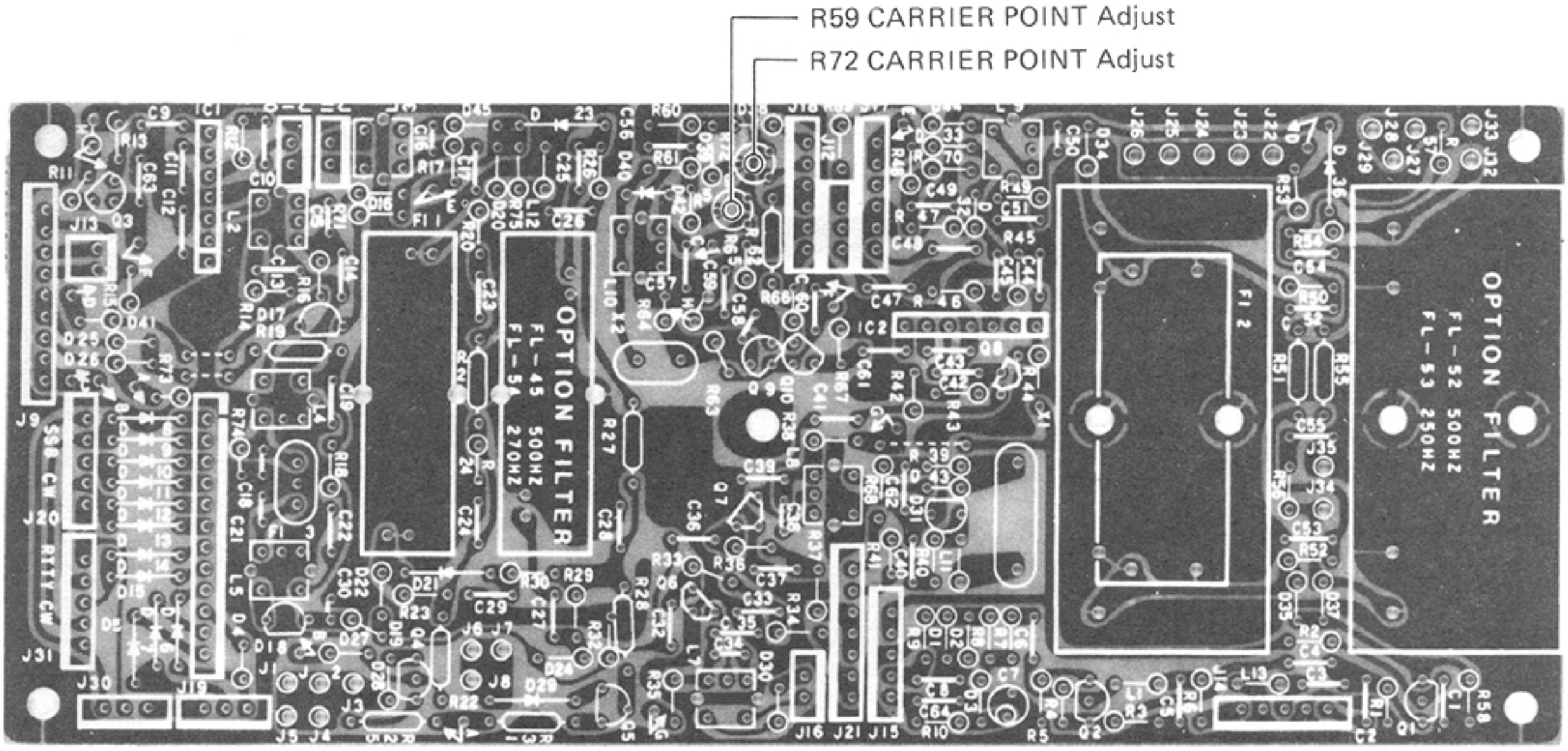
SW-C UNIT



MAIN UNIT

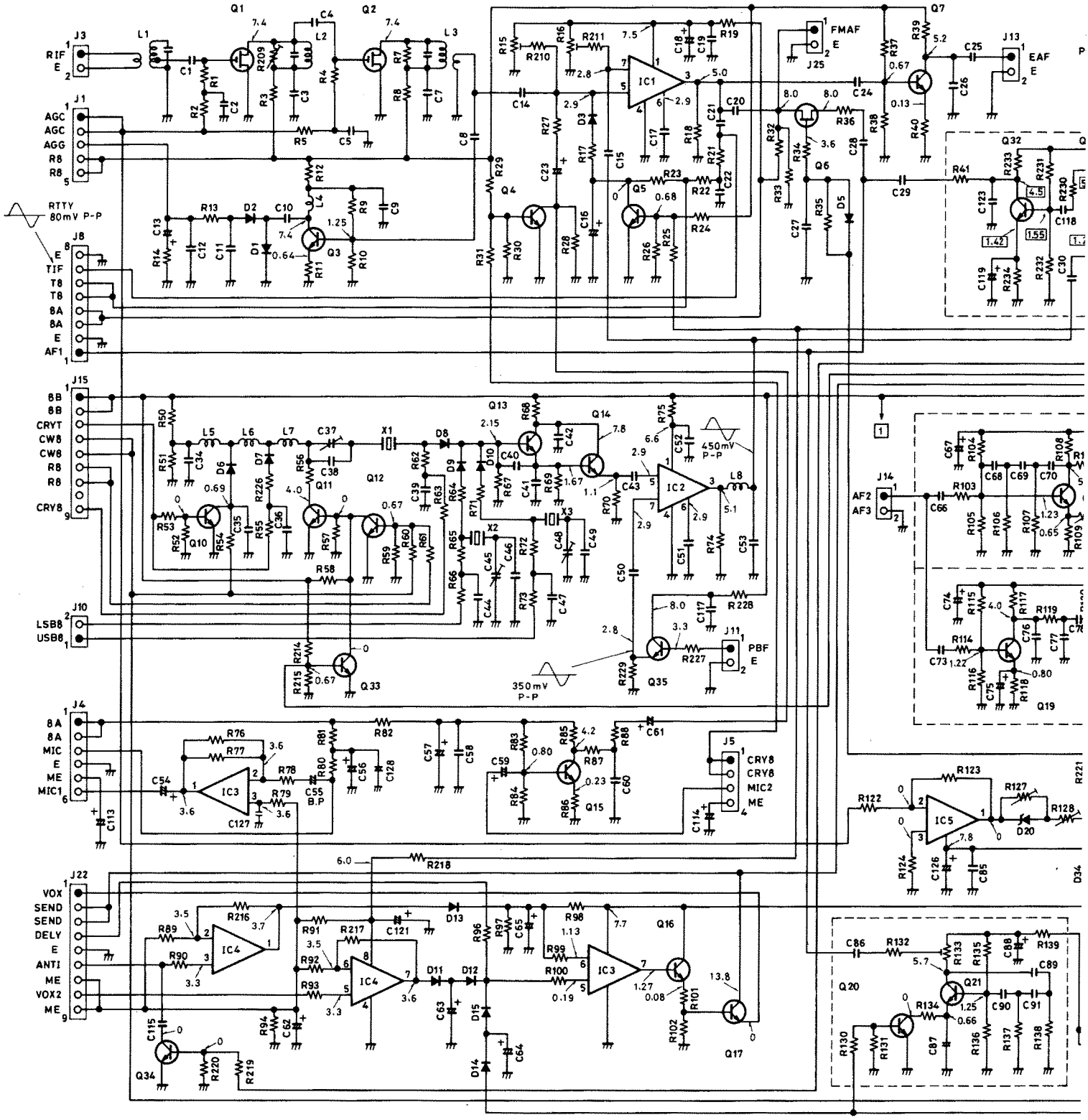


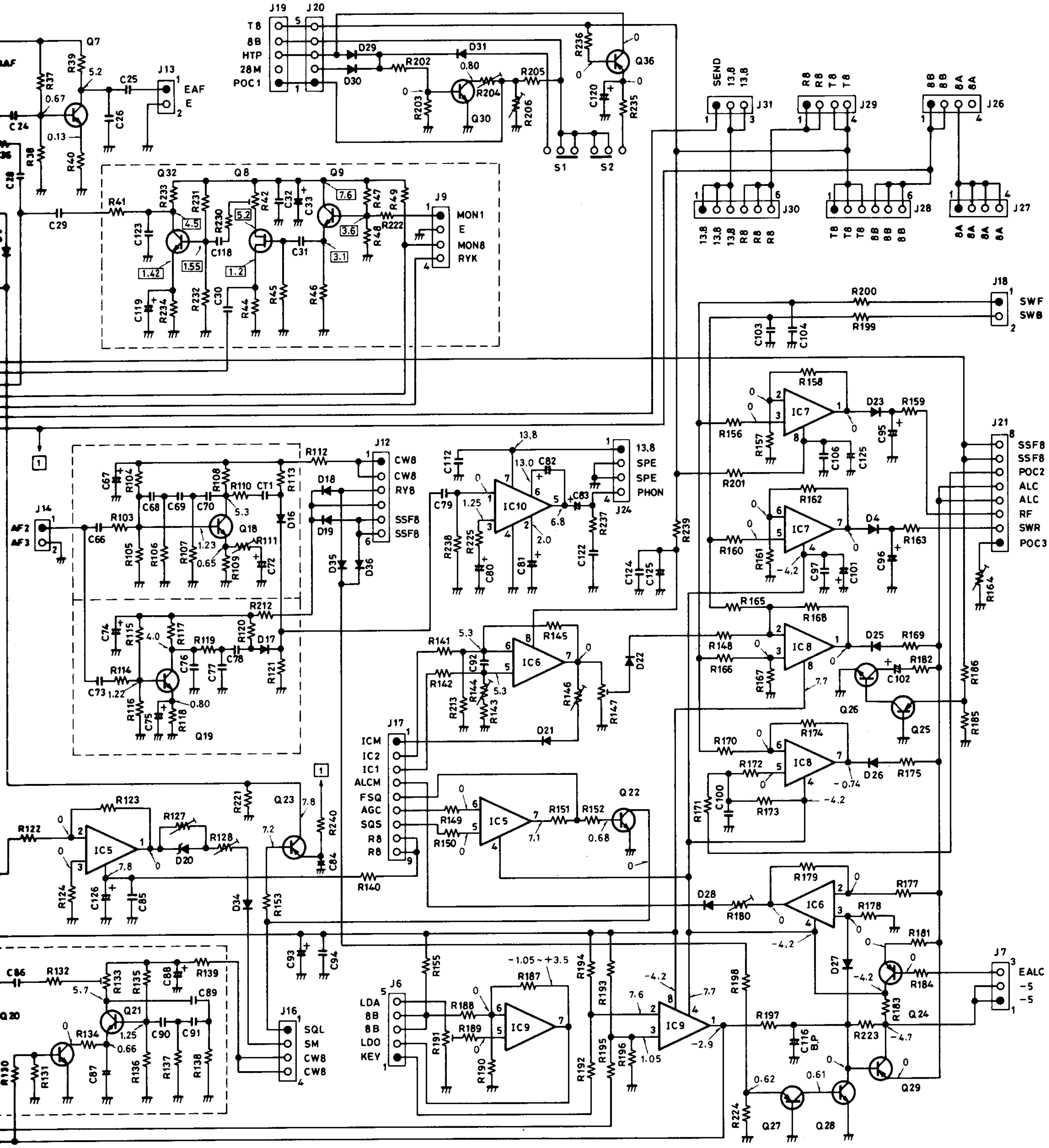
IF UNIT



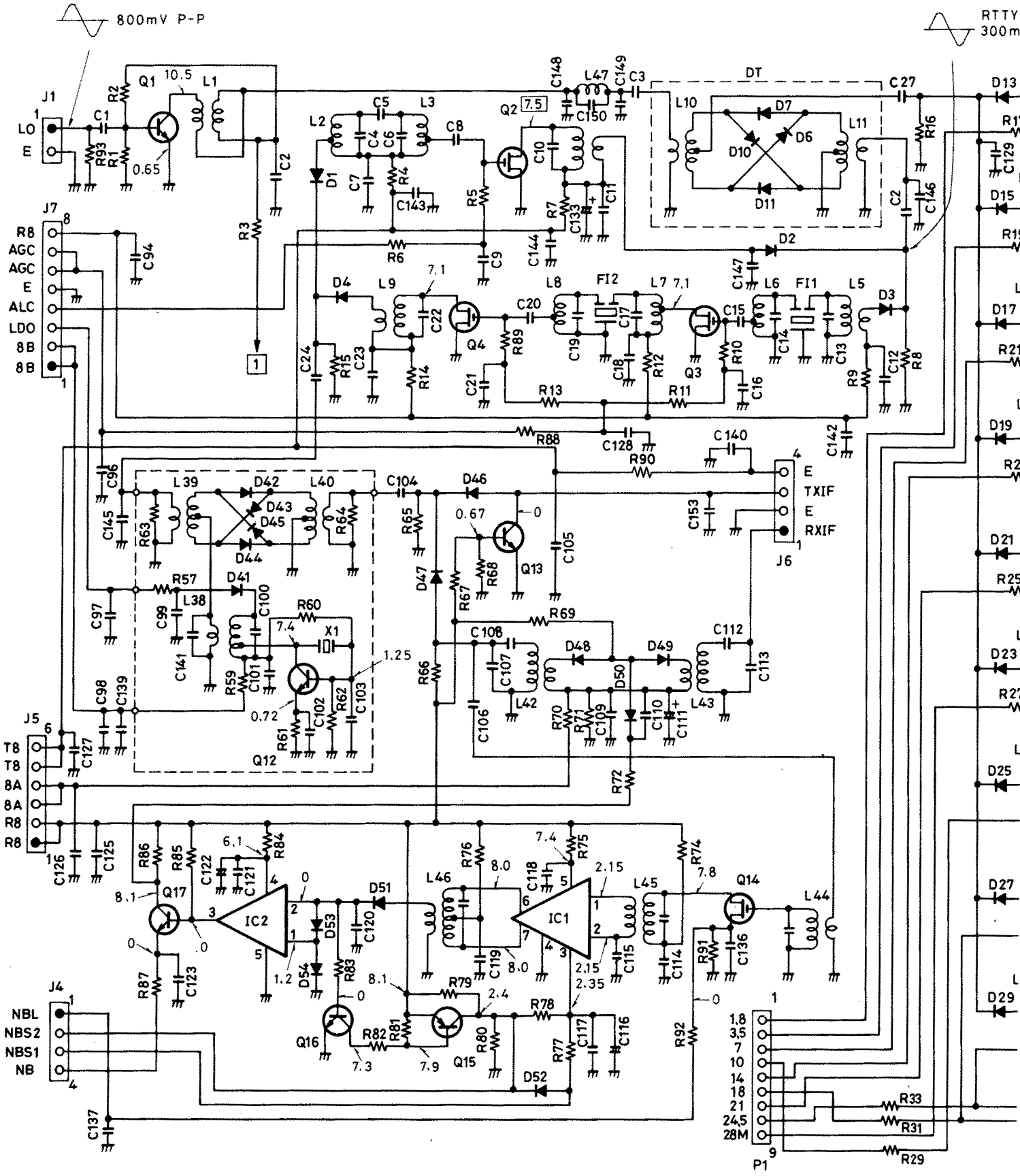
SECTION 10 VOLTAGE (CIRCUIT) DIAGRAMS

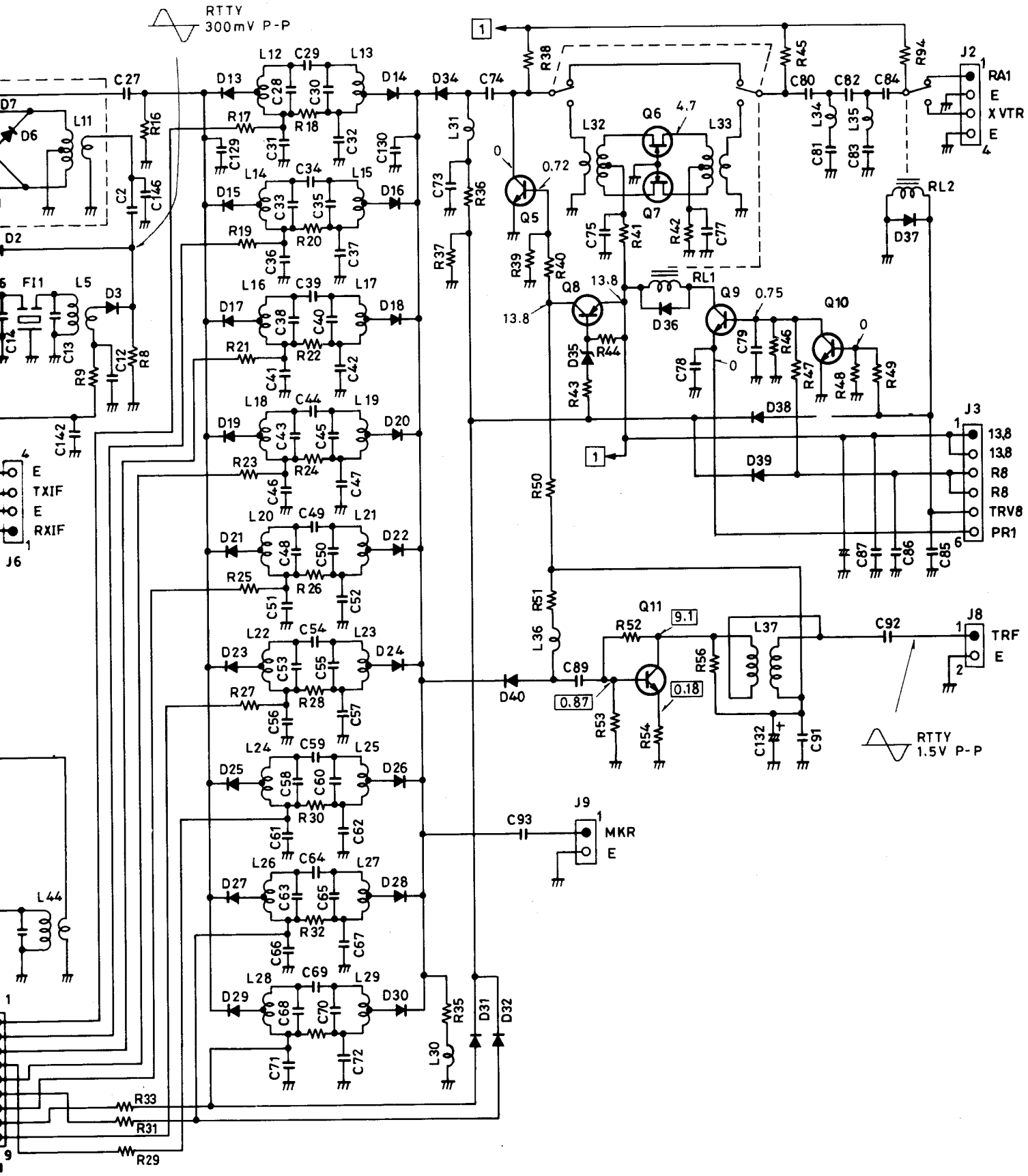
MAIN UNIT CIRCUIT AND VOLTAGE DIAGRAM



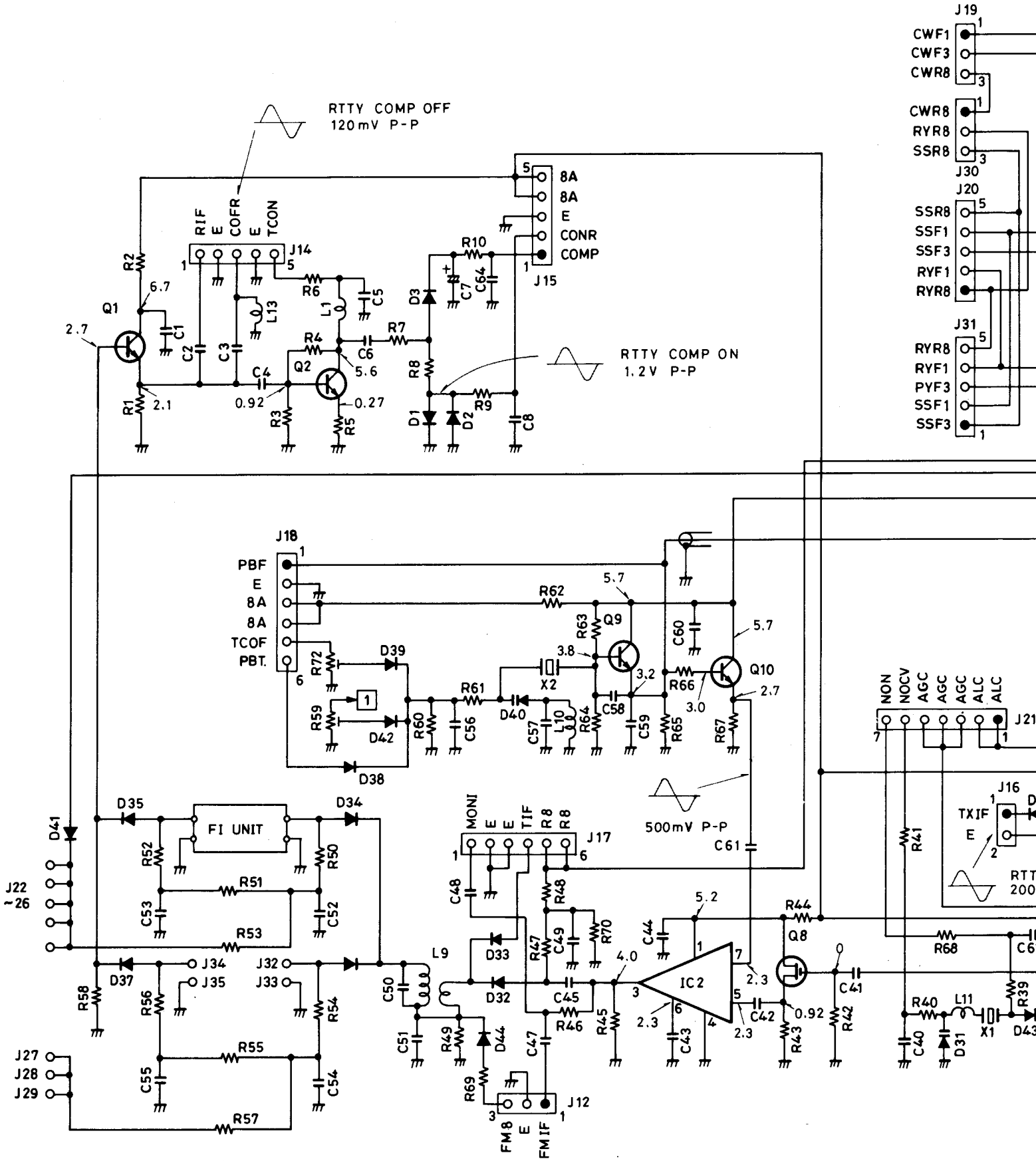

J19 J20
T8
8B
HTP
28M
POC1
J13 EAF E
SEND 13.8 13.8 J31
R8 R8 T8 T8 J29
8B 8B 8A 8A J26
13.8 13.8 13.8 R8 R8 R8 J30
T8 T8 T8 8B 8B 8B J28
8A 8A 8A 8A J27
S1 S2
J9 MON1 E MON8 RYK
J18 SWF SWB
J12 CW8 CW8 RY8 SSF8 SSF8
J24 13.8 SPE SPE PHON
J14 AF2 AF3
J21 SSF8 SSF8 POC2 ALC ALC RF SWR POC3
J17 ICM IC2 IC1 ALCM FSQ AGC SQS R8 R8
J16 SQL SM CW8 CW8
J6 LDA 8B 8B LDO KEY
J7 EALC -5 -5
IC5 IC6 IC7 IC8 IC9 IC10

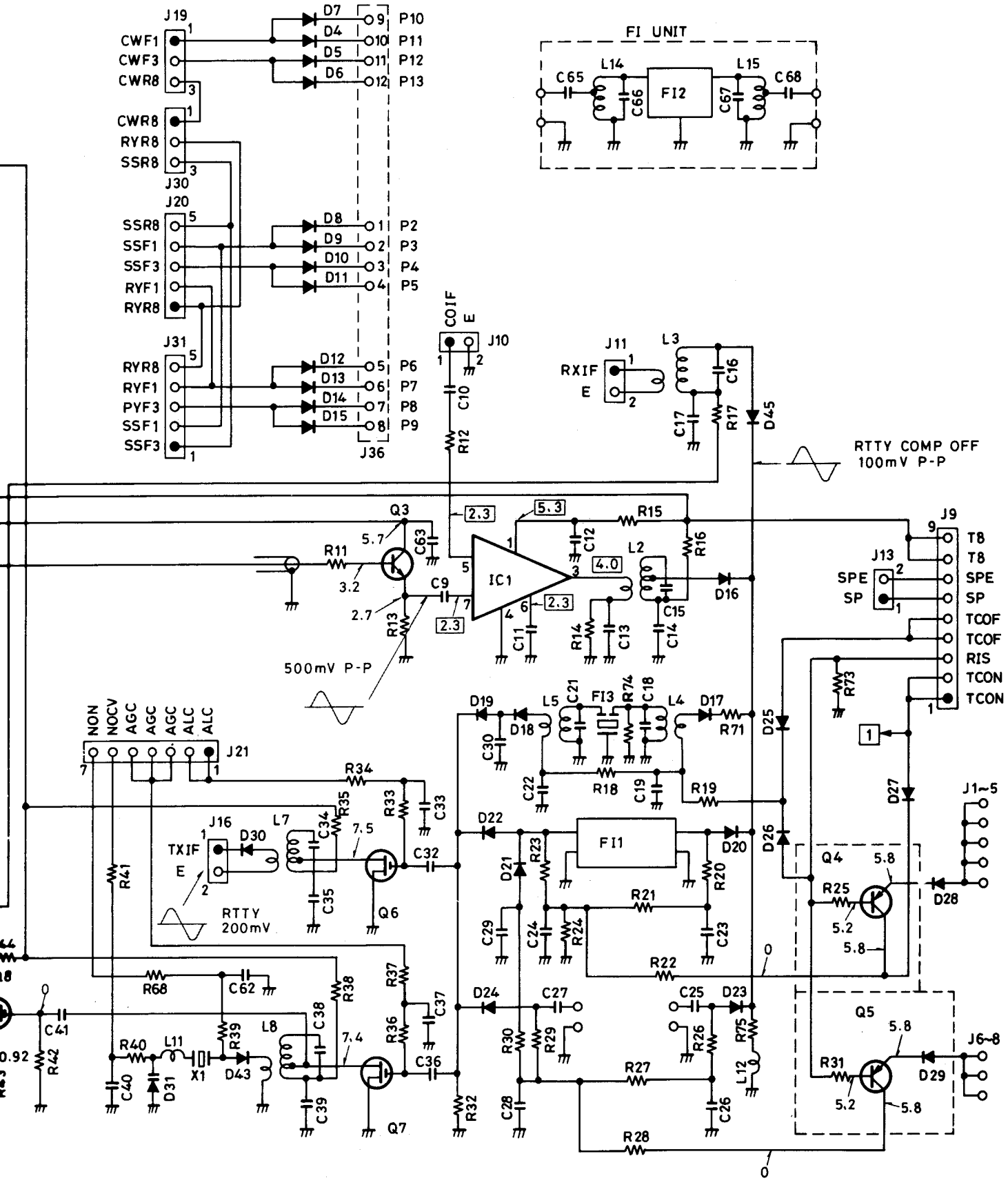
RF UNIT CIRCUIT AND VOLTAGE DIAGRAM



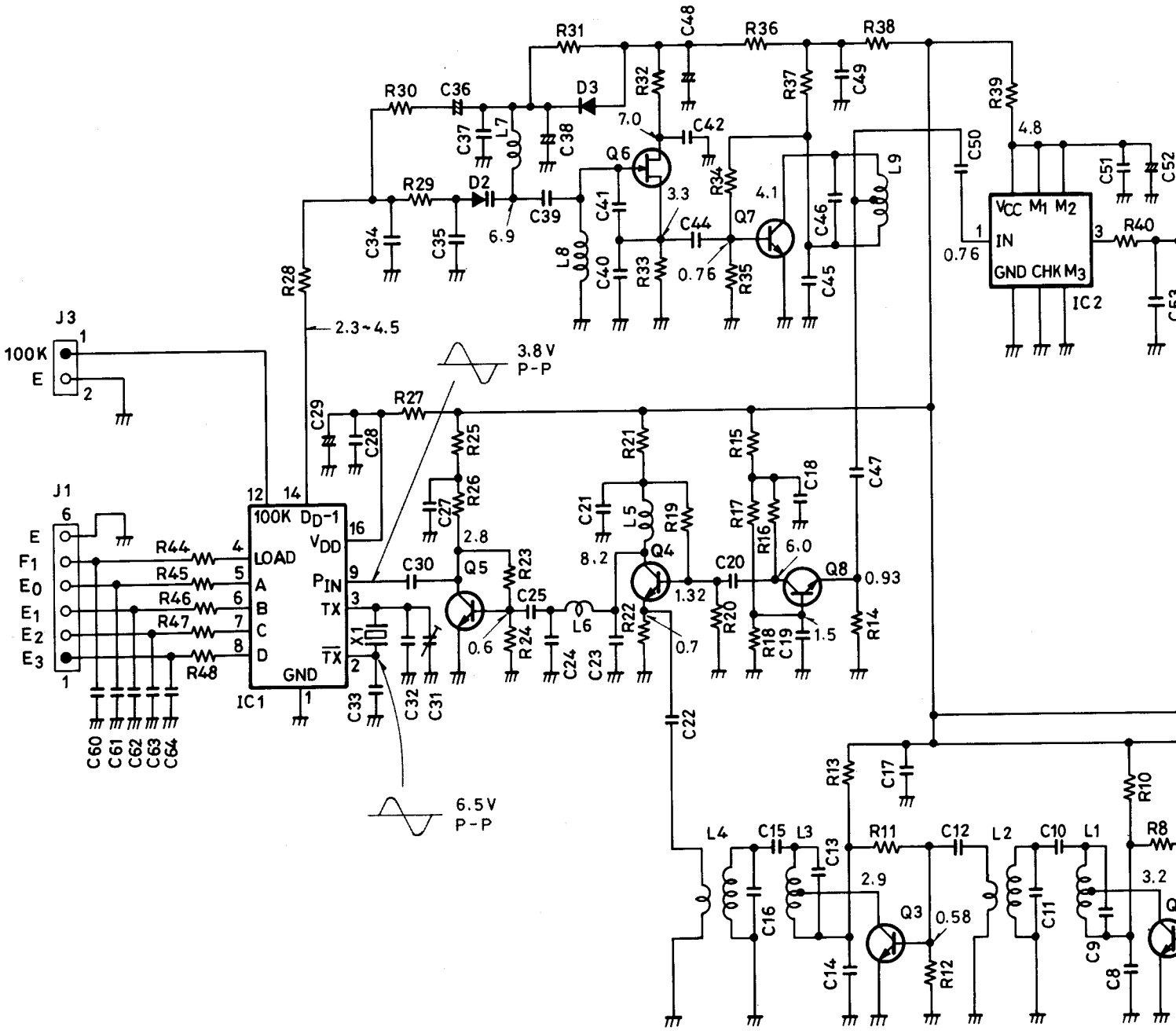

RTTY
300mV P-P
J2
RA1
E
XVTR
E
4
J3
13.8
13.8
R8
R8
TRV8
PR1
6
J6
4
E
TXIF
E
RXIF
1
J8
TRF
E
J9
MKR
E
RTTY
1.5V P-P
RL1
RL2
Q5
Q6
Q7
Q8
Q9
Q10
Q11
4.7
0.72
13.8
0.75
9.1
0.87
0.18
D40
C27
C74
C80
C82
C84
C92
C93
R38
R45
R94
R50
R33
R31
R29

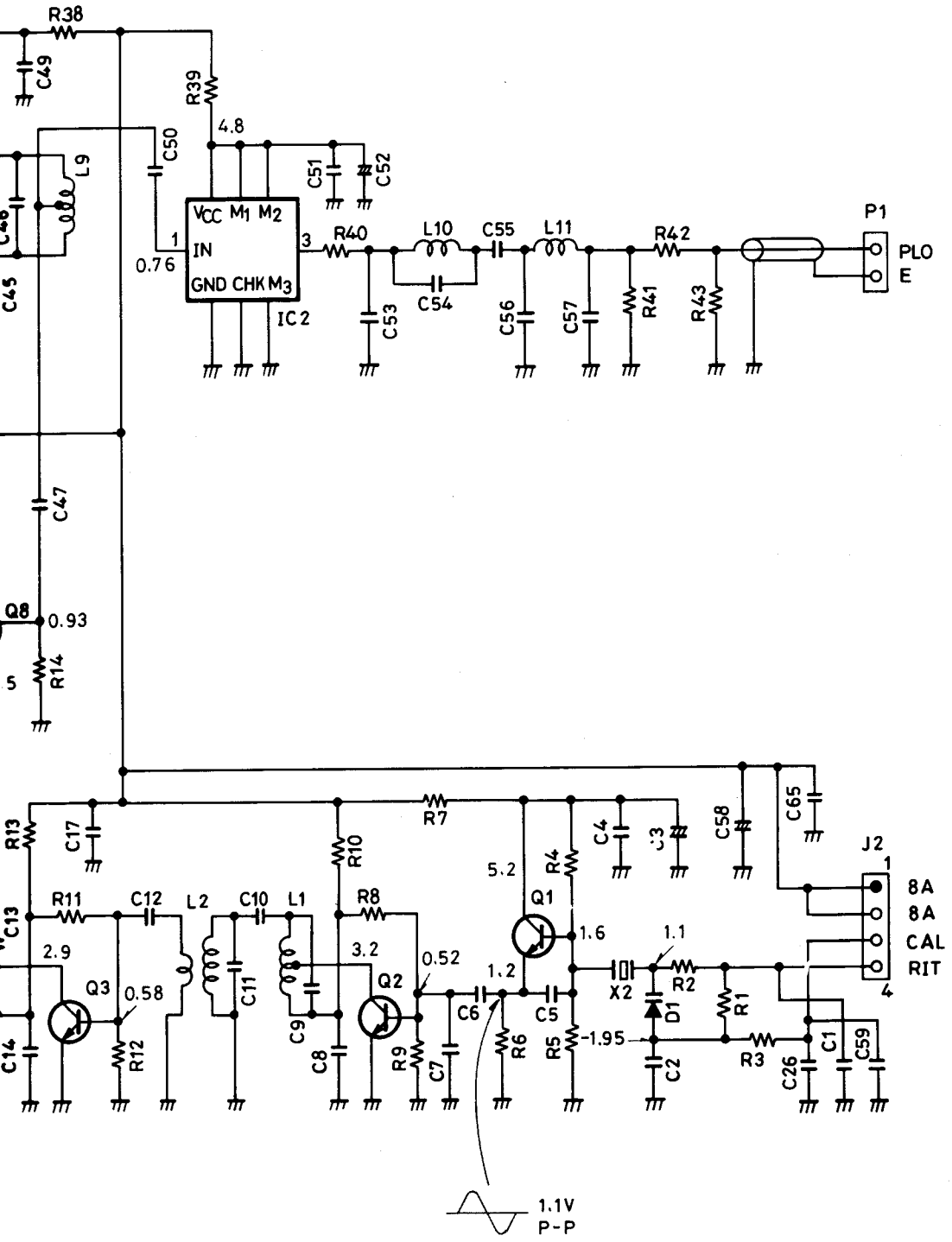
IF UNIT CIRCUIT AND VOLTAGE DIAGRAM



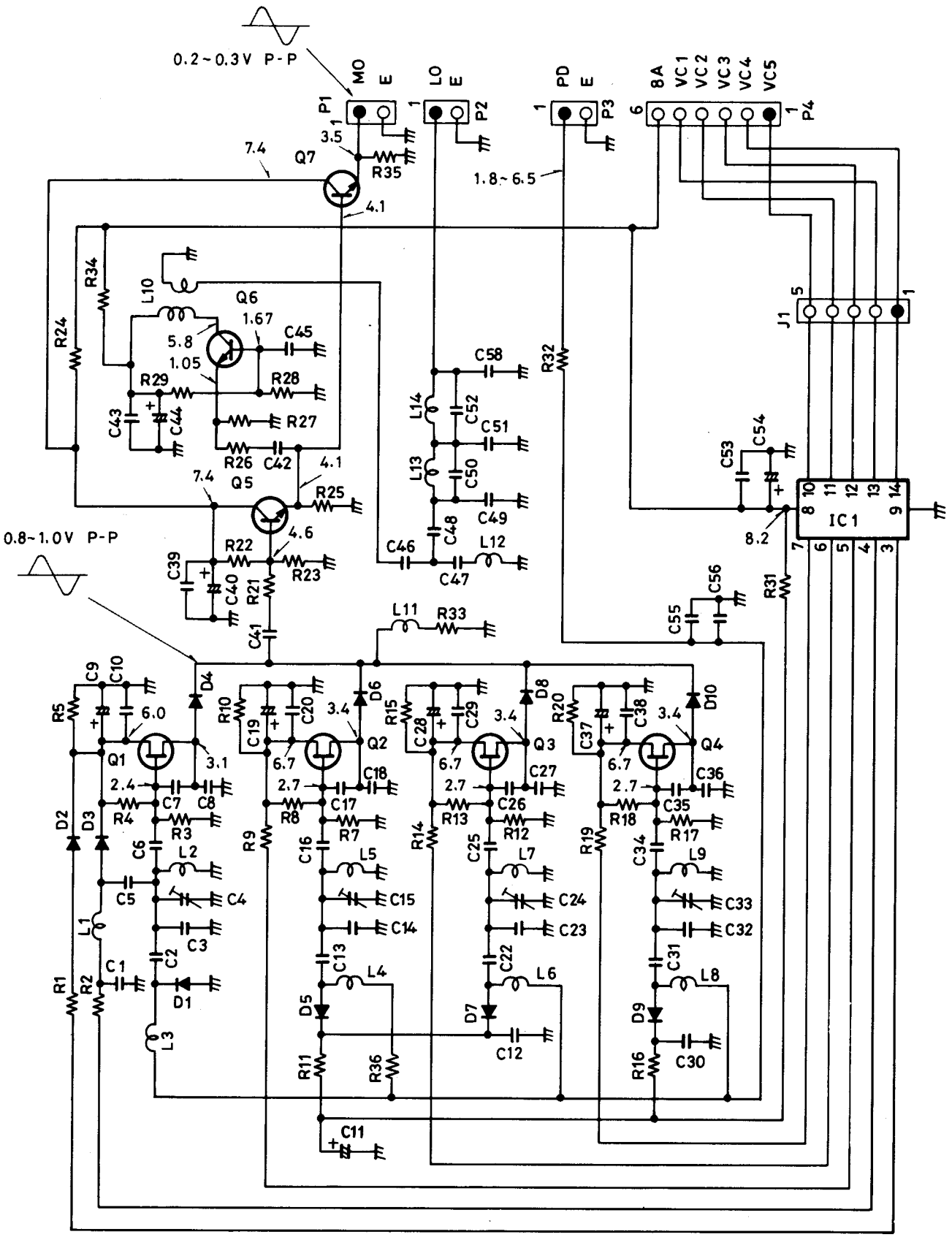

FI UNIT
FI2
C65
L14
C66
C67
L15
C68
J19
CWF1
CWF3
CWR8
J30
RYR8
SSR8
J20
SSF1
SSF3
RYF1
J31
PYF3
J36
D7
D4
D5
D6
D8
D9
D10
D11
D12
D13
D14
D15
P10
P11
P12
P13
P2
P3
P4
P5
P6
P7
P8
P9
COIF
J10
C10
R12
J11
RXIF
L3
C16
C17
R17
D45
RTTY COMP OFF
100mV P-P
Q3
IC1
R11
C63
C9
R13
C12
L2
R16
D16
C15
C11
R14
C13
C14
R15
500mV P-P
J9
T8
SPE
SP
TCOF
RIS
TCON
J13
R73
NON
NOCV
AGC
ALC
J21
R34
R35
R33
C33
J16
TXIF
D30
L7
C34
C35
Q6
RTTY
200mV
R41
D19
D18
L5
C21
FI3
R74
C18
L4
D17
R71
D25
C30
C22
R18
C19
R19
D27
J1~5
D22
FI1
D20
D26
D21
R23
R20
R21
C29
C24
R24
C23
R22
Q4
R25
D28
5.2
5.8
R68
C62
R38
R37
C41
R40
L11
R39
L8
C38
C37
D24
C27
C25
D23
Q5
R31
D29
J6~8
R42
C40
D31
X1
D43
C39
Q7
R36
C36
R30
R29
R26
R75
L12
R27
C28
C26
R32
R28
0
7.5
7.4
5.7
3.2
2.7
4.0
2.3
5.3
1
2
3
4
5
6
7
8
9

PLL UNIT CIRCUIT AND VOLTAGE DIAGRAM

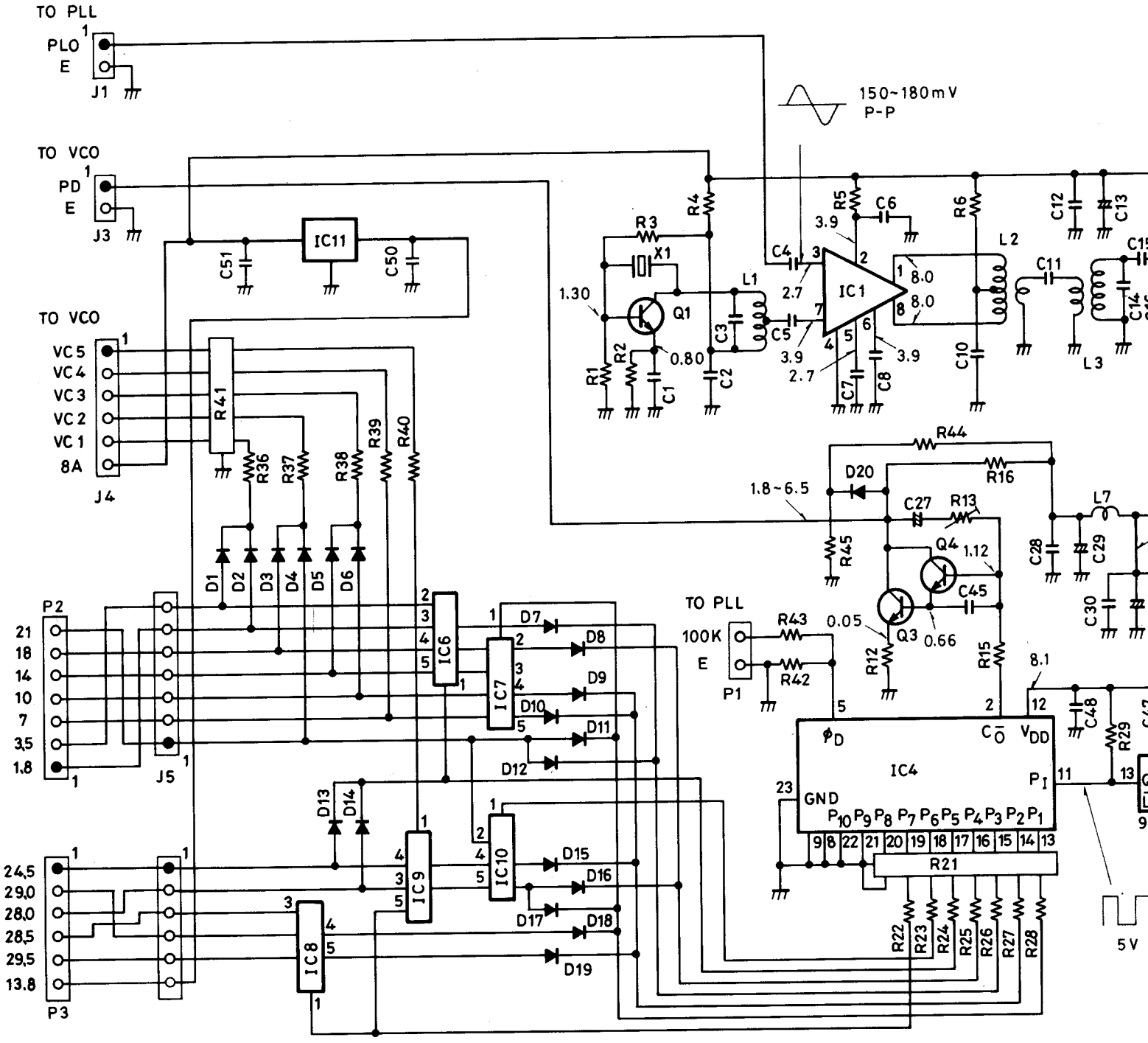


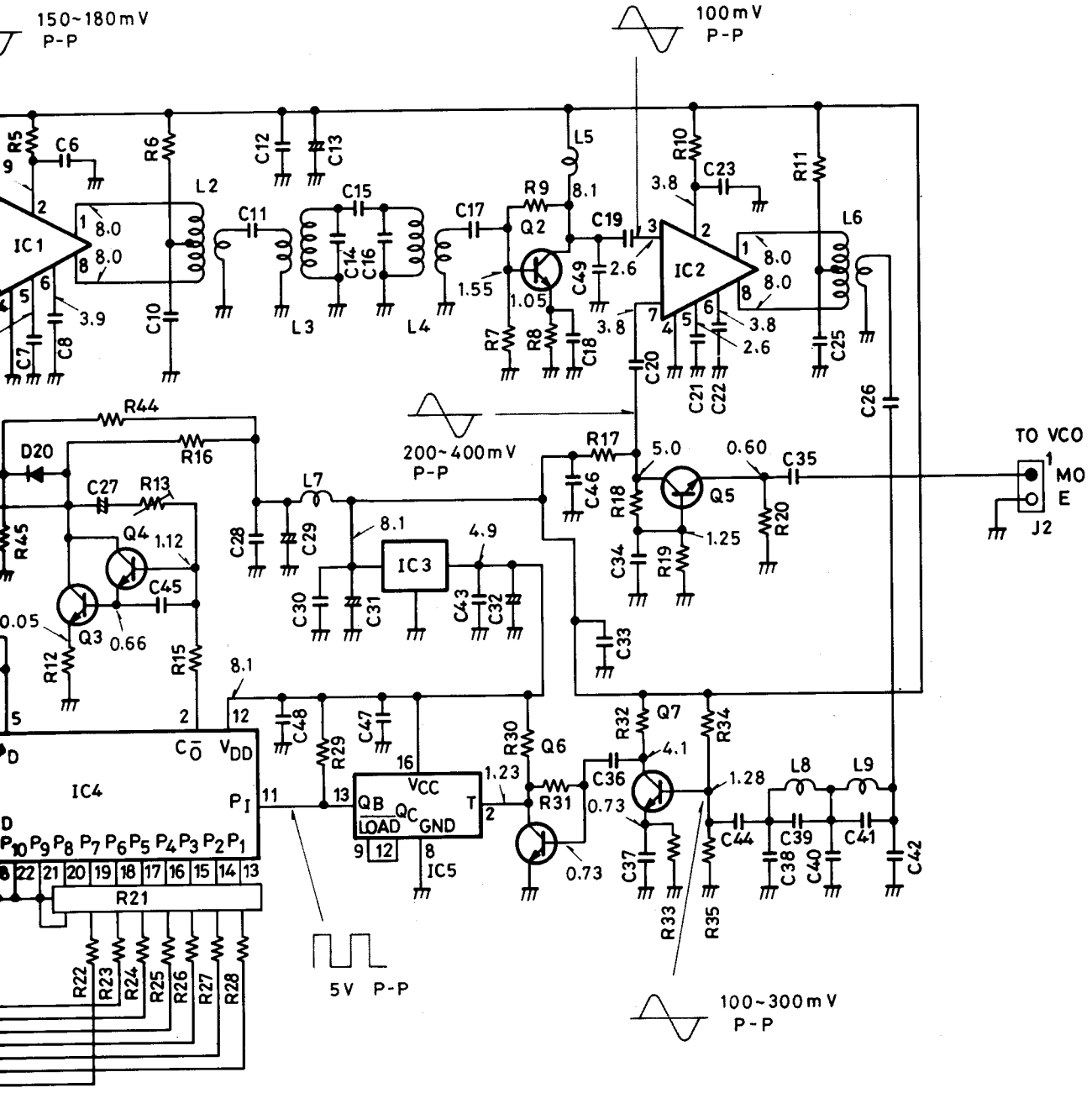

R38
C49
R39
4.8
C50
L9
C51
C52
VCC M1 M2
1
IN
0.76
GND CHK M3
IC2
3
R40
L10
C55
L11
R42
P1
PLO
E
C54
C53
C56
C57
R41
R43
C47
Q8
0.93
R14
R13
C17
R7
R10
C58
C65
J2
1
8A
8A
CAL
RIT
4
5.2
R4
C4
C3
Q1
1.6
1.1
R11
C12
L2
C10
L1
R8
2.9
3.2
0.52
1.2
X2
R2
R1
Q3
0.58
Q2
C11
C9
C6
C5
D1
C13
C14
R12
C8
R9
C7
R6
R5
-1.95
C2
R3
C26
C1
C59
1.1V
P-P

VCO UNIT CIRCUIT AND VOLTAGE DIAGRAM

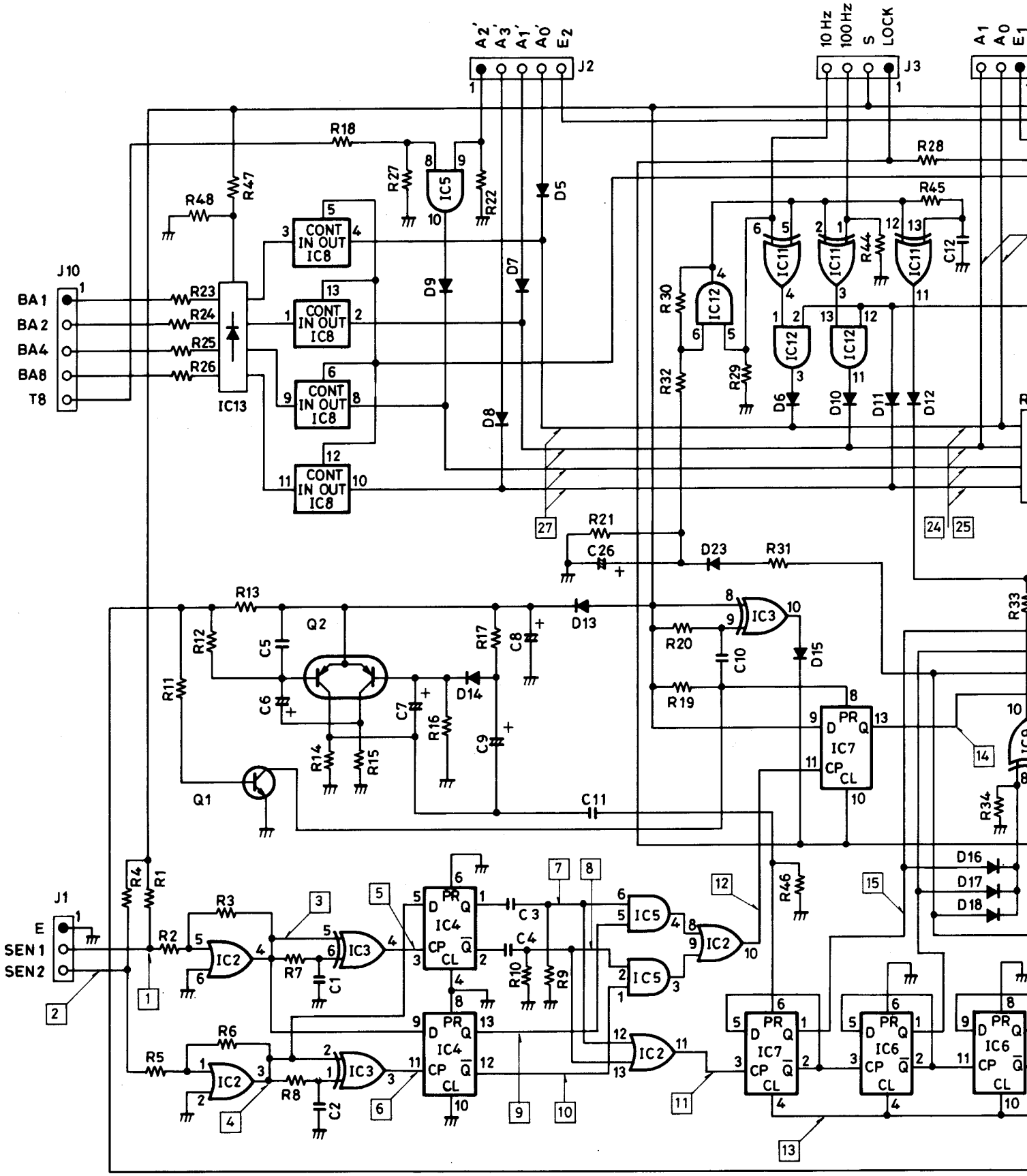


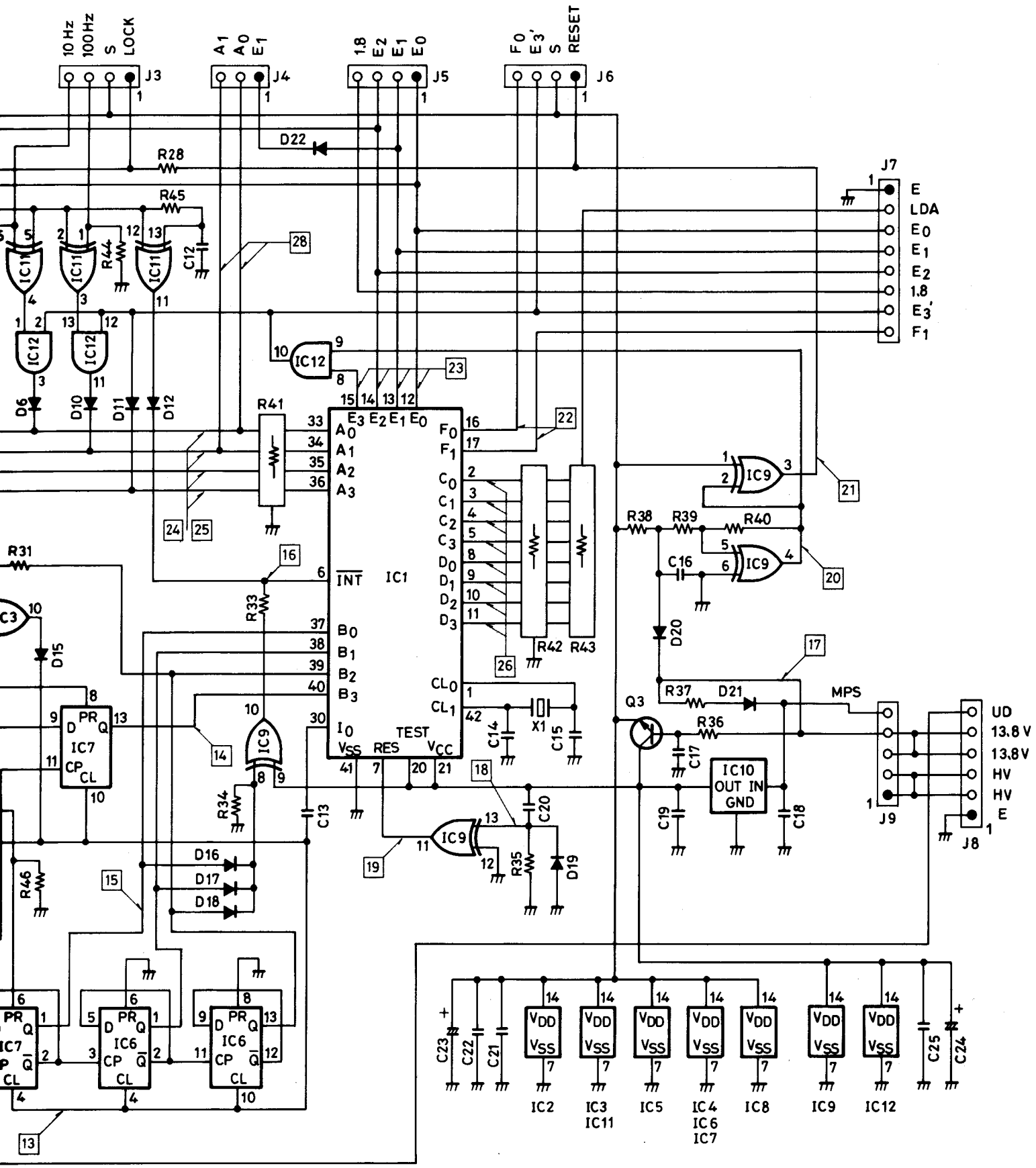
HPL UNIT CIRCUIT AND VOLTAGE DIAGRAM



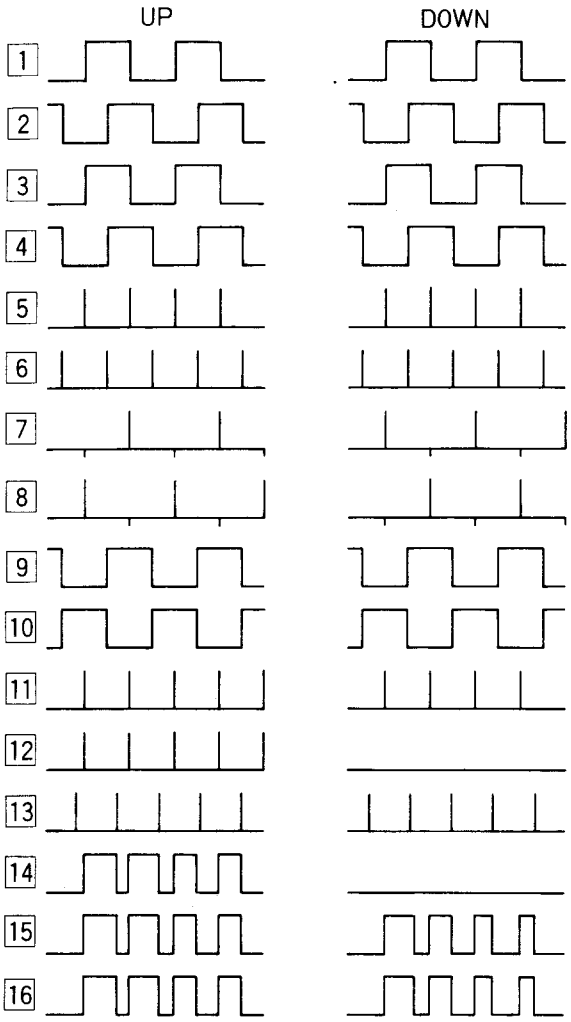

150~180mV P-P
100mV P-P
200~400mV P-P
5V P-P
100~300mV P-P
TO VCO
MO
E
J2
IC1
IC2
IC3
IC4
IC5
Q2
Q3
Q4
Q5
Q6
Q7
L2
L3
L4
L5
L6
L7
L8
L9
R21
R22
R23
R24
R25
R26
R27
R28
D20
VCC
GND
LOAD
QB
QC
T
VDD
P10 P9 P8 P7 P6 P5 P4 P3 P2 P1

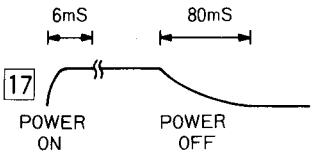
LOGIC UNIT CIRCUIT AND VOLTAGE DIAGRAM

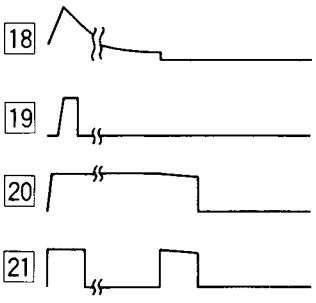


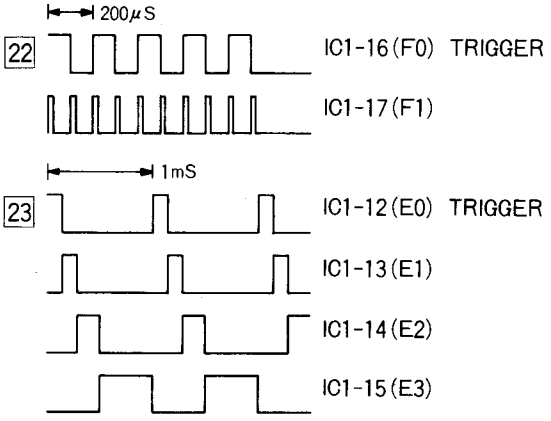

10 Hz
100 Hz
S
LOCK
J3
A1
A0
E1
J4
1.8
E2
E1
E0
J5
F0
E3'
S
RESET
J6
J7
E
LDA
E0
E1
E2
1.8
E3'
F1
D22
R28
R45
R44
C12
IC11
IC12
D6
D10
D11
D12
R41
IC1
INT
TEST
RES
VSS
VCC
R42
R43
X1
C14
C15
R31
D15
R33
R34
C13
IC7
IC9
D16
D17
D18
R46
R35
D19
C20
C16
R38
R39
R40
D20
R37
D21
Q3
R36
C17
C18
C19
IC10
OUT IN
GND
MPS
UD
13.8 V
13.8 V
HV
HV
E
J8
J9
C21
C22
C23
C24
C25
VDD
VSS
IC2
IC3
IC11
IC5
IC4
IC6
IC7
IC8
IC9
IC12

LOGIC UNIT WAVEFORM CHARTS







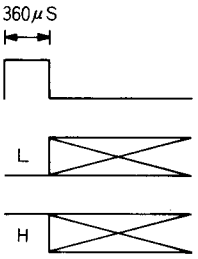


24 VFO MEMORY

IC1

FUNC \ PIN NO.		33 A0	34 A1	35 A2	36 A3
VFO	A	L			
	B	H			
MEMORY	OFF		L		
	ON		H		
NOR				L	
SPLIT				H	
WRITE	OFF				L
	ON				H

IC1-14(E2) TRIGGER

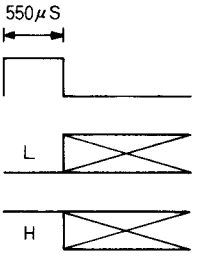


25 VFO PITCH

IC1

PIN ON.		33 A0	34 A1	35 A2	36 A3
VFO	10Hz	H	L	L	H
	100Hz	L	H	L	H
	1KHz	L	L	L	H
POWER	OFF				L
	ON				H

IC1-15(E3) TRIGGER



26 IC1 D/A DATA OUT

100Hz台

FREQ. \ PIN NO.	2 C0	3 C1	4 C2	5 C3
0.0KHz	L	L	L	L
0.1KHz	H	L	L	L
0.2KHz	L	H	L	L
0.3KHz	H	H	L	L
0.4KHz	L	L	H	L
0.5KHz	H	L	H	L
0.6KHz	L	H	H	L
0.7KHz	H	H	H	L
0.8KHz	L	L	L	H
0.9KHz	H	L	L	H

10Hz台

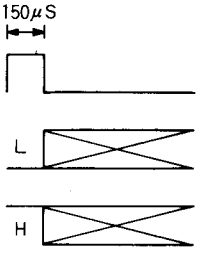
FREQ. \ PIN NO.	8 D0	9 D1	10 D2	11 D3
0.00KHz	L	L	L	L
0.01KHz	H	L	L	L
0.02KHz	L	H	L	L
0.03KHz	H	H	L	L
0.04KHz	L	L	H	L
0.05KHz	H	L	H	L
0.06KHz	L	H	H	L
0.07KHz	H	H	H	L
0.08KHz	L	L	L	H
0.09KHz	H	L	L	H

27 BAND SWITCH

IC8

BAND \ PIN NO.	3・4	1・2	8・9	10・11
1.8MHz	L	H	L	L
3.5MHz	L	H	L	L
7MHz	H	H	L	L
10MHz	L	L	H	L
14MHz	H	L	H	L
18MHz	L	H	H	L
21MHz	H	H	H	L
24.5MHz	L	L	L	H
28.0MHz	H	L	L	H
28.5MHz	L	H	L	H
29.0MHz	H	H	L	H
29.5MHz	L	L	H	H

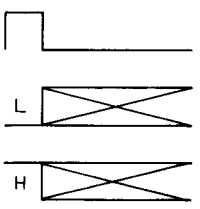
IC1-12(E0) TRIGGER



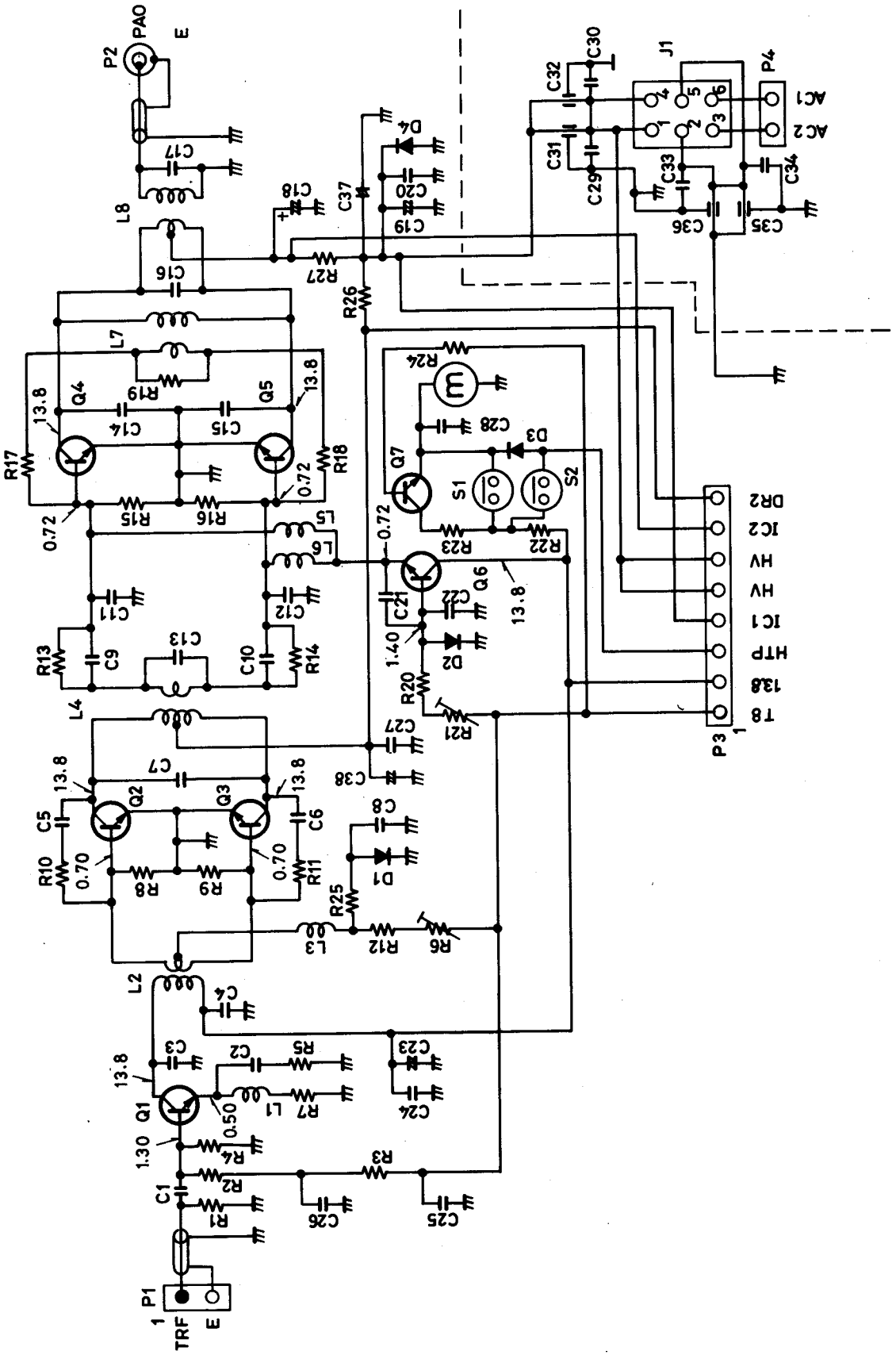
28 MODE SWITCH

MODE	J4-2 A0	J4-3 A1
NOR	H	L
REV	L	H
CW RTTY FM	L	L

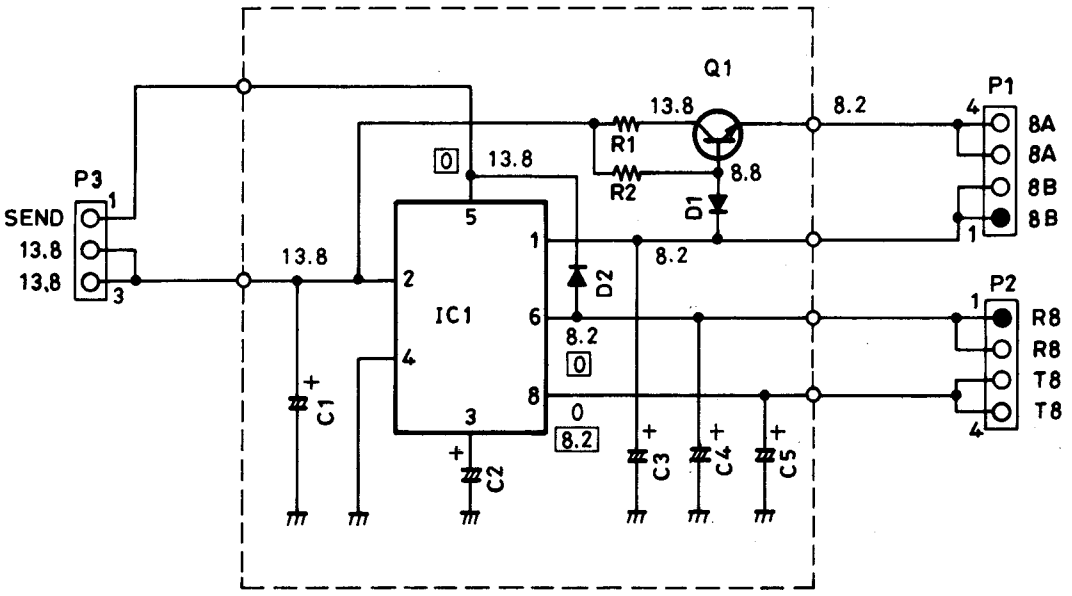
IC1-13(E1) TRIGGER



PA UNIT CIRCUIT AND VOLTAGE DIAGRAM



REG UNIT CIRCUIT AND VOLTAGE DIAGRAM



SECTION 11 PARTS LIST

[EF UNIT]

REF. NO.	DESCRIPTION	PART NO.
R1	Surge Absorber	DSA-301
R2	Resistor	4.7K R25
C1	Ceramic (EXT SP)	0.0047 50V
C2	Ceramic (KEY)	0.0047 50V
C3	Ceramic (KEY)	0.0047 50V
J1	Pin Jack (N.C.)	AT-700
J2	Pin Jack (X-VETER)	AT-700
J3	Pin Jack (R.ANT IN)	AT-700
J4	Pin Jack (R.ANT OUT)	AT-700
J5	Pin Jack (SEND)	AT-700
J6	Pin Jack (EALC)	AT-700
J7	Pin Jack (MEMO)	AT-700
J8	Pin Jack (RTTY)	AT-700
J9	Jack (EXT.SP)	HSJ0779-01A
J10	Jack (KEY)	LJ035-1-2
J11	Jack (ANT)	FM-MD-RM1
J12	Jack (EARTH)	SQ-2054
J13	Connector (ACC)	1625-24R
P1	Connector	TL-25H-04-A1
P2	Connector	TL-25H-03-A1
P3	Connector	TL-25H-10-A1
P4	Connector (ANT)	TMP-P01X-A1
P5	Connector (MEMO AC)	SMP-04V-B
P6	Connector	TL-25H-02-A1
P7	Connector	TL-25H-05-A1
P8	Connector	TL-25H-07-A1
P9	Connector (SP)	5250-2A
S1	Slide Switch	S1
SP1	SPEAKER	090A06

[PA UNIT]

REF. NO.	DESCRIPTION	PART NO.
Q1	Transistor	2SC1971
Q2	Transistor	2SC1945
Q3	Transistor	2SC1945
Q4	Transistor	2SC2097
Q5	Transistor	2SC2097
Q6	Transistor	2SD313
Q7	Transistor	2SC2120
D1	Varistor	MV5
D2	Varistor	MV11
D3	Diode	1N4002
D4	Diode	15CD11
R1	Resistor	220 R25
R2	Resistor	390 R25
R3	Resistor	10 R25
R4	Resistor	100 R25
R5	Resistor	2.2 R25
R6	Resistor	100 FR10
R7	Resistor	3.3 R25
R8	Resistor	22 R25
R9	Resistor	22 R25
R10	Resistor	120 R50
R11	Resistor	120 R50
R12	Resistor	68 R50
R13	Resistor	2.2 2W (RSF2B)
R14	Resistor	2.2 2W (RSF2B)
R15	Resistor	1.5 R50
R16	Resistor	1.5 R50
R17	Resistor	3.3 1W
R18	Resistor	3.3 1W
R19	Resistor	10 R50
R20	Resistor	560 R25
R21	Trimmer	1K FR10
R22	Resistor	68 1W
R23	Resistor	22 R25
R24	Resistor	2.2K R25
R25	Resistor	1.8 R25
R26	Resistor	0.1 2W
R27	Resistor	0.012 5W
C1	Ceramic	0.001 50V
C2	Barrier Lay	0.0012 50V
C3	Ceramic	100P 50V
C4	Barrier Lay	0.1 25V
C5	Mylar	0.01 50V
C6	Mylar	0.01 50V
C7	Cylinder	100P 50V
C8	Barrier Lay	0.1 25V
C9	Monolythic	6800P 50V
C10	Monolythic	6800P 50V
C11	Ceramic	470P SL 50V
C12	Ceramic	470P SL 50V
C13	Ceramic	470P SL 50V
C14	Ceramic	220P 500V
C15	Ceramic	220P 500V
C16	Ceramic	330P 500V
C17	Ceramic	39P 500V
C18	Electrolytic	1000 16V
C19	Electrolytic	220 16V
C20	Barrier Lay	0.1 25V
C21	Ceramic	0.0047 50V

[PA UNIT]

REF. NO.	DESCRIPTION	PART NO.
C22	Electrolytic	10 16V
C23	Electrolytic	470 16V
C24	Barrier Lay	0.1 25V
C25	Barrier Lay	0.1 25V
C26	Barrier Lay	0.1 25V
C27	Barrier Lay	0.1 25V
C28	Barrier Lay	0.1 25V
C29	Barrier Lay	0.047 25V
C30	Barrier Lay	0.047 25V
C31	Feed Through	TF318-452E102GMV
C32	Feed Through	TF318-452E102GMV
C33	Barrier Lay	0.047 25V
C34	Barrier Lay	0.047 25V
C35	Feed Through	TF318-452E102GMV
C36	Feed Through	TF318-452E102GMV
C37	Electrolytic	220 16V
L1	Choke Coil	LW-22
L2	Transformer	LR-117
L3	Choke Coil	LW-18
L4	Transformer	LR-113
L5	Choke Coil	LW-18
L6	Choke Coil	LW-18
L7	Transformer	LR-83
L8	Transformer	LR-114
	Bead Core	2D1
	Bead Core	2D1 (1=16)
S1	Thermal Switch	OHD70M
S2	Thermal Switch	OHD80M
J1	Connector	LLR-6
P1	Connector	TL-25H-02-A1
P2	Connector	TMP-P01-XA1
P3	Connector	TL-25H-08-A1
P4	Connector	1545R-1
B1	PA P.C.B	B-568

[FIL UNIT]

REF. NO.	DESCRIPTION	PART NO.
D1	Diode	1N60
D2	Diode	1N60
D3	Diode	1N4002
L1	Coil	LR47
L2	Coil	LR48
L3	Coil	LR49
L4	Coil	LR50
L5	Coil	LR52
L6	Coil	LR51
L7	Coil	LR139
L8	Coil	LR90
L9	Coil	LR91
L10	Coil	LR53
L11	Coil	LR54
L12	Coil	LR139
L13	Coil	LR55
L14	Coil	LR56
L15	Coil	LR57
L16	Coil	LR58
L17	Coil	LR22A
L18	Choke Coil	222L6
L19	Choke Coil	222L6
R1	Resistor	68 R25
R2	Resistor	47K R25
R3	Resistor	47K ELR25
R4	Resistor	47K R25
R5	Resistor	12K ELR25
R6	Resistor	12K ELR25
C1	Dip Mica	DM20 2200P 500V 1CR
C2	Ceramic	DD31-2-SL 220P 500V 02
C3	Dip Mica	DM20 2700P 500V 1CR
C4	Dip Mica	DM19 390P 500V 1CR
C5	Dip Mica	DM20 1500P 500V 1CR
C6	Dip Mica	DM19 680P 500V 1CR
C7	Ceramic	DD31-0-SL82P 500V 02
C8	Dip Mica	DM20 1200P 500V 1CR
C9	Ceramic	DD31-2-SL220P 500V 02
C10	Dip Mica	DM19 680P 500V 1CR
C11	Dip Mica	DM19 470P 500V 1CR
C12	Ceramic	DD31-2-SL 120P 500V 02
C13	Dip Mica	DM19 680P 500V 1CR
C14	Ceramic	DD35-0-SC39P 500V 02
C15	Dip Mica	DM19 390P 500V 1CR
C16	Dip Mica	DM19 390P 500V 1CR
C17	Ceramic	DD38-0-SL27P 500V 02
C18	Dip Mica	DM19 470P 500V 1CR
C19	Ceramic	DD38-0-SL68P 500V 02
C20	Ceramic	DD31-2-SL220P 500V 02
C21	Ceramic	DD31-2-SL180P 500V 02
C22	Ceramic	DD35-0-SL33P 500V 02
C23	Ceramic	DD31-4-SL330P 500V 02
C24	Ceramic	DD36-0-SL56P 500V 02
C25	Ceramic	DD31-0-SL200P 500V 02
C26	Ceramic	DD38-0-SL82P 500V 02
C27	Ceramic	DD35-0-SL10P 500V 02
C28	Ceramic	DD31-2-SL150P 500V 02
C29	Ceramic	DD35-0-SL39P 500V 02
C30	Ceramic	DD31-0-SL150P 500V 02
C31	Ceramic	DD35-0-SL47P 500V 02
C32	Ceramic	DD35-0-SL15P 500V 02
C33	Ceramic	DD31-0-SL120P 500V 02

[FIL UNIT]

REF. NO.	DESCRIPTION	PART NO.
C34	Ceramic	DD35-0-SL27P 500V 02
C35	Ceramic	DD38-0-SL100P 500V 02
C36	Ceramic	100P 50V
C37	Ceramic	100P 50V
C38	Trimmer	ECV-1ZW20X40
C39	Ceramic	220P 50V
C40	Ceramic	100P 50V
C41	Ceramic	100P 50V
C42	Ceramic	0.0047 50V
C43	Ceramic	0.0047 50V
C44	Electrolytic	220 16V
RL1	Relay	LZ12H
J1	Connector	TMP-J01X-V1
J2	Connector	TL-25P-03-V1
J3	Connector	TMP-J01X-V1
J4	Connector	TL-25P-04-V1
P1	Connector	TL-25H-08-A1
P2	Connector	TL-25H-04-A1
P3	Connector	TL-25H-02-A1
S1	Rotary Switch	SRY-202C
B1	FIL P.C.B	B-569C

[ACC UNIT]

REF. NO.	DESCRIPTION	PART NO.
D1	Diode	1SS53
D2	Diode	1SS53
D3	Diode	1SS53
R1	Resistor	220 R25
R2	Resistor	220 R25
R3	Resistor	220 R25
R4	Resistor	220 R25
R5	Resistor	68 R25
R6	Resistor	220 R25
R7	Resistor	220 R25
R8	Resistor	220 ELR25
R9	Resistor	1K R25
R10	Resistor	220 R25
R11	Resistor	220 R25
R12	Resistor	220 R25
C1	Ceramic	0.0047 50V
C2	Ceramic	0.0047 50V
C3	Ceramic	0.0047 50V
C4	Ceramic	0.0047 50V
C5	Ceramic	0.0047 50V
C6	Ceramic	0.0047 50V
C7	Ceramic	0.0047 50V
C8	Ceramic	0.0047 50V
C9	Ceramic	220P 50V
C10	Ceramic	0.0047 50V
C11	Ceramic	0.0047 50V
C12	Ceramic	0.0047 50V
C13	Ceramic	0.0047 50V
C14	Ceramic	0.0047 50V
C15	Ceramic	0.0047 50V
C16	Ceramic	0.0047 50V
C17	Ceramic	0.0047 50V
C18	Ceramic	0.0047 50V
C19	Ceramic	0.0047 50V
C20	Ceramic	0.0047 50V
C21	Ceramic	0.0047 50V
C22	Ceramic	0.0047 50V
C23	Ceramic	0.0047 50V
RL1	Relay	FBR21BD012-M
J1	Connector	TL-25P-08-V1
J2	Connector	TL-25P-02-V1
J3	Connector	TL-25P-10-V1
J4	Connector	TL-25P-07-V1
J5	Connector	TL-25P-05-V1
J6	Connector	TL-25P-02-V1
J7	Connector	TL-01T-1 3B
J8	Connector	TL-25P-08-V1
J9	Connector	TL-25P-06-V1
J10	Connector	TL-25P-04-V1
J11	Connector	TL-25P-06-V1
F1	Fuse	5A
FH1	Fuse Holder	S-N5051
B1	ACC P.C.B	B-570B
L1	Coil	BT01RN1-A61
L2	Coil	BT01RN1-A61
L3	Coil	BT01RN1-A61

[ACC UNIT]

REF. NO.	DESCRIPTION	PART NO.
L4	Coil	BT01RN1-A61
L5	Coil	BT01RN1-A61
L6	Coil	BT01RN1-A61
L7	Coil	BT01RN1-A61
L8	Coil	BT01RN1-A61
L9	Coil	BT01RN1-A61
L10	Coil	BT01RN1-A61
L11	Coil	BT01RN1-A61
L12	Coil	BT01RN1-A61

[RF UNIT]

REF. NO.	DESCRIPTION	PART NO.
IC1	IC	TA7124P
IC2	IC	M51201L
Q1	Transistor	2SC2053
Q2	FET	2SK241Y
Q3	FET	2SK241GR
Q4	FET	2SK241GR
Q5	Transistor	2SC1636
Q6	FET	2SK125
Q7	FET	2SK125
Q8	Transistor	2SB562
Q9	Transistor	2SC945
Q10	Transistor	2SC945
Q11	Transistor	2SC2053
Q12	Transistor	2SC945Q
Q13	Transistor	2SC945
Q14	FET	2SK241Y
Q15	Transistor	2SA1015Y
Q16	Transistor	2SC945P
Q17	Transistor	2SC945P
D1	Diode	1SS53
D2	Diode	1SS53
D3	Diode	1SS53
D4	Diode	1SS53
D6	Diode	1SS97
D7	Diode	1SS97
D10	Diode	1SS97
D11	Diode	1SS97
D13	Diode	1SS53
D14	Diode	1SS53
D15	Diode	1SS53
D16	Diode	1SS53
D17	Diode	1SS53
D18	Diode	1SS53
D19	Diode	1SS53
D20	Diode	1SS53
D21	Diode	1SS53
D22	Diode	1SS53
D23	Diode	1SS53
D24	Diode	1SS53
D25	Diode	1SS53
D26	Diode	1SS53
D27	Diode	1SS53
D28	Diode	1SS53
D29	Diode	1SS53
D30	Diode	1SS53
D31	Diode	1SS53
D32	Diode	1SS53
D34	Diode	1SS53
D35	Zener Diode	XZ086
D36	Diode	1SS53
D37	Diode	1SS53
D38	Diode	1SS53
D39	Diode	1SS53
D40	Diode	1SS53
D41	Varactor Diode	1T25
D42	Diode	1SS99
D43	Diode	1SS99
D44	Diode	1SS99
D45	Diode	1SS99
D46	Diode	1SS53
D47	Diode	1SS53
D48	Diode	1SS53

[RF UNIT]

REF. NO.	DESCRIPTION	PART NO.
D49	Diode	1SS53
D50	Diode	1SS53
D51	Diode	1N60
D52	Diode	1SS53
D53	Diode	1SS53
D54	Varistor	MV-11
FI1	Crystal Filter	39M1B
FI2	Crystal Filter	39M1B
X1	Crystal	CR4 (30.72MHz)
L1	Coil	LR85A
L2	Coil	LS-225
L3	Coil	LS-215
L4	Coil	LS-114
L5	Coil	LS-247
L6	Coil	LS-249
L7	Coil	LS-250
L8	Coil	LS-249
L9	Coil	LS-114
L10	Coil	LR-116
L11	Coil	LR-116
L12	Coil	LS-223
L13	Coil	LS-223
L14	Coil	LS-194
L15	Coil	LS-194
L16	Coil	LS-195
L17	Coil	LS-195
L18	Coil	LS-196
L19	Coil	LS-196
L20	Coil	LS-197
L21	Coil	LS-197
L22	Coil	LS-197
L23	Coil	LS-197
L24	Coil	LS-195
L25	Coil	LS-195
L26	Coil	LS-196
L27	Coil	LS-196
L28	Coil	LS-197
L29	Coil	LS-197
L30	Choke Coil	EL0810SK1-101K
L31	Choke Coil	EL0810SK1-101K
L32	Coil	LR-130
L33	Coil	LR-129
L34	Choke Coil	EL0810SK1-3R9K
L35	Choke Coil	EL0810SK1-4R7K
L36	Choke Coil	EL0810SK1-101K
L37	Coil	LR-20
L38	Coil	LS-198
L39	Coil	LR-116
L40	Coil	LR-116
L42	Coil	LS-232
L43	Coil	LS-232
L44	Coil	LS-226
L45	Coil	LS-136
L46	Coil	LS-227
L47	Coil	LA-137A
L48	Choke Coil	LAL04NA101K
R1	Resistor	680 ELR25
R2	Resistor	8.2K ELR25
R3	Resistor	100 ELR25
R4	Resistor	1K ELR25

[RF UNIT]

REF. NO.	DESCRIPTION	PART NO.
R5	Resistor	6.8K ELR25
R6	Resistor	1K ELR25
R7	Resistor	100 ELR25
R8	Resistor	2.2K ELR25
R9	Resistor	1K R25
R10	Resistor	100K ELR25
R11	Resistor	1K ELR25
R12	Resistor	100 ELR25
R13	Resistor	1K ELR25
R14	Resistor	100 ELR25
R15	Resistor	2.2K ELR25
R16	Resistor	390 ELR25
R17	Resistor	47 ELR25
R18	Resistor	220 ELR25
R19	Resistor	47 ELR25
R20	Resistor	220 ELR25
R21	Resistor	47 ELR25
R22	Resistor	220 ELR25
R23	Resistor	47 ELR25
R24	Resistor	220 ELR25
R25	Resistor	47 ELR25
R26	Resistor	220 ELR25
R27	Resistor	47 ELR25
R28	Resistor	220 ELR25
R29	Resistor	47 ELR25
R30	Resistor	220 ELR25
R31	Resistor	47 ELR25
R32	Resistor	220 ELR25
R33	Resistor	47 ELR25
R34	Resistor	220 ELR25
R35	Resistor	100 ELR25
R36	Resistor	100 ELR25
R37	Resistor	1K ELR25
R38	Resistor	10K R25
R39	Resistor	2.2K R25
R40	Resistor	4.7K R25
R41	Resistor	22 R25
R42	Resistor	22 R25
R43	Resistor	1K R25
R44	Resistor	4.7K R25
R45	Resistor	10K R10
R46	Resistor	10K R10
R47	Resistor	22K R25
R48	Resistor	10K ELR25
R49	Resistor	22K ELR25
R50	Resistor	56 R25
R51	Resistor	100 ELR25
R52	Resistor	4.7K ELR25
R53	Resistor	680 ELR25
R54	Resistor	4.7 R25
R56	Resistor	220 ELR25
R57	Resistor	10K ELR25
R59	Resistor	470 ELR25
R60	Resistor	22K ELR25
R61	Resistor	270 ELR25
R62	Resistor	4.7K ELR25
R63	Resistor	10K ELR25
R64	Resistor	10K ELR25
R65	Resistor	2.2K ELR25
R66	Resistor	1K ELR25
R67	Resistor	10K ELR25
R68	Resistor	10K ELR25
R69	Resistor	1K ELR25
R70	Resistor	2.2K ELR25

[RF UNIT]

REF. NO.	DESCRIPTION	PART NO.	
R71	Resistor	1K	ELR25
R72	Resistor	220	ELR25
R74	Resistor	100	R25
R75	Resistor	100	ELR25
R76	Resistor	100	R25
R77	Resistor	4.7K	R25
R78	Resistor	47K	R25
R79	Resistor	22K	ELR25
R80	Resistor	10K	ELR25
R81	Resistor	10K	ELR25
R82	Resistor	47K	ELR25
R83	Resistor	100K	ELR25
R84	Resistor	470	ELR25
R85	Resistor	4.7K	ELR25
R86	Resistor	1K	ELR25
R87	Resistor	100	ELR25
R88	Resistor	1.8M	ELR25
R89	Resistor	1.8K	ELR25
R90	Resistor	4.7K	ELR25
R91	Resistor	150	ELR25
R92	Resistor	10	R25
R93	Resistor	56	ELR25
R94	Resistor	10K	R25
C1	Ceramic	47P	50V
C2	Barrier Lay	0.1	25V
C3	Ceramic	0.001	50V
C4	Ceramic	5P	50V
C5	Ceramic	0.5	50V
C6	Ceramic	5P	50V
C7	Ceramic	0.0047	50V
C8	Ceramic	0.001	50V
C9	Ceramic	0.0047	50V
C10	Ceramic	24P	50V
C11	Ceramic	0.0047	50V
C12	Ceramic	0.0047	50V
C13	Ceramic	15P	50V
C14	Ceramic	15P	50V
C15	Ceramic	0.001	50V
C16	Ceramic	0.0047	50V
C17	Ceramic	15P	50V
C18	Ceramic	0.0047	50V
C19	Ceramic	15P	50V
C20	Ceramic	0.001	50V
C21	Ceramic	0.0047	50V
C22	Ceramic	24P	50V
C23	Ceramic	0.0047	50V
C24	Ceramic	0.0047	50V
C25	Ceramic	0.0047	50V
C27	Ceramic	0.0047	50V
C28	Ceramic	220P	50V
C29	Ceramic	33P	50V
C30	Ceramic	220P	50V
C31	Barrier Lay	0.1	25V
C32	Barrier Lay	0.1	25V
C33	Ceramic	100P	50V
C34	Ceramic	22P	50V
C35	Ceramic	100P	50V
C36	Barrier Lay	0.047	25V
C37	Barrier Lay	0.047	25V
C38	Ceramic	47P	50V
C39	Ceramic	4P	50V
C40	Ceramic	47P	50V
C41	Barrier Lay	0.047	25V

[RF UNIT]

REF. NO.	DESCRIPTION	PART NO.	
C42	Barrier Lay	0.047	25V
C43	Ceramic	15P	50V
C44	Ceramic	1P	50V
C45	Ceramic	15P	50V
C46	Ceramic	0.0047	50V
C47	Ceramic	0.0047	50V
C48	Ceramic	18P	50V
C49	Ceramic	2P	50V
C50	Ceramic	18P	50V
C51	Ceramic	0.0047	50V
C52	Ceramic	0.0047	50V
C53	Ceramic	10P	50V
C54	Ceramic	1.5P	50V
C55	Ceramic	10P	50V
C56	Ceramic	0.0047	50V
C57	Ceramic	0.0047	50V
C58	Ceramic	24P	50V
C59	Ceramic	2P	50V
C60	Ceramic	24P	50V
C61	Ceramic	0.0047	50V
C62	Ceramic	0.0047	50V
C63	Ceramic	8P	50V
C64	Ceramic	0.75P	50V
C65	Ceramic	8P	50V
C66	Ceramic	0.0047	50V
C67	Ceramic	0.0047	50V
C68	Ceramic	15P	50V
C69	Ceramic	1.5P	50V
C70	Ceramic	15P	50V
C71	Ceramic	0.0047	50V
C72	Ceramic	0.0047	50V
C73	Barrier Lay	0.047	25V
C74	Barrier Lay	0.047	25V
C75	Barrier Lay	0.047	25V
C77	Barrier Lay	0.047	25V
C78	Barrier Lay	0.047	25V
C79	Ceramic	0.0047	50V
C80	Barrier Lay	TBD04V122K	
C81	Barrier Lay	TBD08V153K	
C82	Barrier Lay	UFD085A821K	
C83	Barrier Lay	TBD06V682K	
C84	Barrier Lay	TBD04V122K	
C85	Barrier Lay	0.047	25V
C86	Barrier Lay	0.047	25V
C87	Barrier Lay	0.047	25V
C89	Barrier Lay	0.047	25V
C91	Barrier Lay	0.1	25V
C92	Barrier Lay	0.047	25V
C93	Ceramic	3P	50V
C94	Barrier Lay	0.047	25V
C96	Barrier Lay	0.047	25V
C97	Ceramic	0.0047	50V
C98	Barrier Lay	0.047	25V
C99	Ceramic	0.0047	50V
C100	Ceramic	27P	50V
C101	Ceramic	0.0047	50V
C102	Ceramic	0.0047	50V
C103	Ceramic	22P	50V
C104	Ceramic	0.0047	50V
C105	Ceramic	0.0047	50V
C106	Cylinder	68P	50V
C107	Ceramic	330P	50V
C108	Ceramic	56P	50V
C109	Ceramic	0.0047	50V

[RF UNIT]

REF. NO.	DESCRIPTION	PART NO.	
C110	Mylar	0.01	50V
C111	Electrolytic	10	16V
C112	Ceramic	56P	50V
C113	Ceramic	330P	50V
C114	Ceramic	0.0047	50V
C115	Ceramic	0.0047	50V
C116	Electrolytic	0.47	50V
C117	Ceramic	0.0047	50V
C118	Ceramic	0.0047	50V
C119	Ceramic	0.0047	50V
C120	Ceramic	100P	50V
C121	Ceramic	0.0047	50V
C122	Electrolytic	10	16V
C123	Ceramic	0.0047	50V
C125	Barrier Lay	0.047	25V
C126	Barrier Lay	0.047	25V
C127	Barrier Lay	0.047	25V
C128	Barrier Lay	0.047	25V
C129	Ceramic	33P	50V
C130	Ceramic	33P	50V
C132	Electrolytic	2.2	50V
C133	Electrolytic	2.2	50V
C137	Ceramic	0.0047	50V
C139	Ceramic	0.0047	50V
C140	Ceramic	0.0047	50V
C141	Ceramic	68P	50V
C142	Ceramic	0.0047	50V
C143	Ceramic	0.0047	50V
C144	Ceramic	0.0047	50V
C145	Ceramic	10P	50V
C146	Ceramic	10P	50V
C147	Ceramic	5P	50V
C148	Ceramic	47P	50V
C149	Ceramic	47P	50V
C150	Ceramic	56P	50V
C151	Ceramic	0.0047	50V
C152	Electrolytic	10	25V
C153	Ceramic	120P	
B1	RF P.C.B	B-575C	
B2	2nd MIX P.C.B	B-576A	
	VCO Case		
RL1	Relay	BR221-D012	
RL2	Relay	FBR211BD009-M	
J1	Connector	TL-25P-02-V1	
J2	Connector	TL-25P-04-V1	
J3	Connector	TL-25P-06-V1	
J4	Connector	TL-25P-04-V1	
J5	Connector	TL-25P-06-V1	
J6	Connector	TL-25P-04-V1	
J7	Connector	TL-25P-08-V1	
J8	Connector	TL-25P-02-V1	
J9	Connector	TL-25P-02-V1	
P1	Connector	TL-25P-09-A1	

[IF UNIT]

REF. NO.	DESCRIPTION	PART NO.
IC1	IC	μPC1037H
IC2	IC	μPC1037H
Q1	Transistor	2SC945P
Q2	Transistor	2SC945P
Q3	Transistor	2SC945P
Q4	Transistor	2SA1015Y
Q5	Transistor	2SA1015Y
Q6	FET	2SK241Y
Q7	FET	2SK241GR
Q8	FET	2SK241GR
Q9	Transistor	2SC763C
Q10	Transistor	2SC945P
D1	Diode	1S953
D2	Diode	1S953
D3	Diode	1S953
D4	Diode	1SS53
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
D14	Diode	1SS53
D15	Diode	1SS53
D16	Diode	1SS53
D17	Diode	1SV99
D18	Diode	1SV99
D19	Diode	1SS53
D20	Diode	1SS53
D21	Diode	1SS53
D22	Diode	1SS53
D23	Diode	1SS53
D24	Diode	1SS53
D25	Diode	1SS53
D26	Diode	1SS53
D27	Diode	1SS53
D28	Diode	1SS53
D29	Diode	1SS53
D30	Diode	1SS53
D31	Varactor Diode	FC51M
D32	Diode	1SS53
D33	Diode	1SS53
D34	Diode	1SS53
D35	Diode	1SS53
D36	Diode	1SS53
D37	Diode	1SS53
D38	Diode	1SS53
D39	Diode	1SS53
D40	Varactor Diode	1T25
D41	Diode	1SS53
D42	Diode	1SS53
D43	Diode	1SS53
D44	Diode	1SS53
D45	Diode	1SS53
FI1	Crystal Filter	9M22D2
FI2	Ceramic Filter	CFJ455K5
FI3	Crystal Filter	9M15A

[IF UNIT]

REF. NO.	DESCRIPTION	PART NO.	
X1	Crystal	CR12A	
X2	Crystal	9.4665MHz HC-43/u	
L1	Choke Coil	LAL04SK102K	
L2	Coil	LS-246	
L3	Coil	LS-187	
L4	Coil	LS-188	
L5	Coil	LS-188	
L7	Coil	LS-245	
L8	Coil	LS-253	
L9	Coil	LS-251A	
L10	Coil	LS-141A	
L11	Choke Coil	LAL04SK2R2K	
L12	Choke Coil	LAL04SK101K	
L13	Choke Coil	LAL04SK8R2K	
L14	Coil	LS-255	
L15	Coil	LS-255	
R1	Resistor	470	ELR25
R2	Resistor	330	ELR25
R3	Resistor	2.2K	ELR25
R4	Resistor	10K	ELR25
R5	Resistor	12	ELR25
R6	Resistor	100	ELR25
R7	Resistor	470	ELR25
R8	Resistor	27	ELR25
R9	Resistor	1.5K	ELR25
R10	Resistor	27	ELR25
R11	Resistor	1.5K	ELR25
R12	Resistor	2.2K	ELR25
R13	Resistor	4.7K	R25
R14	Resistor	3.3K	ELR25
R15	Resistor	220	ELR25
R16	Resistor	2.2K	ELR25
R17	Resistor	2.2K	ELR25
R18	Resistor	220	ELR25
R19	Resistor	1K	R25
R20	Resistor	2.2K	ELR25
R21	Resistor	220	R25
R22	Resistor	220	R25
R23	Resistor	1K	ELR25
R24	Resistor	4.7K	ELR25
R25	Resistor	100K	R25
R26	Resistor	2.2K	R25
R27	Resistor	220	R25
R28	Resistor	220	R25
R29	Resistor	1K	R25
R30	Resistor	10K	R25
R31	Resistor	100K	R25
R32	Resistor	3.3K	ELR25
R33	Resistor	100K	ELR25
R34	Resistor	100K	ELR25
R35	Resistor	220	ELR25
R36	Resistor	100K	ELR25
R37	Resistor	1M	ELR25
R38	Resistor	100	ELR25
R39	Resistor	4.7K	ELR25
R40	Resistor	1M	ELR25
R41	Resistor	47K	ELR25
R42	Resistor	1M	ELR25
R43	Resistor	1K	ELR25
R44	Resistor	220	ELR25
R45	Resistor	3.3K	ELR25
R46	Resistor	1K	ELR25

[IF UNIT]'

REF. NO.	DESCRIPTION	PART NO.	
R47	Resistor	3.3K	ELR25
R48	Resistor	330	ELR25
R49	Resistor	2.2K	ELR25
R50	Resistor	3.3K	ELR25
R51	Resistor	220	R25
R52	Resistor	3.3K	ELR25
R53	Resistor	220	ELR25
R54	Resistor	3.3K	ELR25
R55	Resistor	220	R25
R56	Resistor	3.3K	ELR25
R57	Resistor	220	ELR25
R58	Resistor	3.3K	ELR25
R59	Trimmer	10K	H0651A
R60	Resistor	47K	ELR25
R61	Resistor	220K	ELR25
R62	Resistor	1K	R25
R63	Resistor	33K	ELR25
R64	Resistor	100K	ELR25
R65	Resistor	2.7K	ELR25
R66	Resistor	1.5K	ELR25
R67	Resistor	4,7K	R25
R68	Resistor	220	ELR25
R69	Resistor	220	ELR25
R70	Resistor	3.3K	ELR25
R71	Resistor	330	ELR25
R72	Trimmer	10K	H0651A
R73	Resistor	4.7K	ELR25
R74	Resistor	12K	ELR25
R75	Resistor	2.2K	ELR25
C1	Barrier Lay	0.047	25V
C2	Barrier Lay	0.047	25V
C3	Barrier Lay	0.047	25V
C4	Ceramic	0.0047	50V
C5	Barrier Lay	0.047	50V
C6	Ceramic	0.0047	50V
C7	Electrolytic	47	10V
C8	Ceramic	330P	50V
C9	Ceramic	0.0047	50V
C10	Ceramic	0.0047	50V
C11	Barrier Lay	0.047	25V
C12	Barrier Lay	0.1	25V
C13	Ceramic	0.0047	50V
C14	Ceramic	0.0047	50V
C15	Ceramic	56P	50V
C16	Ceramic	120P	50V
C17	Ceramic	0.0047	50V
C18	Ceramic	33P	50V
C19	Ceramic	0.0047	50V
C21	Ceramic	33P	50V
C22	Ceramic	0.0047	50V
C23	Ceramic	0.0047	50V
C24	Ceramic	0.0047	50V
C25	Ceramic	0.0047	50V
C26	Ceramic	0.0047	50V
C27	Ceramic	0.0047	50V
C28	Ceramic	0.0047	50V
C29	Ceramic	0.0047	50V
C30	Ceramic	5P	50V
C32	Ceramic	0.0047	50V
C33	Ceramic	0.0047	50V
C34	Ceramic	47P	50V
C35	Ceramic	0.0047	50V
C36	Ceramic	0.0047	50V

[IF UNIT]

REF. NO.	DESCRIPTION	PART NO.	
C37	Ceramic	0.0047	50V
C38	Ceramic	47P	50V
C39	Ceramic	0.0047	50V
C40	Ceramic	0.0047	50V
C41	Ceramic	0.0047	50V
C42	Ceramic	0.0047	50V
C43	Barrier Lay	0.047	25V
C44	Barrier Lay	0.047	25V
C45	Barrier Lay	0.047	25V
C47	Ceramic	0.0047	50V
C48	Ceramic	0.0047	50V
C49	Ceramic	0.0047	50V
C50	Ceramic	470P	50V
C51	Barrier Lay	0.047	25V
C52	Barrier Lay	0.047	25V
C53	Barrier Lay	0.047	25V
C54	Barrier Lay	0.047	25V
C55	Barrier Lay	0.047	25V
C56	Ceramic	0.0047	50V
C57	Ceramic	82P UJ	50V
C58	Stycon	510P	50V
C59	Dip Mica	120P	50V
C60	Ceramic	0.0047	50V
C61	Ceramic	0.0047	50V
C62	Ceramic	0.0047	50V
C63	Ceramic	0.0047	50V
C64	Barrier Lay	0.1	25V
C65	Barrier Lay	0.047	25V
C66	Ceramic	470P	50V
C67	Ceramic	470P	50V
C68	Barrier Lay	0.047	25V
J1	Connector	RT-01T-1.3B	
J2	Connector	RT-01T-1.3B	
J3	Connector	RT-01T-1.3B	
J4	Connector	RT-01T-1.3B	
J5	Connector	RT-01T-1.3B	
J6	Connector	RT-01T-1.3B	
J7	Connector	RT-01T-1.3B	
J8	Connector	RT-01T-1.3B	
J9	Connector	TL-25P-09-V1	
J10	Connector	TL-25P-02-V1	
J11	Connector	TL-25P-02-V1	
J12	Connector	TL-25P-03-V1	
J13	Connector	5045-2A	
J14	Connector	TL-25P-05-V1	
J15	Connector	TL-25P-05-V1	
J16	Connector	TL-25P-02-V1	
J17	Connector	TL-25P-06-V1	
J18	Connector	TL-25P-06-V1	
J19	Connector	TL-25P-03-V1	
J20	Connector	TL-25P-05-V1	
J21	Connector	TL-25P-07-V1	
J22	Connector	TL-01T-1.3B	
J23	Connector	TL-01T-1.3B	
J24	Connector	TL-01T-1.3B	
J25	Connector	TL-01T-1.3B	
J26	Connector	TL-01T-1.3B	
J27	Connector	TL-01T-1.3B	
J28	Connector	TL-01T-1.3B	
J29	Connector	TL-01T-1.3B	
J30	Connector	TL-25P-03-V1	
J31	Connector	TL-25P-05-V1	
J32	Connector	RT-01T-1.3B	

[IF UNIT]

REF. NO.	DESCRIPTION	PART NO.
J33	Connector	RT-01T-1.3B
J34	Connector	RT-01T-1.3B
J35	Connector	RT-01T-1.3B
J36	Connector	TLB-P12H-B1
P2	Connector	SMF-01T-1.3
P3	Connector	SMF-01T-1.3
P4	Connector	SMF-01T-1.3
P5	Connector	SMF-01T-1.3
P6	Connector	SMF-01T-1.3
P7	Connector	SMF-01T-1.3
P8	Connector	SMF-01T-1.3
P9	Connector	SMF-01T-1.3
P10	Connector	SMF-01T-1.3
P11	Connector	SMF-01T-1.3
P12	Connector	SMF-01T-1.3
P13	Connector	SMF-01T-1.3
B1	IF P.C.B	B-577C
B2	FI P.C.B	B-633

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.
IC1	IC	μPC1037H
IC2	IC	μPC1037H
IC3	IC	NJM4558D
IC4	IC	NJM4558D
IC5	IC	NJM082D
IC6	IC	NJM4558D
IC7	IC	NJM082D
IC8	IC	NJM4558D
IC9	IC	NJM4558D
IC10	IC	μPC1181H
Q1	FET	2SK241GR
Q2	FET	2SK241GR
Q3	Transistor	2SC945P
Q4	Transistor	2SC945 ANY RANK
Q5	Transistor	2SC945 ANY RANK
Q6	FET	2SK30A-Y
Q7	Transistor	2SC945P
Q8	FET	2SK192AGR
Q9	Transistor	2SC945 ANY RANK
Q10	Transistor	2SC945 ANY RANK
Q11	Transistor	2SC945 ANY RANK
Q12	Transistor	2SC945 ANY RANK
Q13	Transistor	2SC945P
Q14	Transistor	2SC945P
Q15	Transistor	2SC945P
Q16	Transistor	2SC1645 ANY RANK
Q17	Transistor	2SD468
Q18	Transistor	2SC945P
Q19	Transistor	2SC1571G
Q20	Transistor	2SC945 ANY RANK
Q21	Transistor	2SC945P
Q22	Transistor	2SC945P
Q23	Transistor	2SA1015
Q24	Transistor	2SA1015
Q25	Transistor	2SA1015
Q26	Transistor	2SC945P
Q27	Transistor	2SA1015
Q22	Transistor	2SC945P
Q29	Transistor	2SA1015
Q30	Transistor	2SC945 ANY RANK
Q32	Transistor	2SC945P
Q33	Transistor	2SC945
Q34	Transistor	2SC945
Q35	Transistor	2SC945P
Q36	Transistor	2SA1015
D1	Diode	1N60
D2	Diode	1SS97
D3	Diode	1SS53
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
D14	Diode	1SS53
D15	Diode	1SS53
D16	Diode	1SS53
D17	Diode	1SS53
D18	Diode	1SS53

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.
D19	Diode	1SS53
D20	Zener Diode	MZ304B
D21	Diode	1SS53
D22	Diode	1SS53
D23	Diode	1SS53
D24	Diode	1SS53
D25	Diode	1SS53
D26	Diode	1SS53
D27	Diode	1SS53
D28	Diode	1SS53
D29	Diode	1SS53
D30	Diode	1SS53
D31	Diode	1SS53
D34	Diode	1SS53
D35	Diode	1SS53
D36	Diode	1SS53
X1	Crystal	9.0116MHz HC-43/u
X2	Crystal	9.0145MHz HC-43/u
X3	Crystal	9.0115MHz HC-43/u
L1	Coil	LS-238
L2	Coil	LS-239
L3	Coil	LS-240
L4	Choke Coil	LAL04SK102K
L5	Coil	LS171
L6	Coil	LS-171
L7	Coil	LS-243
L8	Choke Coil	LAL04SK820K
R1	Resistor	1.5K ELR25
R2	Resistor	1K ELR25
R3	Resistor	100 ELR25
R4	Resistor	12K ELR25
R5	Resistor	1K ELR25
R7	Resistor	1K ELR25
R8	Resistor	100 R25
R9	Resistor	22K ELR25
R10	Resistor	4.7K ELR25
R11	Resistor	220 ELR25
R12	Resistor	220 ELR25
R13	Resistor	4.7K ELR25
R14	Resistor	4.7K ELR25
R15	Trimmer	100K H0651A
R16	Trimmer	100K H0651A
R17	Resistor	47K ELR25
R18	Resistor	3.3K ELR25
R19	Resistor	100 R25
R21	Resistor	1K ELR25
R22	Resistor	220 ELR25
R23	Resistor	10K ELR25
R24	Resistor	10K ELR25
R25	Resistor	10K ELR25
R26	Resistor	10K ELR25
R27	Resistor	1K ELR25
R28	Resistor	10K ELR25
R29	Resistor	10K ELR25
R30	Resistor	10K ELR25
R31	Resistor	10K ELR25
R32	Resistor	10K ELR25
R33	Resistor	47K R25
R34	Resistor	100K ELR25
R35	Resistor	470K ELR25
R36	Resistor	33K ELR25
R37	Resistor	47K ELR25

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.	
R38	Resistor	4.7K	ELR25
R39	Resistor	3.3K	ELR25
R40	Resistor	150	ELR25
R41	Resistor	33K	ELR25
R42	Trimmer	2.2K	H0651A
R44	Resistor	1K	ELR25
R45	Resistor	100K	ELR25
R46	Resistor	1K	ELR25
R47	Resistor	22K	ELR25
R48	Resistor	22K	ELR25
R49	Resistor	100	ELR25
R50	Resistor	10K	ELR25
R51	Resistor	10K	ELR25
R52	Resistor	10K	ELR25
R53	Resistor	10K	ELR25
R54	Resistor	2.2K	ELR25
R55	Resistor	2.2K	ELR25
R56	Resistor	4.7	ELR25
R57	Resistor	10K	ELR25
R58	Resistor	10K	ELR25
R59	Resistor	10K	ELR25
R60	Resistor	10K	ELR25
R61	Resistor	10K	ELR25
R62	Resistor	10K	ELR25
R63	Resistor	220	R25
R64	Resistor	15	ELR25
R65	Resistor	10K	ELR25
R66	Resistor	220	ELR25
R67	Resistor	4.7K	ELR25
R68	Resistor	220	ELR25
R69	Resistor	3.9K	ELR25
R70	Resistor	1K	R25
R71	Resistor	15	ELR25
R72	Resistor	10K	ELR25
R73	Resistor	220	R25
R74	Resistor	3.3K	ELR25
R75	Resistor	100	ELR25
R76	Resistor	180K	ELR25
R77	Resistor	4.7K	ELR25
R78	Resistor	4.7K	ELR25
R79	Resistor	4.7K	ELR25
R80	Resistor	820	ELR25
R81	Resistor	100	ELR25
R82	Resistor	330	ELR25
R83	Resistor	27K	ELR25
R84	Resistor	3.3K	ELR25
R85	Resistor	3.3K	ELR25
R86	Resistor	220	ELR25
R87	Resistor	2.2K	ELR25
R88	Resistor	2.2K	ELR25
R89	Resistor	47K	ELR25
R90	Resistor	47K	ELR25
R91	Resistor	10K	ELR25
R92	Resistor	47K	ELR25
R93	Resistor	47K	ELR25
R94	Resistor	15K	ELR25
R96	Resistor	220K	ELR25
R97	Resistor	100K	ELR25
R98	Resistor	470K	ELR25
R99	Resistor	220K	ELR25
R100	Resistor	1.8M	ELR25
R101	Resistor	470	ELR25
R102	Resistor	470	ELR25
R103	Resistor	15K	ELR25

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.	
R104	Resistor	22K	ELR25
R105	Resistor	4.7K	ELR25
R106	Resistor	4.7K	ELR25
R107	Resistor	4.7K	ELR25
R108	Resistor	1K	ELR25
R109	Resistor	330	ELR25
R110	Resistor	1K	ELR25
R111	Trimmer	100	H0651A
R112	Resistor	330	ELR25
R113	Resistor	10K	ELR25
R114	Resistor	10K	ELR25
R115	Resistor	100K	ELR25
R116	Resistor	33K	ELR25
R117	Resistor	4.7K	R25
R118	Resistor	2.2K	ELR25
R119	Resistor	4.7K	ELR25
R120	Resistor	10K	R25
R121	Resistor	10K	ELR25
R122	Resistor	3.3M	ELR25
R123	Resistor	15M	ERC14GJ
R124	Resistor	3.3M	ELR25
R127	Trimmer	100K	H0651A
R128	Trimmer	3.3K	H0651A
R130	Resistor	10K	ELR25
R131	Resistor	10K	ELR25
R132	Resistor	180K	ELR25
R133	Trimmer	1K	H0651A
R134	Resistor	330	ELR25
R135	Resistor	22K	ELR25
R136	Resistor	4.7K	ELR25
R137	Resistor	4.7K	ELR25
R138	Resistor	4.7K	ELR25
R139	Resistor	330	ELR25
R140	Resistor	100	ELR25
R141	Resistor	68K	ELR25
R142	Resistor	68K	ELR25
R143	Resistor	39K	ELR25
R144	Trimmer	10K	H0651A
R145	Resistor	1M	ELR25
R146	Trimmer	33K	H0651A
R147	Trimmer	10K	H0651A
R148	Resistor	1M	ELR25
R149	Resistor	3.3M	ELR25
R150	Resistor	3.3M	ELR25
R151	Resistor	10K	ELR25
R152	Resistor	10K	ELR25
R153	Resistor	47K	ELR25
R155	Resistor	47	ELR25
R156	Resistor	3.3M	R25
R157	Resistor	3.3M	ELR25
R158	Resistor	10M	ERC14GJ
R159	Resistor	3.9K	ELR25
R160	Resistor	3.3M	ELR25
R161	Resistor	3.3M	ELR25
R162	Resistor	10M	ERC14GJ
R163	Resistor	3.9K	ELR25
R164	Trimmer	33K	H0651A
R165	Resistor	820K	ELR25
R166	Resistor	820K	ELR25
R167	Resistor	100K	ELR25
R168	Resistor	3.3M	ELR25
R169	Resistor	47K	ELR25
R170	Resistor	1M	ELR25
R171	Resistor	10K	ELR25

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.	
R172	Resistor	1M	ELR25
R173	Resistor	100K	ELR25
R174	Resistor	1.8M	ELR25
R175	Resistor	1K	ELR25
R177	Resistor	470K	R25
R178	Resistor	470K	ELR25
R179	Resistor	3.3M	ELR25
R180	Trimmer	47K	H0651A
R181	Resistor	100	ELR25
R182	Resistor	220	ELR25
R183	Resistor	47	ELR25
R184	Resistor	100K	ELR25
R185	Resistor	1K	ELR25
R186	Resistor	10K	ELR25
R187	Resistor	470K	ELR25
R188	Resistor	3.3M	ELR25
R189	Resistor	22K	ELR25
R190	Resistor	22K	ELR25
R191	Trimmer	10K	H0651A
R192	Resistor	4.7K	ELR25
R193	Resistor	22K	ELR25
R194	Resistor	4.7K	ELR25
R195	Resistor	4.7K.	ELR25
R196	Resistor	4.7K	R25
R197	Resistor	22K	ELR25
R198	Resistor	10K	ELR25
R199	Resistor	220	ELR25
R200	Resistor	220	ELR25
R201	Resistor	100	ELR25
R202	Resistor	47K	ELR25
R203	Resistor	47K	ELR25
R204	Trimmer	10K	H0651A
R205	Resistor	10K	ELR25
R206	Trimmer	10K	H0651A
R209	Trimmer	10K	H0651A
R210	Resistor	100K	ELR25
R211	Resistor	47K	R25
R212	Resistor	330	ELR25
R213	Resistor	47K	ELR25
R214	Resistor	10K	ELR25
R215	Resistor	10K	ELR25
R216	Resistor	1M	ELR25
R217	Resistor	1M	ELR25
R218	Resistor	220	ELR25
R219	Resistor	10K	ELR25
R220	Resistor	4.7K	ELR25
R221	Resistor	470K	ELR25
R222	Resistor	47K	ELR25
R223	Resistor	68K	ELR25
R224	Resistor	2.2K	ELR25
R225	Resistor	22	ELR25
R226	Resistor	3.3	ELR25
R227	Resistor	3.3K	ELR25
R228	Resistor	220	ELR25
R229	Resistor	4.7K	ELR25
R230	Resistor	4.7K	ELR25
R231	Resistor	100K	ELR25
R232	Resistor	33K	ELR25
R233	Resistor	4.7K	ELR25
R234	Resistor	2.2K	ELR25
R235	Resistor	47	ELR25
R236	Resistor	22K	ELR25
R237	Resistor	2.2	ELR25
R238	Resistor	10K	ELR25

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.	
R239	Resistor	330	ELR25
R240	Resistor	6.8K	ELR25
C1	Barrier Lay	0.047	25V
C2	Barrier Lay	0.047	25V
C3	Barrier Lay	0.047	25V
C4	Barrier Lay	0.047	25V
C5	Barrier Lay	0.047	25V
C7	Barrier Lay	0.047	25V
C8	Ceramic	33P	50V
C9	Barrier Lay	0.047	25V
C10	Ceramic	0.0047	50V
C11	Ceramic	0.0047	50V
C12	Barrier Lay	0.047	25V
C13	Electrolytic	10	16V
C14	Barrier Lay	0.047	25V
C15	Ceramic	0.0047	50V
C16	Electrolytic	1	50V
C17	Barrier Lay	0.047	25V
C18	Electrolytic	47	10V
C19	Barrier Lay	0.047	25V
C20	Barrier Lay	0.1	25V
C21	Barrier Lay	0.047	25V
C22	Barrier Lay	0.047	25V
C23	Electrolytic	10	25V
C24	Barrier Lay	0.047	25V
C25	Barrier Lay	0.1	25V
C26	Barrier Lay	0.047	25V
C27	Barrier Lay	0.047	25V
C28	Barrier Lay	0.047	25V
C29	Barrier Lay	0.047	25V
C30	Ceramic	0.0047	50V
C31	Ceramic	0.0047	50V
C32	Barrier Lay	0.047	25V
C33	Electrolytic	33	10V
C34	Ceramic	0.0047	50V
C35	Ceramic	0.0047	50V
C36	Ceramic	0.0047	50V
C37	Trimmer	CV05E3001	
C38	Ceramic	82P	50V
C39	Ceramic	0.0047	50V
C40	Dip Mica	150P	50V
C41	Dip Mica	150P	50V
C42	Ceramic	0.0047	50V
C43	Ceramic	0.0047	50V
C44	Ceramic	0.0047	50V
C45	Trimmer	CV05E3001	
C46	Ceramic	47P	50V
C47	Ceramic	0.0047	50V
C48	Trimmer	CV05E3001	
C49	Ceramic	47P	50V
C50	Ceramic	0.0047	50V
C51	Barrier Lay	0.047	25V
C52	Barrier Lay	0.047	25V
C53	Ceramic	470P	50V
C54	Electrolytic	2.2	50V
C55	Electrolytic	1 B.P.	50V
C56	Electrolytic	100	16V
C57	Electrolytic	33	10V
C58	Barrier Lay	0.047	25V
C59	Electrolytic	10	25V
C60	Barrier Lay	0.047	25V
C61	Electrolytic	10	25V
C62	Electrolytic	47	10V

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.	
C63	Electrolytic	4.7	50V
C64	Electrolytic	0.47	50V
C65	Electrolytic	4.7	50V
C66	Mylar	0.01	50V
C67	Electrolytic	47	10V
C68	Mylar	0.022	50V
C69	Mylar	0.022	50V
C70	Mylar	0.022	50V
C71	Barrier Lay	0.047	25V
C72	Electrolytic	22	16V
C73	Mylar	0.033	50V
C74	Electrolytic	100	10V
C75	Electrolytic	22	16V
C76	Mylar	0.022	50V
C77	Barrier Lay	0.047	25V
C78	Barrier Lay	0.047	25V
C79	Barrier Lay	0.1	25V
C80	Electrolytic	220	10V
C81	Electrolytic	47	10V
C82	Electrolytic	47	16V
C83	Electrolytic	470 MS9	16V
C84	Electrolytic	47	10V
C85	Ceramic	0.0047	50V
C86	Barrier Lay	0.1	25V
C87	Tantalum	10	16V
C88	Electrolytic	47	10V
C89	Mylar	0.022	50V
C90	Mylar	0.022	50V
C91	Mylar	0.022	50V
C92	Ceramic	0.001	50V
C93	Electrolytic	470	10V
C94	Barrier Lay	0.1	25V
C95	Electrolytic	4.7	50V
C96	Electrolytic	4.7	50V
C97	Barrier Lay	0.1	25V
C100	Ceramic	0.0047	50V
C101	Electrolytic	470	10V
C102	Electrolytic	1	50V
C103	Ceramic	0.0047	50V
C104	Ceramic	0.0047	50V
C106	Ceramic	0.0047	50V
C112	Barrier Lay	0.047	50V
C113	Electrolytic	47	10V
C114	Electrolytic	47	10V
C115	Electrolytic	1	50V
C116	Electrolytic	0.47 BO	50V
C117	Ceramic	0.0047	50V
C118	Barrier Lay	0.047	25V
C119	Electrolytic	33	10V
C120	Electrolytic	47	10V
C121	Electrolytic	10	50V
C122	Mylar	0.1	50V
C123	Barrier Lay	0.047	25V
C124	Ceramic	0.0047	50V
C125	Electrolytic	47	10V
C126	Electrolytic	47	10V
C127	Barrier Lay	0.1	16V
C128	Electrolytic	47	10V
B1	MAIN P.C.B	B-578C	
S1	Switch	SSS012	
S2	Switch	SSS012	
J1	Connector	TL-25P-05-V1	
J3	Connector	TL-25P-02-V1	

[MAIN UNIT]

REF. NO.	DESCRIPTION	PART NO.
J4	Connector	TL-25P-06-V1
J5	Connector	TL-25P-04-V1
J6	Connector	TL-25P-05-V1
J7	Connector	TL-25P-03-V1
J8	Connector	TL-25P-08-V1
J9	Connector	TL-25P-04-V1
J10	Connector	TL-25P-02-V1
J11	Connector	TL-25P-02-V1
J12	Connector	TL-25P-06-V1
J13	Connector	TL-25P-02-V1
J14	Connector	TL-25P-02-V1
J15	Connector	TL-25P-09-V1
J16	Connector	TL-25P-04-V1
J17	Connector	TL-25P-09-V1
J18	Connector	TL-25P-02-V1
J19	Connector	TL-25P-05-V1
J20	Connector	TL-25P-05-V1
J21	Connector	TL-25P-08-V1
J22	Connector	TL-25P-09-V1
J24	Connector	TL-25P-04-V1
J25	Connector	TL-25P-02-V1
J26	Connector	TL-25P-05-V1
J27	Connector	TL-25P-04-V1
J28	Connector	TL-25P-06-V1
J29	Connector	TL-25P-04-V1
J30	Connector	TL-25P-06-V1
J31	Connector	TL-25P-03-V1

[MATRIX UNIT]

REF. NO.	DESCRIPTION	PART NO.	
IC1	Diode Array	DAN401	
IC2	Diode Array	DAN401	
IC3	Diode Array	DAN401	
IC4	Diode Array	DAN401	
IC5	Diode Array	DAN401	
IC6	Diode Array	DAN401	
D1	Diode	1SS53	
D2	Diode	1SS53	
D3	Diode	1SS53	
D4	Diode	1SS53	
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	
D14	Diode	1SS53	
D15	Diode	1SS53	
D16	Diode	1SS53	
D17	Diode	1SS53	
R1	Resistor	33	ELR25
R2	Resistor	1K	R25
R3	Resistor	1K	R25
R4	Resistor	1K	R25
R5	Resistor	1K	R25
R6	Resistor	1K	R25
R7	Resistor	1K	R25
R8	Resistor	1K	R25
R10	Resistor	750	CRB25FX
R11	Resistor	1.8K	CRB25FX
R12	Resistor	3.3K	CRB25FX
R13	Resistor	5.6K	CRB25FX
R14	Resistor	1K	CRB25FX
R15	Resistor	4.7K	CRB25FX
R16	Resistor	1K	ELR25
C1	Barrier Lay	0.047	25V
C2	Barrier Lay	0.047	25V
C3	Barrier Lay	0.047	25V
C4	Barrier Lay	0.047	25V
C5	Barrier Lay	0.047	25V
C6	Barrier Lay	0.047	25V
C7	Barrier Lay	0.047	25V
C8	Barrier Lay	0.047	25V
C9	Barrier Lay	0.047	25V
C10	Barrier Lay	0.1	25V
C11	Ceramic	0.0047	50V
C12	Barrier Lay	0.047	25V
C13	Barrier Lay	0.047	25V
C14	Electrolytic	100	10V
C15	Electrolytic	10	16V
J1	Connector	TL-25P-08-V1	
J3	Connector	TL-25P-04-V1	
J4	Connector	TL-25P-06-V1	
J5	Connector	TL-25P-06-V1	
J6	Connector	TL-25P-07-V1	
J7	Connector	TL-25P-09-V1	
J8	Connector	TL-25P-04-V1	

[MATRIX UNIT]

REF. NO.	DESCRIPTION	PART NO.
J9	Connector	TL-25P-08-V1
B1	MATRIX P.C.B	B-579C

[LOGIC UNIT]

REF. NO.	DESCRIPTION	PART NO.
IC1	CPU	μPD650C-080
IC2	IC	μPD4071
IC3	IC	μPD4030
IC4	IC	μPD4013
IC5	IC	μPD4081
IC6	IC	TC4013
IC7	IC	TC4013
IC8	IC	μPD4066
IC9	IC	μPD4030
IC10	IC	μA78L05
IC11	IC	μPD4030
IC12	IC	μPD4081
IC13	IC	DAN401
Q1	Transistor	2SC945 ANY RANK
Q2	Transistor	2SA798
Q3	Transistor	2SC945 ANY RANK
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
D14	Diode	1SS53
D15	Diode	1SS53
D16	Diode	1SS53
D17	Diode	1SS53
D18	Diode	1SS53
D19	Diode	1SS53
D20	Diode	1SS53
D21	Diode	1N4002
D22	Diode	1SS53
D23	Diode	1SS53
X1	Ceramic Unit	CSB430A
R1	Resistor	100K R25
R2	Resistor	220K R25
R3	Resistor	1M R25
R4	Resistor	100K R25
R5	Resistor	220K R25
R6	Resistor	1M R25
R7	Resistor	47K ELR25
R8	Resistor	47K ELR25
R9	Resistor	47K ELR25
R10	Resistor	47K R25
R11	Resistor	100K R25
R12	Resistor	100K ELR25
R13	Resistor	2.7K ELR25
R14	Resistor	10K ELR25
R15	Resistor	10K ELR25
R16	Resistor	150K ELR25
R17	Resistor	100K R25
R18	Resistor	47K R25
R19	Resistor	47K R25
R20	Resistor	220K R25
R21	Resistor	100K R25
R22	Resistor	100K R25
R23	Resistor	22K R25
R24	Resistor	22K R25

[LOGIC UNIT]

REF. NO.	DESCRIPTION	PART NO.
R25	Resistor	22K R25
R26	Resistor	22K R25
R27	Resistor	56K R25
R28	Resistor	47K R25
R29	Resistor	47K R25
R30	Resistor	470K R25
R31	Resistor	4.7K R25
R32	Resistor	47K R25
R33	Resistor	47K R25
R34	Resistor	47K R25
R35	Resistor	820K ELR25
R36	Resistor	4.7K ELR25
R37	Resistor	4.7K R25
R38	Resistor	1M ELR25
R39	Resistor	820K R25
R40	Resistor	3.3M R25
R41	Resistor	RM4-473K
R42	Resistor	RM8-222K
R43	Resistor	NETWORK-A1
R44	Resistor	47K R25
R45	Resistor	470K R25
R46	Resistor	47K R25
R47	Resistor	1.2K ELR25
R48	Resistor	3.3K ELR25
C1	Ceramic	0.001 50V
C2	Ceramic	0.001 50V
C3	Ceramic	0.001 50V
C4	Ceramic	0.001 50V
C5	Barrier Lay	0.1 25V
C6	Electrolytic	0.47 50V
C7	Electrolytic	0.47 50V
C8	Electrolytic	100 10V
C9	Electrolytic	4.7 10V
C10	Ceramic	0.001 50V
C11	Ceramic	0.0022 50V
C12	Barrier Lay	0.1 25V
C13	Ceramic	0.001 50V
C14	Ceramic	100P 50V
C15	Ceramic	100P 50V
C16	Barrier Lay	0.1 25V
C17	Barrier Lay	0.1 25V
C18	Barrier Lay	0.047 25V
C19	Barrier Lay	0.1 25V
C20	Barrier Lay	0.1 25V
C21	Barrier Lay	0.1 25V
C22	Ceramic	0.0047 50V
C23	Electrolytic	470 10V
C24	Electrolytic	220 10V
C25	Barrier Lay	0.1 25V
C26	Electrolytic	10 16V
J1	Connector	TL-25P-03-V1
J2	Connector	TL-25P-05-V1
J3	Connector	TL-25P-04-V1
J4	Connector	TL-25P-03-V1
J5	Connector	TL-25P-04-V1
J6	Connector	TL-25P-04-V1
J7	Connector	TL-25P-08-V1
J8	Connector	TL-25P-06-V1
J9	Connector	TL-25P-05-V1
J10	Connector	TL-25P-05-V1
B1	LOGIC P.C.B	B-608B

[PLL UNIT]

REF. NO.	DESCRIPTION	PART NO.
IC1	IC	TC9125P
IC2	IC	HD10551
Q1	Transistor	2SC945P
Q2	Transistor	2SC763C
Q3	Transistor	2SC763C
Q4	Transistor	2SC763C
Q5	Transistor	2SC945P
Q6	FET	2SK125
Q7	Transistor	2SC763C
Q8	Transistor	2SC945P
D1	Varactor Diode	1SV50
D2	Varactor Diode	SVC201
D3	Diode	1SS53
X1	Crystal	9.000MHz HC-18/u
X2	Crystal	13.666MHz HC-18/u
L1	Coil	LS-191
L2	Coil	LS-191
L3	Coil	LS-3A
L4	Coil	LS-3A
L5	Choke Coil	LAL04SK100K
L6	Choke Coil	LAL04SK2R7M
L7	Choke Coil	LW-19
L8	Coil	LB-113
L9	Coil	LS-3A
L10	Choke Coil	LS-206
L11	Choke Coil	R70 (LB4)
R1	Resistor	630 ELR25
R2	Resistor	100K ELR25
R3	Resistor	47K ELR25
R4	Resistor	22K ELR25
R5	Resistor	10K ELR25
R6	Resistor	1K R25
R7	Resistor	2.2K R25
R8	Resistor	22K ELR25
R9	Resistor	4.7K ELR25
R10	Resistor	2.2K R25
R11	Resistor	22K R25
R12	Resistor	4.7K ELR25
R13	Resistor	1K R25
R14	Resistor	220 R25
R15	Resistor	100 ELR25
R16	Resistor	470 R25
R17	Resistor	22K R25
R18	Resistor	5.6K ELR25
R19	Resistor	22K ELR25
R20	Resistor	4.7K ELR25
R21	Resistor	100 ELR25
R22	Resistor	470 ELR25
R23	Resistor	47K ELR25
R24	Resistor	22K ELR25
R25	Resistor	680 ELR25
R26	Resistor	330 R25
R27	Resistor	100 R25
R28	Resistor	10K R25
R29	Resistor	47K ELR25
R30	Resistor	2.2K ELR25
R31	Resistor	100K ELR25
R32	Resistor	470 R25
R33	Resistor	10K ELR25

[PLL UNIT]

REF. NO.	DESCRIPTION	PART NO.
R34	Resistor	27K R25
R35	Resistor	10K ELR25
R36	Resistor	330 ELR25
R37	Resistor	1K R25
R38	Resistor	100 ELR25
R39	Resistor	100 ELR25
R40	Resistor	100 ELR25
R41	Resistor	82 ELR25
R42	Resistor	100 R25
R43	Resistor	68 ELR25
R44	Resistor	330 ELR25
R45	Resistor	330 ELR25
R46	Resistor	330 ELR25
R47	Resistor	330 ELR25
R48	Resistor	330 ELR25
C1	Ceramic	0.0047 50V
C2	Ceramic	0.0047 50V
C3	Electrolytic	47 10V
C4	Ceramic	0.0047 50V
C5	Ceramic	220P 50V
C6	Ceramic	220P 50V
C7	Ceramic	220P 50V
C8	Ceramic	0.0047 50V
C9	Ceramic	20P 50V
C10	Ceramic	1P 50V
C11	Ceramic	22P 50V
C12	Ceramic	10P 50V
C13	Ceramic	10P 50V
C14	Ceramic	0.0047 50V
C15	Ceramic	0.35P 50V
C16	Ceramic	10P 50V
C17	Ceramic	0.0047 50V
C18	Ceramic	220P 50V
C19	Ceramic	0.0047 50V
C20	Ceramic	4P 50V
C21	Ceramic	0.047 50V
C22	Ceramic	0.0047 50V
C23	Ceramic	33P 50V
C24	Ceramic	33P 50V
C25	Ceramic	0.001 50V
C26	Ceramic	0.0047 50V
C27	Ceramic	0.0047 50V
C28	Ceramic	0.0047 50V
C29	Electrolytic	47 10V
C30	Ceramic	0.0047 50V
C31	Trimmer	CV05D2001
C32	Ceramic	18P 50V
C33	Ceramic	20P 50V
C34	Ceramic	470P 50V
C35	Ceramic	470P 50V
C36	Electrolytic	1 50V
C37	Ceramic	0.0047 50V
C38	Electrolytic	47 10V
C39	Ceramic	15P 50V
C40	Ceramic	3P 50V
C41	Ceramic	3P 50V
C42	Ceramic	0.0047 50V
C44	Ceramic	1P 50V
C45	Ceramic	0.0047 50V
C46	Ceramic	10P 50V
C47	Cylinder	0.001 50V
C48	Electrolytic	470 10V
C49	Ceramic	0.0047 50V

[PLL UNIT]

REF. NO.	DESCRIPTION	PART NO.	
C50	Ceramic	0.001	50V
C51	Ceramic	220P	50V
C52	Electrolytic	22	10V
C53	Ceramic	220P	50V
C54	Ceramic	68P	50V
C55	Ceramic	0.0047	50V
C56	Ceramic	470P SL	50V
C57	Ceramic	470P SL	50V
C58	Electrolytic	47	10V
C59	Ceramic	0.0047	50V
C60	Ceramic	470P	50V
C61	Ceramic	470P	50V
C62	Ceramic	470P	50V
C63	Ceramic	470P	50V
C64	Ceramic	470P	50V
C65	Ceramic	0.0047	50V
J1	Connector	TL-25P-06-V1	
J2	Connector	TL-25P-04-V1	
J3	Connector	TL-25P-02-V1	
P1	Connector	TL-25H-02-A1	
B1	PLL P.C.B	B-582B	

[VCO UNIT]

REF. NO.	DESCRIPTION	PART NO.	
IC1	IC	BA618	
Q1	FET	2SK19GR (2SK192AGR)	
Q2	FET	2SK19GR (2SK192AGR)	
Q3	FET	2SK19GR (2SK192AGR)	
Q4	FET	2SK19GR (2SK192AGR)	
Q5	Transistor	2SC763C	
Q6	Transistor	2SC2053	
Q7	Transistor	2SC945P	
D1	Varicap	SVC201	
D2	Diode	1SS53	
D3	Diode	1SS53	
D4	Diode	1SS53	
D5	Varicap	SVC201	
D6	Diode	1SS53	
D7	Varicap	SVC201	
D8	Diode	1SS53	
D9	Varicap	SVC201	
D10	Diode	1SS53	
L1	Choke Coil	LAL04NA820K	
L2	Coil	LB-137	
L3	Choke Coil	LAL04NA820K	
L4	Choke Coil	LAL04NA101K	
L5	Coil	LB-137	
L6	Choke Coil	LAL04NA101K	
L7	Coil	LB-138	
L8	Choke Coil	LAL04NA101K	
L9	Coil	LB-138	
L10	Coil	LR-87	
L11	Choke Coil	LAL04NA101K	
L12	Choke Coil	R36	LB-4
L13	Choke Coil	LA137A	
L14	Choke Coil	R12	LB-4
R1	Resistor	100	ELR25
R2	Resistor	100	ELR25
R3	Resistor	220K	ELR25
R4	Resistor	220K	ELR25
R5	Resistor	4.7K	ELR25
R7	Resistor	100	ELR25
R8	Resistor	100	ELR25
R9	Resistor	100	R25
R10	Resistor	4.7K	ELR25
R11	Resistor	1K	ELR25
R12	Resistor	220K	ELR25
R13	Resistor	220K	ELR25
R14	Resistor	100	R25
R15	Resistor	4.7K	ELR25
R16	Resistor	1K	ELR25
R17	Resistor	220K	ELR25
R18	Resistor	220K	ELR25
R19	Resistor	100	R25
R20	Resistor	4.7K	ELR25
R21	Resistor	47	ELR25
R22	Resistor	15K	ELR25
R23	Resistor	47K	ELR25
R24	Resistor	100	ELR25
R25	Resistor	1K	ELR25
R26	Resistor	22	ELR25
R27	Resistor	220	ELR25
R28	Resistor	5.6K	ELR25
R29	Resstor	15K	ELR25

[VCO UNIT]

REF. NO.	DESCRIPTION	PART NO.	
R31	Resistor	4.7K	ELR25
R32	Resistor	1.2K	R25
R33	Resistor	330	ELR25
R34	Resistor	100	ELR25
R35	Resistor	2.2K	ELR25
R36	Resistor	3.3K	R25
C1	Barrier Lay	0.047	25V
C2	Ceramic	68P	50V
C3	Ceramic	12P	50V
C4	Trimmer	CTZ51A	
C5	Ceramic	18P	50V
C6	Ceramic	47P	50V
C7	Ceramic	22P	50V
C8	Ceramic	39P	50V
C9	Electrolytic	47	10V
C10	Ceramic	0.0047	50V
C11	Electrolytic	47	10V
C12	Barrier Lay	0.047	25V
C13	Ceramic	68P	50V
C14	Ceramic	15P	50V
C15	Trimmer	CTZ51A	
C16	Ceramic	47P	50V
C17	Ceramic	10P	50V
C18	Ceramic	15P	50V
C19	Electrolytic	47	10V
C20	Ceramic	0.0047	50V
C22	Ceramic	47P	50V
C23	Ceramic	10P	50V
C24	Trimmer	CTZ51A	
C25	Ceramic	47P	50V
C26	Ceramic	27P	50V
C27	Ceramic	18P	50V
C28	Electrolytic	47	10V
C29	Ceramic	0.0047	50V
C30	Barrier Lay	0.047	25V
C31	Ceramic	47P	50V
C32	Ceramic	5P	50V
C33	Trimmer	CTZ51A	
C34	Ceramic	47P	50V
C35	Ceramic	10P	50V
C36	Ceramic	15P	50V
C37	Electrolytic	47	10V
C38	Ceramic	0.0047	50V
C39	Ceramic	0.0047	50V
C40	Electrolytic	47	10V
C41	Ceramic	5P	50V
C42	Ceramic	0.0047	50V
C43	Ceramic	0.0047	50V
C44	Electrolytic	47	16V
C45	Ceramic	0.0047	50V
C46	Ceramic	68P	50V
C47	Ceramic	100P	50V
C48	Ceramic	68P	50V
C49	Ceramic	56P	50V
C50	Ceramic	100P	50V
C51	Ceramic	120P	50V
C52	Ceramic	27P	50V
C53	Ceramic	0.0047	50V
C54	Electrolytic	100	10V
C55	Ceramic	0.0047	50V
C56	Barrier Lay	0.047	50V
C58	Ceramic	82P	50V

[VCO UNIT]

REF. NO.	DESCRIPTION	PART NO.
J1	Connector	TLB-P05H-B1
P1	Connector	TL-25H-02-A1
P2	Connector	TL-25H-02-A1
P3	Connector	TL-25H-02-A1
P4	Connector	TL-25H-06-A1
B1	VCO P.C.B	B-634A

[HPL UNIT]

REF. NO.	DESCRIPTION	PART NO.
IC1	IC	SN76515
IC2	IC	SN76515
IC3	IC	μA78L05
IC4	IC	MB8718M
IC5	IC	M74LS161P
IC6	IC	DAN401
IC7	IC	DAN401
IC8	IC	DAN401
IC9	IC	SAN401
IC10	IC	SAN401
IC11	IC	μA78L82
Q1	Transistor	2SC945
Q2	Transistor	2SC763C
Q3	Transistor	2SC1571G
Q4	Transistor	2SC1571G
Q5	Transistor	2SC763C
Q6	Transistor	2SC763C
Q7	Transistor	2SC763C
D1	Diode	1SS53
D2	Diode	1SS53
D3	Diode	1SS53
D4	Diode	1SS53
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
D14	Diode	1SS53
D15	Diode	1SS53
D16	Diode	1SS53
D17	Diode	1SS53
D18	Diode	1SS53
D19	Diode	1SS53
D20	Diode	1S953
X1	Crystal	34.9315MHz HC-18/u
L1	Coil	LS193
L2	Coil	LR116
L3	Coil	LS191
L4	Coil	LS191
L5	Choke Coil	101 (LB-4)
L6	Coil	LR116
L7	Choke Coil	101 (L-4)
L8	Choke Coil	1R0 (LB4)
L9	Choke Coil	R70 (LB4)
R1	Resistor	4.7K ELR25
R2	Resistor	560 ELR25
R3	Resistor	22K ELR25
R4	Resistor	150 ELR25
R5	Resistor	3.3K ELR25
R6	Resistor	10 ELR25
R7	Resistor	47K ELR25
R8	Resistor	470 ELR25
R9	Resistor	100K R25
R10	Resistor	3.3K ELR25
R11	Resistor	10 ELR25

[HPL UNIT]

REF. NO.	DESCRIPTION	PART NO.
R12	Resistor	47 ELR25
R13	Trimmer	1K H0651A
R15	Resistor	15K ELR25
R16	Resistor	4.7K ELR25
R17	Resistor	100 ELR25
R18	Resistor	15K ELR25
R19	Resistor	5.6K ELR25
R20	Resistor	330 ELR25
R21	Array	RM8-473K
R22	Resistor	68K R25
R23	Resistor	68K R25
R24	Resistor	68K R25
R25	Resistor	68K R25
R26	Resistor	68K ELR25
R27	Resistor	68K ELR25
R28	Resistor	68K ELR25
R29	Resistor	1.5K ELR25
R30	Resistor	1K R25
R31	Resistor	15K ELR25
R32	Resistor	1K ELR25
R33	Resistor	150 ELR25
R34	Resistor	39K ELR25
R35	Resistor	10K ELR25
R36	Resistor	22K ELR25
R37	Resistor	22K ELR25
R38	Resistor	22K ELR25
R39	Resistor	22K ELR25
R40	Resistor	22K ELR25
R41	Array	RM6-104K
R42	Resistor	27K ELR25
R43	Resistor	15K ELR25
R44	Resistor	10K ELR25
R45	Resistor	12K ELR25
C1	Ceramic	470P 50V
C2	Ceramic	0.0047 50V
C3	Ceramic	82P 50V
C4	Ceramic	0.001 50V
C5	Ceramic	0.001 50V
C6	Ceramic	0.0047 50V
C7	Ceramic	0.0047 50V
C8	Ceramic	0.0047 50V
C10	Ceramic	0.0047 50V
C11	Ceramic	0.001 50V
C12	Ceramic	0.0047 50V
C13	Electrolytic	47 16V
C14	Ceramic	27P 50V
C15	Ceramic	2P 50V
C16	Ceramic	27P 50V
C17	Ceramic	15P 50V
C18	Ceramic	470P 50V
C19	Ceramic	0.001 50V
C20	Ceramic	0.0047 50V
C21	Ceramic	0.0047 50V
C22	Ceramic	0.0047 50V
C23	Ceramic	0.0047 50V
C25	Ceramic	0.0047 50V
C26	Ceramic	0.001 50V
C27	Tantal	0.47 35V
C28	Ceramic	0.0047 50V
C29	Electrolytic	47 16V
C30	Ceramic	0.0047 50V
C31	Electrolytic	10 16V
C32	Electrolytic	47 10V

[HPL UNIT]

REF. NO.	DESCRIPTION	PART NO.	
C33	Ceramic	0.0047	50V
C34	Ceramic	0.0047	50V
C35	Ceramic	0.001	50V
C36	Ceramic	0.0047	50V
C37	Ceramic	180P	50V
C38	Ceramic	82P	50V
C39	Ceramic	10P	50V
C40	Ceramic	120P	50V
C41	Ceramic	30P	50V
C42	Ceramic	62P	50V
C43	Ceramic	0.0047	50V
C44	Ceramic	0.0047	50V
C45	Ceramic	0.0047	50V
C46	Ceramic	0.001	50V
C47	Ceramic	0.0047	50V
C48	Ceramic	0.0047	50V
C49	Ceramic	47P	50V
C50	Barrier Lay	0.1	25V
C51	Barrier Lay	0.1	25V
J1	Connector	TL-25P-02-V1	
J2	Connector	TL-25P-02-V1	
J3	Connector	TL-25P-02-V1	
J4	Connector	TL-25P-06-V1	
J5	Connector	TLB-P07H-B1	
J6	Connector	TLB-P06H-B1	
P1	Connector	TL-25H-02-A1	
P2	Connector	TL-25H-07-A1	
P3	Connector	TL-25H-06-A1	
B1	HPL P.C.B	B-635A	

[FRONT UNIT]

REF. NO.	DESCRIPTION	PART NO.	
IC1	IC	μPD549C	
IC2	IC	μPD4030	
Q1	Transistor	2SC1636	ANY RANK
Q2	Transistor	2SC945	ANY RANK
Q3	Transistor	2SA1015Y	
Q4	Transistor	2SA1015Y	
Q5	Transistor	2SA1015Y	
Q6	Transisjtor	2SA1015Y	
Q7	Transistor	2SC945	ANY RANK
Q8	Transistor	2SA1015Y	
Q9	Transistor	2SC1214	ANY RANK
D1	Diode	1SS53	
D2	Diode	1SS53	
D3	Diode	1SS53	
D4	Diode	1SS53	
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	
D14	Diode	1SS53	
D15	Diode	1SS53	
D16	Diode	1SS53	
D17	Zener Diode	WZ040	
D18	Zener Diode	WZ056	
D19	Diode	1SS53	
D20	Diode	1SS53	
D21	Diode	1SS53	
D22	Diode	1SS53	
D23	Diode	1SS53	
D24	Diode	1SS53	
D25	LED (XIT)	LN233RP	
D26	LED (RIT)	LN233RP	
D27	LED (TX)	LN233RP	
D28	LED (RX)	LN333GP	
D29	LED (MEMO)	LN433YP	
D30	LED (SPLIT)	LN433YP	
D31	Diode	1SS99	
D32	Diode	1SS99	
R1	Resistor	47K	R25
R2	Resistor	470K	ELR25
R3	Resistor	47K	ELR25
R4	Resistor	22K	ELR25
R5	Resistor	47K	R25
R6	Resistor	47K	ELR25
R7	Resistor	47K	ELR25
R8	Resistor	47K	ELR25
R9	Resistor	47K	ELR25
R10	Array	RM6-473K	
R11	Array	RM8-473K	
R12	Resistor	100	R25
R13	Resistor	100	R25
R14	Resistor	47K	ELR25
R15	Resistor	47K	ELR25
R16	Resistor	47K	ELR25
R17	Resistor	100K	ELR25
R18	Resistor	39K	ELR25

[FRONT UNIT]

REF. NO.	DESCRIPTION	PART NO.	
R19	Resistor	560	ELR25
R20	Variable Resistor	K122-5N1212-1MA	
R21	Variable Resistor	K121B0	1KB
R23	Trimmer	33K	H0651A
R24	Variable Resistor	K122-5N1212-10KB500KC	
R25	Variable Resistor	K121-B0-1MB	
R27	Variable Resistor	K12B	10KAx2
R28	Variable Resistor	K12C	10KBx210KA
R29	Resistor	22K	R25
R31	Resistor	33K	R25
R33	Trimmer	33K	H0651A
R34	Resistor	470K	R25
R36	Resistor	2.2K	R25
R37	Variable Resistor	K12C	10KB1KB10KB
R39	Trimmer	10K	H1051C(SR19D)
R40	Trimmer	10K	H1051C(SR19D)
R41	Trimmer	10K	H1051C(SR19D)
R42	Resistor	47K	R25
R43	Resistor	10K	ELR25
R44	Resistor	29K	R25
R45	Trimmer	10K	H0651A
R46	Resistor	47K	R25
R47	Resistor	15K	R25
R49	Trimmer	4.7K	H0651A
R50	Trimmer	10K	H0651A
R51	Variable Resistor	S2011G1	10KB
R52	Variable Resistor	S2011G1	10KB
R53	Resistor	22	ELR25
R54	Resistor	27K	ELR25
R55	Resistor	10	ELR25
R56	Resistor	680	ELR25
R57	Resistor	1K	ELR25
R58	Resistor	1K	ELR25
R59	Resistor	1K	ELR25
R60	Resistor	1.2K	ELR25
R61	Resistor	1.2K	ELR25
R62	Resistor	1.2K	ELR25
R63	Trimmer	10K	H1052A
R64	Trimmer	10K	H1052A
R65	Variable Resistor	K121B0	10KB
R66	Resistor	470	R25
R68	Resistor	4.7K	R25
R69	Resistor	470K	R25
R70	Resistor	3.3K	ELR25
C1	Barrier Lay	0.1	25V
C2	Barrier Lay	0.1	25V
C3	Ceramic	0.001	50V
C5	Ceramic	0.0022	50V
C6	Ceramic	0.0022	50V
C7	Ceramic	0.0022	50V
C8	Ceramic	0.0022	50V
C9	Ceramic	0.0022	50V
C10	Ceramic	0.0022	50V
C11	Barrier Lay	0.047	25V
C12	Mylar	0.15	50V
C13	Barrier Lay	0.1	25V
C14	Barrier Lay	0.0047	50V
C15	Electrolytic	47	16V
C16	Electrolytic	47	16V
C17	Electrolytic	47	16V
C18	Ceramic	0.0047	50V
C19	Electrolytic	1000	6.3V
C20	Electrolytic	220	16V

[FRONT UNIT]

REF. NO.	DESCRIPTION	PART NO.	
C21	Electrolytic	47	16V
C22	Electrolytic	47	16V
C23	Ceramic	0.0047	50V
C24	Ceramic	0.01	50V
C25	Electrolytic	10	16V
L1	Transformer	LB-119	
L3	Choke Coil	LAL04NA101K	
L4	Choke Coil	LAL04NA101K	
L5	Choke Coil	LAL04NA101K	
L6	Choke Coil	LAL04NA101K	
L7	Choke Coil	LAL04NA101K	
L8	Choke Coil	BT01RN1-A61	
L9	Choke Coil	BT01RN1-A61	
S1	Push-Sw (POWER)	TW-0068	
S2	Lever-Sw (SEND)	M2012J-1K	
S3	Push-Sw (P. AMP)	SPJ312E	
S4	Push-Sw (0.5MHz)	SPJ322H	
S5	Push-Sw (XIT)	SPJ322H	
S6	Push-Sw (RIT)	SPJ522E	
S7	Push-Sw (COMP.)	SPJ522E	
S8	Push-Sw (VOX)	SPJ512E	
S9	Push-Sw (P.B.T)	PS-135-A22S	
S10	Push-Sw (FIL)	PS-135-A22S	
S11	Push-Sw (NOTCH)	PS-135-A22S	
S12	Rotary-Sw (METER)	SBU1026	
S13	Rotary-Sw (MODE)	SPU2045	
S14	Rotary-Sw (N.B)	SBU1023	
S15	Push-Sw (VFO. STEP)	SUN411A	
S16	Push-Sw (SPLIT)	SUN411A	
S17	Lever-Sw (MARKER)	MS621C HS-6210	
S18	Lever-Sw (MONITOR)	MS611A HS-611A	
S19	Rotary Encoder	LA24007	
FL1	Lamp	BQ044-3258A	
J1	Mic Connector	FM214-8SS	
J2	Phones Jack	LJ035-1-2	
J3	Connector	TL-25P-06-L1	
J4	Connector	TL-25P-06-L1	
J5	Connector	TL-25P-06-V1	
J6	Connector	TL-25P-05-V1	
J7	Connector	TL-25P-07-V1	
J8	Connector	TL-25P-07-V1	
J9	Connector	TL-25P-03-V1	
J10	Connector	TL-25P-04-L1	
J11	Connector	TL-25P-04-V1	
J12	Connector	TL-25P-04-L1	
J13	Connector	TL-25P-07-L1	
J14	Connector	TL-25P-11-L1	
J15	Connector	TL-25P-12-L1	
J16	Connector	TL-25P-09-L1	
J17	Connector	TL-25P-07-L1	
J18	Connector	TL-25P-10-L1	
J19	Connector	TL-25P-07-V1	
J20	Connector	TL-25P-06-V1	
J21	Connector	TL-25P-06-V1	
J22	Connector	TL-25P-05-V1	
J23	Connector	TL-25P-03-V1	
J24	Connector	TL-25P-07-V1	
J25	Connector	TL-25P-04-V1	
J26	Connector	TL-25P-07-V1	
J27	Connector	TL-25P-04-V1	

[FRONT UNIT]

REF. NO.	DESCRIPTION	PART NO.
J28	Connector	TL-25P-04-V1
J29	Connector	TL-25P-04-V1
J30	Connector	RT-01T-1.3B
J31	Connector	RT-01T-1.3B
J32	Connector	TL-25P-06-V1
J33	Connector	TLB-P04H-B1
J36	Connector	TL-25P-03-L1
J37	Connector	TL-25P-06-V1
J38	Connector	TL-25P-03-V1
J39	Connector	TL-25P-03-V1
P1	Connector	TL-25H-03-A1
P2	Connector	TL-25H-04-A1
P3	Connector	TL-25H-04-A1
P4	Connector	TL-25H-06-A1
P5	Connector	TL-25H-07-A1
P6	Connector	TL-25H-04-A1
P7	Connector	TL-25H-06-A1
P8	Connector	TL-25H-04-A1
P9	Connector	TL-25H-05-A1
P10	Connector	TL-25H-04-A1
P11	Connector	TL-25H-03-A1
P12	Connector	TL-25H-03-A1
P13	Connector	TL-25H-06-A1
P14	Connector	TL-25H-03-A1
P15	Connector	TL-25H-07-A1
P16	Connector	TL-25H-05-A1
P17	Connector	TL-25H-03-A1
P18	Connector	TL-25H-05-A1
P19	Connector	TL-25H-05-A1
P20	Connector	TL-25H-04-A1
P21	Connector	TL-25H-06-A1
P22	Connector	1545P-1
P23	Connector	TL-25H-03-A1
DS1	Display Tube	9-BT-12
B1	DISP P.C.B	B-581B
B2	DC-DC P.C.B	B-585B
B3	VR (A) P.C.B	B-586A
B4	VR (B) P.C.B	B-587A
B5	VR (C) P.C.B	B-588A
B6	SW (A) P.C.B	B-589B
B7	SW (B) P.C.B	B-590A
B8	SW (C) P.C.B	B-591B
B9	SW (D) P.C.B	B-592C
B10	SW (E) P.C.B	B-593B
B11	MIC P.C.B	B-594A
B12	LED (A) P.C.B	B-595
B13	LED (B) P.C.B	B-596
B14	SW (F) P.C.B	B-606B

[REG UNIT]

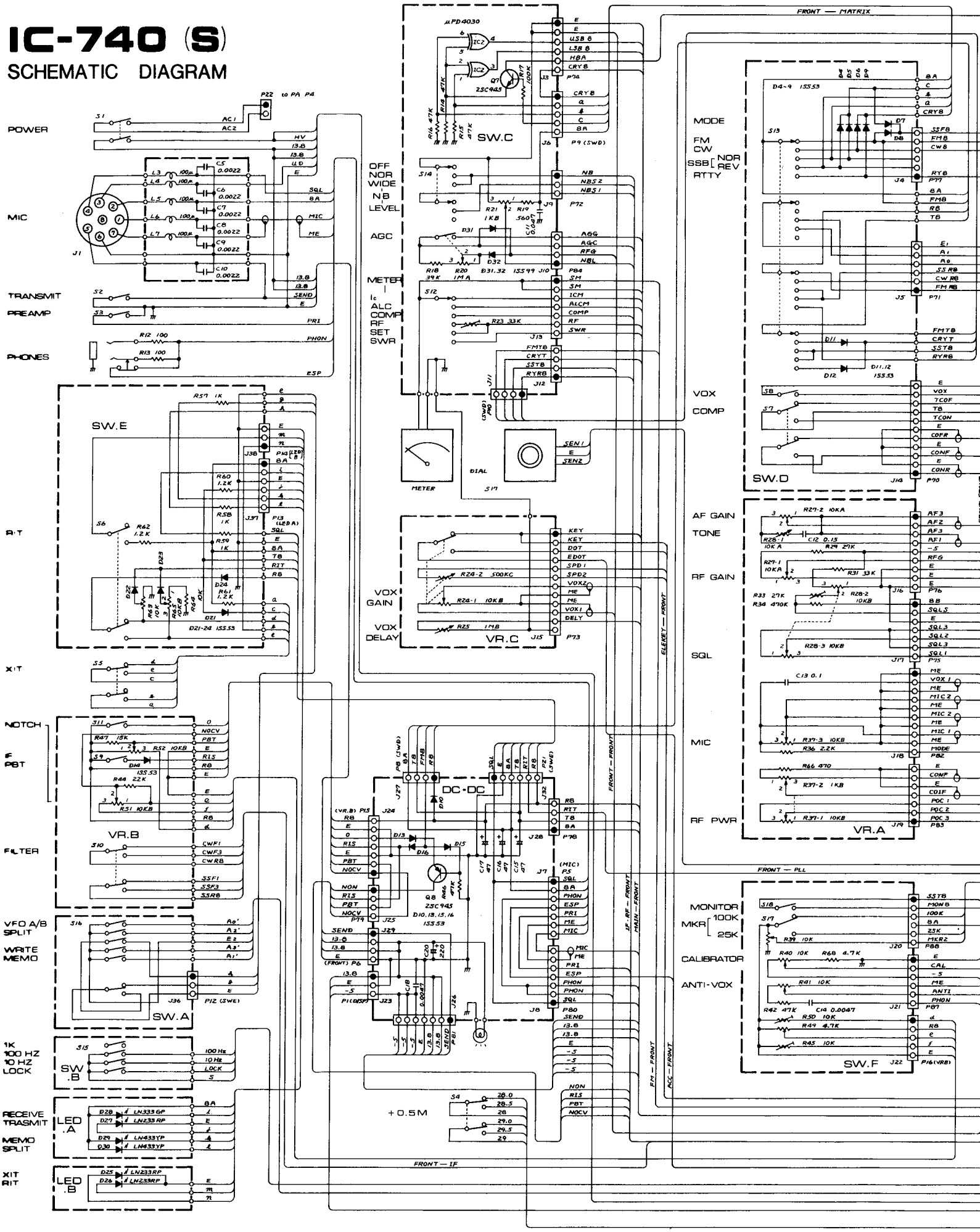
REF. NO.	DESCRIPTION	PART NO.	
IC1	IC	MB3756	
Q1	Transistor	2SD313	
D1	Diode	1N4002	
D2	Diode	1N4002	
R1	Resistor	4.7	ELR25
R2	Resistor	220	ELR25
C1	Electrolytic	1000	16V
C2	Electrolytic	4.7	10V
C3	Electrolytic	22	10V
C4	Electrolytic	47	10V
C5	Electrolytic	100	10V
B1	REG P.C.B	B-482A	

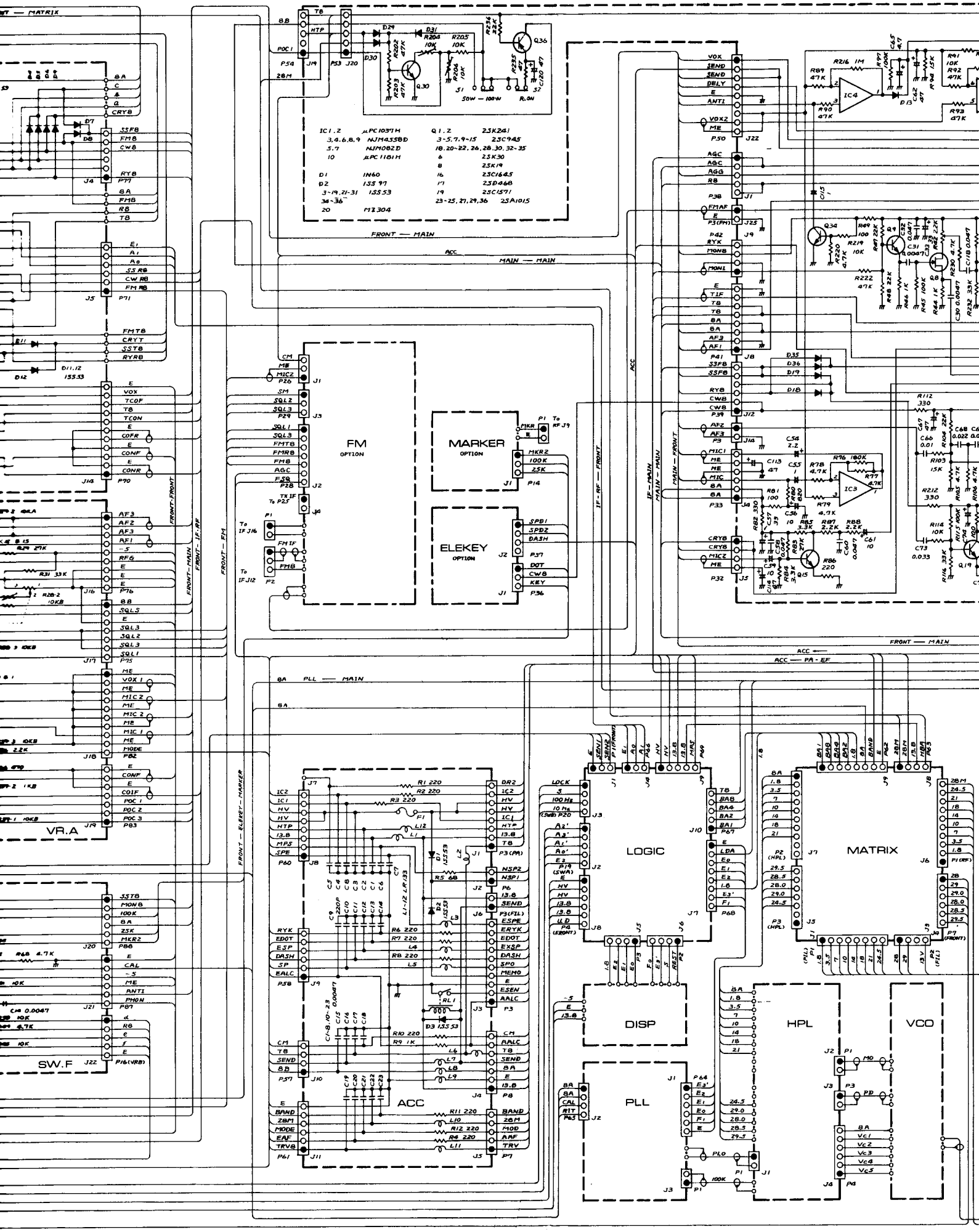
[KEY-JUMP UNIT]

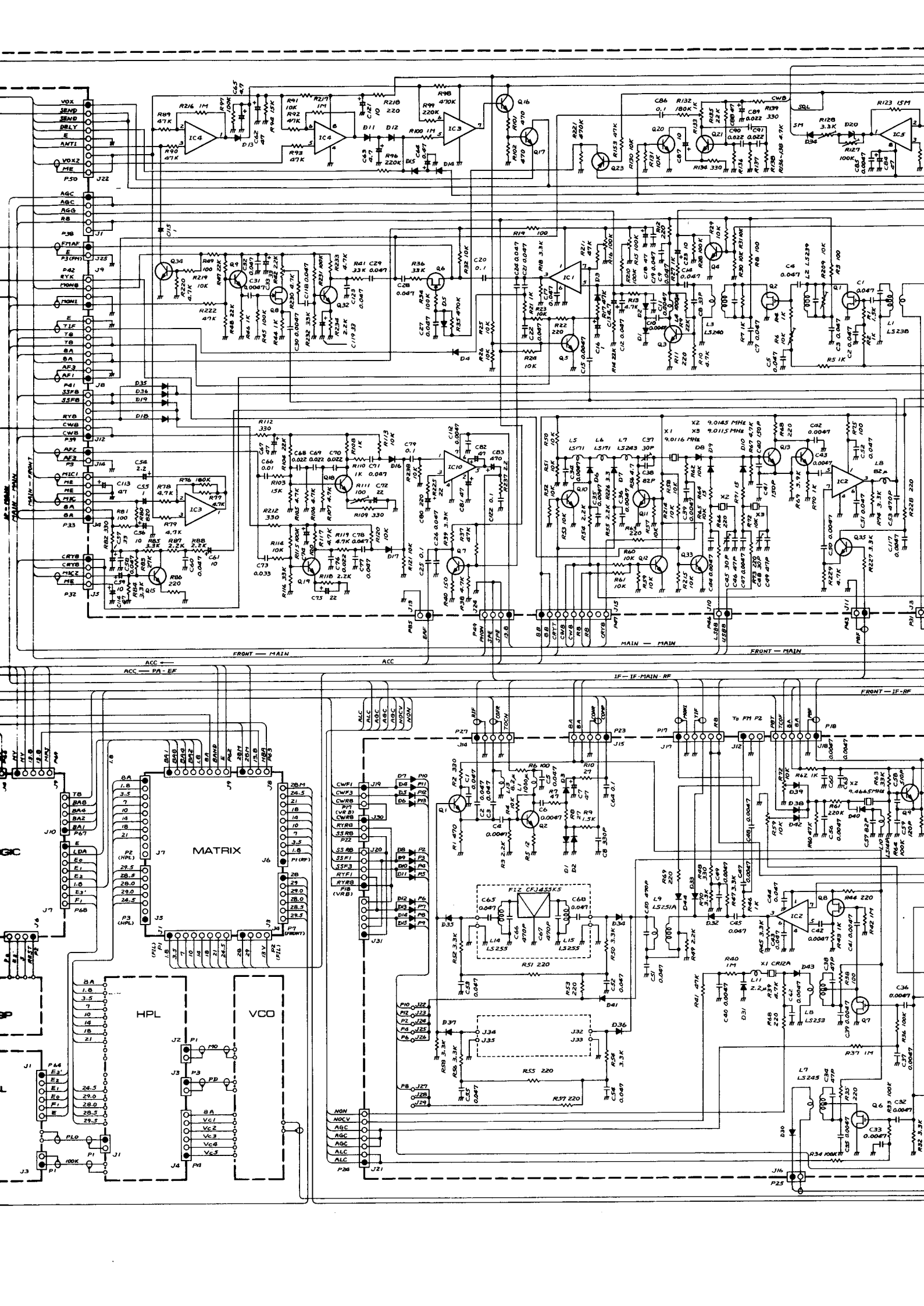
REF. NO.	DESCRIPTION	PART NO.
P1	Connector	TL-25H-04-A1
P2	Connector	TL-25H-04-A1
P3	Connector	TL-25H-03-A1
J1	Connector	TL-25P-03-V1
J2	Connector	TL-25P-04-V1
B1	KEY-JUMP P.C.B	B-650

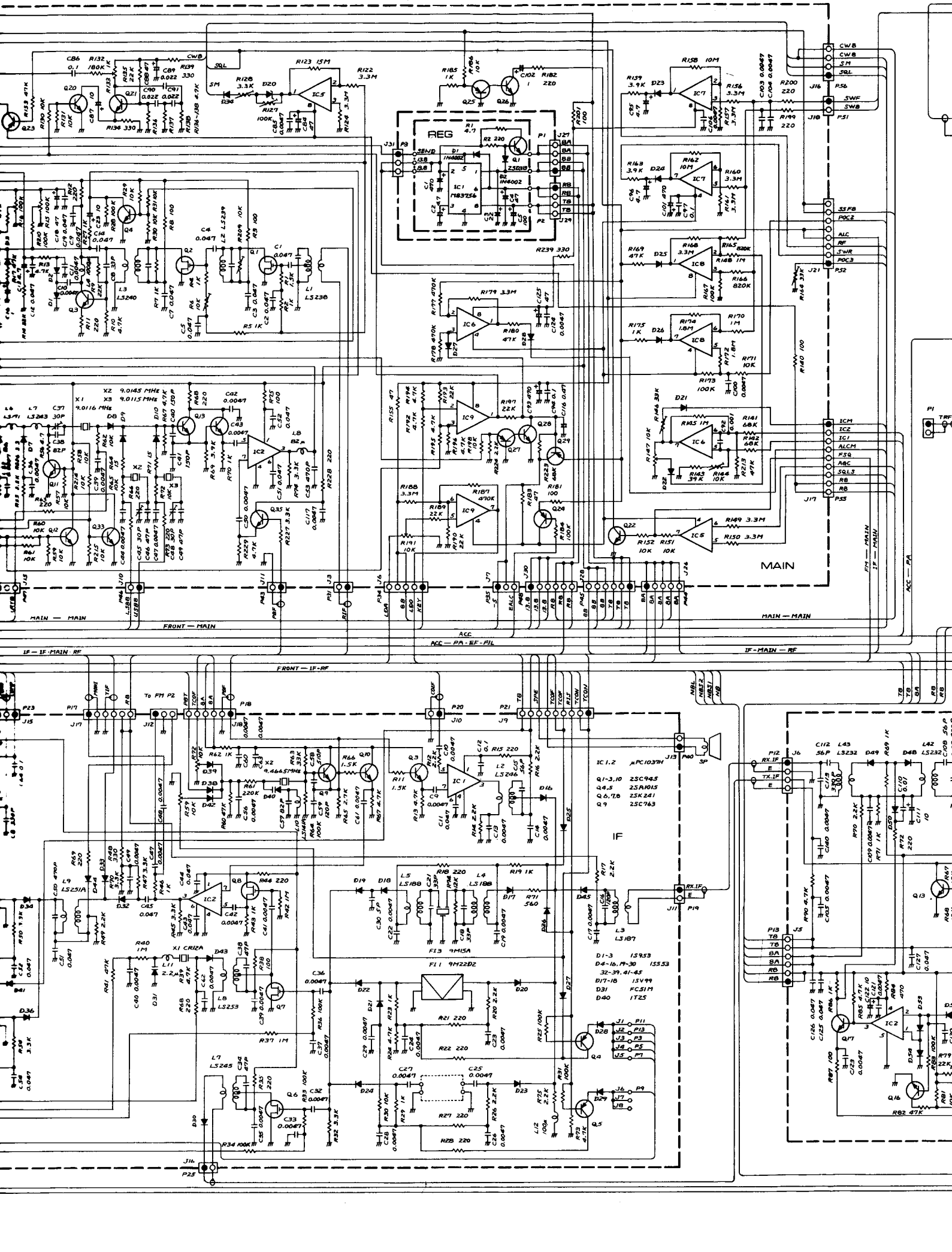
IC-740 (S)

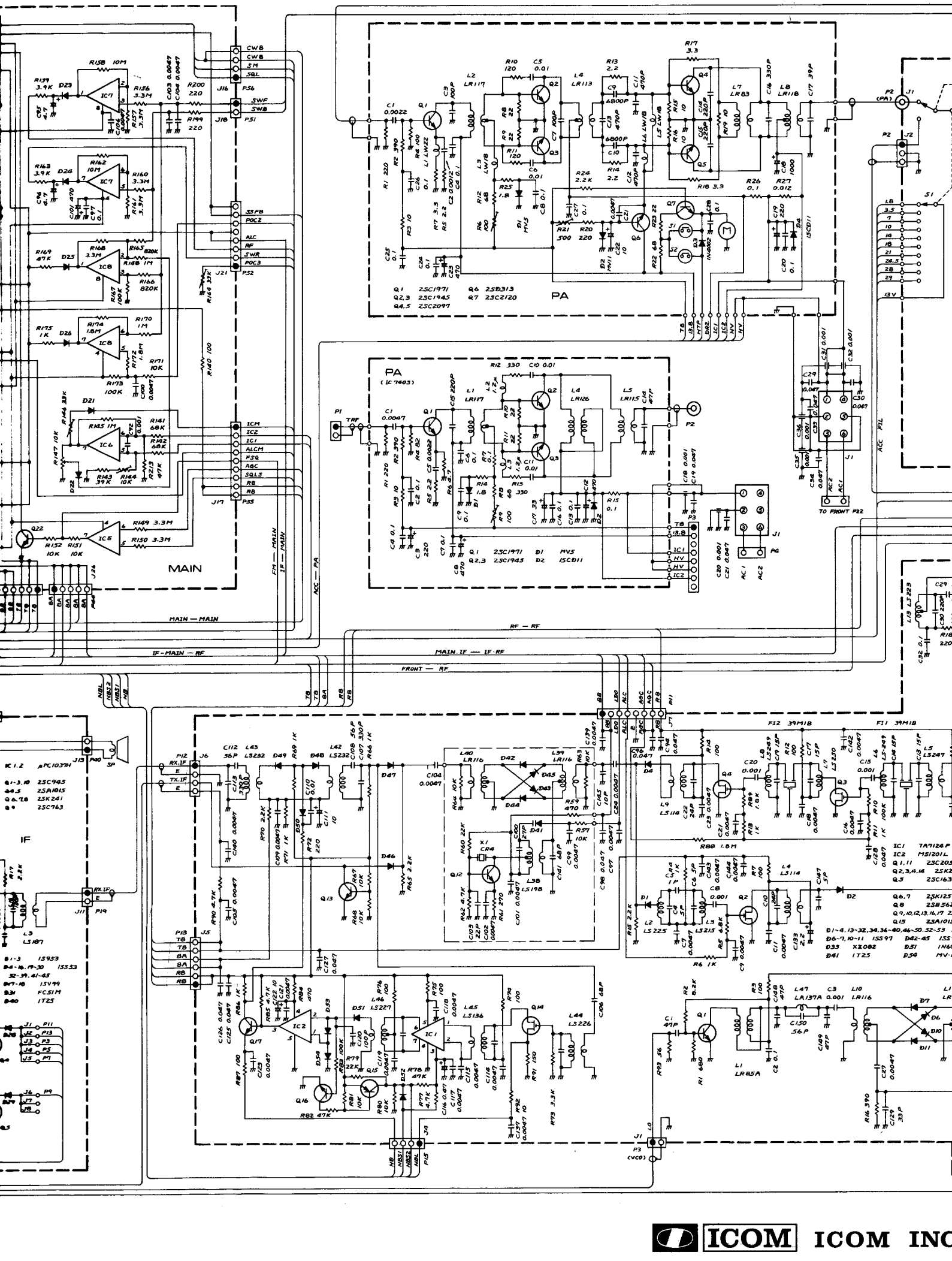
SCHEMATIC DIAGRAM



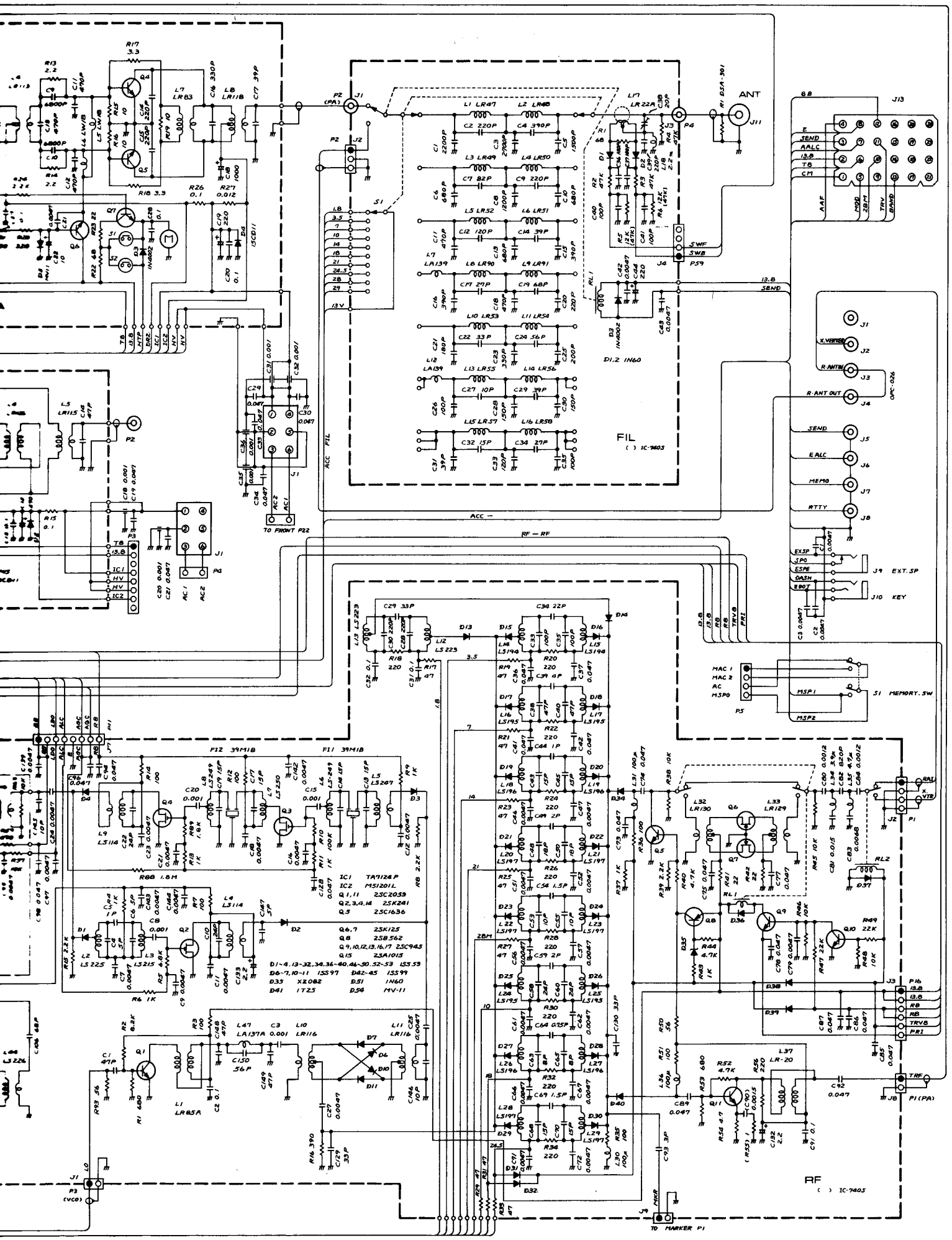

FRONT — MAIN
MAIN — MAIN
ACC
FRONT — FM
FRONT — MAIN — IF-RF
FRONT — FRONT
IF — MAIN
MAIN — FRONT
IF — RF — FRONT
FRONT — ELEKEY — MARKER
ACC — PA - EF
PLL — MAIN
FM
OPTION
MARKER
OPTION
ELEKEY
OPTION
LOGIC
MATRIX
DISP
HPL
VCO
PLL
ACC
VR.A
SW.F


MAIN — FRONT
FRONT — MAIN
MAIN — MAIN
FRONT — MAIN
ACC
ACC — PA - EF
IF — IF · MAIN · RF
FRONT — IF-RF
MATRIX
HPL
VCO
To FM P2


REG
MAIN
IF
IC1,2 μPC1037H
Q1-3,10 2SC945
Q4,5 2SA1015
Q6,7,8 2SK241
Q9 2SC763
D1-3 1S953
D4-16,19-30 1S553
32-39,41-45
D17-18 1SV99
D31 FC51M
D40 1T25
F11 9M22D2
F13 9M15A
X1 9.0145 MHz
X2 9.0115 MHz
X3 9.0116 MHz
X2 9.4665MHz
MAIN — MAIN
FRONT — MAIN
IF — IF · MAIN · RF
FRONT — IF · RF
IF — MAIN — RF
FM — MAIN
IF — MAIN
ACC — PA
ACC
ACC — PA · EF · FIL
SP



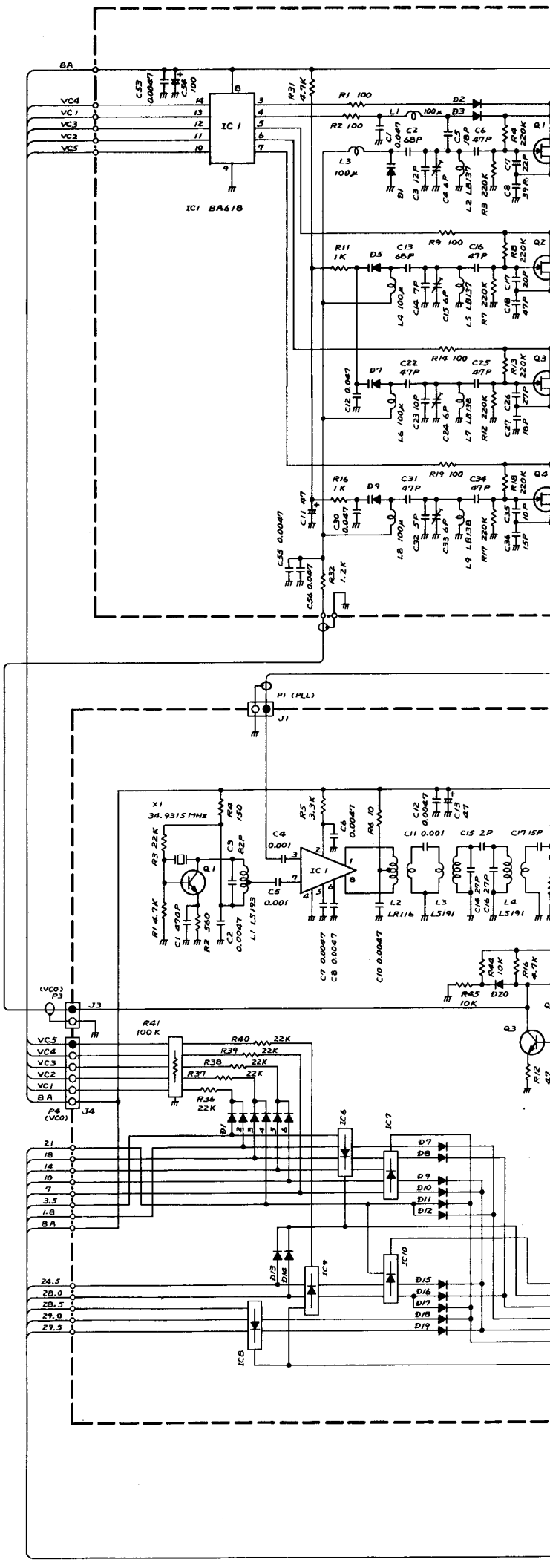
ICOM ICOM INC

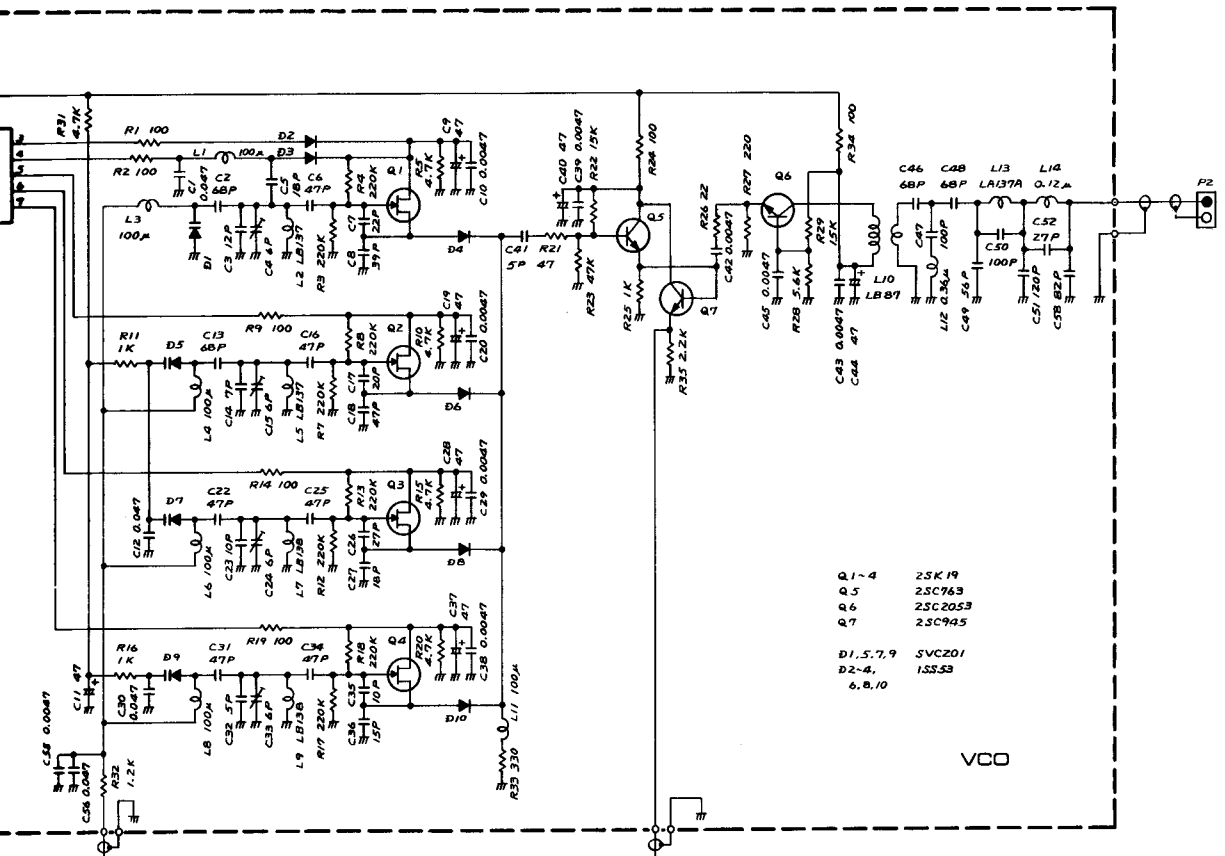


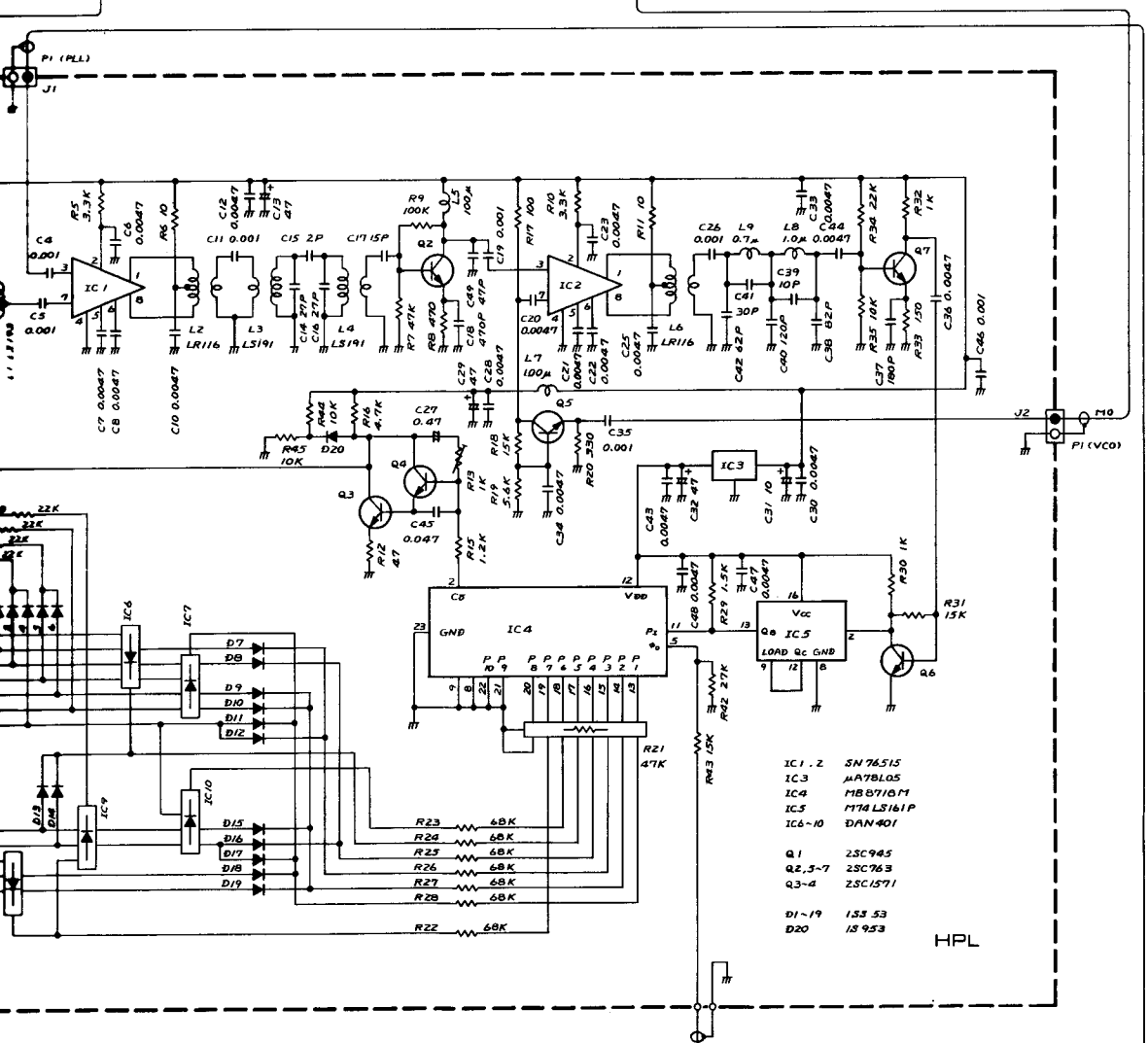
ICOM ICOM INCORPORATED

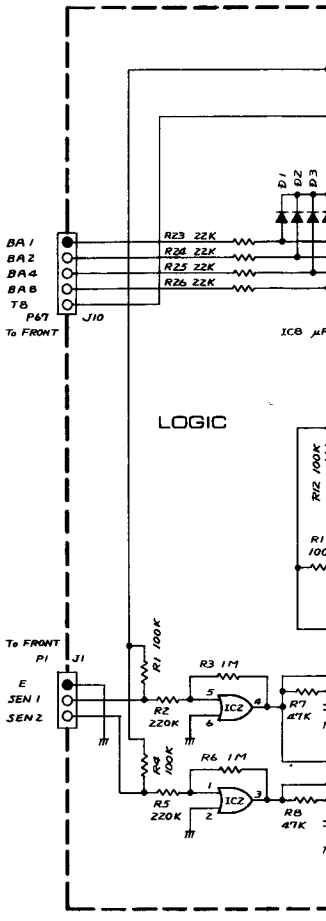
Some components subject to change for an improvement without notice.

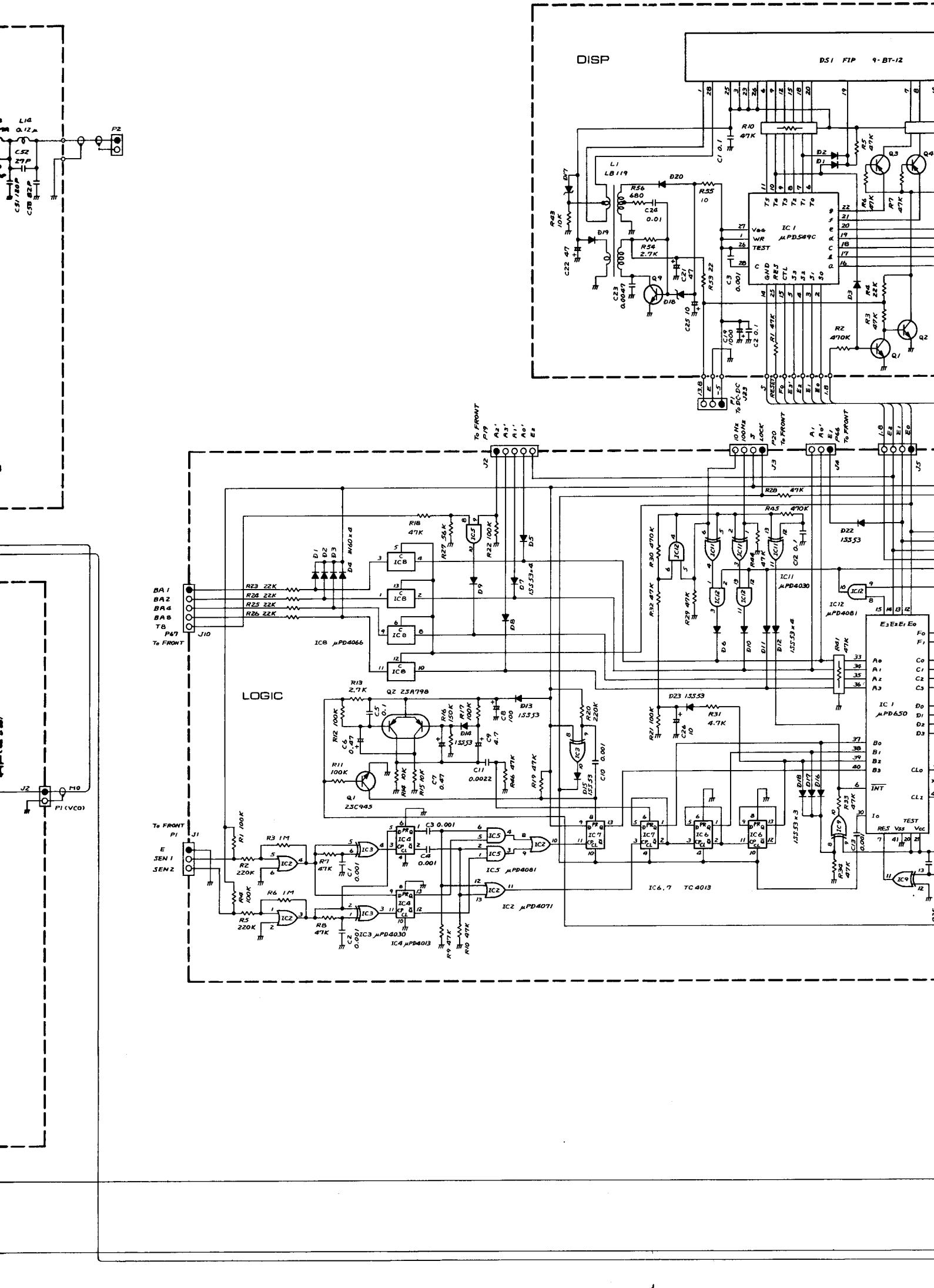
A-0413

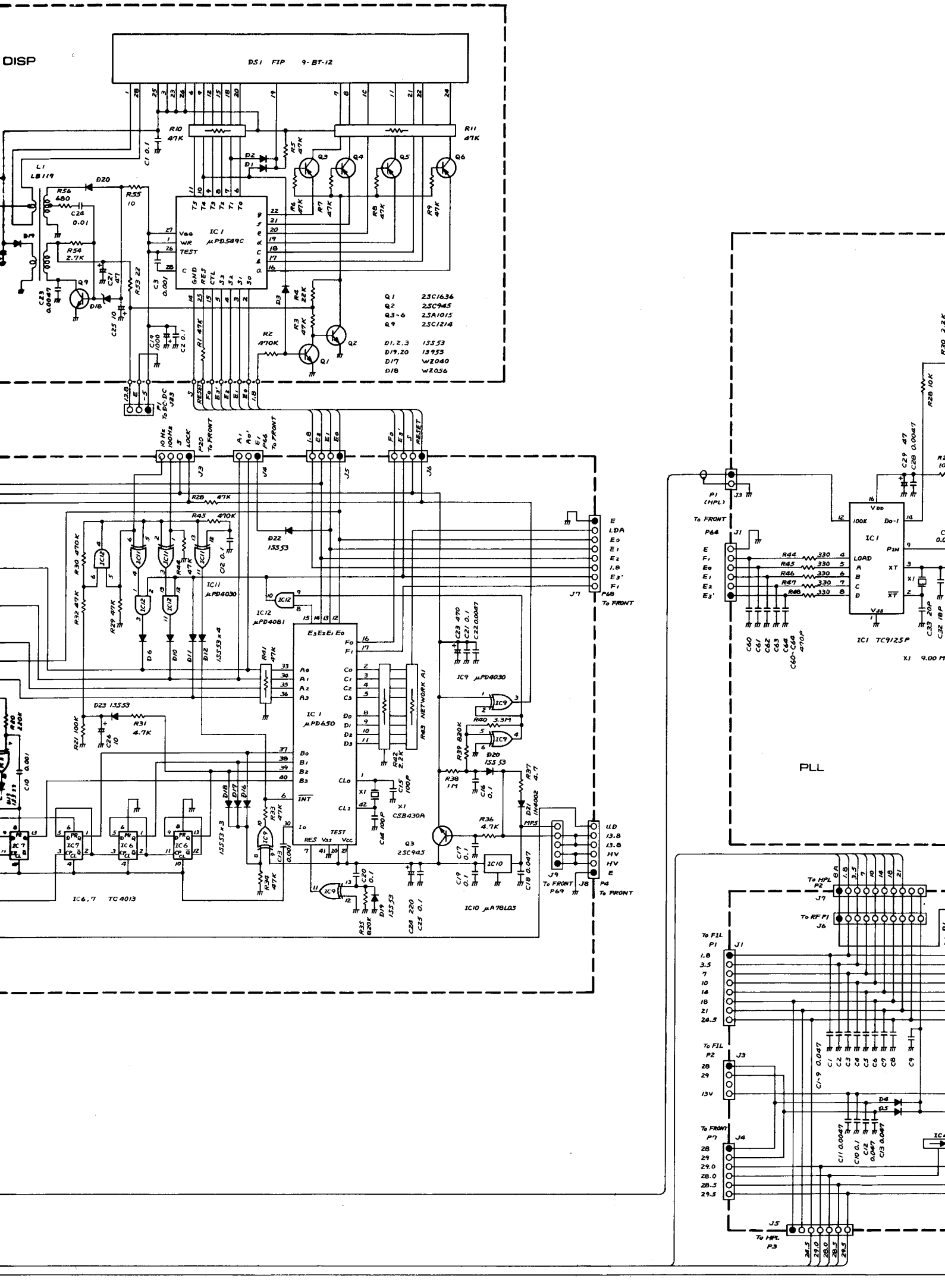

8A
VC4
VC1
VC3
VC2
VC5
IC1 BA618
P1 (PLL)
J1
X1
34.9315 MHz
IC1
(VCO) P3
J3
P4 (VCO)
J4
R41 100 K
21
18
14
10
7
3.5
1.8
8A
24.5
28.0
28.5
29.0
29.5
IC6
IC7
IC9
IC10
D20

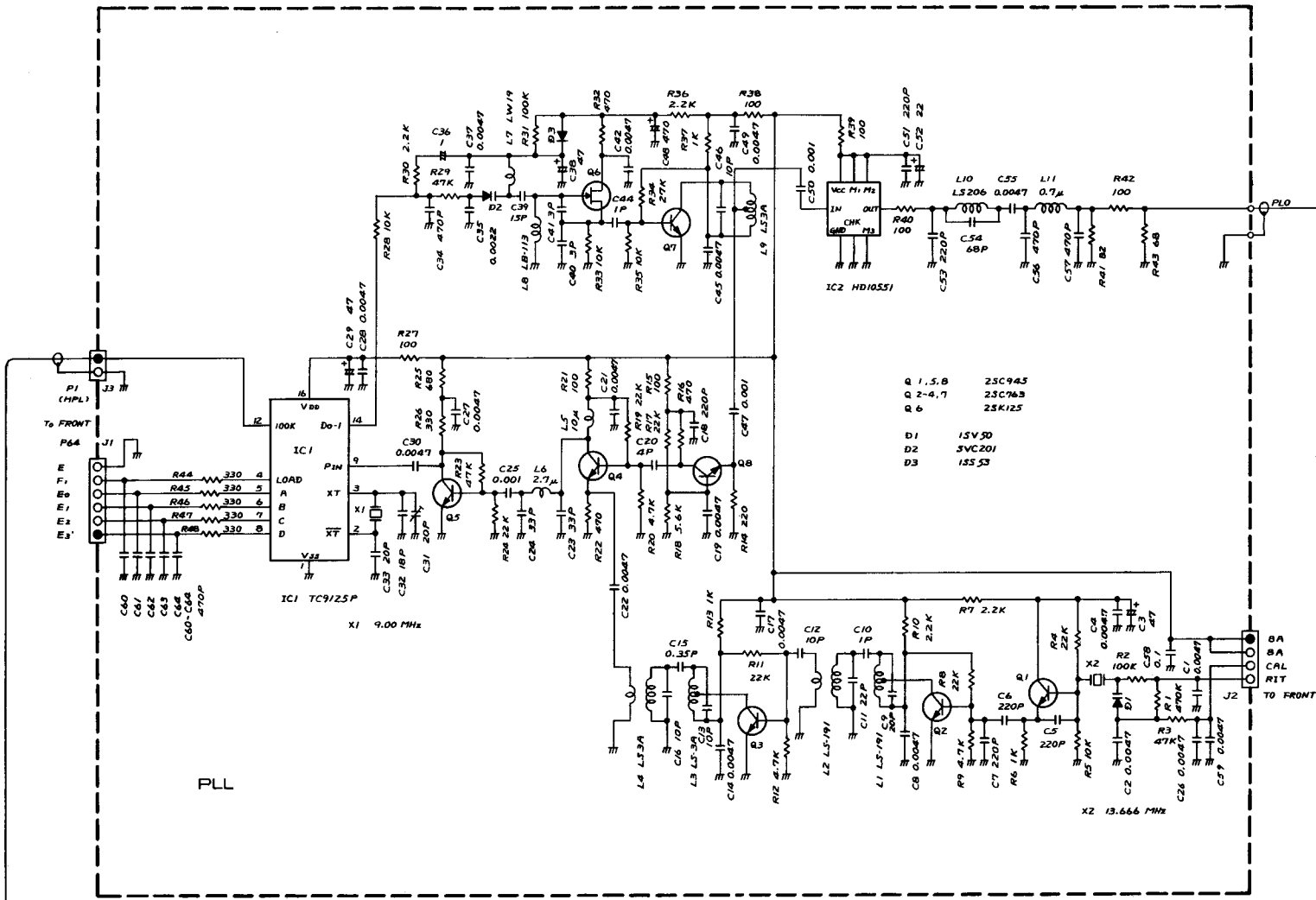

VCO
Q1~4 2SK19
Q5 2SC963
Q6 2SC2053
Q7 2SC945
D1,5,7,9 SVC201
D2~4, 6,8,10 1SS53

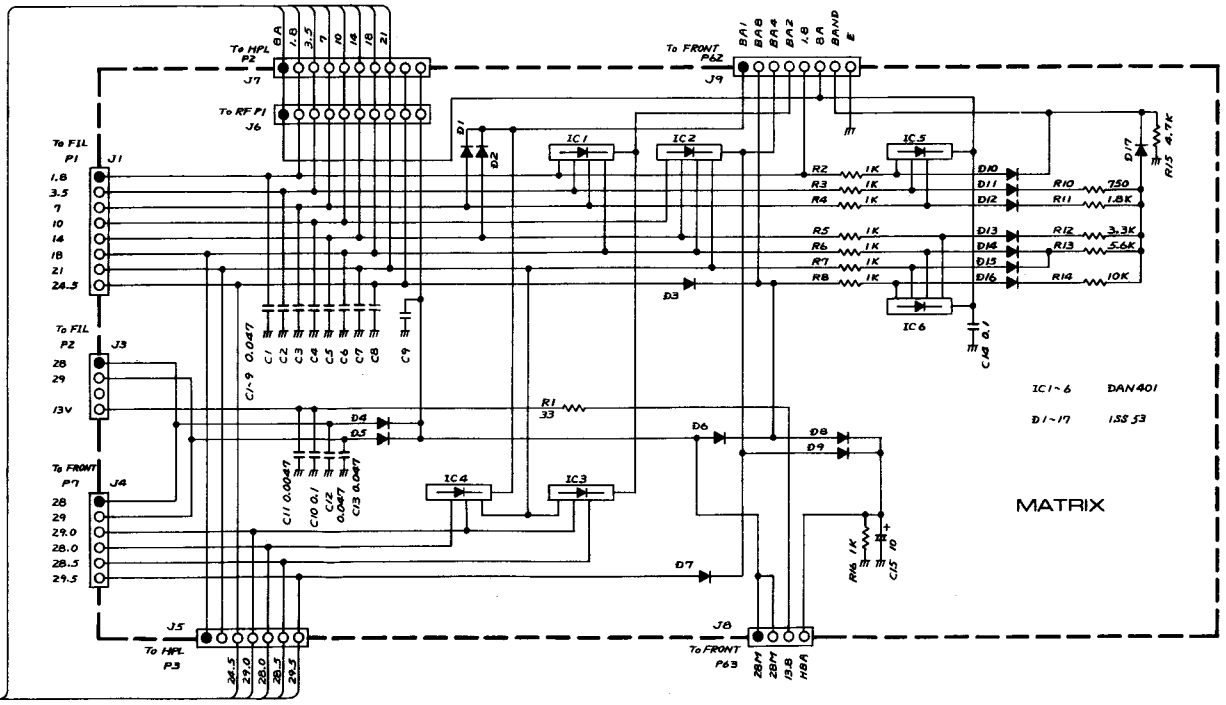

HPL
IC1,2 SN76515
IC3 μA78L05
IC4 MB8718M
IC5 M74LS161P
IC6~10 DAN401
Q1 2SC945
Q2,3~7 2SC963
Q3~4 2SC1571
D1~19 1SS53
D20 1S953

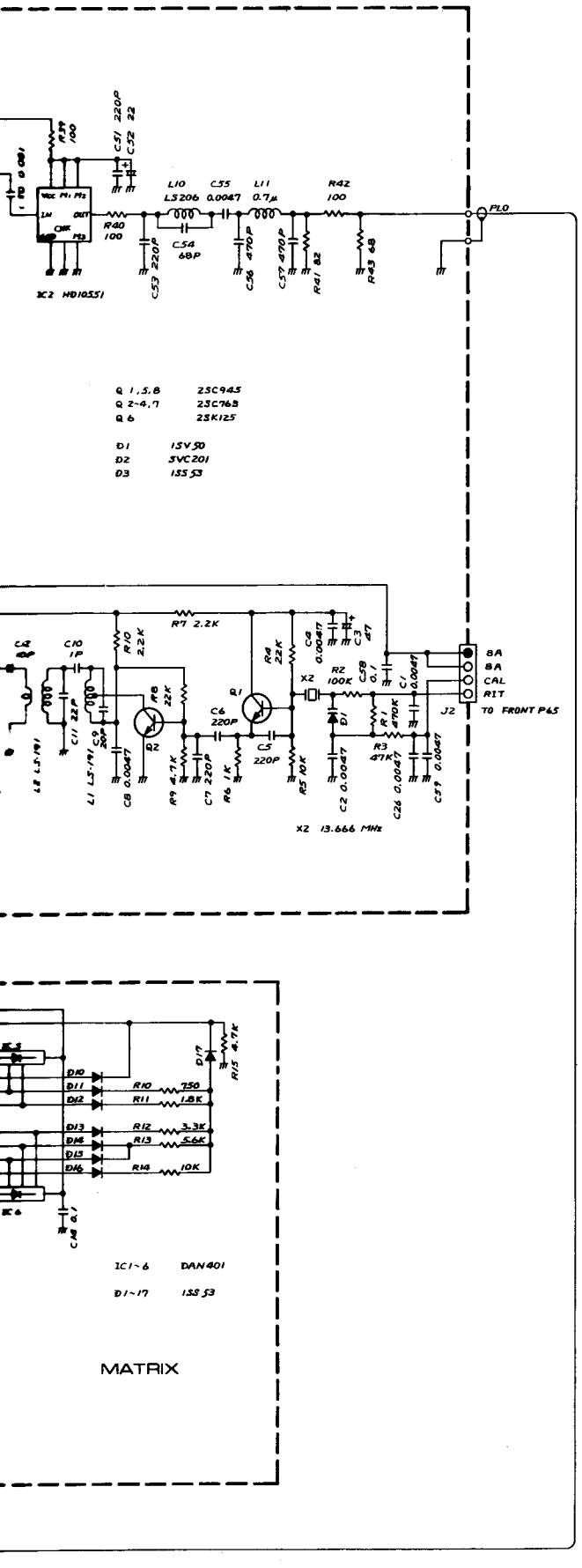

LOGIC


DISP
DS1 FIP 9-BT-12
IC1 μPD549C
LOGIC
IC8 μPD4066
IC5 μPD4081
IC3 μPD4030
IC4 μPD4013
IC2 μPD4071
IC6,7 TC4013
IC11 μPD4030
IC12 μPD4081
IC1 μPD650
Q1 2SC945
Q2 2SA798
To FRONT
To DC-DC
10 Hz 100 Hz
LOCK
BA1
BA2
BA4
BA8
T8
P47
P1 (VCO)
SEN1
SEN2

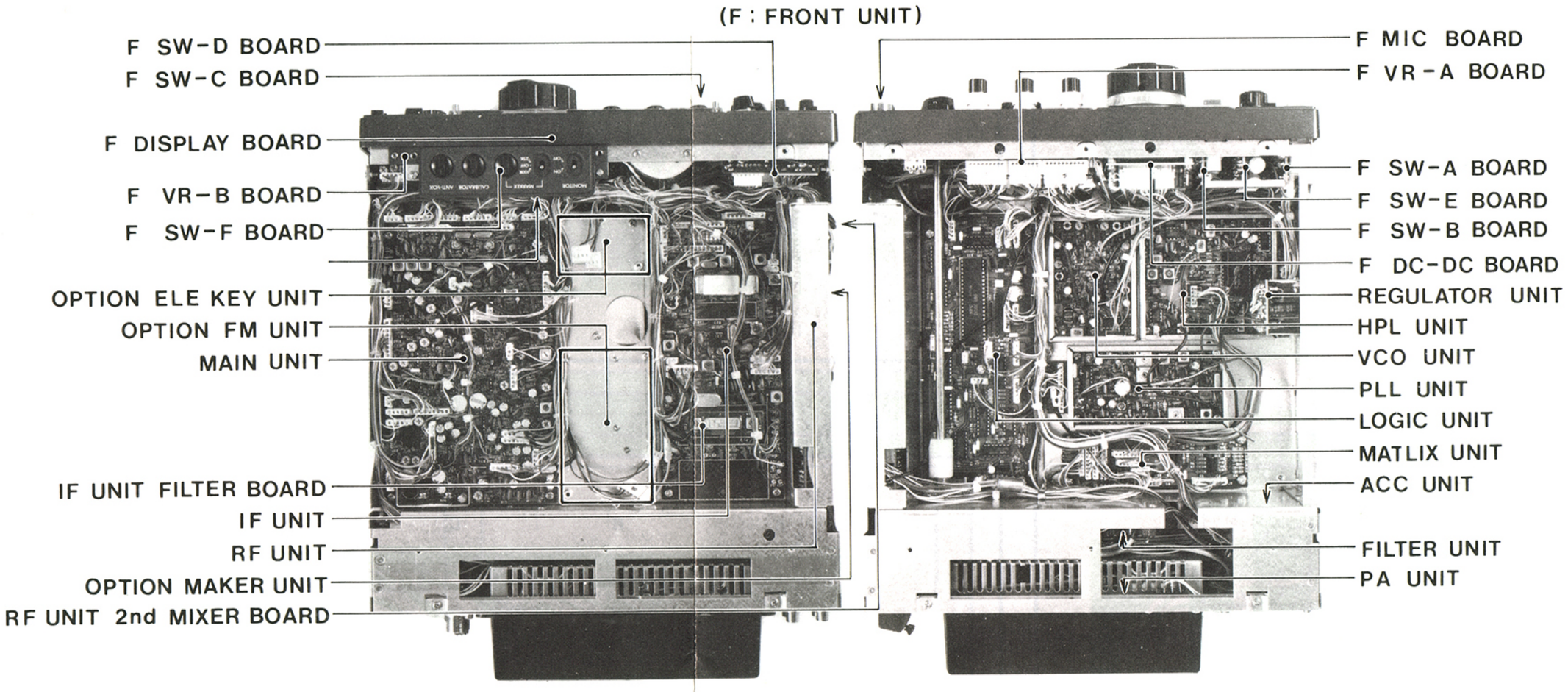

DISP
DS1 FIP 9-BT-12
IC1 μPD549C
Q1 2SC1636
Q2 2SC945
Q3~6 2SA1015
Q9 2SC1214
D1,2,3 1S53
D19,20 1S953
D17 WZ040
D18 WZ056
IC11 μPD4030
IC12 μPD4081
IC1 μPD650
IC9 μPD4030
IC6,7 TC4013
IC10 μA78L05
Q3 2SC945
X1 CSB430A
PLL
IC1 TC9125P
X1 9.00 M
To FRONT
To DC-DC
To MPL
To RF P1
To FIL
LOCK
RESET


PLL
IC1 TC9125P
X1 9.00 MHz
X2 13.666 MHz
IC2 HD10551
Q 1,5,8 2SC945
Q 2-4,7 2SC763
Q 6 2SK125
D1 1SV50
D2 3VC201
D3 1SS53
To FRONT P64
P1 (MPL)
J1
J2
J3
PLO
8A
8A
CAL
RIT
TO FRONT


MATRIX
IC1~6 DAN401
D1~17 1SS53
To MPL P2
To RF P1
To FRONT P62
To FIL P1
To FIL P2
To FRONT P7
To MPL P3
To FRONT P63
J1
J2
J3
J4
J5
J6
J7
J9


C51 220P
C52 22
L10
LS206
C55 0.0047
L11 0.7μ
R42 100
P10
R40 100
C54 68P
C53 220P
C56 470P
C57 470P
R41 82
R43 68
IC2 HD10551
Q 1,5,8 2SC945
Q 2-4,7 2SC763
Q 6 2SK125
D1 1SV50
D2 1SVC201
D3 1SS53
R7 2.2K
R10 2.2K
R4 22K
C4 0.0047
C3 47
C12
C10 1P
C11 22P
C9 20P
C8 0.0047
L1 LS-181
L2 LS-181
R8 22K
Q2
C6 220P
C5 220P
R9 4.7K
C7 220P
R6 1K
R5 10K
X2
R2 100K
C58 0.1
C1 0.0047
D1
R1 470K
R3 47K
C2 0.0047
C26 0.0047
C59 0.0047
B1
8A
8A
CAL
RIT
J2
TO FRONT P45
X2 13.666 MHz
D17
R15 4.7K
D10
D11
D12
R10 750
R11 1.8K
D13
D14
D15
D16
R12 3.3K
R13 5.6K
R14 10K
C48 0.1
IC1~6 DAN401
D1~17 1SS53
MATRIX

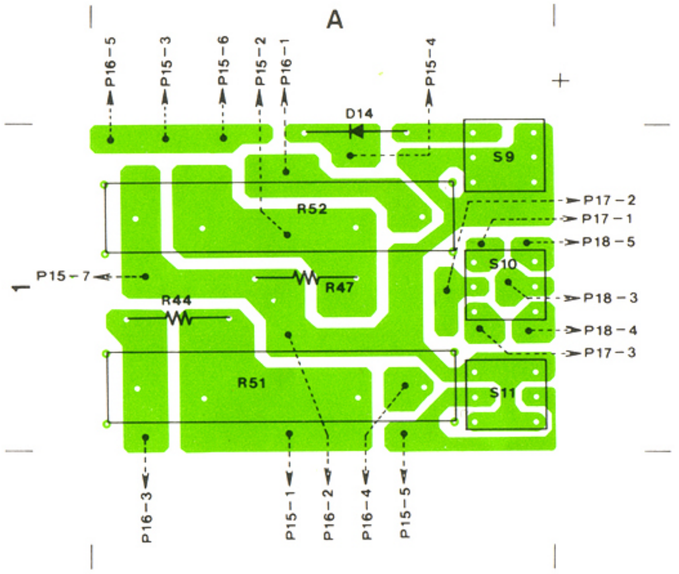
UNIT LAYOUT


(F : FRONT UNIT)
F SW-D BOARD
F SW-C BOARD
F DISPLAY BOARD
F VR-B BOARD
F SW-F BOARD
OPTION ELE KEY UNIT
OPTION FM UNIT
MAIN UNIT
IF UNIT FILTER BOARD
IF UNIT
RF UNIT
OPTION MAKER UNIT
RF UNIT 2nd MIXER BOARD
F MIC BOARD
F VR-A BOARD
F SW-A BOARD
F SW-E BOARD
F SW-B BOARD
F DC-DC BOARD
REGULATOR UNIT
HPL UNIT
VCO UNIT
PLL UNIT
LOGIC UNIT
MATLIX UNIT
ACC UNIT
FILTER UNIT
PA UNIT

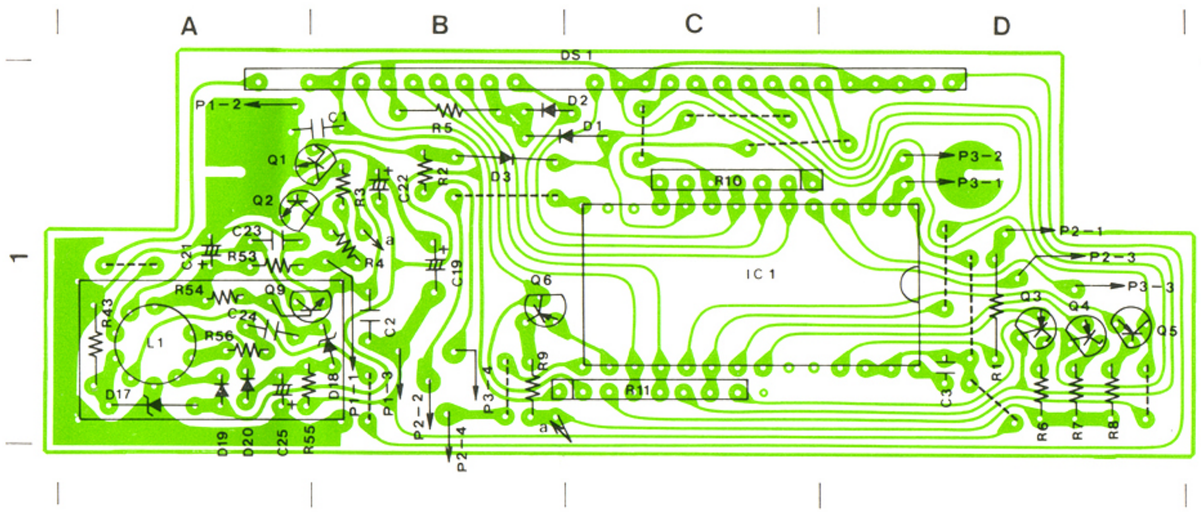
ICOM IC-740 BOARD LAYOUT

FRONT UNIT

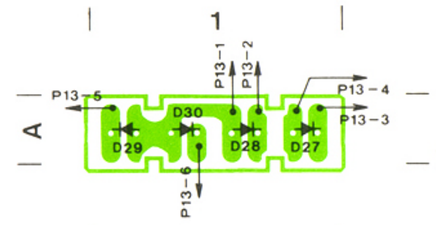
■ VR-B BOARD



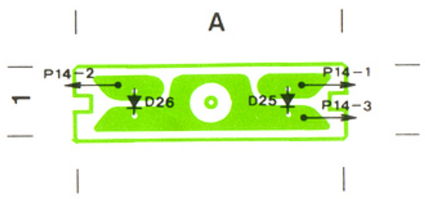
■ DISPLAY BOARD



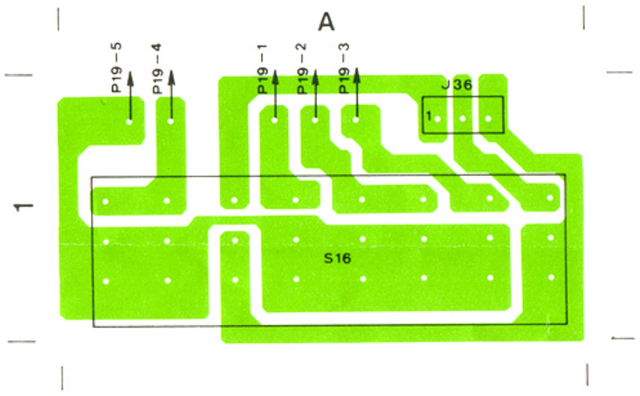
■ LED BOARD



■ LED BOARD



■ SW-A BOARD



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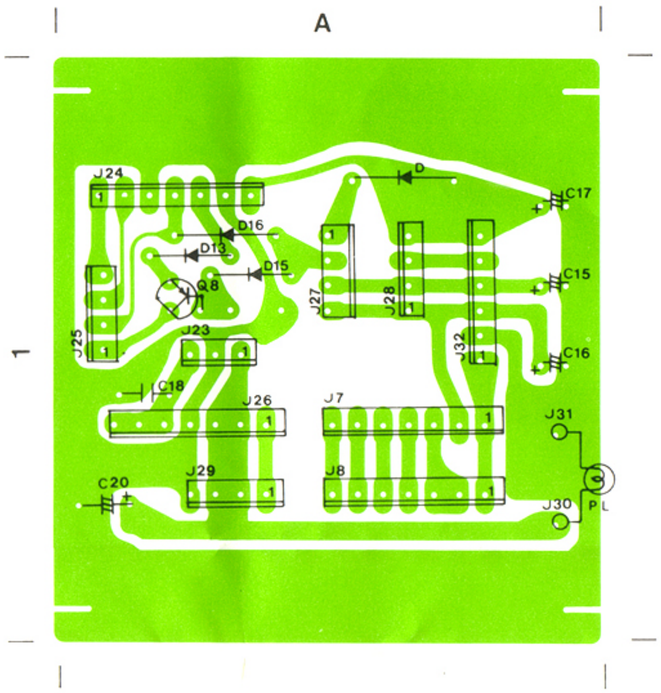

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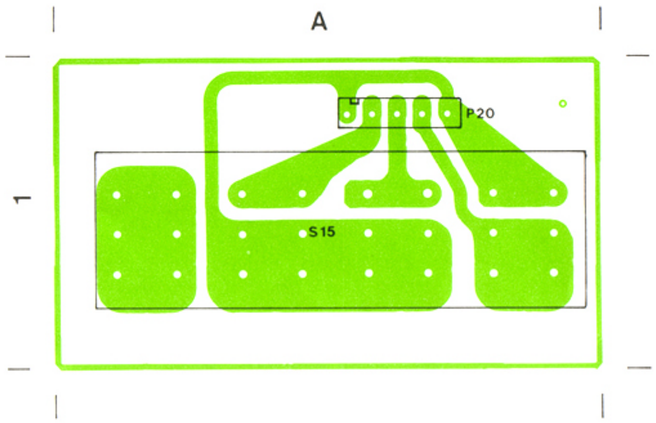

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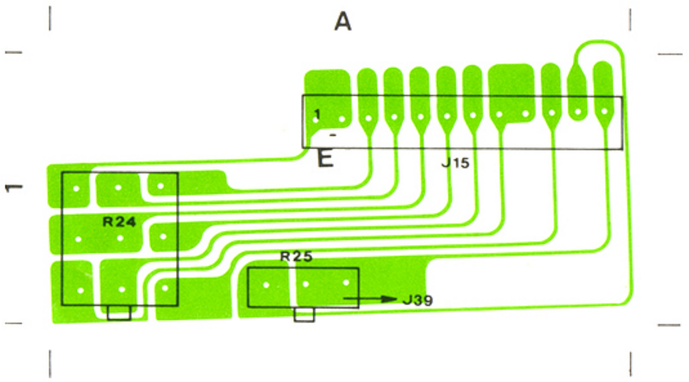

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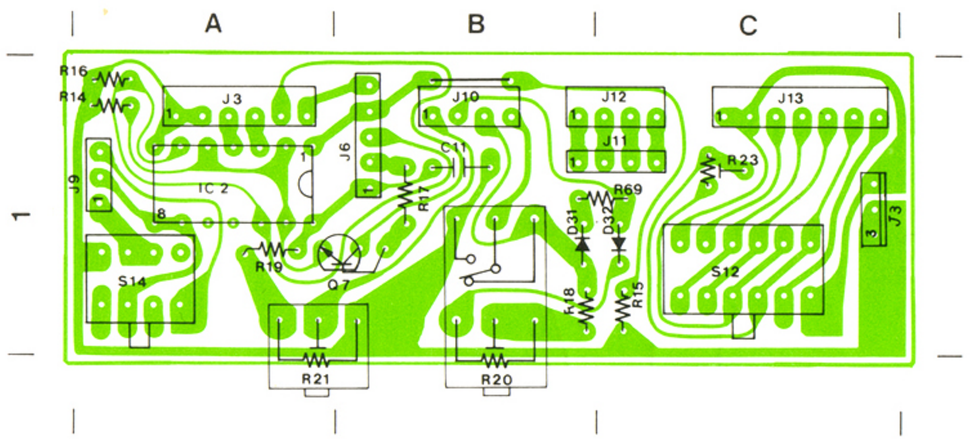

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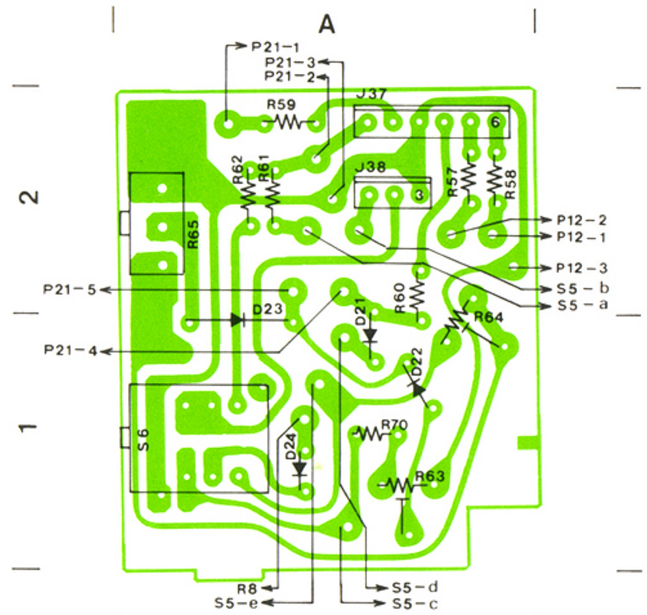

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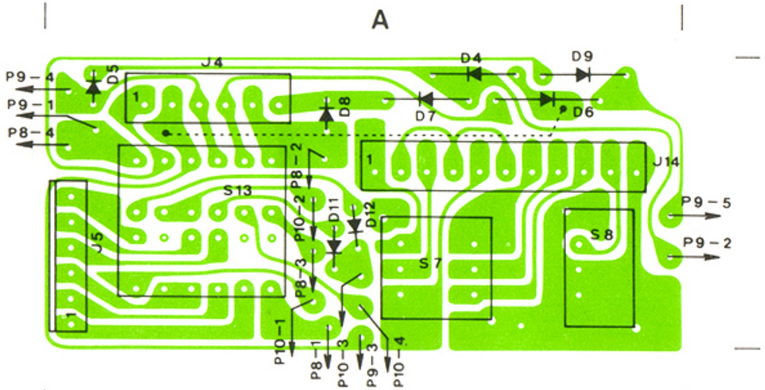

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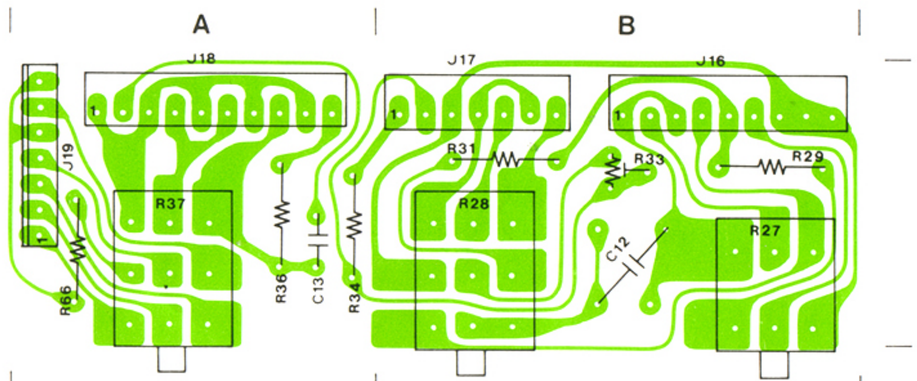

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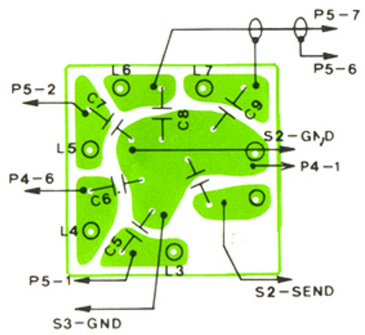

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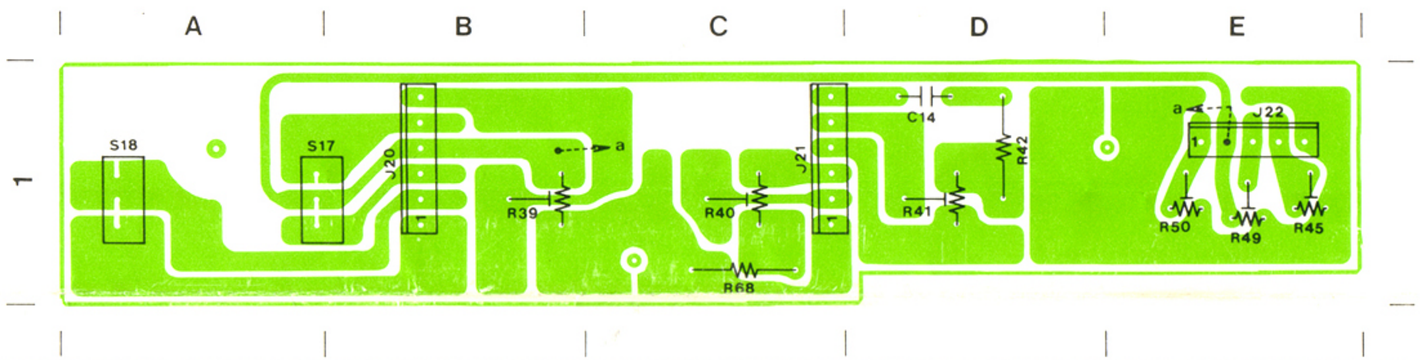

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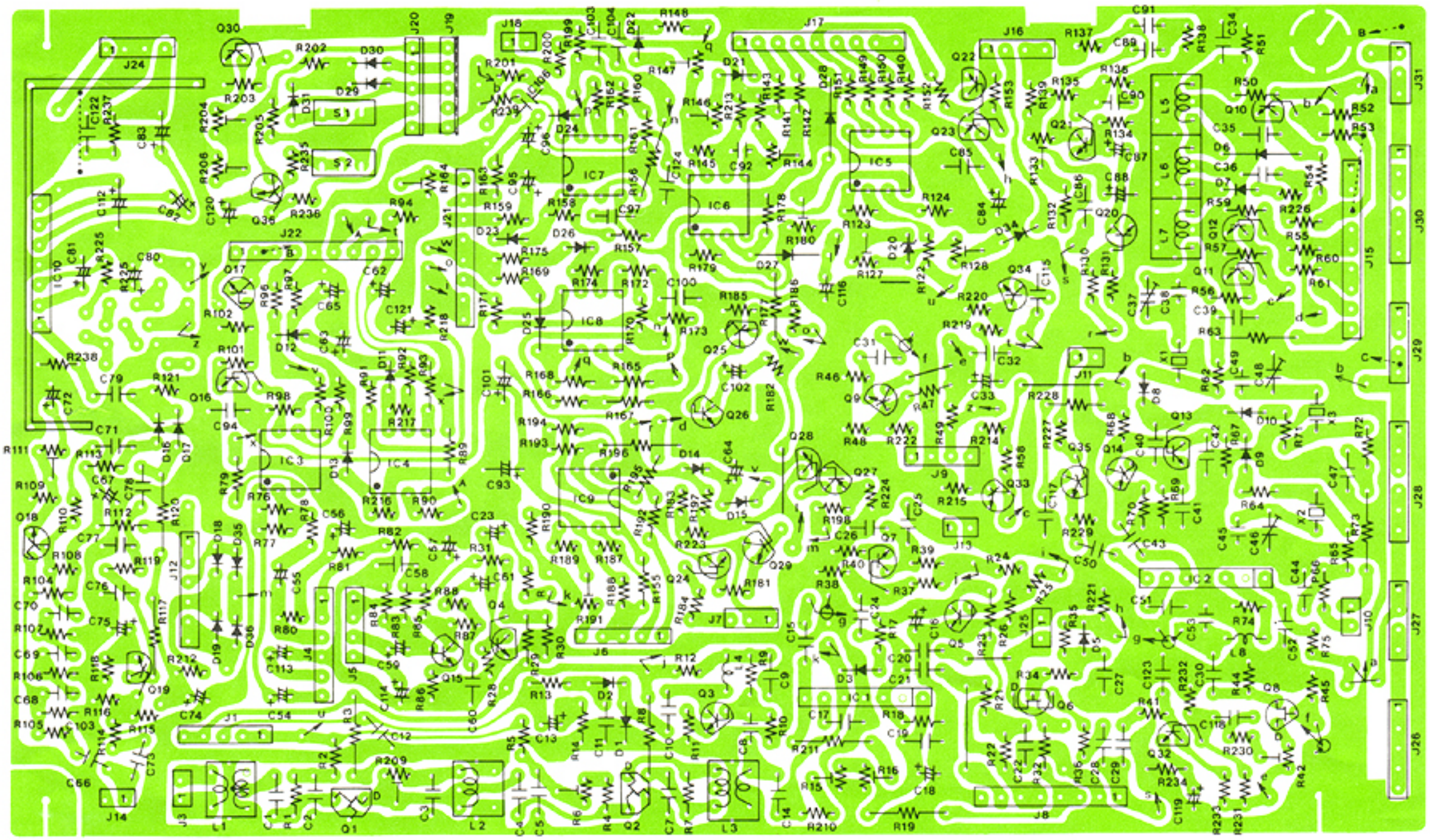
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IF UNIT

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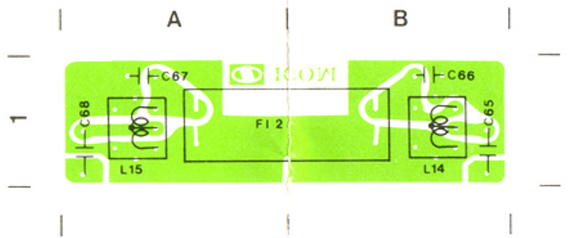

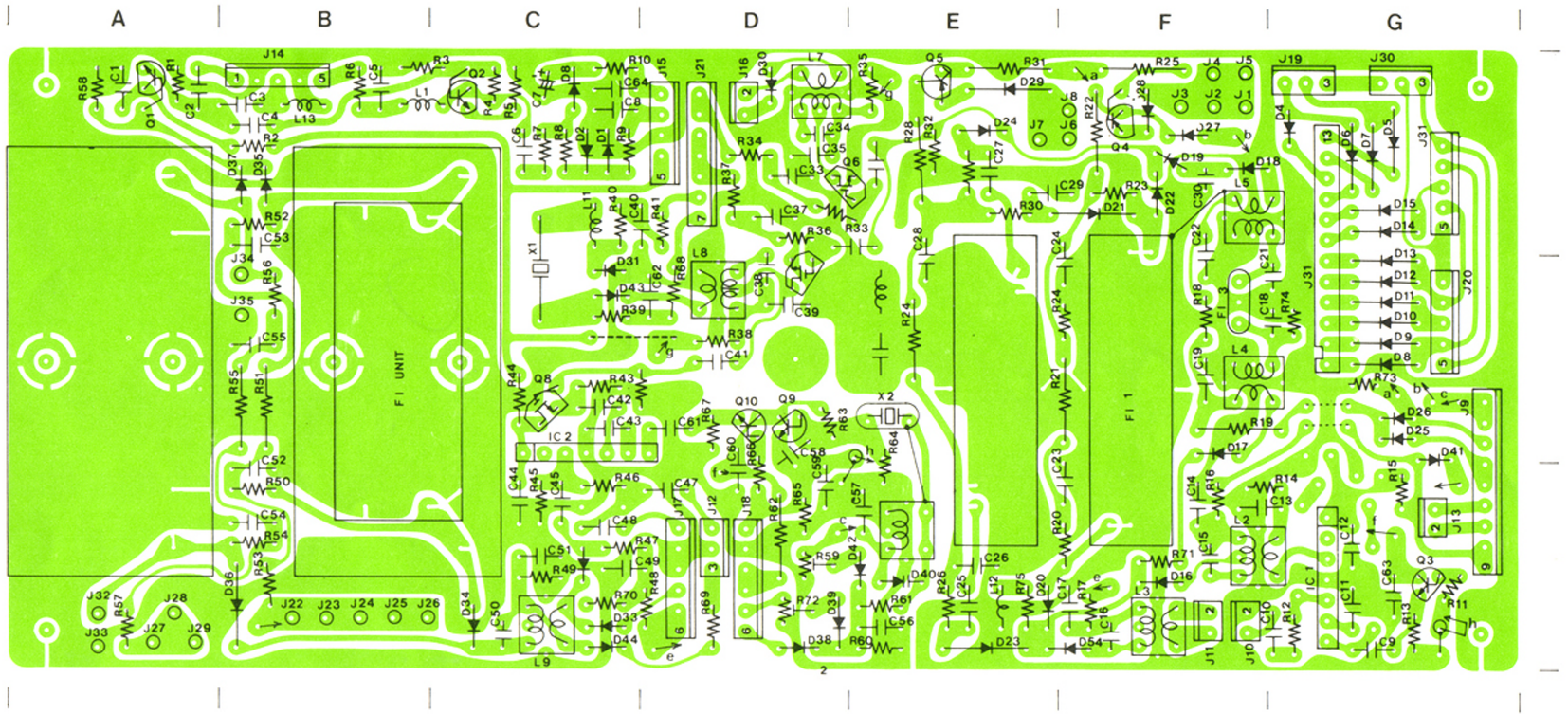

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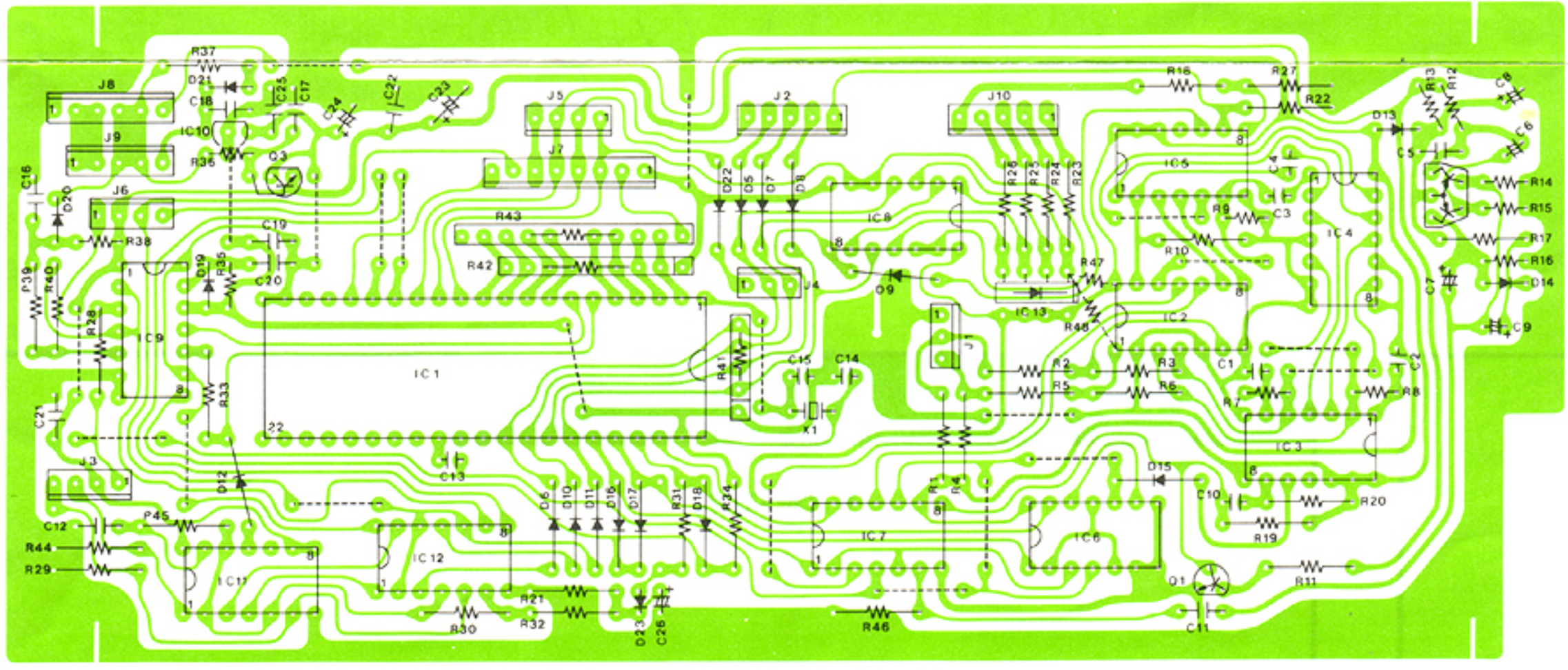
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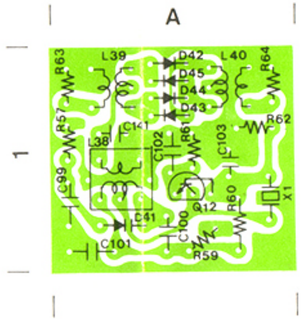

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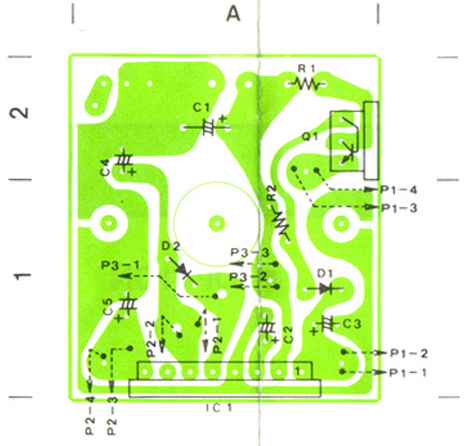

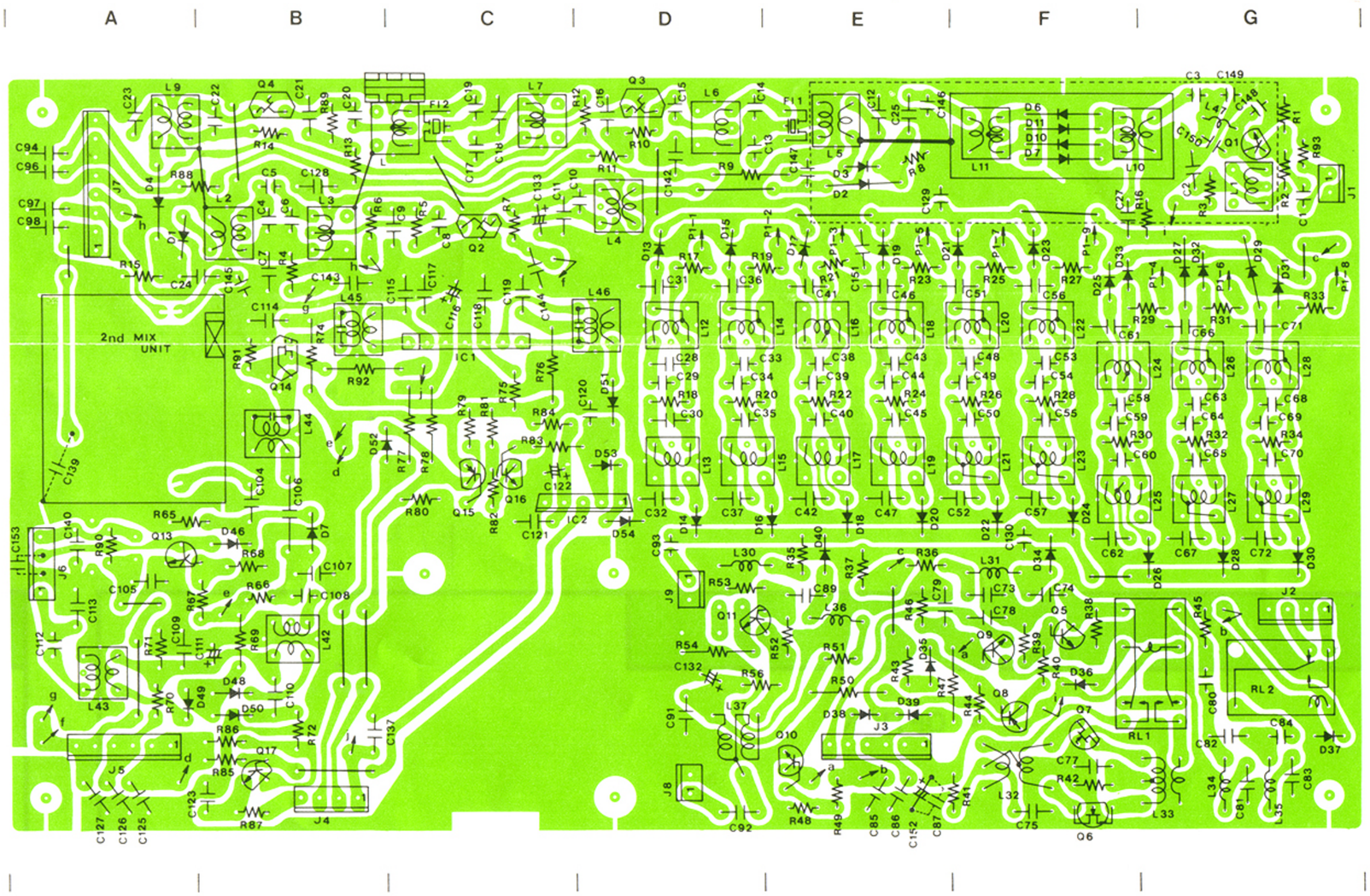

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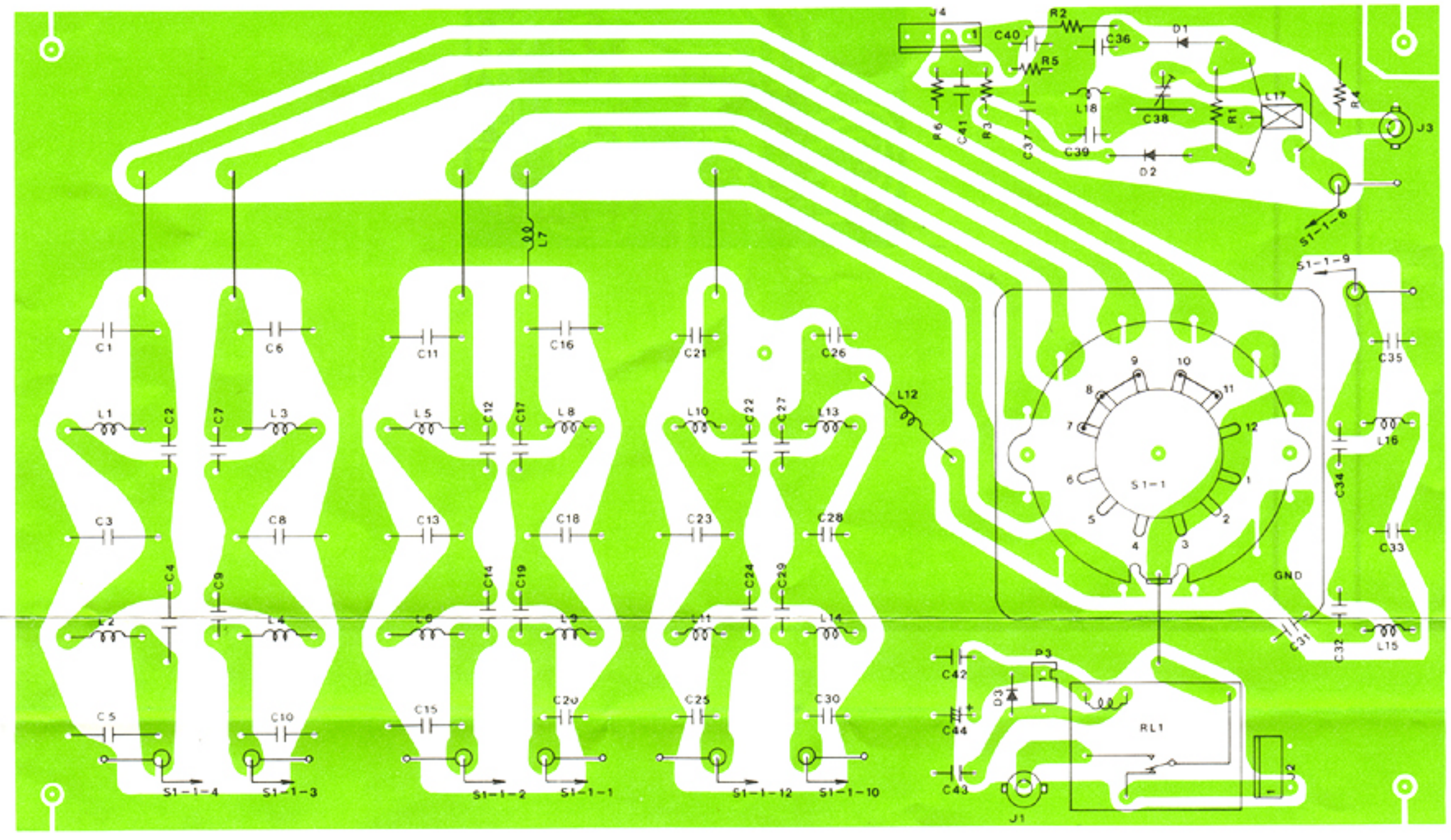
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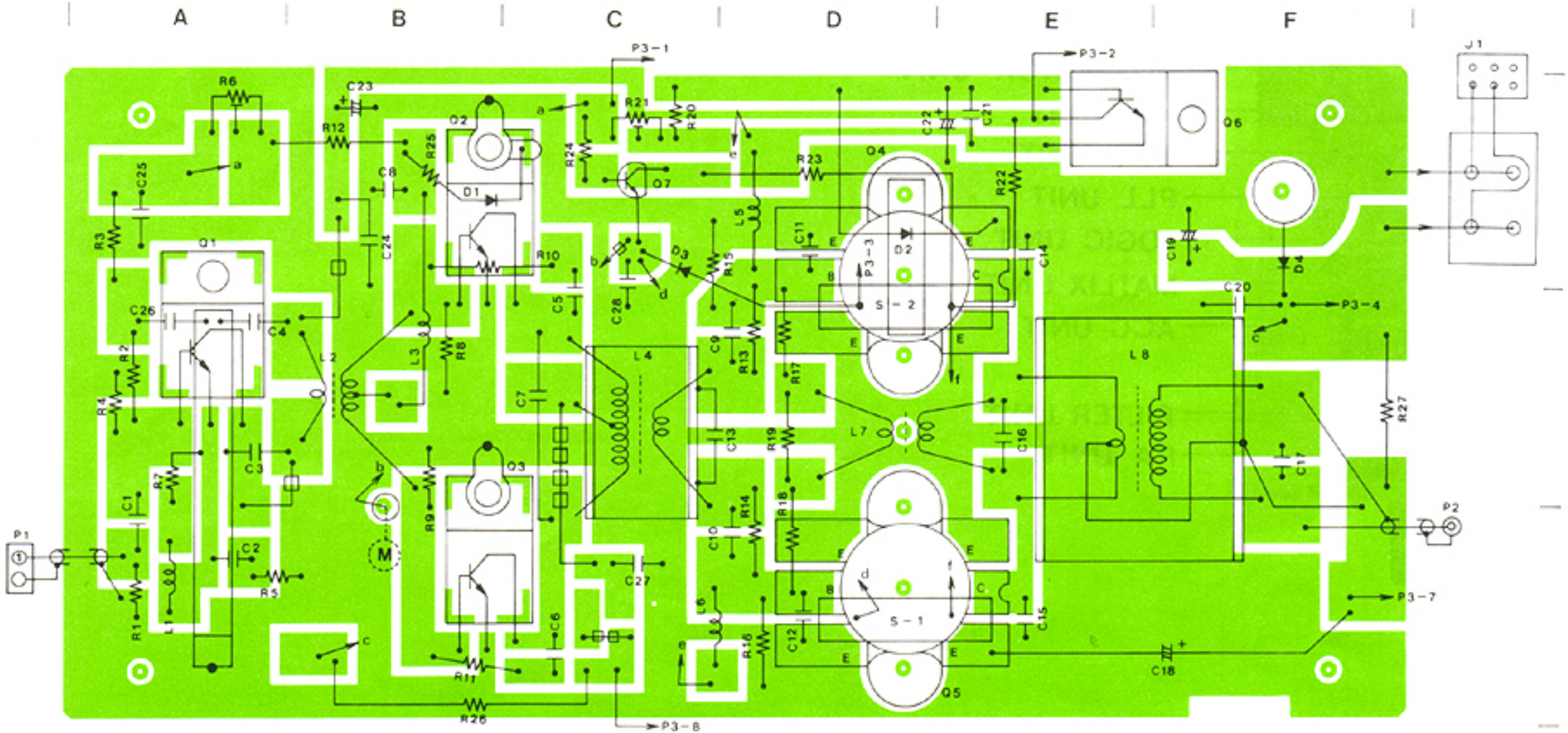
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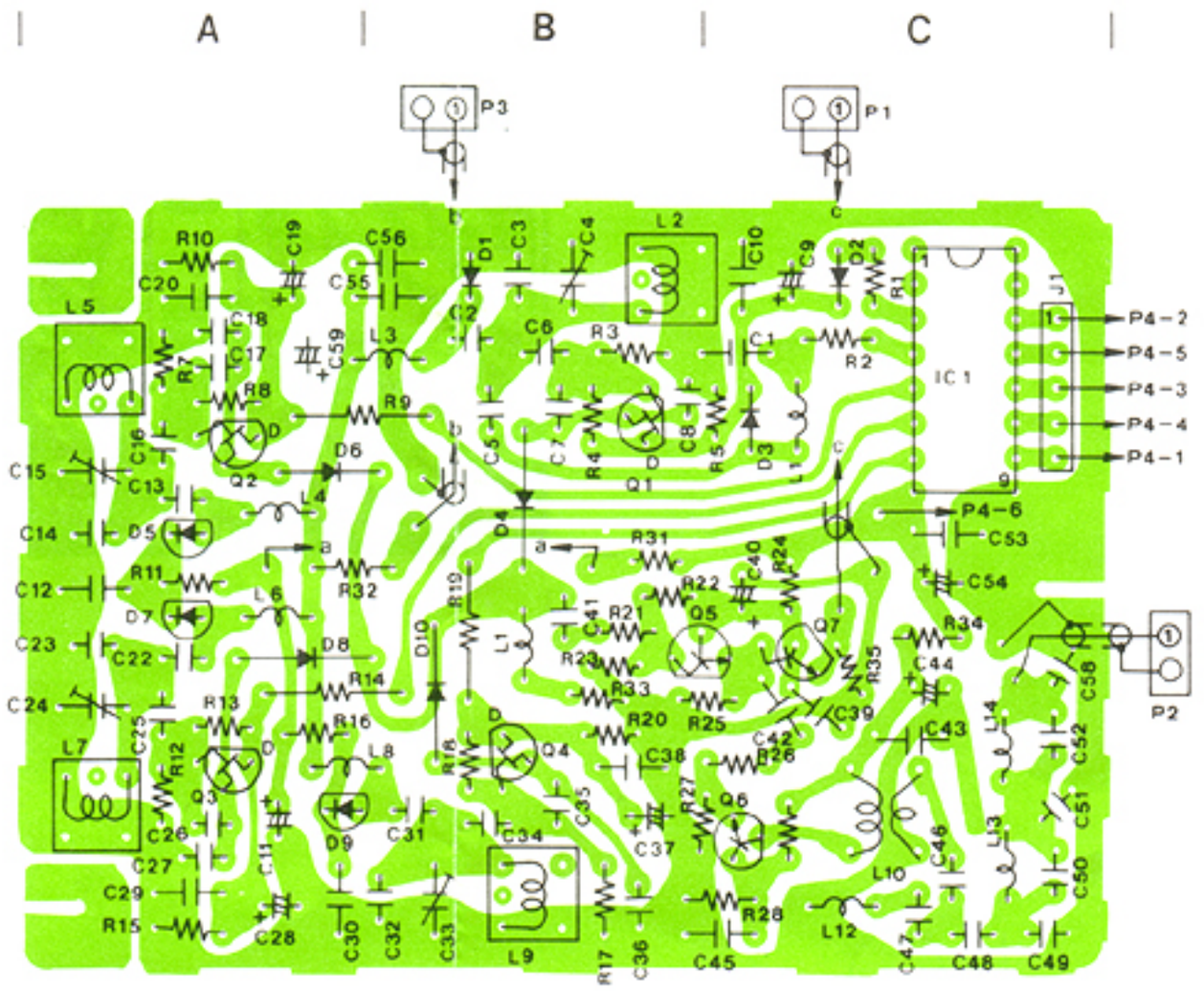

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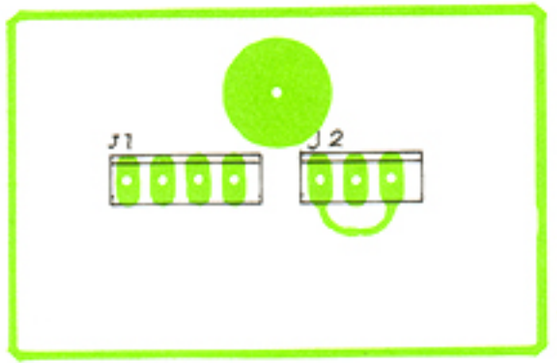

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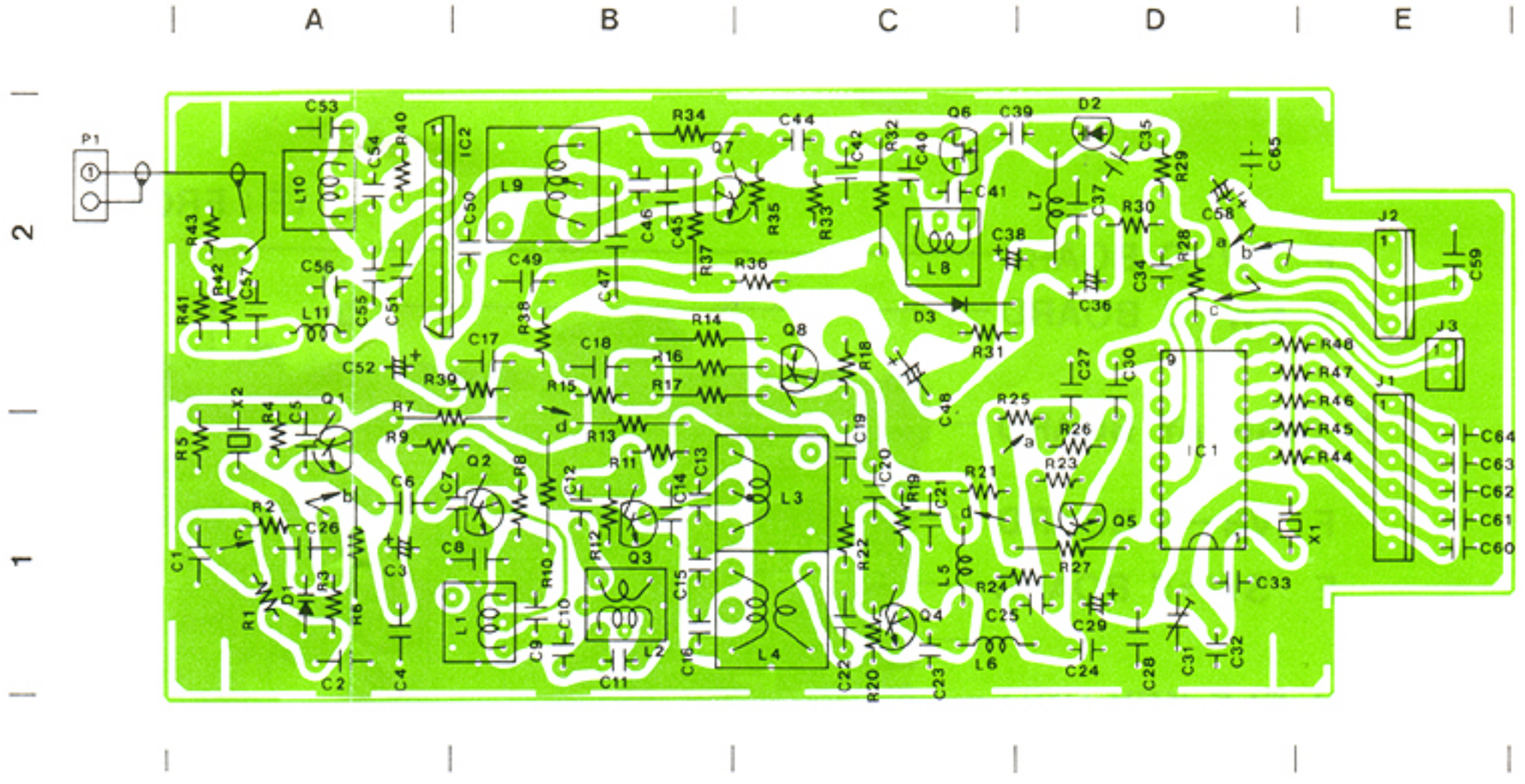
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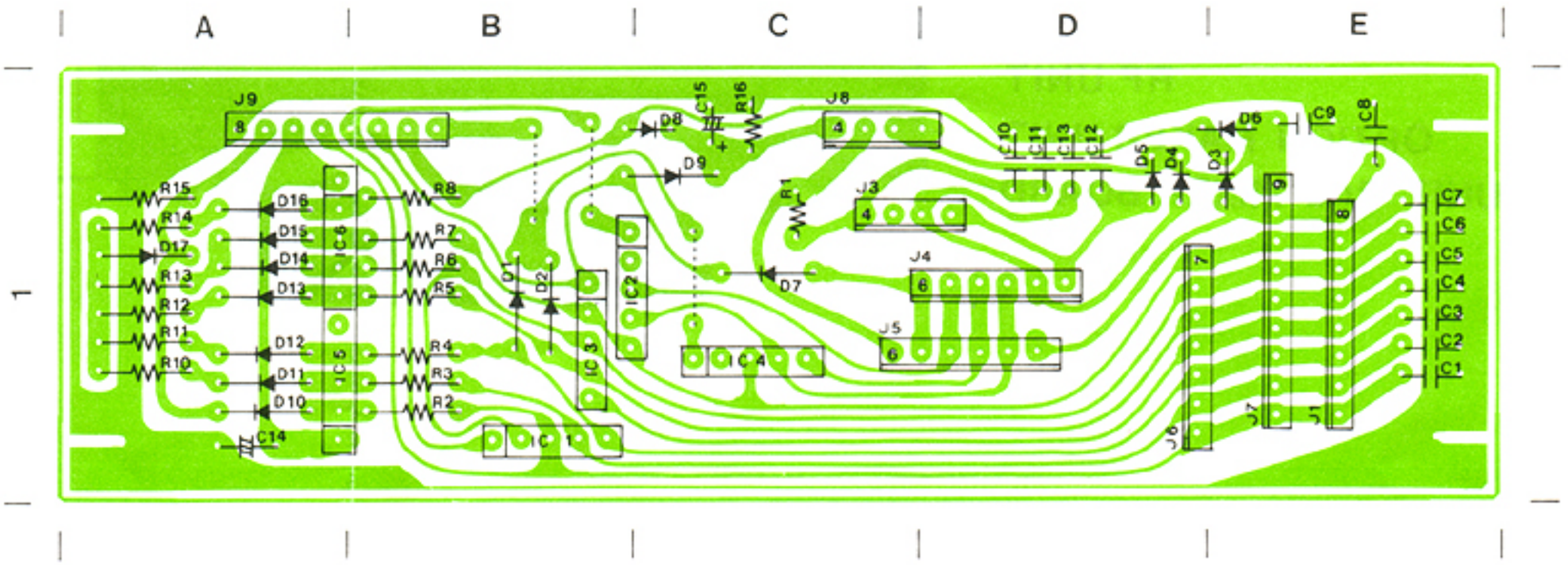
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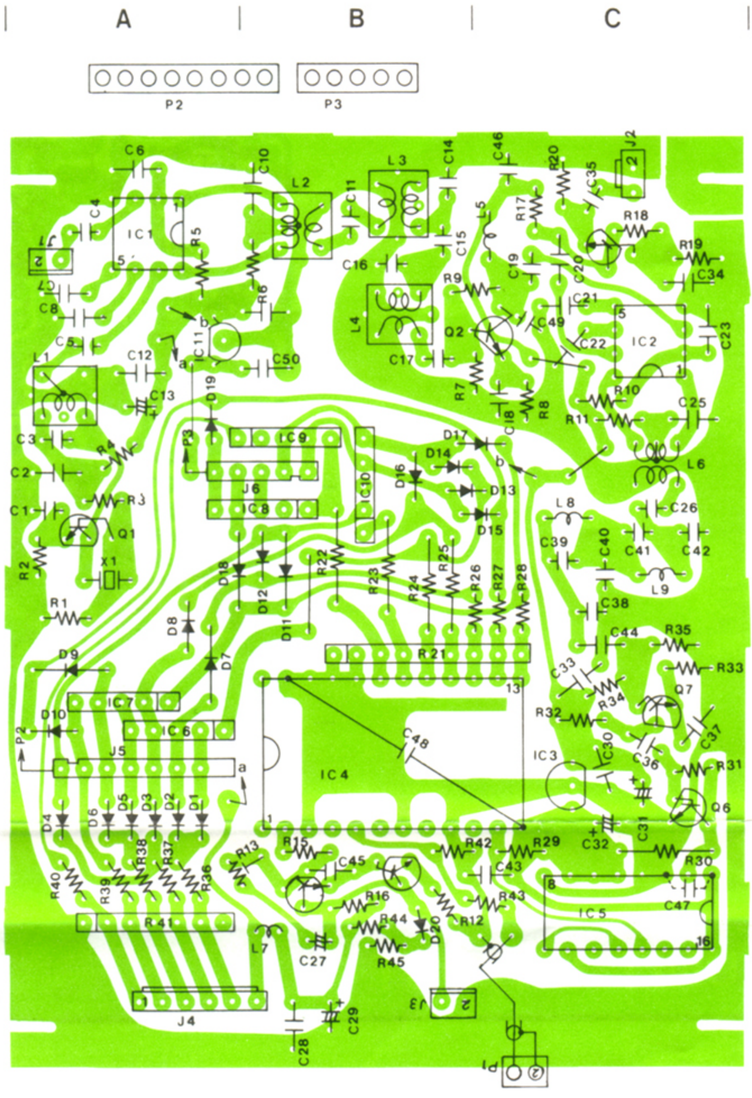

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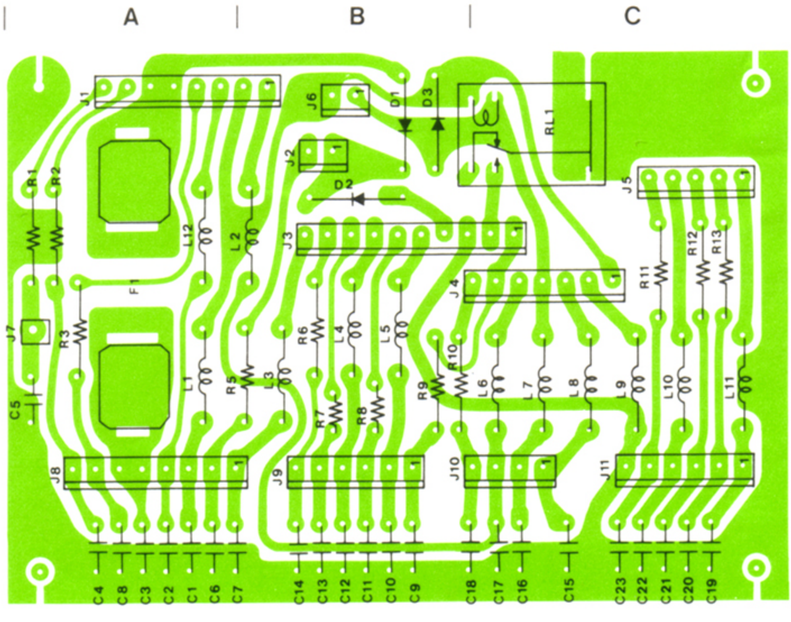

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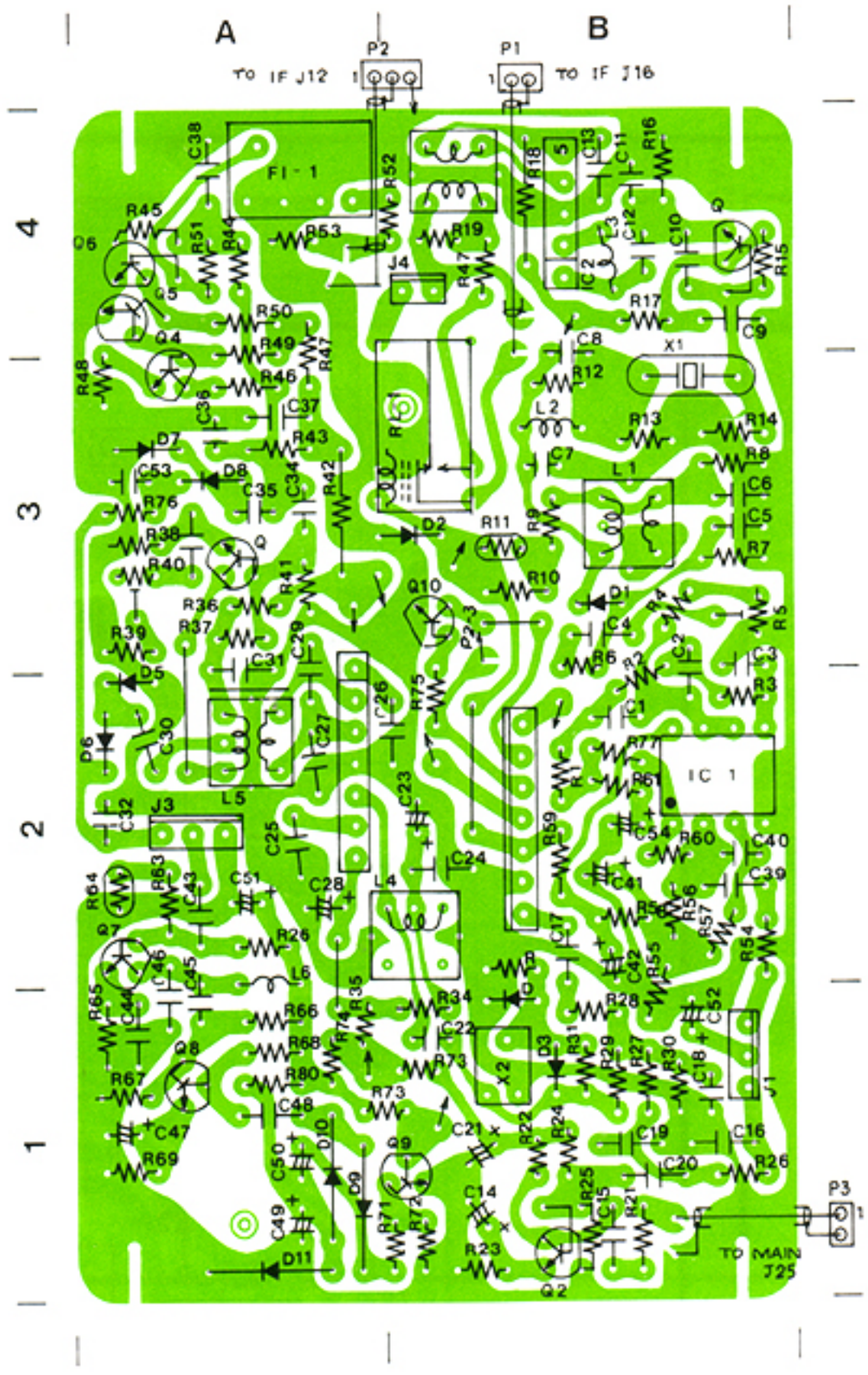
FM UNIT

■ OPTION



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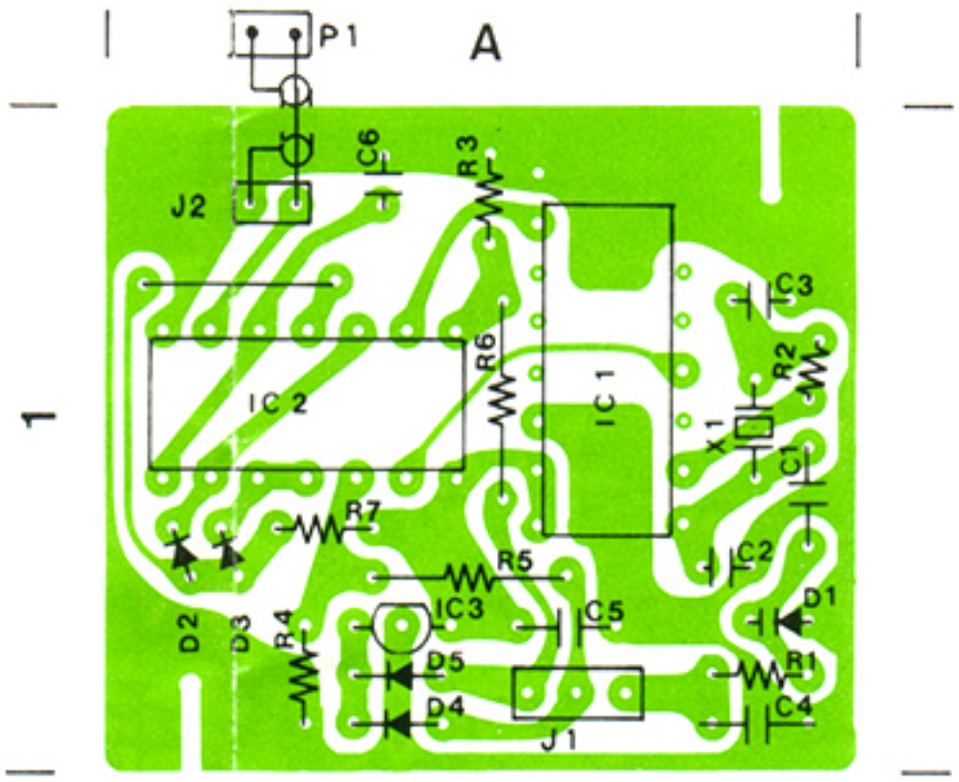

ELE-KEY UNIT

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