



# SERVICE MANUAL

## R-2000 DCK-1

### COMMUNICATIONS RECEIVER



Downloaded by  
Amateur Radio Directory  
[www.hamdirectory.info](http://www.hamdirectory.info)

#### CONTENTS

|                                     |    |                         |            |
|-------------------------------------|----|-------------------------|------------|
| SPECIFICATIONS .....                | 2  | DISASSEMBLY.....        | 22         |
| CIRCUIT DESCRIPTION .....           | 3  | PACKING .....           | 23         |
| PARTS LIST .....                    | 11 | ADJUSTMENT .....        | 24         |
| PC BOARD VIEW AND SCHEMATIC DIAGRAM |    | ADJUSTMENT POINT .....  | 29         |
| RX UNIT (X55-1340-00).....          | 16 | TERMINAL FUNCTION ..... | 30         |
| PLL UNIT (X50-1920-00).....         | 18 | BLOCK DIAGRAM .....     | 31         |
| SWITCH UNIT (X41-1480-00) .....     | 20 | DCK-1 (OPTION).....     | BACK COVER |
| SCHEMATIC DIAGRAM .....             | 21 |                         |            |

## SPECIFICATIONS

Frequency Range: 150 kHz ~ 30 MHz  
 150 kHz ~ 26 MHz (W2 type)  
 2 MHz ~ 30 MHz (X type)

Mode: AM, FM, SSB (USB/LSB), CW

Sensitivity: (0 dB $\mu$  = 1  $\mu$ V)

| Mode \ Frequency     | 150 kHz ~ 2 MHz      | 2 MHz ~ 30 MHz        |
|----------------------|----------------------|-----------------------|
| SSB/CW (S+N/N 10 dB) | Less than 2 $\mu$ V  | Less than 0.4 $\mu$ V |
| AM (S+N/N 10 dB)     | Less than 20 $\mu$ V | Less than 4 $\mu$ V   |
| FM (S+N/N 20 dB)     | -                    | Less than 1 $\mu$ V   |

Selectivity:

| Mode \ Selectivity | Selectivity     |                  |
|--------------------|-----------------|------------------|
| AM-WIDE            | 6 kHz (-6 dB)   | 18 kHz (-50 dB)  |
| AM-NARROW          | 2.7 kHz (-6 dB) | 5 kHz (-50 dB)   |
| SSB/CW             | 2.7 kHz (-6 dB) | 5 kHz (-50 dB)   |
| CW-NARROW          | 500 Hz (-6 dB)* | 820 Hz (-60 dB)* |
| FM                 | 15 kHz (-6 dB)  | 30 kHz (-50 dB)  |

\*: with YG-455C optional CW crystal filter

| Symbol | Destination             |
|--------|-------------------------|
| K      | U. S. A                 |
| M      | General market          |
| T      | Britain                 |
| W      | Europe                  |
| X      | Australia & New Zealand |

Image Ratio: Better than 70 dB

IF Rejection: Better than 70 dB

Frequency Stability: Within  $\pm 300$  Hz during the first hour after 1 minute of warm-up.

Within  $\pm 50$  Hz during any 30 minutes period thereafter.

Frequency Accuracy:  $\pm 10 \times 10^{-6}$  or better (at normal temperatures)

Squelch Sensitivity: (threshold, 0 dB $\mu$  = 1  $\mu$ V)

AM/SSB/CW = Less than 3.12  $\mu$ V

FM = Less than 0.5  $\mu$ V

Audio Load Impedance: 4 $\Omega$  to 16 $\Omega$

Audio Output Power: 1.5W (8 $\Omega$  load, 10% distortion)

Antenna Impedance: 50 $\Omega$ /500 $\Omega$

Power Consumption: (at no signal) = 14W AC

13.8V DC, 0.6A (with optional DCK-1)

(at Memory Back-up) = 3W AC

13.8V DC, 0.1A (with optional DCK-1)

Power Requirements: 100/120/220/240V AC, 50/60 Hz  
 13.8V DC (with optional DCK-1)

Dimensions: 375 (14.8) W x 115 (4.5) H x 210 (8.3) D mm (inch)

Weight: 5.5 kg (12.1 lbs.) approx.

Downloaded by   
 Amateur Radio Directory   
  
[www.hamdirectory.info](http://www.hamdirectory.info)

## CIRCUIT DESCRIPTION

## RX unit X55-1340-00

R-2000 is a triple conversion general coverage receiver with a first IF of 45.85 ~ 45.90 MHz, 9.85 ~ 9.90 MHz second IF and a 455 kHz third IF.

Both low (50 $\Omega$ ) or high (500 $\Omega$ ) impedance antenna terminals are provided for all bands.

The signal supplied through the antenna terminal goes to the antenna fuse (100 mA) and three step RF attenuator (10, 20, and 30 dB). It next enters the BPF (Band Pass Filter), which divides the 0.15 ~ 30 MHz range into 6 bands; 0.15 MHz ~ 1 MHz, 1 MHz ~ 2 MHz, 2 MHz ~ 4 MHz, 4 MHz ~ 8 MHz, 8 MHz ~ 17 MHz and 17 MHz ~ 30 MHz. Q58: SN74LS145N converts the BCD band data signal from the PLL control circuit to select the appropriate BPF for the frequency selected.

Exiting the BPF, the signal, is fed to RF amp Q1: 3SK73(GR), first IF trap (operating at 40.875 MHz) and emitter follower Q2: 2SC1815 (Y).

The RF signal is mixed with the first local oscillator 45.9 ~ 75.85 MHz and converted to the 45.85 ~ 45.90 MHz first IF by balanced mixer Q3 and Q4: 3SK73(GR).

Q3 and Q4 drain voltage is supplied through a switching circuit consisting of Q5 and Q6 controlled by Q47 and Q48: 2SC1815 (Y) will turn off when the VHB signal is applied from the PLL control circuit in the (optional) VHF reception mode. At the same time, the first IF circuit input is switched to the converter by switching diodes D13 and D14: 1S2588.

After passing the first IF LC filter the signal is converted to the 9.85 ~ 9.90 MHz second IF by the second balanced mixer Q7 and Q8: 3SK74(L) using the 36 MHz second local oscillator injection signal.

The second IF signal passes through ceramic filter F1 ( $f_0$ : 9.875 MHz) and is converted to the 455 KHz third IF by the third balanced mixer Q9 and Q10: 3SK73(GR) using the 9.445 ~ 9.395 MHz third local oscillator injection signal.

The signal is applied to the NB gate D15, 16. A part of the signal is also applied to the NB (Noise Blanker) amplifiers on the PLL unit via buffer Q11: 2SC1815(Y). The signal output from the NB gate is switched to the appropriate bandwidth third IF filter (F2 ~ F5 of 455 kHz), then fed to the third IF amplifiers.

The IF filter bandwidths are: F3; 2.7 kHz, F4; 6 kHz and F5; 15 kHz. Filter F3 is used in the AM narrow, SSB and CW wide modes, F4 in the AM wide mode and F5 in the FM mode. Filter position F2 is provided for the CW narrow mode and an optional YG-455C or YG-455CN filter can be used.

The third IF amplifiers are divided into two systems; one for the FM mode and one for all other modes.

In the FM mode, the signal passing through F5 is amplified by Q32: TA7060P, Q33: 2SC1675(L) and Q34:  $\mu$ PC577H, then detected by ceramic discriminator F6, and diodes D41 and 42.

The noise component of the detected signal is amplified by Q35 and Q36: 2SC1775(E), rectified (D44 and 45), DC amplified (Q37 and 38), then applied to squelch gate switch Q41: 2SC1815(Y), center stop control Q40: 2SC1815(Y) and BUSY LED switch Q42 and Q43: 2SC1815(Y).

The DC voltage which is generated from the discriminator (F6) is fed to window comparator Q39: NJM4558D which forms an AND circuit together with Q40 and generates the

Program Scan center stop signal which is applied to the PLL control circuit via Q46: 2SC1815(Y). The FM IF signal from Q33 is amplified by Q59: 2SC1815(Y) and detected by D39 and D40: 1N60 to drive the S meter.

In all modes other than FM, the signal which has passed F2 through F4 are amplified by Q12 and Q13: 3SK73(GR). A sample of the IF signal is buffer by Q14: 2SC1815(Y) and is AM detected by D29: 1N60, buffered by Q15, and diode switched by D30 to the squelch-controlled switch Q16. Output from Q14 is also rectified by D37 and D38: 1N60. This signal is also split: the rectified output is both AGC amplified by Q23: 2SC1815(Y) and squelch amplified by Q28: 2SC1815(Y), Q29: 2SK192A(GR), Q30: 2SA1015(Y) and Q31: 2SC1815(Y), Q24 (CW and SSB) and Q25 (AM) 2SC1815(Y) select the AGC slow time constant by mode. AGC is applied dack to the RF and IF amplified. The AGC voltage is also amplified by Q50: 2SK192A(GR) and Q51: 2SA1015(Y) to drive the S meter. Q26 and Q27: 2SC1815(Y) switch off power to the AM, CW, and SSB IF amplifiers and squelch amplifiers in the FM mode. The output of the squelch amplifiers (Q31) is applied to the BUSY LED switch Q44: 2SC1815(Y), scan stop switch Q45: 2SC1815(Y) and squelch gate Q16: 2SC2240(GR).

Q21: 2SC1815(Y) is the BFO circuit oscillator and Q22: 2SC1815(Y) the buffer. The BFO output is applied to the product detector D25 ~ D28 (1N60). Q20: 2SC1815(Y) is the LSB frequency shift switch.

The AM signal detected by D29 is buffered by Q15: 2SC2240(GR), and the audio signal is selected according to mode by either D30 (for AM) or D31 (for SSB and CW). This is fed through switch Q16 to audio amplifier Q17: 2SC2240(GR). The FM audio signal passes squelch gate Q52: 2SC2240(GR) and then goes to Q17.

Audio amplified by Q17 is first fed to the VOLUME and TONE controls. Q18: 2SC2240(GR) provides output to the REC jack.

The audio signal, having passed the VOLUME and TONE controls, is power amplified by Q57: HA1368R to drive the speaker.

As accessory circuits, a BEEP oscillator circuit (Q55 and 56) and standby mute circuit (Q49, 60 and 61) are provided.

In the mute mode, Q49: 2SC1815(Y) decreases the RB (receive B+) line to -6V to mute all modes except FM. The RB line then controls Q60 and 61 to disrupt FMB (FM B+) to Q33, which effectively mutes the FM mode.

The power supply circuits consists of a 9V AVR (automatic voltage regulator) Q54: AN7809 and a 14V ripple filter Q53.

| Item   | Rating                         |
|--|--------------------------------|
| Nominal center frequency   | within 9.875 MHz $\pm$ 30 kHz  |
| 3 dB bandwidth   | within 130 $\pm$ 30 kHz        |
| 20 dB bandwidth  | 350 kHz or less                |
| Loss   | 8 dB or less                   |
| Spurious response<br>(within 9.875 $\pm$ 2 MHz)<br>(within 8.965 $\pm$ 25 KHz) | 30 dB or more<br>40 dB or more |
| Input and output impedance   | 330 $\Omega$                   |

Table 1. Ceramic filter (L72-0338-05) RX unit F1

## CIRCUIT DESCRIPTION

| Item   | Rating                         |
|--|--------------------------------|
| Center frequency   | 455 kHz $\pm$ 0.6 kHz          |
| 6 dB band width  | 2.8 $\pm$ 0.3 kHz              |
| 40 dB band width   | 5.5 kHz or less                |
| Insertion loss (at maximum output)                               | 6.0 dB or less                 |
| Guaranteed attenuation (within 455 $\pm$ 100 kHz)                | 55 dB or more                  |
| Spurious attenuation (within 0.1 to 1.0 MHz) for 600 to 700 kHz. | 45 dB or more<br>40 dB or more |
| I/O matching impedance   | 2.0 k $\Omega$                 |

**Table 2. Ceramic filter (L72-0332-05, RX unit F3)  
SSB, AM-N, CW-W**

| Item  | Rating                             |
|---|------------------------------------|
| Nominal center frequency                          | 455 kHz                            |
| 6 dB band width                                   | $\pm$ 3 kHz or more (from 455 kHz) |
| 50 dB band width                                  | $\pm$ 9 kHz or less (from 455 kHz) |
| Ripple (within 455 $\pm$ 2 kHz)                   | 2 dB or less                       |
| Insertion loss                                    | 6 dB or less                       |
| Guaranteed attenuation (within 455 $\pm$ 100 kHz) | 60 dB or more                      |
| I/O matching impedance                            | 2.0 k $\Omega$                     |

**Table 3. Ceramic filter (L72-0319-05, RX unit F4)  
AM-W**

| Item  | Rating                |
|---|-----------------------|
| Nominal center frequency                          | 455 kHz               |
| 6 dB bandwidth                                    | $\pm$ 7.5 kHz or more |
| 50 dB bandwidth                                   | $\pm$ 15 kHz or less  |
| Ripple (within 455 $\pm$ 5 kHz)                   | 3 dB or less          |
| Loss  | 6 dB or less          |
| Guaranteed attenuation (within 455 $\pm$ 100 kHz) | 35 dB or more         |
| Input and output impedance                        | 1.5 k $\Omega$        |

**Table 4. Ceramic filter (L72-0316-05, RX unit F5)  
FM**

| Item                       | Rating  |
|----------------------------|---|
| Center frequency $f_o$     | 455.7 kHz   |
| Center frequency deviation | $f_o \pm 50$ Hz at 6 dB                                     |
| 6 dB bandwidth             | $\pm 250$ Hz or more  |
| 60 dB bandwidth            | $\pm 425$ Hz or less  |
| Ripple                     | 2 dB or less  |
| Loss                       | 6 dB or less  |
| Guaranteed attenuation     | 80 dB or more at 100 Hz to 455.1 kHz and 456.3 kHz to 2 MHz |
| Input and output impedance | 2 k $\Omega$ // 15 pF                                       |

**Table 5. CW Crystal filter (L71-0206-05)  
YG-455C (Option)**

| Item                       | Rating  |
|----------------------------|---|
| Center frequency $f_o$     | 455.7 kHz   |
| Center frequency deviation | $f_o \pm 50$ Hz at 6 dB                                     |
| 6 dB bandwidth             | $\pm 125$ Hz or more  |
| 60 dB bandwidth            | $\pm 250$ Hz or less  |
| Ripple                     | 2 dB or less  |
| Loss                       | 6 dB or less  |
| Guaranteed attenuation     | 80 dB or more at 100 Hz to 455.3 kHz and 456.1 kHz to 2 MHz |
| Input and output impedance | 2 k $\Omega$ // 15 pF                                       |

**Table 6. CW Crystal filter (L71-0207-05)  
YG-455CN (Option)**

### PLL (Phase locked loop) unit X50-1920-00

The PLL unit houses the PLL oscillator circuit, microprocessor control circuit and the NB amplifier circuits. In the PLL circuit, there is a 9 MHz reference frequency crystal oscillator, the first local oscillator (45.90 ~ 75.85 MHz), second local oscillator (36 MHz) and third local oscillator (9.395 ~ 9.445 MHz), which are output to the Receiver unit.

The digital circuit peripheral to the microprocessor controls the PLL circuit frequency, display, clock/timer, input interface, rotary encoder mode (speed) and memory.

#### 1. PLL circuit

##### 1) Reference frequency oscillator

Q1 operates at a reference frequency of 9 MHz, which is supplied to the second and third local oscillator circuits through buffer Q2.

Via buffer Q3, a 4.5 MHz signal divided 1/2 by IC1 is supplied through buffer Q4 to the first local oscillator PLL circuit. The reference frequency is also buffered (Q6) and divided down to 1 kHz by IC2 for use as a clock reference signal.

##### 2) First local oscillator circuit (LO1)

The first local oscillator is obtained from the PLL (Phase Locked Loop) circuit. Three VCOs (Voltage Controlled Oscillator) controlled by the microprocessor through Q20 ~ 22 cover the 45.90 ~ 75.85 MHz frequency range. The VCO output is amplified by Q26, Q27 and Q28. Part of the signal is applied to buffer Q16: 2SC1907 and PLL IC5: MN6147C. The spurious component is eliminated from the remaining signal by a BPF and is output via buffer Q29 and Q30: 2SC1707 as the LO1 signal.

IC5: MN6147C consists of a programmable frequency divider, reference frequency divider and phase comparator which compares the reference and VCO frequencies (comparison frequency; 25 kHz). The programmable divider's ratio (1836 ~ 3034; only even number) is controlled by the microprocessor.

The phase error signal from the comparator is applied to the VCO by active filter Q17, Q18 and Q19: 2SC1775.

##### 3) Second local oscillator (LO2)

The reference frequency is quadrupled by Q5: 2SC1815 to obtain the 36 MHz second local oscillator frequency.

## CIRCUIT DESCRIPTION

## 4) Third local oscillator (LO3)

This circuit consists of PLL IC2: MN6147C which incorporates a 5 kHz PLL and mixer. One VCO is provided; the frequency range is 39.505 ~ 44.500 MHz and the dividing ratio range is 7901 ~ 8900. This PLL circuit is composed of VCO Q11: 2SC1923, PLL IC2: MN6147C and a loop filter consisting of Q8, Q9 and Q10: 2SC1775. The VCO output is buffered (Q12), divided 1/100 to 395.05 ~ 455.00 kHz by IC3: MN54459L, buffered (Q13) and mixed with the 9 MHz reference signal by IC4: SN16913P to obtain the 9.39505 ~ 9.445 MHz third local oscillator frequency. This is filtered (CF1) and amplified (Q15), then sent to the Receiver unit.

## 5) Unlock muting

The output from PLL IC2 pin 2 (unlock) becomes an unlock signal through IC21: TA7324P and Q71, and is used to control the audio muting circuit on Switch unit "B" to reduce or eliminate any pulse noise which may be generated when the frequency is changed and the PLL momentarily resets.

## 2. Control unit

## 1) Rotary encoder input circuit

On the Encoder unit, a 50 slit rotary disc and 2 photointerruptors generate 2 clock signals having a 90° phase difference, which are input to the Control unit via the EN1 and EN2 lines. These clock signals are waveform shaped by IC6, quadrupled by the gate circuit consisting of IC7 and 8 (the 50 pulse/rev signal is changed to a 200 pulse/rev signal), and applied IC12, through Flip-Flop IC9 1/4 to the microprocessor pin No. 39 (T1 port). At the same time, the encoder's rotational direction is detected from the clock pulses by the FF circuit IC9 1/4 and is input to microprocessor pin 29 (Port 37). The waveforms at each point are shown in Fig. 1.

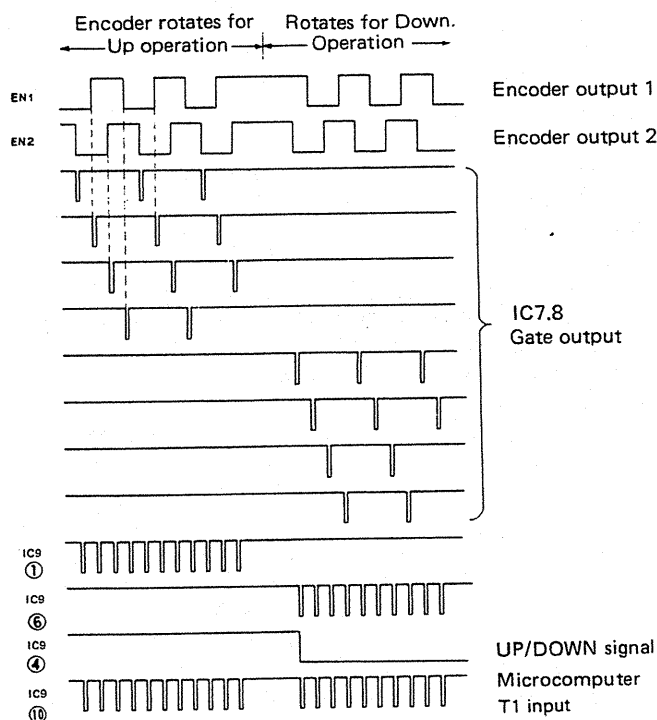


Fig. 1 Encoder output to micro-processor input timing and waveforms

## 2) Program scan circuit

IC10 on the Control circuit is an astable multivibrator circuit controlled by the PG. SCAN switch. Both its output, and the clock signal are applied to the microprocessor T1 port.

During scan, the multivibrator oscillators output pulse train is accessed by ICs 9 1/4, 10 1/4 and 11 1/2, while the oscillator stops in the HOLD mode and only the Encoder clock pulse is available.

The oscillator frequency is determined by C173, C174, R145 and VR1. When the tuning speed is SLOW or MID, the oscillator frequency is approximately 10 ~ 18 Hz. When it is FAST, Q34 turns on and the oscillator frequency is approximately 5 ~ 9 Hz.

## 3) Clock circuit

A 1 kHz clock signal is output from PLL IC2 (pin 6), waveform shaped by IC17 1/4 and applied to the microprocessor INT port (pin No. 6) to count the time.

When the HOUR and MINUTE switches are depressed simultaneously the time display shows 00:00. In CLOCK 1 mode, the time display stops flashing and the clock begins counting the seconds (which are not shown) when the switches are depressed. When the display is flashing, the HOUR and MINUTE switches cannot be used to set the time.

When the Function switch is set to any position other than FREQUENCY, depressing the HOUR switch will increment the HOUR digit by one. When the HOUR switch is held ON, the Hours digit increases continuously. The Minutes digit does not change during HOURS set.

Each time the MINUTE switch is depressed, the Minutes digit increases by one. When the switch is held ON, the Minutes digit advances. The Hours digit does not change during Minutes set.

To program the timer, set the timer ON time and place the timer switch ON. Receiver power remains off until the timer preset time is reached, when the relay is activated and the power is switched on.

When the timer OFF time is programmed, the power is turned off at that preset time. When the timer switch is ON, the power switch is inoperative. The timer output is available at the Remote control terminals on the rear panel.

## 4) Microprocessor power supply circuit

When the microprocessor IC12:  $\mu$ PD80C49C is in operation, 5V should be applied to Vcc pin No. 40.

When the microprocessor is in the back-up standby mode, 2V should be applied. When the power switch is turned off, Q35 and Q36 change the level of RESET pin No. 4 to low to protect the RAM, the VDD pin No. 26 becomes low to stop the oscillator and the contents of the RAM are maintained by the low standby voltage (Vcc).

When the power is turned on, 5V is applied to the Vcc pin, the VDD pin becomes high while the RESET pin is held low to activate the oscillator, then the RESET pin returns to a logic high and the program is reset.

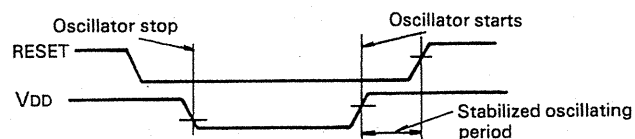


Fig. 2 Micro-processor power supply circuit

## CIRCUIT DESCRIPTION

### 5) Dimmer circuit

The dimmer functions by controlling power to the DC/DC converter. When the main power is on, approximately 12V is supplied to Q41 and Q42 by Q61, Q72, Q73 and D40. When the main power is off or the DIMMER switch is ON, Q73 turns off, and the voltage to Q41 and Q42 is decreased to approximately 8.5V to reduce the display voltage, resulting in a dimmed display.

### 6) Display circuit

The seven segment and digit signals are output from IC14 to drive the 8-digit display. As the output current is active low, IC15, IC16, Q38, Q39 and Q40 are used.

### 3. Noise blanker circuit

Pulse noise is obtained through Q11 on the Receiver unit. It is amplified by Q62, Q63 and Q64, rectified by D43 and D44 and DC amplified by Q66 to drive the Receiver unit NB gate circuit. The NB is ON when Q66 is emitter is grounded through D45 varistor. Q65 is the NB AGC amplifier.

| Item   | Rating                         |
|--|--------------------------------|
| Nominal center frequency   | within 9.420 MHz $\pm$ 30 kHz  |
| 3 dB bandwidth   | within 130 $\pm$ 30 kHz        |
| 20 dB bandwidth  | 350 kHz or less                |
| Loss   | 8 dB or less                   |
| Spurious response<br>(within 9.420 $\pm$ 2 MHz)<br>(within 8.510 $\pm$ 25 KHz) | 30 dB or more<br>40 dB or more |
| Input and output impedance   | 330 $\Omega$                   |

Table 7. Ceramic filter (L72-0337-05) PLL unit CF1

### Microprocessor Operational Description

#### 1. Digital VFO

##### 1) Reception frequency

The VFO continuously covers 100 kHz - 29,999.95 kHz and stops at the end.

W2 type: 150 kHz - 25.99995 MHz

X type : 2 MHz - 29.99995 MHz

##### 2) Frequency step

|      | Step   | One VFO cycle |
|------|--------|---------------|
| FAST | 5 kHz  | 1 MHz         |
| MID  | 500 Hz | 100 kHz       |
| SLOW | 50 Hz  | 10 kHz        |

The step changeover frequency does not change. When the VFO is operated with an increased step frequency, frequencies lower than the step frequency are rounded and the VFO scans up or down referring to that frequency.

**Example:** SLOW step  $\rightarrow$  FAST step

1

3,160.45 MHz

(3,160.4 MHz)  $\rightarrow$  3,165.00 MHz (3,165.0 MHz) UP

3,155.00 MHz (3,155.0 MHz) DOWN

2

3,163.45 MHz

(3,163.4 MHz)  $\rightarrow$  3,170 MHz (3,170.0 MHz) UP

3,160.00 MHz (3,160.0 MHz) DOWN

3

3,168.45 MHz

(3,168.4 MHz)  $\rightarrow$  3,170.00 MHz (3,170.0 MHz) UP

3,160.00 MHz (3,160.0 MHz) DOWN

The above frequencies are displayed frequency; the 10 Hz digits are not displayed.

### 3) BAND function

The frequency changes by a 1 MHz step when the BAND switch is operated. When the switch is kept depressed, the frequency changes continuously every 0.2 seconds. A beep signal sounds every step. The BAND function stops at the frequency limit and the beep signal does not sound.

When the down operation below the receivable range, the final displayed frequency is the minimum receivable frequency.

Example:

DOWN UP

1,034.6 kHz  $\rightarrow$  0,100.0 kHz  $\rightarrow$  1,100.0 kHz

### 4) F. LOCK

The VFO and BAND switch operation stop when the F. LOCK switch is set to ON.

### 5) BACK UP

When the memory is not backed up, the unit enters 15,000.00 kHz MODE (AM) after initial setting.

When the memory is backed up, the unit enters the last reception frequency mode.

### 2. MODE function

With the mode select operation, the 1st local oscillation frequency is shifted and the displayed frequency is received.

|     | 1st local oscillation frequency shift width |
|-----|---|
| AM  | 0 (Reference)                               |
| FM  | 0   |
| USB | +1.7 kHz                                    |
| LSB | -1.7 kHz                                    |
| CW  | +0.7 kHz                                    |

### 3. MEMORY function

#### 1) Memory contents

Built-in 10-channel memory (Frequency and mode information is stored.)

#### 2) M. IN function

When M.CH 1 - 0 switch is pressed with the M.IN switch kept pressed the selected memory channel data is displayed, the beep signal sounds and the displayed frequency and mode are stored. At that time, the previously stored data is replaced with new data.

#### 3) MR function

When M.CH 1 - 0 is pressed, the stored memory contents are recalled to the VFO, enabling frequency shifting.

#### 4) AUTO.M function

When the AUTO.M switch is pressed, the AUTO.M indicator lights and the auto memory function turns on.

When the switch is pressed again, the indicator goes off and the auto memory function turns off.

Auto memory ON: The shifted frequency and mode are stored in the displayed memory channel.

Auto memory OFF: The displayed memory channel contents are not changed even when the frequency is shifted or the mode is changed.

## CIRCUIT DESCRIPTION

## Example:

frequency change
MR  
 3.235.00 (AM)  $\begin{matrix} \downarrow \\ \rightarrow \\ \downarrow \end{matrix}$  4.182.00 (USB)  $\begin{matrix} \downarrow \\ \rightarrow \\ \downarrow \end{matrix}$  3.235.00 (AM)  
 (CH5) (CH5)

## 4. M.SCAN function

## 1) ALL scan

When the M.S switch is pressed, the M.S indicator lights. When the switch is released, the scanning operation starts. The scanning interval is 1.5 seconds.  
 M1  $\rightarrow$  M2  $\rightarrow$  M3  $\rightarrow$  .....  $\rightarrow$  M9  $\rightarrow$  M0  $\rightarrow$  M1  $\rightarrow$  ..... start

When the M.S switch is pressed again, the M.S indicator goes off, the scanning operation stops and the unit displays the frequency and mode which were displayed before the scanning operation was started.

## 2) Select scan

When the desired M.CH switch is pressed with the M.S switch kept pressed, the stored data is recalled. When the switch is released, only the selected memory frequency is scanned.  
 When the desired M.CH switch is pressed twice in succession, the M.CH display shows "C" and memory frequency scanning is cancelled.

## Example:

M.CH
CH6 cancelled.  
 M.S  $\rightarrow$  2  $\rightarrow$  8  $\rightarrow$  6  $\rightarrow$   $\begin{matrix} \downarrow \\ 6 \end{matrix}$   $\rightarrow$  4  $\rightarrow$  M.S  
(Keep pressed.)
Released.  
Then scan starts.

Scan: M2  $\rightarrow$  M4  $\rightarrow$  M8  $\rightarrow$  M2  $\rightarrow$  M4  $\rightarrow$  M8  $\rightarrow$  M2

The scanning release operation is the same as that in all scan and the selected memory channel is cleared.

## 3) HOLD

When the HOLD switch is pressed during the memory scan operation, the HOLD indicator lights and the scanning operation stops.

In the hold mode, the mode can be changed and memory storage is possible. The memory data does not change without memory input even when the mode is changed.

4) When the FUNCTION switch is set to a position other than FREQUENCY during the memory scanning operation or the POWER switch is set to OFF the scanning operation is released and the unit displays the reception frequency and mode which were displayed before the scanning operation was started.

## 5. P.SCAN function

## 1) Scan

When the P.S switch is pressed, the P.S indicator lights and the data stored in channel 9 is recalled. When the switch is released, the frequencies between channel 9 and channel 0 are scanned.

The reception mode stored in channel 9 is used as a reference and the scanning direction is from channel 9 to 0. When the scanning operation reaches channel 0, it starts from channel 9 again. At that time, a beep signal sounds to indicate that the P.SCAN operation has finished one cycle.

The scan step can be selected with scan step switch and

the reception mode can be changed. When the mode is change, the mode does not change until one cycle of P.SCAN operation is finished.

When the P.SCAN operation is finished.

When the P.SCAN switch is pressed again, the P.SCAN indicator goes off, the scanning operation stops and the unit displays the frequency and mode which were displayed before the scanning operation was started.

## 2) HOLD

When the HOLD switch is pressed during P.SCAN operation, the HOLD indicator lights, the scanning operation stops and the VFO shifts the frequency within the range of the P.SCAN frequency. At the end frequency, the operation stops.

In the HOLD mode, memory storage is possible. When new data is input to channel 9, the stored data can be used as the P.SCAN range.

When the HOLD switch is pressed again, the HOLD indicator goes off and the scanning operation is resumed.

## 3) BUSY signal stop

When the squelch is opened during the P.SCAN operation, the BUSY indicator lights and the scanning operation stops. When the squelch is closed, the BUSY indicator goes off and the scanning operation starts again. Pressing the BAND UP/DOWN switch when the scanning scanning is stopped due to the squelch function will restart the scanning operation. When the BAND UP/DOWN switch is kept pressed, the scanning operation does not stop even when the squelch opens.  
 The BUSY signal stop functions in all modes.

4) When the FUNCTION switch is set to a position other than FREQUENCY or the POWER switch is set to OFF, the scanning operation stops and the unit displays the received frequency and mode which were displayed before the scanning operation was started.

5) When a converted is connected and the data stored in both channels 9 and 0 is not an HF or VHF frequency, the M.CH display shows "E" and the P.SCAN does not function. When the M.CH display of the channels 9 and 0 shows "E", P.SCAN does not function.

## 6. Clock function

1) When the FUNCTION switch is set to CLOCK-1 or CLOCK-2, the unit display the time.

CLOCK-1: Reference time

CLOCK-2: Dual time

When power is supplied, the clock indication blinks.

When CLOCK-1 is reset, the indication stops the blinking.

## 2) Setting time

Reset CLOCK-1 to stop the blinking. At that time, the seconds digit is set to 0. When the indication is blinking, the time cannot be set. Resetting CLOCK-2 does not stop the indication blinking.

| Function | Hour | Minute | Operation   |
|----------|------|--------|---|
| CLOCK-1  | ON   | ON     | Reset to 0:00 (0 sec.).   |
|          | ON   | OFF    | The minutes digits are maintained, the hours digit is incremented and the seconds digits count. |
|          | OFF  | ON     | The hours digit is maintained, the minutes digits are incremented and the seconds digits count. |

## CIRCUIT DESCRIPTION

| Function | Hour | Minute | Operation   |
|----------|------|--------|---|
| CLOCK-2  | ON   | ON     | Reset to 0:00 and the seconds digits count.   |
|          | ON   | OFF    | The minutes digits are maintained, the hours digit is incremented and the seconds digits count. |
|          | OFF  | ON     | The hours digit is maintained, the minutes digits are incremented and the seconds digits count. |

The clock employs the 24-hour system.

0.00 ... → 23,59 → 0.00 ... → 3.15 → 3.16 ...

Each time the HOUR or MINUTE switch is pressed, the corresponding digit is incremented by 1. When the switch is kept pressed, the digit is continuously incremented at an interval of 0.12 seconds.

3) When the power is shut off, the CLOCK-1 and CLOCK-2 are reset to 0:00. When the power is supplied again, the indication blinks.

### 7. Timer function

#### 1) TIMER switch

When the TIMER switch is set to ON regardless of the POWER switch setting, the power is turned off and the timer functions. The CLOCK-1 and ON TIME are compared and power is supplied when the set times coincide. Then the CLOCK-2 and OFF time are compared and power is shut off when the set times coincide.

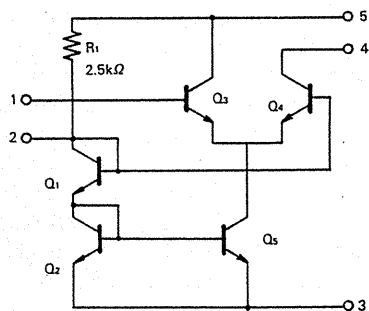


Fig. 3 TA7060P (RX unit Q32)

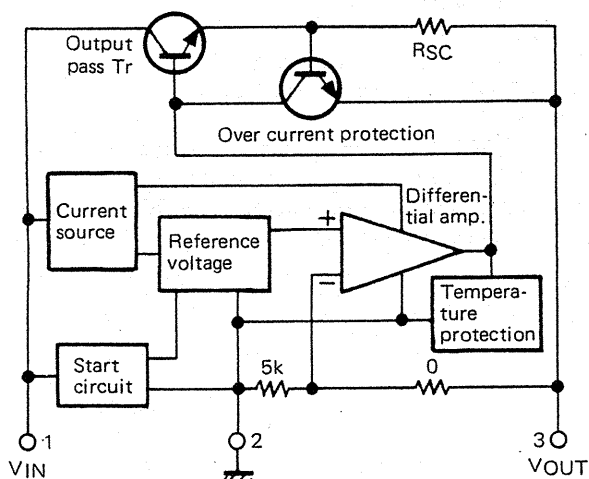


Fig. 4 AN7809 (RX unit Q54, PLL unit IC20)  
AN7805 (PLL unit IC18, 19)

When the ON and OFF times are the same, the power is not turned on.

When CLOCK-1 indication blinks, setting the TIMER switch ON will not operate the timer and the TIMER ERROR indicator will light.

#### 2) Time setting

| Function | Hour | Minute | Operation   |
|----------|------|--------|---|
| ON/OFF   | ON   | ON     | Reset to 0:00.  |
| TIME     | ON   | OFF    | The minutes digits are maintained and the hours digits are incremented. |
|          | OFF  | ON     | The hours digit is maintained and the minutes digits are incremented.   |

The HOUR and MINUTE switches function in the same way as for the clock.

3) The CLOCK and ON/OFF TIME are displayed regardless of the POWER switch setting.

### 8. BACK UP

When the memory back up lithium battery is loaded, the data (frequency and mode) stored in the memory, last reception frequency and mode and ON/OFF TIME are backed up even when the power is shut off.

### 9. Dimmer function

When the DIMMER switch is set to ON or the POWER switch is set to OFF, the brightness of the digital display and meter decreases, resulting in a dimmer effect.

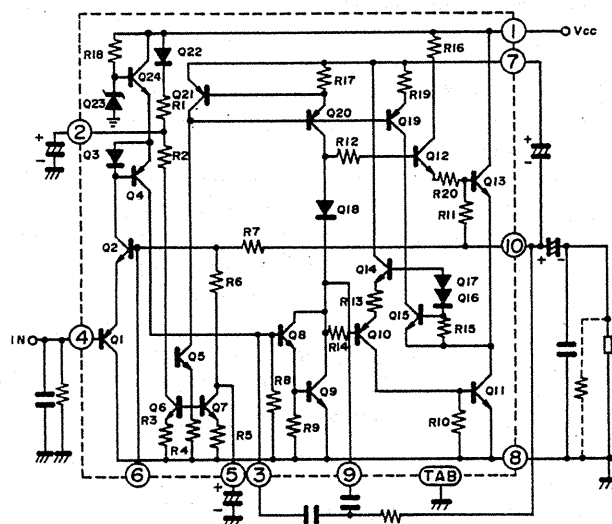


Fig. 5 HA1368R (RX unit Q57)



CIRCUIT DESCRIPTION

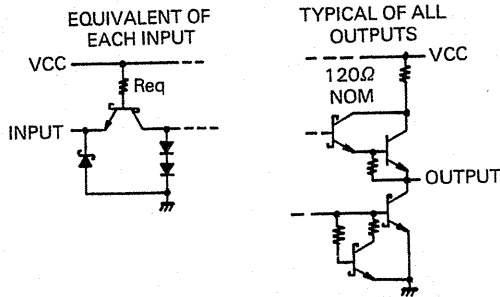
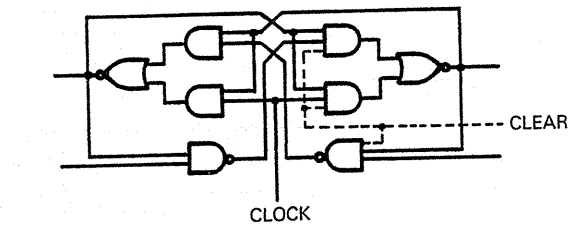
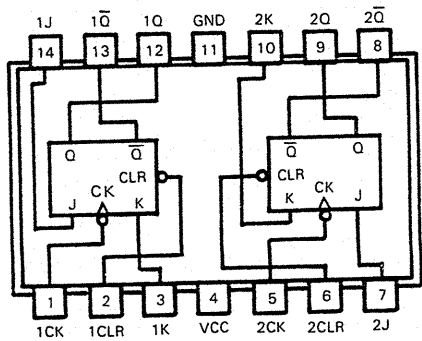


Fig. 6 SN74LS73N (PLL unit IC1)

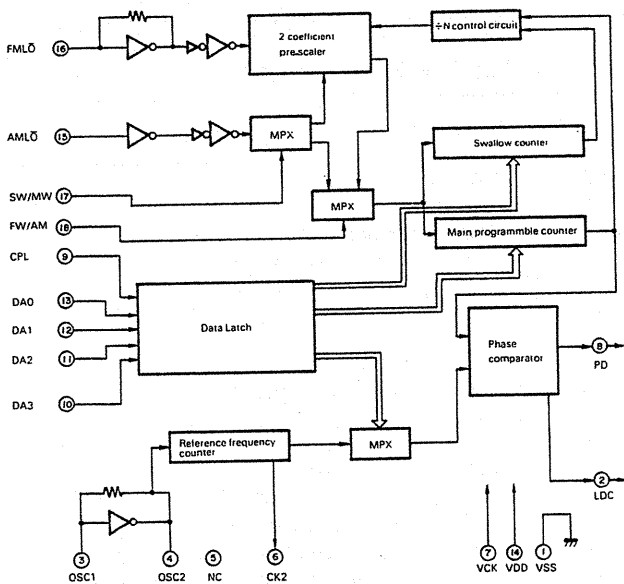
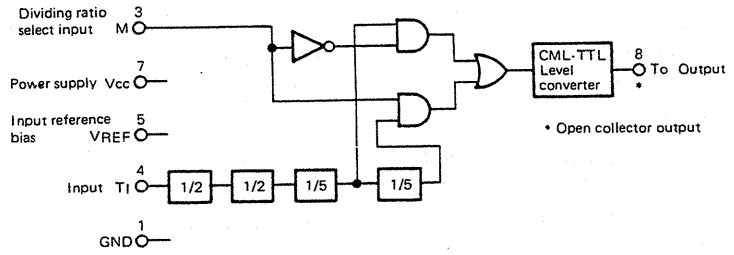


Fig. 7 MN6147C (PLL unit IC2, 5)



|                      |      |       |
|----------------------|------|-------|
| M                    | "L"  | "H"   |
| Dividing data output | 1/20 | 1/100 |

Fig. 8 M54459L (PLL unit IC3)

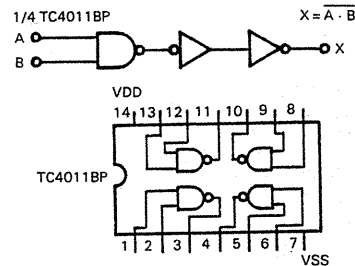


Fig. 9 TC4011BP (PLL unit IC6 ~ 11, 17)

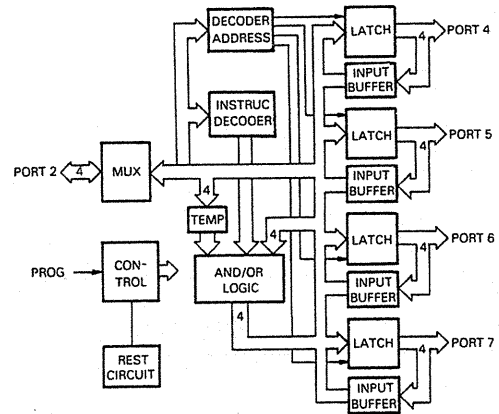


Fig. 10 μPD82C43C (PLL unit IC13, 14)

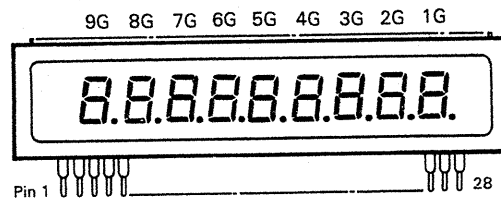


Fig. 11 FIP9D7 (PLL unit)

Table 8. FIP9D7 Terminals

|              |    |    |    |    |      |    |      |      |    |      |      |    |    |    |
|--------------|----|----|----|----|------|----|------|------|----|------|------|----|----|----|
| Terminal No. | 1  | 2  | 3  | 4  | 5    | 6  | 7    | 8    | 9  | 10   | 11   | 12 | 13 | 14 |
| Connection   | F  | NC | 9G | NC | NC   | 8G | P(g) | P(f) | 7G | P(e) | P(d) | 6G | NC | NC |
| Terminal No. | 15 | 16 | 17 | 18 | 19   | 20 | 21   | 22   | 23 | 24   | 25   | 26 | 27 | 28 |
| Connection   | 5G | NP | NP | 4G | P(d) | 3G | P(c) | P(b) | 2G | P(a) | NC   | 1G | NP | F  |

## CIRCUIT DESCRIPTION

| Item                  | Symbol    | Rating                       | Unit |
|-----------------------|-----------|------------------------------|------|
| Operating voltage     | $V_{cc}$  | $V_{ss}-0.3 \sim +10$        | V    |
| Input voltage         | $V_i$     | $V_{ss}-0.3 \sim V_{cc}+0.3$ | V    |
| Output voltage        | $V_o$     | $V_{ss}-0.3 \sim V_{cc}+0.3$ | V    |
| Operating temperature | $T_{opt}$ | $-40 \sim +85$               | °C   |
| Storage temperature   | $T_{stg}$ | $-65 \sim +150$              | °C   |

Table 9.  $\mu$ PD80C49C-022 Max. Rating

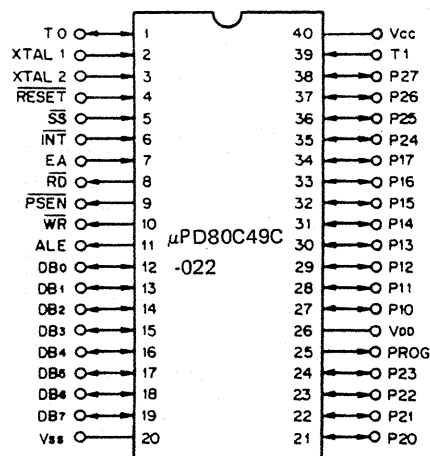


Fig. 12.  $\mu$ PD80C49C-022 Terminal name

### $\mu$ PD80C49C-022 TERMINAL FUNCTIONS

| Terminal No. | Name | Function                            | Input | Output |
|--------------|------|-------------------------------------|-------|--------|
| 1            | TO   | Power ON/OFF DATA input             | ○     |        |
| 2            | X0   | Microcomputer CLOCK (5.74MHz) input | ○     |        |
| 3            | X1   |                                     |       |        |
| 4            | RST  | RESET input, Normally:H             | ○     |        |
| 5            | SS   | Normally 5V                         |       |        |
| 6            | INT  | Clock signal (1KHz) input           | ○     |        |
| 7            | EA   | Normally GND                        |       |        |
| 8            |      | Not used, Normally:open             |       |        |
| 9            |      |                                     |       |        |
| 10           |      |                                     |       |        |
| 11           |      |                                     |       |        |
| 12           | B0   | AM                                  | ○     |        |
| 13           | B1   | USB                                 | ○     |        |
| 14           | B2   | LSB                                 | ○     |        |
| 15           | B3   | CW                                  | ○     |        |
| 16           | B4   | FM                                  | ○     |        |
| 17           | B5   | VCO-L                               | ○     |        |
| 18           | B6   | VCO-M                               | ○     |        |
| 19           | B7   | VCO-H                               | ○     |        |
| 20           | GND  | GND                                 | ○     |        |

| Terminal No. | Name | Function                                 | Input | Output |
|--------------|------|--|-------|--------|
| 21           | P20  | I/O EXPANDER control output              |       | ○      |
| 22           | P21  |  |       | ○      |
| 23           | P22  |  |       | ○      |
| 24           | P23  |  |       | ○      |
| 25           | PRG  |  |       | ○      |
| 26           | VDD  | STBY control input                       | ○     |        |
| 27           | P10  | DATA input                               | ○     |        |
| 28           | P11  |  | ○     |        |
| 29           | P12  |  | ○     |        |
| 30           | P13  |  | ○     |        |
| 31           | P14  |  | ○     |        |
| 32           | P15  |  | ○     |        |
| 33           | P16  |  | ○     |        |
| 34           | P17  | Program SCAN stop input                  | ○     |        |
| 35           | P24  | I/O EXPANDER SELECT (L:EX(O), H:EX(1))   |       |        |
| 36           | P25  | TIMER OUT output                         |       | ○      |
| 37           | P26  | Encoder UP/DOWN input (H:UP, L:Down)     | ○     |        |
| 38           | P27  | VHF signal output (VHF:H)                |       | ○      |
| 39           | T1   | Encoder & program SCAN clock pulse input | ○     |        |
| 40           | Vcc  | Microcomputer 5V & Back up power supply  |       |        |

### I/O EXPANDER (0) IC13: $\mu$ PD82C43C

| Terminal No. | Name | Function   |
|--------------|------|--|
| 2            | P40  | B.P.F. Data (BCD)  |
| 3            | P41  |  |
| 4            | P42  |  |
| 5            | P43  |  |
| 1            | P50  | PLL dividing ratio data, address output & DATA SELECTOR output |
| 23           | P51  |  |
| 22           | P52  |  |
| 21           | P53  |  |
| 20           | P60  | PLL IC5 } Latch clock output                                   |
| 19           | P61  | PLL IC2 }  |
| 18           | P62  | Beep output  |
| 17           | P63  | TIMER error  |
| 13           | P70  | M. SCAN  |
| 14           | P71  | PG. SCAN   |
| 15           | P72  | HOLD   |
| 16           | P73  | AUTO. M  |

### I/O EXPANDER (1) IC14: $\mu$ PD82C43C

| Terminal No. | Name | Function                     |
|--------------|------|------------------------------|
| 2            | P40  | Display DIGIT output 100HZ   |
| 3            | P41  | Display DIGIT output 1K      |
| 4            | P42  | Display DIGIT output 10K     |
| 5            | P43  | Display DIGIT output 100K    |
| 1            | P50  | Display DIGIT output 1M      |
| 23           | P51  | Display DIGIT output 10M     |
| 22           | P52  | Display DIGIT output 100M    |
| 21           | P53  | Display DIGIT output CH      |
| 20           | P60  | Display SEGMENT output a     |
| 19           | P61  | Display SEGMENT output b     |
| 18           | P62  | Display SEGMENT output c     |
| 17           | P63  | Display SEGMENT output d     |
| 13           | P70  | Display SEGMENT output e     |
| 14           | P71  | Display SEGMENT output f     |
| 15           | P72  | Display SEGMENT output g     |
| 16           | P73  | Display SEGMENT output point |

## PARTS LIST

### CAPACITORS

CC 45 TH 1H 220 J  
 1 2 3 4 5 6

- 1 = Type ..... ceramic, electrolytic, etc.
- 2 = Shape ..... round, square, etc.
- 3 = Temp coefficient
- 4 = Voltage rating
- 5 = Value
- 6 = Tolerance

#### Temperature coefficient

| 1st Word | C     | I    | P      | R      | S     | T     | U      |
|----------|-------|------|--------|--------|-------|-------|--------|
| Color*   | Black | Red  | Orange | Yellow | Green | Blue  | Violet |
| ppm /°C  | 0     | - 80 | - 150  | - 220  | - 330 | - 470 | - 750  |

| 2nd Word | G    | H    | J     | K     | L     |
|----------|------|------|-------|-------|-------|
| ppm /°C  | ± 30 | ± 60 | ± 120 | ± 250 | ± 500 |

Example CC45TH = - 470 ± 60ppm /°C

#### Tolerance

| Cord | C      | D     | G   | J   | K    | M    | X    | Z    | P     | No cord   |
|------|--------|-------|-----|-----|------|------|------|------|-------|---|
| (%)  | ± 0.25 | ± 0.5 | ± 2 | ± 5 | ± 10 | ± 20 | + 40 | + 80 | + 100 | More than 10µF - 10 ~ + 50<br>Less than 4.7µF - 10 ~ + 75 |
|      |        |       |     |     |      |      | - 20 | - 20 | - 0   |   |

#### Less than 10 pF

| Cord | B     | C      | D     | F   | G   |
|------|-------|--------|-------|-----|-----|
| (pF) | ± 0.1 | ± 0.25 | ± 0.5 | ± 1 | ± 2 |

#### Rating voltage

| 2nd word<br>1st word | A    | B    | C    | D    | E    | F    | G    | H    | J    | K    | V  |
|----------------------|------|------|------|------|------|------|------|------|------|------|----|
| 0                    | 1.0  | 1.25 | 1.6  | 2.0  | 2.5  | 3.15 | 4.0  | 5.0  | 6.3  | 8.0  | -  |
| 1                    | 10   | 12.5 | 16   | 20   | 25   | 31.5 | 40   | 50   | 63   | 80   | 35 |
| 2                    | 100  | 125  | 160  | 200  | 250  | 315  | 400  | 500  | 630  | 800  | -  |
| 3                    | 1000 | 1250 | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 | 6300 | 8000 | -  |

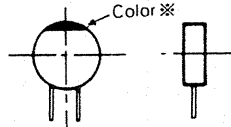
#### Capacitor value

- 1 0 3 = 0.01µF
- 0 1 0 = 1pF
- 1 0 0 = 10pF
- 1 0 1 = 100pF
- 1 0 2 = 1000pF = 0.001µF

1 0 3 = 0.01µF

2 2 0 = 22pF  
 1st number    Multiplier  
 2nd number

CC45



Resistors not listed in this parts list are standard, fixed carbon composition, 1/4W or 1/8W.

The resistance values, in ohms, are indicated on the schematic diagram.

| Abbreviation |              | Abbreviation |          |
|--------------|--------------|--------------|----------|
| Cap          | Capacitor    | ML           | Mylar    |
| C            | Ceramic      | S            | Styren   |
| E            | Electrolytic | T            | Tantalum |
| MC           | Mica         |              |          |

### SEMI CONDUCTOR

N: New Parts

| Item        | Name     | Re-<br>marks |
|-------------|----------|--------------|
| Diode       | 1N60     |              |
|             | 1N4448   |              |
|             | 1S1007   |              |
|             | 1S1555   |              |
|             | 1S1587   |              |
|             | 1S2588   |              |
|             | BA282    |              |
|             | D33A     |              |
|             | RD4.7EB3 |              |
|             | V03C     |              |
| Zener-Diode | WZ-061   |              |
|             | WZ-071   |              |
|             | WZ-110   |              |
|             | XZ-060   |              |
| LED         | ON1110   |              |
|             | LM358P   |              |
|             | SG238D   |              |
|             | SR538D   |              |
|             | SY438D   |              |
|             | TLG205   |              |
|             | TLR205   |              |

| Item | Name        | Re-<br>marks |
|------|-------------|--------------|
|      | TLY205      |              |
| TR   | 2SA1015(Y)  |              |
|      | 2SC1675(L)  |              |
|      | 2SC1775(E)  |              |
|      | 2SC1815(Y)  |              |
|      | 2SC1907     |              |
|      | 2SC1923(D)  |              |
|      | 2SC1959(Y)  |              |
|      | 2SC2240(GR) |              |
|      | 2SC2878     | N            |
|      | 2SD235(Y)   |              |
| FET  | 2SK192A(GR) |              |
|      | 3SK73(GR)   |              |
|      | 3SK74(L)    |              |
| IC   | AN7805      | N            |
|      | AN7809      | N            |
|      | HA1368R     |              |
|      | M54459L     |              |
|      | MN6147C     |              |
|      | NJM4558D    |              |

| Item           | Name          | Re-<br>marks |
|----------------|---------------|--------------|
|                | SN16913P      |              |
|                | SN74LS145N    |              |
|                | SN74LS73N     |              |
|                | TA7060AP      |              |
|                | TA7324P       |              |
|                | TC4011BP      |              |
|                | TC5065BP      |              |
|                | TC5067BP      |              |
|                | µPC577H       |              |
|                | µPD80C49C-022 | N            |
| µPD82C43C      | N             |              |
| Varistor       | MV-13         |              |
|                |               |              |
| Vari-cap       | 1SV53A        |              |
|                | 1SV54GC       |              |
| Display tube   | FIP9D7        |              |
|                |               |              |
| Surge-Absorber | ERZD03DK331   |              |
|                |               |              |

## PARTS LIST

| Part No.       | Re-<br>marks | Description                       |                         |
|----------------|--------------|-----------------------------------|-------------------------|
| <b>GENERAL</b> |              |                                   |                         |
| A01-0939-02    | N            | Case (upper)                      |                         |
| A01-0940-02    | N            | Case (lower)                      |                         |
| A20-2465-03    | N            | Panel                             |                         |
| A23-1472-02    | N            | Rear panel                        |                         |
| B03-0529-04    | N            | Carring handle back plate         |                         |
| B03-0530-14    | N            | Switch name plate, NAR-WIDE       |                         |
| B03-0531-04    | N            | Ornamental plate, Meter           |                         |
| B30-0817-15    |              | Lamp, 14V 80mA                    |                         |
| B31-0641-05    | N            | Meter                             |                         |
| B39-0407-04    |              | Spacer x2                         |                         |
| B42-1722-24    |              | FTZ plate                         | W <sub>2</sub>          |
| B43-0686-04    | N            | Badge                             | K,M,W,W <sub>2</sub> ,X |
| B43-0687-04    | N            | Badge                             | T                       |
| B46-0058-10    |              | Warranty card (TKC)               | K                       |
| B50-4022-00    | N            | Instruction manual                | K,M,W,W <sub>2</sub> ,X |
| B50-4023-00    | N            | Instruction manual                | T                       |
| B58-0637-00    |              | Voltage warning paper             | K,M,W,W <sub>2</sub> ,X |
| B58-0638-00    |              | Warning paper                     | T                       |
| B58-0653-00    | N            | Warning paper                     | W <sub>2</sub>          |
| B58-0654-00    | N            | Warning paper                     | X                       |
| C91-0079-05    |              | C, 0.01 AC125V                    | C1                      |
| E04-0152-05    |              | UHF type receptacle, ANT          |                         |
| E07-0751-05    |              | 7P DIN plug, accessory            |                         |
| E12-0001-15    |              | Phone plug, accessory             |                         |
| E18-0351-05    |              | 3P Inlet, AC power                |                         |
| E30-1643-15    |              | AC Cable ass'y                    | K,M                     |
| E30-1644-15    |              | AC Cable ass'y                    | T                       |
| E30-1645-05    |              | AC Cable ass'y                    | W,W <sub>2</sub>        |
| E30-1647-05    |              | AC Cable ass'y                    | X                       |
| F05-1013-05    |              | Fuse x 2, 0.1A, accessory         |                         |
| F05-1521-05    |              | Fuse 1.5A, accessory              |                         |
| F15-0646-04    | N            | Switch mask, Piano switch         |                         |
| F19-0610-04    |              | Connector mask, DC13.8V           |                         |
| F19-0622-04    | N            | Rear cover                        |                         |
| G13-0669-04    |              | Cushion, MODE                     |                         |
| G16-0506-04    |              | Anti vibration sheet, Case        |                         |
| G53-0510-04    |              | Packing x 2, Case                 |                         |
| H01-4463-04    | N            | Packing carton                    | K,M,W,W <sub>2</sub> ,X |
| H01-4464-04    | N            | packing carton                    | T                       |
| H03-2098-04    | N            | Packing carton                    |                         |
| H10-2569-02    | N            | Packing fixture (R)               |                         |
| H10-2570-02    | N            | Packing fixture (L)               |                         |
| H12-1320-04    | N            | Cushion                           |                         |
| H20-1419-03    | N            | Protective cover                  |                         |
| H25-0029-04    |              | Protective bag 60x100             |                         |
| H25-0105-04    |              | Protective bag 150x350            |                         |
| J02-0323-05    |              | Foot x 4, Case (lower)            |                         |
| J02-0403-04    |              | Rubber foot x 4, Case             |                         |
| J02-0428-05    | N            | Assistant foot, Case (lower)      |                         |
| J19-1369-04    | N            | Knob metal fittings, Piano switch |                         |
| J19-1372-14    | N            | Knob metal fittings, Piano switch |                         |
| J21-2573-04    |              | Foot metal fittings x 2, Case     |                         |
| J21-2788-04    | N            | Speaker metal fittings x 3        |                         |
| J32-0767-04    | N            | Hex. boss x 4, Meter              |                         |

| Part No.    | Re-<br>marks | Description                           |                |
|-------------|--------------|---------------------------------------|----------------|
| J61-0019-05 |              | Band x 3                              |                |
| J61-0401-05 |              | Nylon band x 20                       |                |
| K01-0411-05 | N            | Carring handle                        |                |
| K21-0769-04 | N            | Main knob                             |                |
| K23-0738-04 |              | Knob, FUNCTION                        |                |
| K23-0755-04 | N            | Knob x 4, AF, TONE, SQL, ATT          |                |
| K27-0426-14 |              | Band knob x 2                         |                |
| K29-0758-04 |              | Push knob x 2, POWER, TIMER           |                |
| K29-0767-04 |              | Push knob x 2, DIM, NB                |                |
| K29-0768-04 |              | Push knob, AGC                        |                |
| K29-0771-04 |              | Knob ring                             |                |
| K29-0772-03 | N            | Knob ass'y                            |                |
| K29-0773-04 | N            | Push knob, MODE                       |                |
| K29-0774-04 | N            | Push knob, NAR-WIDE                   |                |
| K29-0775-04 | N            | Push knob, F. LOCK                    |                |
| K29-0776-04 | N            | Push knob x 3, TUNING SPEED           |                |
| L01-8064-05 | N            | Power transformer                     |                |
| N09-0256-05 |              | Ground screw, ANT                     |                |
| N09-0641-05 |              | Screw x 7, Panel                      |                |
| N14-0508-04 |              | Spanner nut, Panel                    |                |
| N15-1040-46 |              | Washer x 2, Carring handle            |                |
| N30-2608-41 |              | Screw x 2, DC                         |                |
| N30-3006-41 |              | Screw x 7, Lamp, PLL, DIN             |                |
| N30-3008-41 |              | Screw x 2, AC                         |                |
| N30-3012-46 |              | Screw, Panel                          |                |
| N30-4006-46 |              | Screw x 2, Carring handle             |                |
| N32-2606-46 |              | Flat screw x 4, Meter                 |                |
| N35-3006-41 |              | Bind screw x 16, Case                 |                |
| N87-2606-46 |              | Bind tapping screw x16                |                |
| N87-2608-46 |              | Self tapping screw x5                 |                |
| N87-3006-41 |              | Knob ass'y x 5                        |                |
| N87-3008-41 |              | Self tapping screw x 25               |                |
| N87-3008-41 |              | Push switch, etc                      |                |
| N87-3010-46 |              | Self tapping screw x 2, ANT, SP       |                |
| N87-3012-46 |              | Self tapping screw x 3, SP            |                |
| N88-3006-46 |              | Tap tight screw x 24, PC board        |                |
| N88-3006-46 |              | Tap tight screw x 10, Sub panel, etc. |                |
| S90-0405-05 | N            | Rotary remote switch, ATT             |                |
| T07-0225-15 | N            | Speaker                               |                |
| X41-1480-00 | N            | Switch unit                           | K,M,T,W        |
| X41-1480-61 | N            | Switch unit                           | W <sub>2</sub> |
| X41-1480-71 | N            | Switch unit                           | X              |
| X50-1920-00 | N            | PLL unit                              |                |
| X54-1690-00 |              | Encoder unit                          |                |
| X55-1340-00 | N            | RX unit                               |                |

PARTS LIST

| Part No.  | Re-<br>marks | Description                                 | Ref. No.                                  | Q'ty |
|---|--------------|---|---|------|
| <b>SWITCH UNIT (X41-1480-00)</b>                |              |   |   |      |
| -00: K, M, T, W<br>-61: W <sub>2</sub> , -71: X |              |   |   |      |
| CE04W1C100M                                     |              | E, 10 16V                                   | C8  | 1    |
| CE04W1H4R7M                                     |              | E, 4.7 50V                                  | C2,4                                      | 2    |
| CQ92M1H102K                                     |              | ML, 0.001                                   | C5  | 1    |
| CQ92M1H104K                                     |              | ML, 0.1                                     | C1,13                                     | 2    |
| CQ92M1H683K                                     |              | ML, 0.068                                   | C3  | 1    |
| CK45F1H103Z                                     |              | C, 0.01                                     | C6,7,9,12                                 | 4    |
| CK45F1H473Z                                     |              | C, 0.047                                    | C21,23,24                                 | 3    |
| C90-0814-05                                     |              | C, 4700 25V                                 | C22                                       | 1    |
| E11-0413-05                                     |              | US jack, phones                             |   | 1    |
| E11-0414-05                                     | N            | US jack, REC                                |   | 1    |
| E23-0512-05                                     |              | Terminal                                    |   | 2    |
| E40-0273-05                                     |              | Mini connector 2P                           |   | 2    |
| E40-0442-05                                     |              | Power connector (4P)                        |   | 1    |
| F05-1521-05                                     |              | Fuse, 1.5A                                  |   | 1    |
| J13-0401-05                                     |              | Fuse holder                                 |   | 2    |
| J30-0514-14                                     |              | LED spacer                                  |   | 6    |
| R01-3421-05                                     |              | Pot. 10K $\Omega$ (A), AF, tone             | VR1,2                                     | 2    |
| R06-9406-05                                     | N            | Pot. 50K $\Omega$ (B), 10K $\Omega$ (B) SQL | VR3,                                      | 1    |
| RS14AB3A220J                                    |              | Metal film 22 $\Omega$ $\pm$ 5% 1W          | R12                                       | 1    |
| RS14AB3A470J                                    |              | Metal film 47 $\Omega$ $\pm$ 5% 1W          | R11                                       | 1    |
| R92-0150-05                                     |              | Jumper wire                                 |   | 25   |
| S29-1429-05                                     | N            | Rotary switch, FUNCTION                     | S30                                       | 1    |
| S29-1430-05                                     | N            | Voltage select switch                       | S40                                       | 1    |
| S40-2440-15                                     |              | Push switch, NB, DIM, AGC                   | S27~29                                    | 3    |
| S40-2442-05                                     | N            | Push switch, NAR-WIDE                       | S24                                       | 1    |
| S42-2406-05                                     | N            | Push switch, power, timer                   | S31                                       | 1    |
| S42-4402-05                                     | N            | Push switch, tuning speed                   | S23                                       | 1    |
| S50-1409-05                                     |              | Tact switch, BAND                           | S25,26                                    | 2    |
| S50-1411-05                                     |              | Tact switch, MODE                           | S16~20                                    | 5    |
| S50-1412-05                                     | N            | Tact switch                                 | S1~15,21,22                               | 17   |
| <b>PLL UNIT (X50-1920-00)</b>                   |              |   |   |      |
| C05-0013-15                                     |              | Ceramic trimmer 30pF                        | C1  | 1    |
| CC45CH1H010C                                    |              | C, 1P $\pm$ 0.25P                           | C75,                                      | 1    |
| CC45CH1H030C                                    |              | C, 3P $\pm$ 0.25P                           | C88                                       | 1    |
| CC45CH1H050C                                    |              | C, 5P $\pm$ 0.25P                           | C15,22,37,38,<br>57,58,87,154             | 8    |
| CC45CH1H0R5C                                    |              | C, 0.5P $\pm$ 0.25P                         | C31,134,136                               | 3    |
| CC45CH1H100D                                    |              | C, 10P $\pm$ 0.5P                           | C23,33,53,<br>117,121,122,<br>126,127,151 | 9    |
| CC45CH1H120J                                    |              | C, 12P                                      | C116                                      | 1    |

| Part No.     | Re-<br>marks | Description               | Ref. No.   | Q'ty |
|--------------|--------------|---------------------------|--|------|
| CC45CH1H150J |              | C, 15P                    | C52,76,150   | 3    |
| CC45CH1H220J |              | C, 22P                    | C14,155  | 2    |
| CC45RH1H010C |              | C, 1P $\pm$ 0.25P         | C135   | 1    |
| CC45RH1H020C |              | C, 2P $\pm$ 0.25P         | C133,142   | 2    |
| CC45RH1H040C |              | C, 4P $\pm$ 0.25P         | C138   | 1    |
| CC45RH1H060D |              | C, 6P $\pm$ 0.5P          | C140,143,146   | 3    |
| CC45RH1H070D |              | C, 7P $\pm$ 0.5P          | C51  | 1    |
| CC45RH1H100D |              | C, 10P $\pm$ 0.5P         | C115,120,125   | 3    |
| CC45RH1H220J |              | C, 22P                    | C144,  | 1    |
| CC45RH1H330J |              | C, 33P                    | C141   | 1    |
| CC45RH1H470J |              | C, 47P                    | C49, 118   | 2    |
| CC45RH1H560J |              | C, 56P                    | C113   | 1    |
| CC45SL1H101J |              | C, 100P                   | C13,16,26  | 3    |
| CC45SL1H121J |              | C, 120P                   | C147   | 1    |
| CC45SL1H180J |              | C, 18P                    | C181,182   | 2    |
| CC45SL1H181J |              | C, 180P                   | C68  | 1    |
| CC45SL1H330J |              | C, 33P                    | C11  | 1    |
| CC45SL1H560J |              | C, 56P                    | C65,67,112   | 3    |
| CE04W1A101M  |              | E, 100 10V                | C175,  | 1    |
| CE04W1A470M  |              | E, 47 10V                 | C177,185   | 2    |
| CE04W1C101M  |              | E, 100 16V                | C222   | 1    |
| CE04W1C220M  |              | E, 22 16V                 | C18,47,55,97,<br>100   | 5    |
| CE04W1C221M  |              | E, 220 16V                | C186   | 1    |
| CE04W1E100M  |              | E, 10 25V                 | C187,189   | 2    |
| CE04W1E470M  |              | E, 47 25V                 | C213,217   | 2    |
| CE04W1H0R1M  |              | E, 0.1 50V                | C180,  | 1    |
| CE04W1H010M  |              | E, 1 50V                  | C178,231   | 2    |
| CE04W1H100M  |              | E, 10 50V                 | C190,191   | 2    |
| CE04W1HR47M  |              | E, 0.47 50V               | C227,230   | 2    |
| CE04W1H4R7M  |              | E, 4.7 50V                | C201   | 1    |
| CK45B1H102K  |              | C, 0.001                  | C40,60,64,66,70,79,80,82,<br>90,148,153,157,~159,166,<br>172,198,202,234,236               | 23   |
| CK45B1H221K  |              | C, 220P                   | C12  | 1    |
| CK45F1H103Z  |              | C, 0.01                   | C25,36,54,63,98,99,111,<br>131,132,137,149,152,<br>156,160,188,203,211,<br>235             | 18   |
| CK45F1H223Z  |              | C, 0.022                  | C24,28,29,39,56,59,74,83,<br>84,85,89,129,193~197,<br>204~210,237                          | 27   |
| CK45F1H473Z  |              | C, 0.047                  | C21,35,41,42,61,62,69,77,<br>91,167,170,176,179,184<br>199,212,216,224,225,228<br>232, 238 | 22   |
| CQ92M1H103K  |              | ML, 0.01                  | C92,93   | 2    |
| CQ92M1H104K  |              | ML, 0.1                   | C45,95,214,<br>215,218~<br>221   | 8    |
| CQ92M1H123K  |              | ML, 0.012                 | C43,44,94,   | 3    |
| CQ92M1H333K  |              | ML, 0.033                 | C173,174   | 2    |
| CQ92M1H472K  |              | ML, 0.0047                | C48,128  | 2    |
| C90-0817-05  |              | C, 1000 16V               | C130   | 1    |
| C91-0456-05  |              | E, 0.047 25V              | C19,46,71~73,96,162,168,<br>169,171,183,192,200,<br>223,226,229                            | 16   |
| E04-0154-05  |              | Coax connector            |  | 4    |
| E06-0752-05  | N            | DIN connector, 7P, REMOTE |  | 1    |

## PARTS LIST

| Part No.     | Re-<br>marks | Description                           | Ref. No.                   | Q'ty |
|--------------|--------------|---------------------------------------|----------------------------|------|
| E06-1051-05  | N            | DIN connector, 10P                    |                            | 1    |
| E11-0408-05  |              | V. CONVERTER                          |                            | 1    |
| E23-0046-04  |              | MIC jack, EXT SP                      |                            | 2    |
| E40-0273-05  |              | Square terminal                       |                            | 12   |
| E40-0373-05  |              | Mini connector, 2P                    |                            | 3    |
| E40-0473-05  |              | Mini connector, 3P                    |                            | 4    |
| E40-0573-05  |              | Mini connector, 4P                    |                            | 3    |
| E40-0673-05  |              | Mini connector, 5P                    |                            | 1    |
| E40-0773-05  |              | Mini connector, 6P                    |                            | 1    |
| J21-2792-04  |              | Connector metal fittings (B)          |                            | 1    |
| J31-0502-04  |              | PC Board collar                       |                            | 9    |
| J42-0428-05  |              | PC Board bush                         |                            | 9    |
| L19-0323-05  |              | OSC transformer DC-DC                 | T9                         | 1    |
| L32-0651-05  |              | OSC coil VCO-L                        | T6                         | 1    |
| L32-0652-05  |              | OSC coil VCO-M                        | T7                         | 1    |
| L32-0653-05  |              | OSC coil VCO-H                        | T8                         | 1    |
| L34-0540-05  |              | Tuning coil 455KHz                    | T10                        | 1    |
| L34-0863-05  |              | Tuning coil 455KHz                    | T11                        | 1    |
| L34-2058-05  |              | Tuning coil VCO                       | T3                         | 1    |
| L34-2147-05  | N            | Tuning coil 9.42MHz                   | T4                         | 1    |
| L34-2148-05  | N            | Tuning coil 9.42MHz                   | T5                         | 1    |
| L34-2149-05  | N            | Tuning coil 36MHz                     | T1,2                       | 2    |
| L40-1001-03  |              | Ferri-inductor 10 $\mu$ H             | L22,39                     | 2    |
| L40-1001-14  |              | Ferri-inductor 10 $\mu$ H             | L67,68                     | 2    |
| L40-1011-03  |              | Ferri-inductor 100 $\mu$ H            | L6,11,19,40~<br>44         | 15   |
| L40-1011-13  |              | Ferri-inductor 100 $\mu$ H            | L58,66                     | 2    |
| L40-1011-14  |              | Ferri-inductor 100 $\mu$ H            | L51~56                     | 6    |
| L40-1021-03  |              | Ferri-inductor 1mH                    | L7~9,12,20,<br>23,27,59,60 | 9    |
| L40-1092-14  |              | Ferri-inductor 1 $\mu$ H              | L32                        | 1    |
| L40-1292-14  |              | Ferri-inductor 1.2 $\mu$ H            | L29,31,34                  | 3    |
| L40-1501-03  |              | Ferri-inductor 15 $\mu$ H             | L26                        | 1    |
| L40-1511-03  |              | Ferri-inductor 150 $\mu$ H            | L13,15,45                  | 3    |
| L40-1541-27  |              | Ferri-inductor 150 $\mu$ H            | L21,                       | 1    |
| L40-1801-03  |              | Ferri-inductor 18 $\mu$ H             | L25,                       | 1    |
| L40-1892-14  |              | Ferri-inductor 1.8 $\mu$ H            | L30,                       | 1    |
| L40-2201-03  |              | Ferri-inductor 22 $\mu$ H             | L24,37,38,                 | 3    |
| L40-2211-03  |              | Ferri-inductor 220 $\mu$ H            | L16                        | 1    |
| L40-2225-04  |              | Ferri-inductor 2.2mH                  | L14,                       | 1    |
| L40-2282-14  |              | Ferri-inductor 0.22 $\mu$ H           | L33,36                     | 2    |
| L40-3982-14  |              | Ferri-inductor 0.39 $\mu$ H           | L35,                       | 1    |
| L40-4701-03  |              | Ferri-inductor 47 $\mu$ H             | L10,28                     | 2    |
| L40-4711-03  |              | Ferri-inductor 470 $\mu$ H            | L1~5,17,18                 | 7    |
| L72-0337-05  | N            | Ceramic filter 9.42MHz                | CF1                        | 1    |
| L77-0984-05  | N            | Crystal 9MHz                          | X1                         | 1    |
| L78-0005-05  |              | Ceramic oscillator 5.745MHz           | X2                         | 1    |
| N09-0641-05  |              | Screw                                 |                            | 2    |
| N10-2030-46  |              | Screw                                 |                            | 2    |
| N30-2606-46  |              | Screw                                 |                            | 6    |
| N30-3006-46  |              | Screw                                 |                            | 1    |
| N30-3008-46  |              | Screw                                 |                            | 2    |
| R12-6401-05  |              | Trim. pot 470K (B)                    | VR1                        | 1    |
| RS14AB3D101J |              | Metal film 100 $\Omega$ $\pm$ 5% 2W   | R217                       | 1    |
| RS14AB3D150J |              | Metal film 15 $\Omega$ $\pm$ 5% 2W    | R218,                      | 1    |
| R90-0162-05  |              | Inline block 47k $\Omega$ $\times$ 8  | IB2~4                      | 3    |
| R92-0563-05  |              | Inline block 150k $\Omega$ $\times$ 5 | IB5,6                      | 2    |
| R92-0150-05  |              | Short jumper                          |                            | 191  |

| Part No.                          | Re-<br>marks | Description                | Ref. No.   | Q'ty |
|-----------------------------------|--------------|----------------------------|--|------|
| S51-2408-05                       |              | Relay                      | RL1  | 1    |
| W09-0323-05                       |              | Lithium battery            |  | 1    |
| <b>ENCODER UNIT (X54-1690-00)</b> |              |                            |  |      |
| CE04W0J101M                       |              | E, 100 6.3V                | C1   | 1    |
| D09-0305-04                       |              | Encoder slit               |  | 1    |
| D21-0824-05                       |              | Shaft ass'y                |  | 1    |
| N30-2606-46                       |              | Screw                      |  | 2    |
| R12-2409-05                       |              | Trim. pot .5k $\Omega$ (B) | VR1,2  | 2    |
| <b>RX UNIT (X55-1340-00)</b>      |              |                            |  |      |
| CC45CG1H221J                      |              | C, 220P                    | C165   | 1    |
| CC45CH1H020C                      |              | C, 2P $\pm$ 0.25P          | C110   | 1    |
| CC45CH1H050C                      |              | C, 5P $\pm$ 0.25P          | C93  | 1    |
| CC45CH1H0R5C                      |              | C, 0.5P $\pm$ 0.25P        | C95  | 1    |
| CC45CH1H070D                      |              | C, 7P $\pm$ 0.5P           | C96  | 1    |
| CC45CH1H150J                      |              | C, 15P                     | C111   | 1    |
| CC45CH1H151J                      |              | C, 150P                    | C175   | 1    |
| CC45CH1H220J                      |              | C, 22P                     | C188   | 1    |
| CC45CH1H270J                      |              | C, 27P                     | C164   | 1    |
| CC45CH1H330J                      |              | C, 33P                     | C169   | 1    |
| CC45RH1H020C                      |              | C, 2P $\pm$ 0.25P          | C80  | 1    |
| CC45RH1H070D                      |              | C, 7P $\pm$ 0.5P           | C90  | 1    |
| CC45SL1H101J                      |              | C, 100P                    | C141,144   | 2    |
| CC45SL1H120J                      |              | C, 12P                     | C234,235   | 2    |
| CC45SL1H151J                      |              | C, 150P                    | C29,31,36,37,<br>67  | 5    |
| CC45SL1H220J                      |              | C, 22P                     | C205,207   | 2    |
| CC45SL1H241J                      |              | C, 240P                    | C27~29   | 3    |
| CC45SL1H270J                      |              | C, 27P                     | C109   | 1    |
| CC45SL1H301J                      |              | C, 300P                    | C30  | 1    |
| CC45SL1H331J                      |              | C, 330P                    | C19,21   | 2    |
| CC45SL1H511J                      |              | C, 510P                    | C16~18   | 3    |
| CC45SL1H680J                      |              | C, 68P                     | C38  | 1    |
| CC45SL1H820J                      |              | C, 82P                     | C40,170,243  | 3    |
| CE04W1A101M                       |              | E, 100 10V                 | C233,247   | 2    |
| CE04W1A470M                       |              | E, 47 10V                  | C156,158,160,226,231,<br>237,251,252   | 8    |
| CE04W1C100M                       |              | E, 10 16V                  | C11,15,22,26,32,35,41,44,<br>51,54,60,63,64,71,76,78,<br>83,112,117~119,123~130,<br>147,148,150,176,181<br>210,212,214,228,240 | 39   |
| CE04W1C101M                       |              | E, 100 16V                 | C217,  | 1    |
| CE04W1C102M                       |              | E, 1000 16V                | C238   | 1    |
| CE04W1C221M                       |              | E, 220 16V                 | C218,  | 1    |
| CE04W1H0R1M                       |              | E, 0.1 50V                 | C149,  | 1    |
| CE04W1H010M                       |              | E, 1 50V                   | C3,69  | 8    |
| CE04W1HR22M                       |              | E, 0.22 50V                | 155,157,159,<br>172,197,255<br>C182,183,<br>215  | 3    |

## PARTS LIST

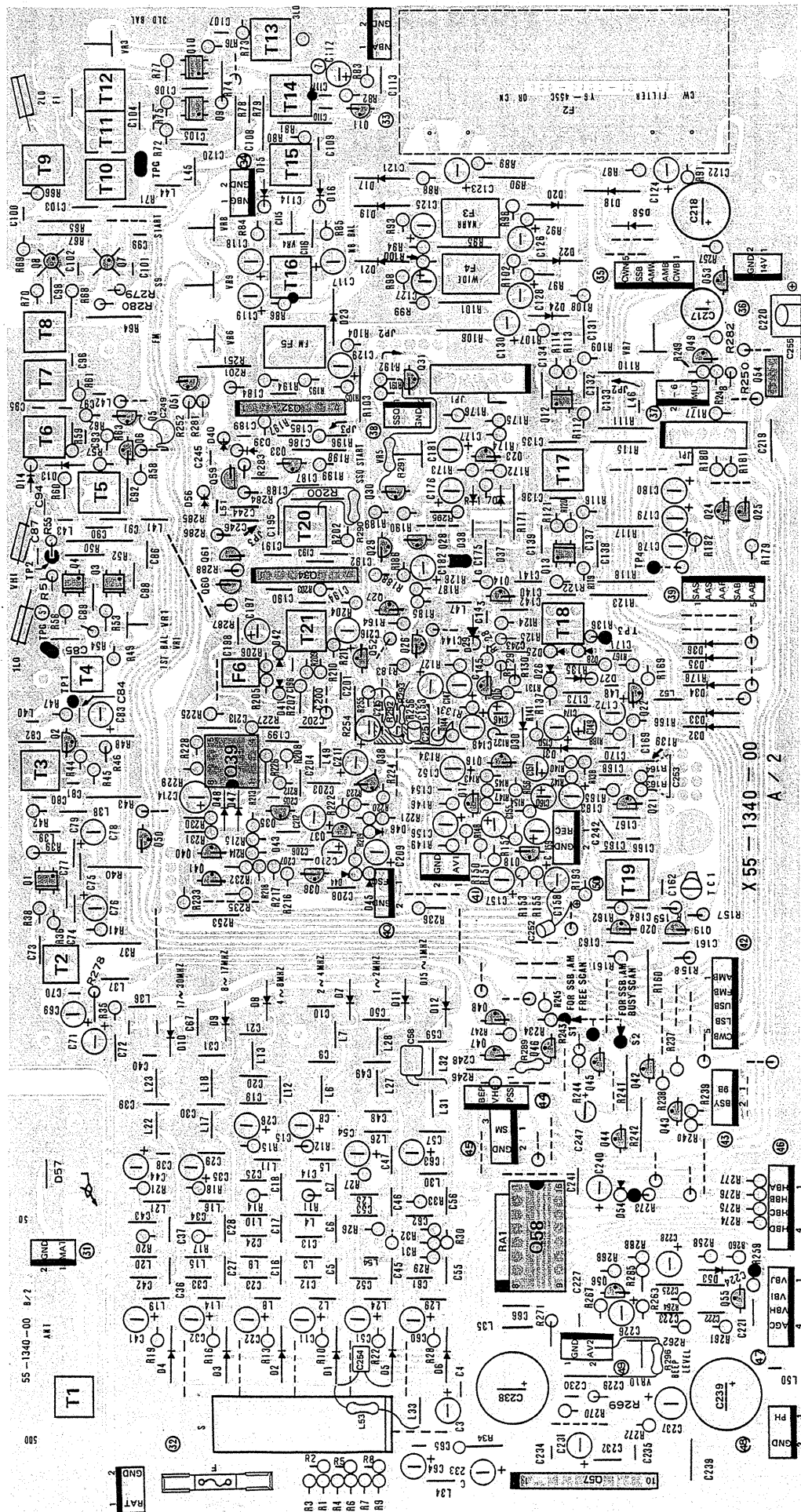
| Part No.     | Re-<br>marks | Description                 | Ref. No.   | Q'ty | Part No.    | Re-<br>marks | Description                      | Ref. No.                | Q'ty |
|--------------|--------------|-----------------------------|--|------|-------------|--------------|----------------------------------|-------------------------|------|
| CE04W1H2R2M  |              | E, 2.2 50V                  | C152,178,179   | 3    | L34-0858-05 |              | Tuning coil 46MHz                | T5                      | 1    |
| CE04W1H3R3M  |              | E, 3.3 50V                  | C209   | 1    | L34-0864-05 |              | Tuning coil 455KHz               | T14                     | 1    |
| CE04W1HR47M  |              | E, 0.47 50V                 | C146,151,153,<br>180   | 4    | L34-0865-15 |              | Tuning coil 455KHz               | T15                     | 1    |
| CE04W1H4R7M  |              | E, 4.7 50V                  | C211,  | 1    | L34-0866-15 |              | Tuning coil 455KHz               | T16                     | 1    |
| CK45B1H102K  |              | C, 0.001                    | C87,94,100<br>107,196,245  | 6    | L34-0868-05 |              | Tuning coil 455KHz               | T18                     | 1    |
| CK45B1H681K  |              | C, 680P                     | C8,10,20   | 3    | L34-2068-05 |              | Tuning coil 46MHz                | T6,7                    | 2    |
| CK45F1H103Z  |              | C, 0.01                     | C73,92,98,113,115,116,<br>121,122,131,136,163,<br>171,186,221,232,241  | 16   | L34-2109-15 |              | Tuning coil 46MHz                | T3                      | 1    |
| CQ92M1H102K  |              | ML, 0.001                   | C5 ~ 7,168,<br>200,254   | 6    | L34-2148-05 |              | Tuning coil 9.42MHz              | T13                     | 1    |
| CQ92M1H103K  |              | ML, 0.01                    | C206,222 ~<br>225  | 5    | L34-2149-05 |              | Tuning coil 36MHz                | T9                      | 1    |
| CQ92M1H104K  |              | ML, 0.1                     | C219,220,<br>239,253   | 4    | L34-2150-05 | N            | Tuning coil 46 MHz               | T8                      | 1    |
| CQ92M1H122K  |              | ML, 0.0012                  | C9,48,50   | 3    | L34-2151-05 | N            | Tuning coil 9.9MHz               | T10                     | 1    |
| CQ92M1H183K  |              | ML, 0.018                   | C201,  | 1    | L34-2152-05 | N            | Tuning coil 9.9MHz               | T12                     | 1    |
| CQ92M1H222K  |              | ML, 0.0022                  | C47,202,204,<br>208  | 4    | L34-2153-05 | N            | Tuning coil 9.9MHz               | T11                     | 1    |
| CQ92M1H272K  |              | ML, 0.0027                  | C49,57,59,   | 3    | L40-1001-02 |              | Ferri-inductor 10μH              | L24,26                  | 2    |
| CQ92M1H333K  |              | ML, 0.033                   | C55,56,167,<br>173,174   | 5    | L40-1011-03 |              | Ferri-inductor 100μH             | L41,42,44,45,           | 4    |
| CQ92M1H392K  |              | ML, 0.0039                  | C45,46,230   | 3    | L40-1021-03 |              | Ferri-inductor 1mH               | L39,40,46 ~<br>48,51,52 | 7    |
| CQ92M1H393K  |              | ML, 0.039                   | C203   | 1    | L40-1205-25 |              | Ferri-inductor 12μH              | L31,32                  | 2    |
| CQ92M1H473K  |              | ML, 0.047                   | C199,213,229   | 3    | L40-1092-02 |              | Ferri-inductor 1μH               | L54                     | 1    |
| CQ92M1H562K  |              | ML, 0.0056                  | C58  | 1    | L40-1092-02 |              | Ferri-inductor 1.2μH             | L9,10,14,16             | 4    |
| CQ09FS1H561G |              | ML, 560P ± 2%               | C166   | 1    | L40-1292-02 |              | Ferri-inductor 1.8μH             | L12,13,                 | 2    |
| C90-0817-05  |              | E, 1000 16V                 | C236   | 1    | L40-1892-02 |              | Ferri-inductor 1.8μH             | L20                     | 1    |
| C91-0131-05  |              | C, 0.01 25V                 | C4,65,70,81,84,97,99,101,<br>102,143,145,154,189,<br>216,227   | 15   | L40-2282-14 |              | Ferri-inductor 0.22μH            | L20                     | 1    |
| C91-0456-05  |              | C, 0.047 25V                | C82,248,249,12 ~ 14,23 ~<br>25,33,34,42,43,52,53,61,<br>62,72,74,75,77,79,85,86,<br>91,103, ~ 106,108,114,<br>120,132, ~ 135,137 ~<br>140,142,177,184,185,187,<br>190 ~ 195,198,66,88,89,<br>244,246 | 1    | L40-2791-02 |              | Ferri-inductor 2.7μH             | L3,4,8,11               | 4    |
| C91-0490-05  |              | Cap, 1000P 50V              | C242   | 1    | L40-3382-14 |              | Ferri-inductor 0.33μH            | L36,                    | 1    |
| E04-0154-05  |              | Coax connector              |  | 1    | L40-3392-02 |              | Ferri-inductor 3.3μH             | L6,7                    | 2    |
| E04-0157-05  |              | Mini pin jack A             |  | 3    | L40-3982-14 |              | Ferri-inductor 0.39μH            | L22,23                  | 2    |
| E21-0461-05  | N            | 4P push terminal            |  | 1    | L40-3991-02 |              | Ferri-inductor 3.9μH             | L38                     | 1    |
| E23-0512-05  |              | Terminal                    |  | 2    | L40-4701-03 |              | Ferri-inductor 47μH              | L43,50                  | 2    |
| E29-0434-05  |              | 1P connector                |  | 1    | L40-4711-03 |              | Ferri-inductor 470μH             | L33 ~ 35,37             | 4    |
| E40-0273-05  |              | Mini connector 2P           |  | 14   | L40-4782-02 |              | Ferri-inductor 0.47μH            | L19,21                  | 2    |
| E40-0373-05  |              | Mini connector 3P           |  | 1    | L40-4791-02 |              | Ferri-inductor 4.7μH             | L2,5,25,                | 3    |
| E40-0473-05  |              | Mini connector 4P           |  | 2    | L40-4791-14 |              | Ferri-inductor 4.7μH             | L53                     | 1    |
| E40-0573-05  |              | Mini connector 5P           |  | 3    | L40-6825-04 |              | Ferri-inductor 6.8mH             | L49                     | 1    |
| J13-0039-05  |              | Fuse holder                 |  | 2    | L40-6882-02 |              | Ferri-inductor 0.68μH            | L15,17,18,              | 3    |
| J31-0502-04  |              | PC Board collar             |  | 12   | L40-6891-02 |              | Ferri-inductor 6.8μH             | L27,28                  | 2    |
| J42-0428-05  |              | PC Board bush               |  | 12   | L40-8209-25 |              | Ferri-inductor 82μH              | L29,30                  | 2    |
| L19-0324-05  |              | Wide band width transformer | T1,2,4   | 3    | L72-0316-05 |              | Ceramic filter CFW 455E          | F5                      | 1    |
| L30-0503-05  |              | IFT 455KHz                  | T21  | 1    | L72-0319-05 |              | Ceramic filter CFW 455HT         | F4                      | 1    |
| L30-0504-05  |              | IFT 455KHz                  | T20  | 1    | L72-0332-05 |              | Ceramic filter CFW455K1          | F3                      | 1    |
| L32-0646-05  |              | OSC coil 455KHz, BFO        | T19  | 1    | L72-0338-05 | N            | Ceramic filter SFE9.8MK          | F1                      | 1    |
| L34-0540-05  |              | Tuning coil 455KHz          | T17  | 1    | L79-0446-05 |              | Ceramic discriminator<br>CFY455S | F6                      | 1    |
|              |              |                             |  |      | N09-0641-05 |              | Round screw                      |                         | 2    |
|              |              |                             |  |      | N10-2030-46 |              | Screw                            |                         | 3    |
|              |              |                             |  |      | N30-3008-46 |              | Screw                            |                         | 1    |
|              |              |                             |  |      | N30-3010-46 |              | Screw                            |                         | 2    |
|              |              |                             |  |      | R12-1038-05 |              | Trim. pot 1KΩ (B)                | VR3,                    | 1    |
|              |              |                             |  |      | R12-1040-05 |              | Trim. pot 4.7KΩ (B)              | VR5,                    | 1    |
|              |              |                             |  |      | R12-1414-05 |              | Trim. pot 1KΩ (B)                | VR1,                    | 1    |
|              |              |                             |  |      | R12-2409-05 |              | Trim. pot 5KΩ (B)                | VR4,                    | 1    |
|              |              |                             |  |      | R12-3045-05 |              | Trim. pot 10KΩ (B)               | VR7,8,                  | 2    |
|              |              |                             |  |      | R12-3046-05 |              | Trim. pot 47KΩ (B)               | VR6                     | 1    |
|              |              |                             |  |      | R12-5030-05 |              | Trim. pot 100KΩ (B)              | VR10                    | 1    |
|              |              |                             |  |      | R12-6401-05 |              | Trim. pot 470KΩ (B)              | VR9                     | 1    |
|              |              |                             |  |      | R90-0522-05 |              | Resistor block 47KΩx6            | RA-1                    | 1    |
|              |              |                             |  |      | R92-0150-05 |              | Short jumper                     |                         | 70   |
|              |              |                             |  |      | S90-0406-05 | N            | Slide switch, ATT                | S1                      | 1    |

# R-2000

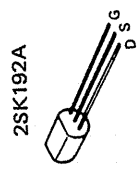
Downloaded by  
Amateur Radio Directory  
[www.hamdirectory.info](http://www.hamdirectory.info)

## PC BOARD VIEW

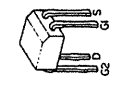
6 RX UNIT (X55 - 1340 - 00) Component Side view



- 2SA1015 (Y)
- 2SC1675 (L)
- 2SC1775 (E)
- 2SC1815 (Y)
- 2SC1959 (Y)
- 2SC2240 (GR)
- 2SC2878

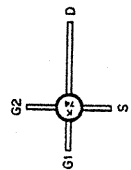


2SK192A



3SK73 (GR)

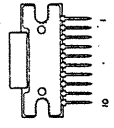
3SK74 (L)



μ PC577H



HA 1368R





Downloaded by  
Amateur Radio Directory  
www.hamdirectory.info

### SCHEMATIC DIAGRAM RX UNIT (X55-1340-00)

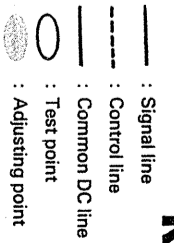
# R-2000

Measurement conditions.

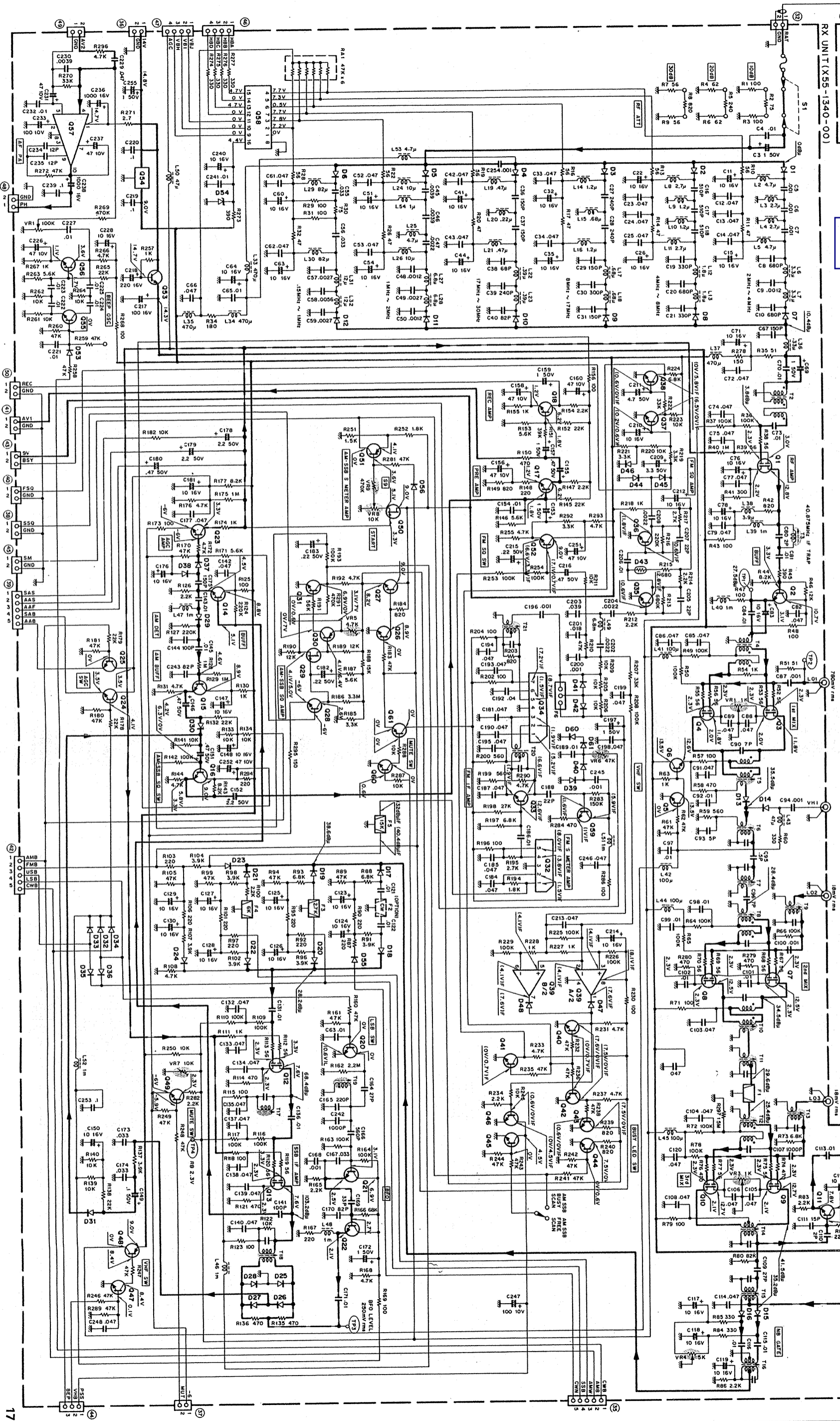
Freq: 14.525 MHz, USB, RX no signal

Notes

- (1) (S/2.0) F: (Squelch open/close) FM Mode
- XXmVrms: Level



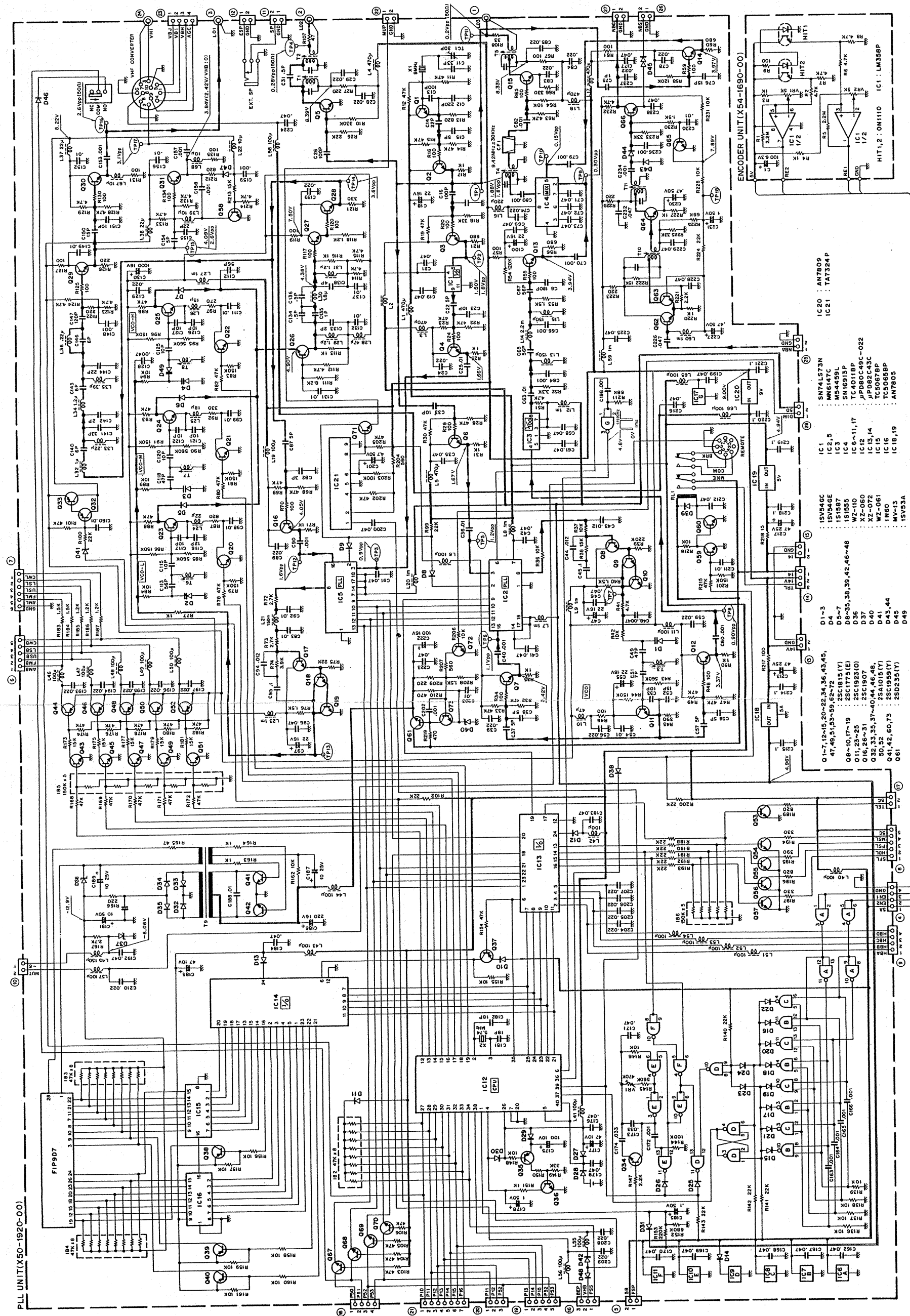
|                                     |               |                 |               |                       |          |     |              |
|-------------------------------------|---------------|-----------------|---------------|-----------------------|----------|-----|--------------|
| 01.3, 4.9, 10, 12, 13               | : 3SK73(GR)   | 030, 48, 51, 61 | : 2SA1015(Y)  | 01-14                 | : 8A282  | 043 | : 033A       |
| 02.5, 6, 11, 14, 20-28, 31, 37, 39, | : TAT80GP     | 032             | : TAT80GP     | 015-20, 24            | : 1S167  | 044 | : RD47E83    |
| 40-47, 49, 56, 59, 60               | : 2SC1675(L)  | 033             | : 2SC1675(L)  | 021-23                | : 1S1007 | 047 | : ER203DK331 |
|                                     | : 2SC1815(Y)  | 034             | : JPC877H     | 025-29, 37, 39, 41,   |          |     |              |
|                                     | : 3SK74(L)    | 035, 36         | : 2SC1779(E)  | 42, 44, 45            | : 1N60   |     |              |
| 07, 8                               | : 3SK74(L)    | 039             | : NIM4580     | 030-36, 46-48, 51-53, |          |     |              |
| 015-16, 32                          | : 2SC2240(GR) | 039             | : NIM4580     | 60, 61                | : 1S1555 |     |              |
| 029, 50                             | : 2SC1921(GR) | 035             | : 2SC1921(GR) |                       |          |     |              |



A B C D E F G H

# R-2000 SCHEMATIC DIAGRAM PLL UNIT (X50-1920-00)

Measurement conditions.  
Freq.: 14.525 MHz, USB, RX, no signal



- IC 1 : AN7809  
IC 2 : AN7809  
IC 3 : AN7809  
IC 4 : AN7809  
IC 5 : AN7809  
IC 6 : AN7809  
IC 7 : AN7809  
IC 8 : AN7809  
IC 9 : AN7809  
IC 10 : AN7809  
IC 11 : AN7809  
IC 12 : AN7809  
IC 13 : AN7809  
IC 14 : AN7809  
IC 15 : AN7809  
IC 16 : AN7809  
IC 17 : AN7809  
IC 18 : AN7809  
IC 19 : AN7809

- Q 1-3 : 1SV54GC  
Q 4 : 1SV54GE  
Q 5-7 : 1SV54G  
Q 8 : 1SV54H  
Q 9 : 1SV54I  
Q 10 : 1SV54J  
Q 11 : 1SV54K  
Q 12 : 1SV54L  
Q 13 : 1SV54M  
Q 14 : 1SV54N  
Q 15 : 1SV54O  
Q 16 : 1SV54P  
Q 17 : 1SV54Q  
Q 18 : 1SV54R  
Q 19 : 1SV54S

- D 1-3 : 1N4148  
D 4 : 1N4148  
D 5-7 : 1N4148  
D 8 : 1N4148  
D 9 : 1N4148  
D 10 : 1N4148  
D 11 : 1N4148  
D 12 : 1N4148  
D 13 : 1N4148  
D 14 : 1N4148  
D 15 : 1N4148  
D 16 : 1N4148  
D 17 : 1N4148  
D 18 : 1N4148  
D 19 : 1N4148

- R 1-3 : 10K  
R 4 : 10K  
R 5-7 : 10K  
R 8 : 10K  
R 9 : 10K  
R 10 : 10K  
R 11 : 10K  
R 12 : 10K  
R 13 : 10K  
R 14 : 10K  
R 15 : 10K  
R 16 : 10K  
R 17 : 10K  
R 18 : 10K  
R 19 : 10K

- C 1-3 : 100nF  
C 4 : 100nF  
C 5-7 : 100nF  
C 8 : 100nF  
C 9 : 100nF  
C 10 : 100nF  
C 11 : 100nF  
C 12 : 100nF  
C 13 : 100nF  
C 14 : 100nF  
C 15 : 100nF  
C 16 : 100nF  
C 17 : 100nF  
C 18 : 100nF  
C 19 : 100nF

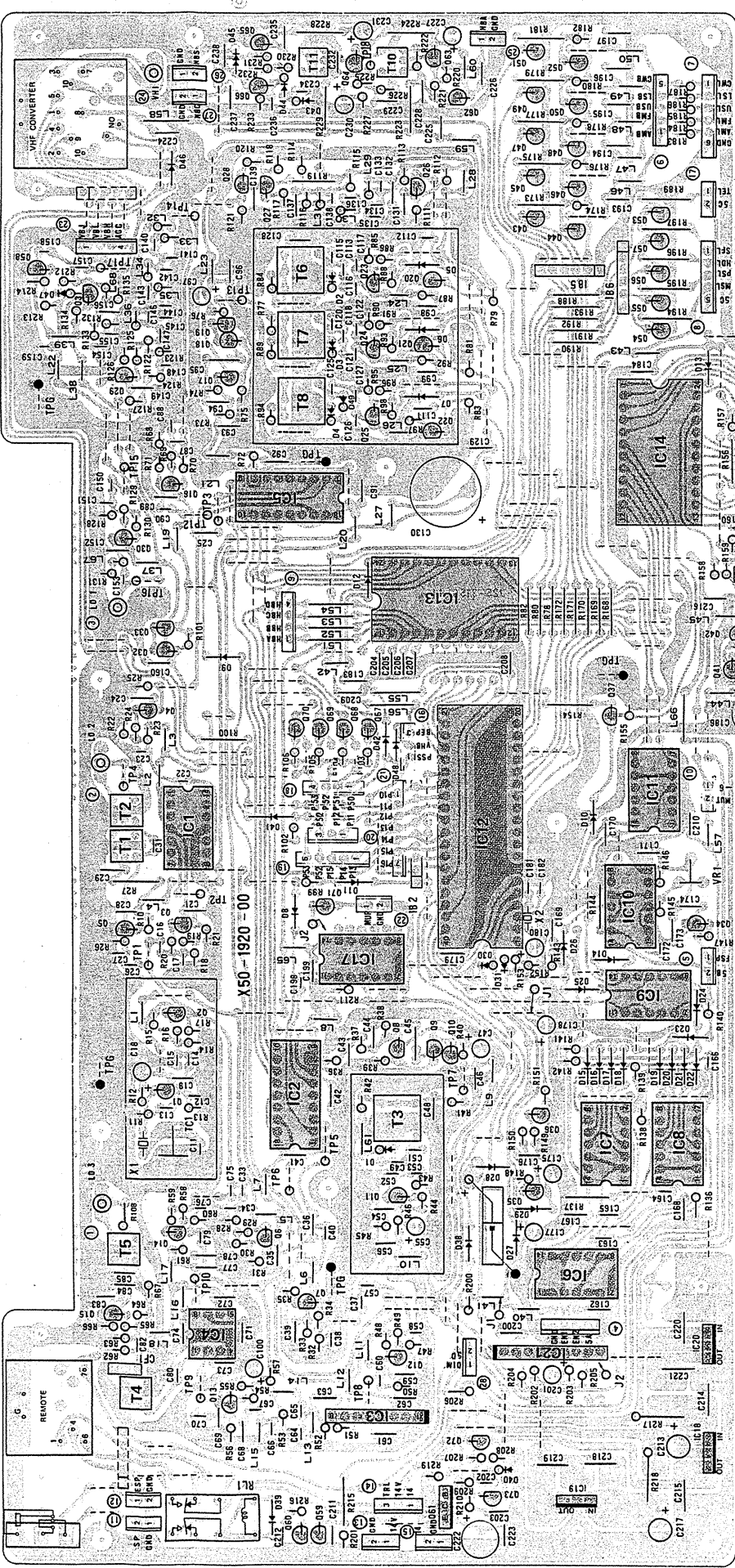
- L 1-3 : 100uH  
L 4 : 100uH  
L 5-7 : 100uH  
L 8 : 100uH  
L 9 : 100uH  
L 10 : 100uH  
L 11 : 100uH  
L 12 : 100uH  
L 13 : 100uH  
L 14 : 100uH  
L 15 : 100uH  
L 16 : 100uH  
L 17 : 100uH  
L 18 : 100uH  
L 19 : 100uH

A B C D E F G H

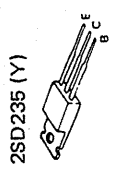
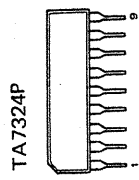
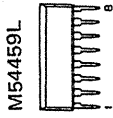
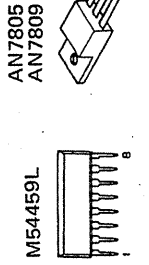
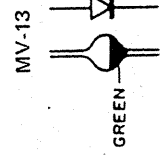
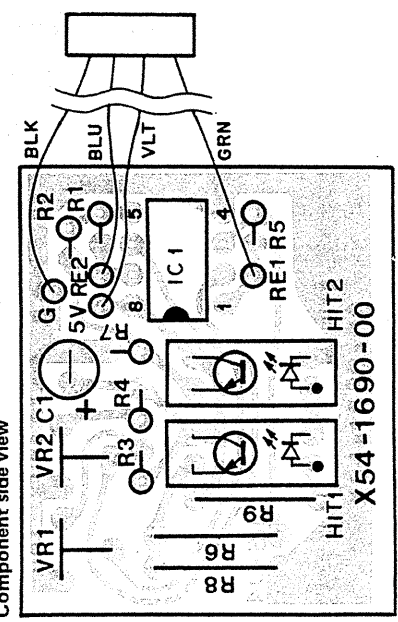
# R-2000

## PC BOARD VIEWS

PLL UNIT (X50-1920-00) Component side view



ENCODER UNIT (X54-1690-00)  
Component side view



- 2SA1015 (Y)
- 2SC1775 (E)
- 2SC1815 (Y)
- 2SC1907
- 2SC1923 (O)
- 2SC1959 (Y)

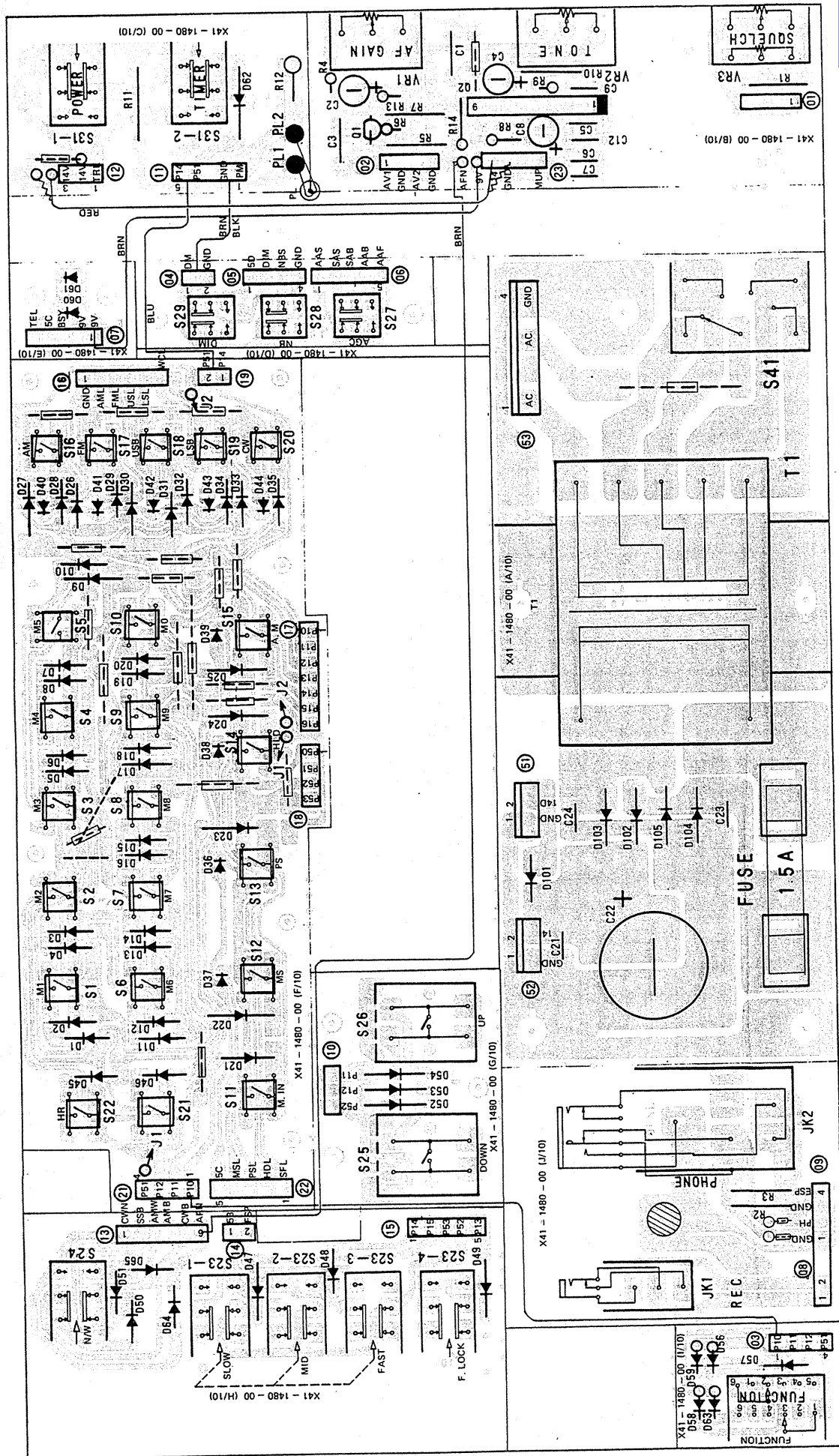
A B C D E F G

# R-2000

## PC BOARD VIEWS

20 SWITCH UNIT (X41 - 1480 - 00) Component side view

2SA1015(Y)



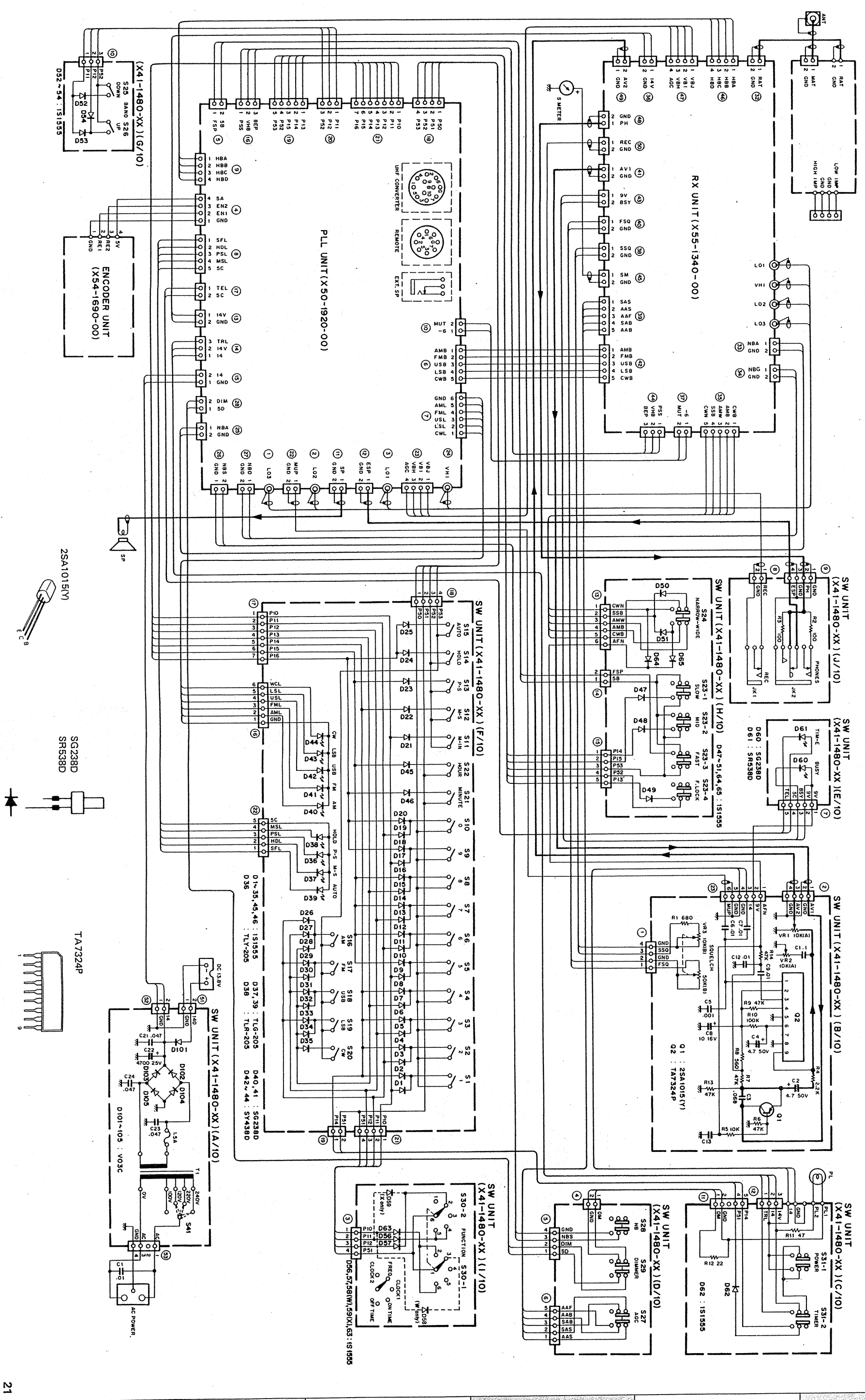
Downloaded by  Amateur Radio Directory   
[www.hamdirectory.info](http://www.hamdirectory.info)

A B C D E F G H

SCHEMATIC DIAGRAM

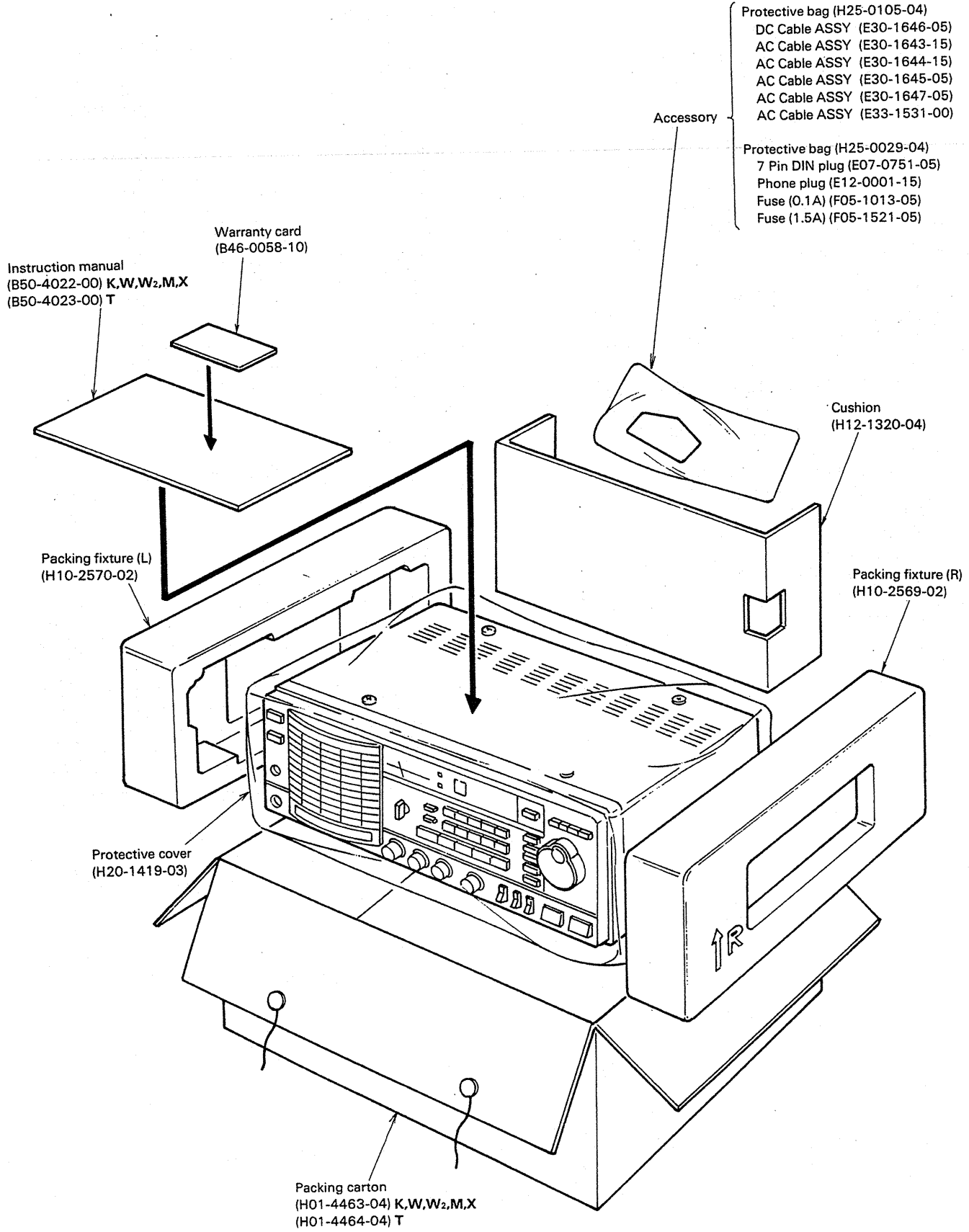
R-2000

: Signal line





## PACKING



## ADJUSTMENT

### REQUIRED TEST EQUIPMENT

#### 1. VTVM or DVM (DC VM)

- 1) Input resistance: More than 1 M $\Omega$
- 2) Voltage range: 1.5 to 1000V DC

**NOTE:** A high-precision voltmeter may be used. However, accurate readings can not be obtained for high-impedance circuits.

#### 2. AF VTVM (AF VM)

- 1) Frequency range: 50 Hz to 10 kHz
- 2) Input impedance: 1 M $\Omega$  or greater
- 3) Voltage range: 10 mV to 30V

#### 3. AF DUMMY LOAD

- 1) Impedance: 8 $\Omega$
- 2) Dissipation: 3W or greater

#### 4. OSCILLOSCOPE

Requires high sensitivity and external synchronization capability.

#### 5. STANDARD SIGNAL GENERATOR (SSG)

- 1) Frequency range: 100 kHz to 80 MHz
- 2) Output: -20 dB/0.1  $\mu$ V to 120 dB/1V
- 3) Output Z = 50  $\Omega$
- 4) Should have AM modulation capability.

Generator must be frequency stable.

#### 6. FREQUENCY COUNTER

- 1) Minimum input voltage: 50 mV
- 2) Frequency range: Greater than 80 MHz

#### 7. NOISE GENERATOR

Must generate ignition-like noise containing harmonics beyond 30 MHz.

### PREPARATION

Unless otherwise specified, set the controls as follows.

|                    |           |
|--------------------|-----------|
| POWER .....        | ON        |
| TIMER .....        | OFF       |
| FUNCTION .....     | FREQUENCY |
| NARROW/WIDE .....  | WIDE      |
| TUNING SPEED ..... | SLOW      |
| F. LOCK .....      | OFF       |
| MODE .....         | AM        |
| AGC FAST .....     | OFF       |
| NB .....           | OFF       |
| DIMMER .....       | OFF       |
| AF GAIN .....      | MIN       |
| tone .....         | CENTER    |
| SQUELCH .....      | MIN       |
| RF ATT .....       | 0         |
| M.SCAN .....       | OFF       |
| PG.SCAN .....      | OFF       |
| AUTO.M .....       | OFF       |

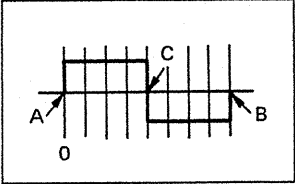
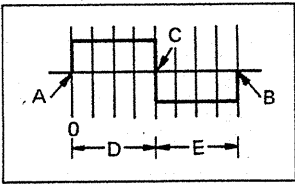
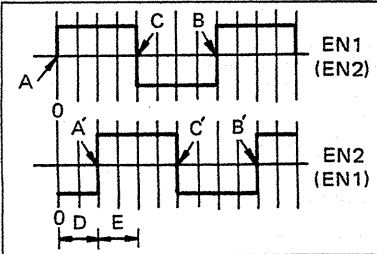
### REFERENCE

| Japanese "SSG" | American "SG" |
|----------------|---------------|
| -6 dB .....    | 0.25 $\mu$ V  |
| 0 dB .....     | 0.5 $\mu$ V   |
| 6 dB .....     | 1 $\mu$ V     |
| 12 dB .....    | 2 $\mu$ V     |
| 24 dB .....    | 8 $\mu$ V     |
| 30 dB .....    | 15.8 $\mu$ V  |
| 40 dB .....    | 50 $\mu$ V    |
| 50 dB .....    | 158 $\mu$ V   |
| 60 dB .....    | 500 $\mu$ V   |
| 70 dB .....    | 1.58 mV       |
| 80 dB .....    | 5 mV          |
| 90 dB .....    | 15.8 mV       |
| 100 dB .....   | 50 mV         |
| 120 dB .....   | 0.5 V         |



## ADJUSTMENT

### Adjusting PLL Section

| Item                              | Condition  | Measurement       |      |                 | Adjustment |      |  | Specifications  |  |   |  |
|-----------------------------------|--|-------------------|------|-----------------|------------|------|--|---|--|---|--|
|                                   |  | Test equipment    | Unit | Terminal        | Unit       | Part | Method   |   |  |   |  |
| 1. Reference oscillator frequency | 1) POWER: ON   | Frequency counter | PLL  | TP4             | PLL        | TC1  | 36,000,000 Hz  | ±20 Hz  |  |   |  |
| 2. VCO                            | 1) MODE: AM<br>f: 17,000.0 kHz   | DC VM             | PLL  | TP7             | PLL        | T3   | 7.5V   | ±0.05V  |  |   |  |
|                                   | 2) f: 16,999.9 kHz   |                   |      |                 |            |      | Check  | 2.3V or more  |  |   |  |
| 3. VCO-H                          | 1) MODE: AM<br>f: 29,999.9 kHz   | DC VM             | PLL  | TP13            | PLL        | T8   | 7.8V   | ±0.05V  |  |   |  |
|                                   | (W2 type)<br>f: 25,999.9 kHz   |                   |      |                 |            |      | 5.6V   |   |  |   |  |
|                                   | 2) f: 17,000.0 kHz   |                   |      |                 |            |      | Check  | 2.0V or more  |  |   |  |
| 4. VCO-M                          | 1) MODE: AM<br>f: 16,999.9 kHz   | DC VM             | PLL  | TP13            | PLL        | T7   | 7.8V   | ±0.05V  |  |   |  |
|                                   | 2) f: 8,000.0 kHz  |                   |      |                 |            |      | Check  | 2.0V or more  |  |   |  |
| 5. VCO-L                          | 1) MODE: AM<br>f: 7,999.9 kHz  | DC VM             | PLL  | TP13            | PLL        | T6   | 7.8V   | ±0.05V  |  |   |  |
|                                   | 2) f: 100.0 kHz  |                   |      |                 |            |      | Check  | 2.0V or more  |  |   |  |
|                                   | (W2 type)<br>f: 150.0 kHz  |                   |      |                 |            |      |  |   |  |   |  |
|                                   | (X type)<br>f: 2,000.0 kHz   |                   |      |                 |            |      | Check  | 3.0V or more  |  |   |  |
| 6. Encoder                        | 1) Remove the MAIN knob and motor-drive the encoder at approx. 300 rpm.    | Oscilloscope      | PLL  | Connector ④-EN1 |            |      |      | Point C may be located anywhere. When motor drive is not available, manually turn the MAIN control to check the duty ratio. |  |   |  |
|                                   | 2) EN1 duty ratio adjustment: Turn a motor clockwise and counterclockwise. |                   |      |                 |            |      | Encoder  |   | VR1  |      | After adjusting with the MAIN control turned CW, check that intervals D and E are also identical when the MAIN control is turned CCW.  |
|                                   | 3) EN2 duty ratio adjustment: Turn a motor in the both direction.          |                   |      |                 |            |      | Connector ④-EN2  |   | VR2  | Adjust until intervals D and E are equal to each other with point C placed at the center. |  |
|                                   | 4) EN1, EN2 phase difference adjustment: Same as above.                    |                   |      |                 |            |      | Connector ④-EN1 and EN2  |   |  | EN1 (EN2)<br>EN2 (EN1)  | EN1 (EN2): Within 90° ±20% (The difference between CW and CCW rotation must also be within this specification.)<br>The phases of EN1 and EN2 may be replaced with each other as indicated in the brackets. |
| 7. PG SCAN SPEED                  | 1) f: 15,000.0 kHz<br>MEMORY CH: 9<br>Write in with M. IN switch.          |                   |      |                 |            |      |  |   |  |   |  |
|                                   | 2) f: 15,010.0 kHz<br>MEMORY CH: 0<br>Write in with M. IN switch.          |                   |      |                 |            |      |  |   |  |   |  |
|                                   | 3) PG SCAN: ON   |                   |      |                 | PLL        | VR1  | Turn clockwise/counterclockwise to check scan speed change.<br>Set to mechanical center. |   |  |   |  |

## ADJUSTMENT

### Adjusting Receiver Section

| Item                          | Condition  | Measurement                                       |            |                   | Adjustment |                |  | Specifications   |  |
|-------------------------------|--|---|------------|-------------------|------------|----------------|--|--|--|
|                               |  | Test equipment                                    | Unit       | Terminal          | Unit       | Part           | Method   |  |  |
| 1. RB voltage                 |  | DC VM   | RX         | TP4               | RX         | VR7            | 2.3V   |  |  |
| 2. BFO (Coarse adjustment)    | 1) MODE: USB   | Frequency counter                                 | RX         | TP3               | RX         | T19            | 456,500 Hz   | ± 50 Hz  |  |
| 3. Sensitivity (RF,IF amp)    | 1) f: 14,525.0 kHz<br>MODE: USB<br>AGC: FAST<br>SSG output: 0 dBμ            | SSG<br>AF VM<br>Oscilloscope<br>AF dummy load     | Rear panel | ANT               | PLL        | T1, T2, T4, T5 | MAX  |  |  |
|                               |  |   |            | EXT SP            | RX         | T5 to T16, T18 | MAX<br>Perform adjustment in the following order: T5, T6, T7, T8, T7, T6, T5, T9, T10, T11, T12, T11, T10, T11, T12, T11, T10, T13, T14, T15, T16, T18.                                      | S/N: 10 dB or more   |  |
| 4. 1st MIX BALANCE            | 1) f: 187.3 kHz<br>MODE: USB<br>TUNING STEP: SLOW                            | AF VM<br>Oscilloscope<br>AF dummy load            | Rear panel | EXT SP            | RX         | VR1            | MIN. Heterodyne  |  |  |
| 5. BFO (Fine adjustment)      | 1) f: 14,525.0 kHz<br>MODE: USB, then LSB                                    | SP  |            |                   | RX         | T19            | Alternate MODE between USB and LSB and adjust for equal noise tone. (Equal highs and lows)   |  |  |
|                               | 2) SSG output: 14.525 MHz<br>0 dBμ   | SSG<br><br>AF VM<br>Oscilloscope<br>AF dummy load | Rear panel | ANT<br><br>EXT SP |            |                | Receive the 14.525 MHz generator signal in USB mode, tune for 1 kHz beat frequency, and AF output at 0.63V/8.Ω. Set to LSB mode, adjust for 1 kHz beat and measure the AF output difference. | Within 1.5 dB  |  |
| 6. FM sensitivity (FM IF amp) | 1) f: 14,525.0 kHz<br>MODE: FM<br>SSG output: 6 dBμ (MODE: 1 kHz DEV: 5 kHz) | SSG<br>AF VM<br>Oscilloscope<br>AF dummy load     | Rear panel | ANT               | RX         | T21            | MAX  | S/N: 20 dB or more   |  |
|                               | 2) SSG output: 6 to 100 dBμ  |   |            | EXT SP            |            |                | Confirm that the output is constant from 6 dB to 100 dB.   | Specified output.  |  |
| 7. S meter                    | 1) MODE: USB<br>AGC: FAST  | S meter   |            |                   | RX         | VR8            | Zero adjustment. Set to S meter starting point.  |  |  |
|                               | 2) f: 14,525.0 kHz<br>SSG output: 8 dBμ                                      | SSG<br>S meter                                    | Rear panel | ANT               |            |                | T17  | S-1<br>Adjust CCW from the peak.   |  |
|                               | 3) SSG output: 30 dBμ  |   |            |                   |            |                | VR9  | S-9  |  |
|                               | 4) MODE: FM<br>SSG output: 30 dBμ  |   |            |                   |            |                | VR6  | +40 dB   |  |
| 8. Squelch                    | 1) MODE: FM<br>AGC: SLOW<br>SQUELCH: Threshold                               | SP  |            |                   |            |                | Check  | Between 1 and 3 (Squelch level) BUSY indicator goes off.                         |  |
|                               | 2) MODE: USB   |   |            |                   | RX         | VR5            | Point at which noise disappears.   |  |  |
|                               | 3) f: 14,525.0 kHz<br>MODE: USB<br>SQUELCH: Threshold<br>SSG output: 20 dBμ  | SSG<br>AF VM<br>Oscilloscope<br>AF dummy load     | Rear panel | ANT               |            |                | Check  | The squelch should open at less than 20 dBμ and the BUSY indicator should light. |  |
|                               | 4) MODE: FM<br>SQUELCH: Threshold<br>SSG output: 0 dBμ                       |   |            |                   |            |                |  | The squelch should open at less than 0 dBμ and the BUSY indicator should light.  |  |

## ADJUSTMENT

| Item            | Condition  | Measurement                                   |            |          | Adjustment |          |   | Specifications  |
|-----------------|--|---|------------|----------|------------|----------|---|---|
|                 |  | Test equipment                                | Unit       | Terminal | Unit       | Part     | Method  |   |
| 9. NB           | 1) f: 14,525.0 kHz<br>MODE: AM<br>WIDE/NARROW: WIDE<br>NB: ON<br>Noise generator output level:<br>S meter indicator $5 \pm 1$  | Noise generator                               | Rear panel | ANT      | RX         | VR4      | MIN   | S1 or less (Typical)  |
|                 | 2)   |   |            |          | PLL        | T10, T11 | Repeat steps 1) and 2) so the NB functions on noise which is below the minimum S meter level. |   |
| 10. 1st IF trap | 1) f: 29,525.0 kHz<br>MODE: USB<br>SSG output: 45.875 MHz<br>90 dB $\mu$   | SSG<br>AF VM<br>Oscilloscope<br>AF dummy load | Rear panel | ANT      | RX         | T3       | MIN   | 70 dB or more   |
| 11. "Beeper"    | 1) AF GAIN: Center<br>TONE: Center<br>SQUELCH: Closed (No noise)<br>* Connect R259 and R273.<br>(Disconnect after adjustment.) | AF VM<br>Oscilloscope<br>AF dummy load        | Rear panel | EXT SP   | RX         | VR10     | 0.3V  | Tone should remain audible even when the AF GAIN is reduced to MIN. |

## &lt; Microprocessor operational check &gt;

| Item   | Condition   | Operation Check   |
|--|---|---|
| 1. Encoder (Dial)  | 1) TUNING SPEED: SLOW<br>Turn the tuning control clockwise and counterclockwise.                                  | Display changes in 100 Hz steps.  |
|  | Turn the main tuning 1 turn.  | Display changes 10 kHz.   |
|  | 2) TUNING SPEED: MID<br>Turn the tuning control clockwise and counterclockwise.                                   | Display changes in 500 Hz step.   |
|  | Turn the main tuning 1 turn.  | Changes 100 kHz.  |
| 3) TUNING SPEED: FAST<br>Turn the tuning control clockwise and counterclockwise. | Changes in 5 kHz step.  |   |
|  | Turn the main tuning 1 turn.  | Changes 1 MHz.  |
| 2. BAND  | 1) TUNING SPEED: FAST<br>Keep the UP switch depressed until tuning stops. Then turn the tuning control clockwise. | The MHz digit scans up in 1 MHz steps and stop when the display indicates 29,995.0 kHz. W2 type stops tuning at 25,995.0. |
|  | Keep the DOWN switch depressed until tuning stops. Turn the tuning control counterclockwise.                      | The MHz digit scans down to 0.100.0 at a 1 MHz step. W2 type stops tuning at 0.150.0 and X type stops at 2.000.0          |
| 3. F. LOCK   | 1) F. LOCK: ON<br>Turn the tuning control and BAND knob.  | The display should not change.  |

| Item   | Condition  | Operation Check   |
|--|--|---|
| 4. DIMMER  | DIMMER: ON   | The S meter and display illumination should be reduced.                         |
| 5. CLOCK and TIMER                                     | 1) POWER: OFF<br>FUNCTION: CLOCK 1   | The clock should function. The illumination should be dim.                      |
|  | 2) TIMER: ON   | * TIMER ERROR (red) indicator should light.<br>* CLOCK display flashes.         |
|  | 3) TIMER: ON<br>Simultaneously press both the HOUR and MINUTE TIME SET switches. | * CLOCK display should be 0:00.<br>* TIMER ERROR (red) indicator should go off. |
|  | 4) FUNCTION: CLOCK 2<br>Keep the HOUR and MINUTE switches depressed.             | The display should continuously advance.  |
|  | Set the hours digit.   | The display should indicate the time difference from CLOCK 1.                   |
|  | 5) FUNCTION: ON<br>Set the TIMER display to 0.02.                                |   |
|  | 6) FUNCTION: OFF<br>Set the TIMER display to 0.03.                               |   |
| 7) FUNCTION: CLOCK 1<br>Set the TIMER display to 0.02. | Power should turn on and the unit should function.                               |   |
| Set the TIMER display to 0.03.                         | Power should shut off.   |   |

## ADJUSTMENT

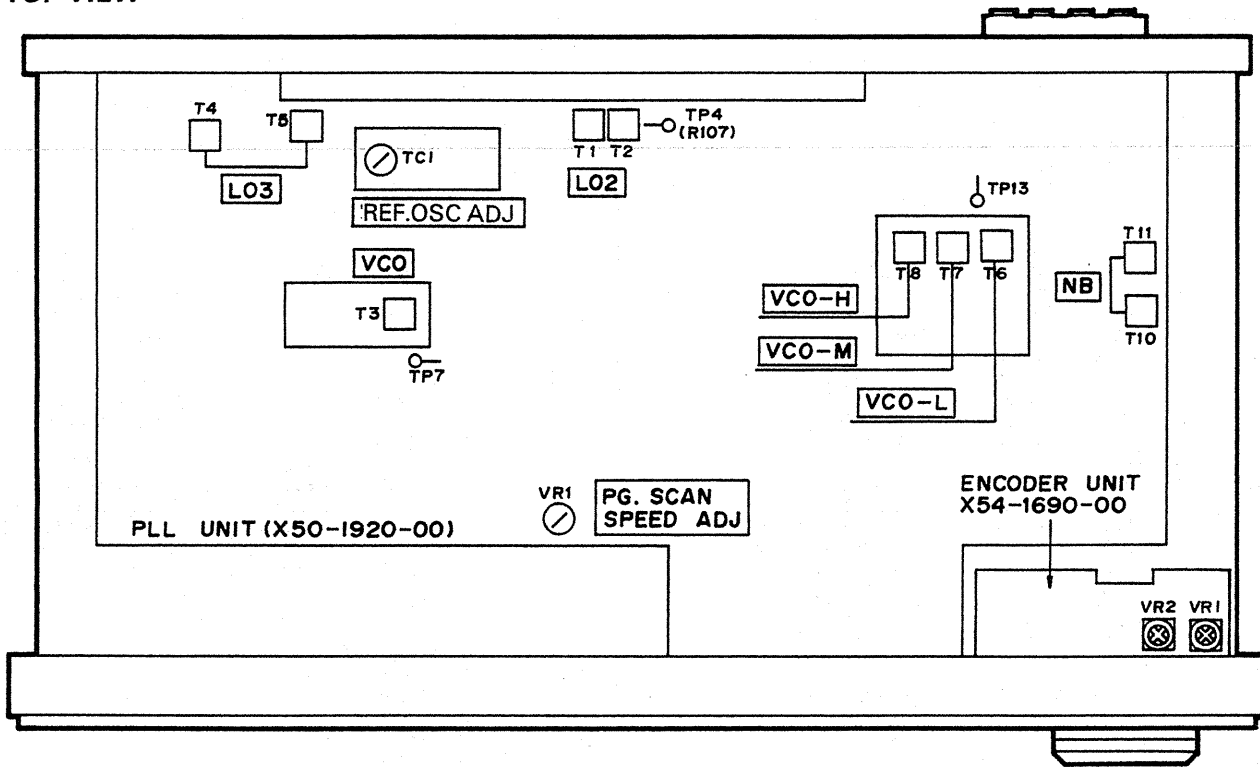
| Item               | Condition   | Operation Check   |
|--------------------|---|---|
| 6. RECALL and MODE | 1) POWER: ON<br>TIMER: OFF<br>FUNCTION: FREQUENCY<br>Press memory switches (1 through 0). | <ul style="list-style-type: none"> <li>* The MEMO indicator should change from 1 through 0.</li> <li>* The frequency display should indicate 15,000.0 for each channel.</li> </ul>  |
|                    | Press MODE AM, FM, USB, LSB and CW switches.  | <ul style="list-style-type: none"> <li>* The green indicators should light for AM and FM modes.</li> <li>* The yellow indicators should light for USB, LSB and CW modes.</li> </ul>   |
| 7. MEMORY          | 1) MODE: USB<br>Press the M. IN switch and store 10,615.0 in channel 9.                   | The beep should be heard when data is stored in channels 9 and 0.   |
|                    | Press the M. IN switch and store 10,635.0 in channel 0.                                   |   |
| 8. M. SCAN         | 1) M. SCAN: ON  | The M. SCAN indicator (green) should light and each channel should be scanned for 2 seconds.  |
|                    | 2) HOLD: ON<br>(Release after test)   | The scan should stop and the HOLD indicator (red) should light.<br>When the HOLD switch is again depressed, scanning should resume.   |
| 9. Select SCAN     | 1) M. SCAN: ON<br>Press channels 1 through 3 and then channel 2 again (twice).            | "C" should be displayed on the MEMO indicator and channels 1 and 3 should be scanned continuously.  |
| 10. PG. SCAN       | 1) PG. SCAN: ON   | <ul style="list-style-type: none"> <li>* The PG. SCAN indicator (yellow) should light.</li> <li>* "P" should be displayed on the MEMO indicator and the USB indicator should light.</li> <li>* The scan should start from 10,615.0 at 5 kHz interval. When 10,635.0 is reached, a "beep" should sound and the scan should restart from 10,615.0.</li> </ul> |
|                    | 2) HOLD: ON<br>Turn the tuning control clockwise and counter-clockwise.                   | Scan should stop.<br>The frequency should change from 10,615.0 to 10,635.0.   |

| Item         | Condition  | Operation Check  |
|--------------|--|--|
| 11. AUTO. M  | 1) AUTO. M: ON<br>Press channel 1 and store 17,000.0 then press channel 2 and 1.                                 | The AUTO. M indicator (green) should light and 17,000.0 should be displayed. |
| 12. Reset    | 1) POWER: OFF<br>Keep the power cable connected to the receiver and disconnect the lithium battery (-) terminal. |  |
|              | Disconnect the power cable and ground IC12 pin 40.<br>(IC12: $\mu$ PD80C49C-022)                                 |  |
|              | Reconnect the power cable.<br>POWER: ON<br>AUTO. M: ON   | Indication<br>MEMO: E<br>f: 150,055.0  |
|              | Disconnect, then reconnect the power cable.  | Indication<br>MEMO: 1<br>f: 15,000.0   |
| 2) POWER: ON | POWER: OFF<br>Reconnect the lithium battery (-) terminal.  |  |
|              | Disconnect the power cable. Reconnect the power after approximately 30 minutes.                                  | Indication<br>MEMO: 1<br>f: 15,000.0   |
| 3) MEMORY: 1 | MEMORY: 1  | Indication<br>MEMO: 1<br>f: 15,000.0   |
|              | MEMORY: 2  | MEMO: 2<br>f: 15,000.0   |
|              | MEMORY: 0  | MEMO: 0<br>f: 15,000.0   |

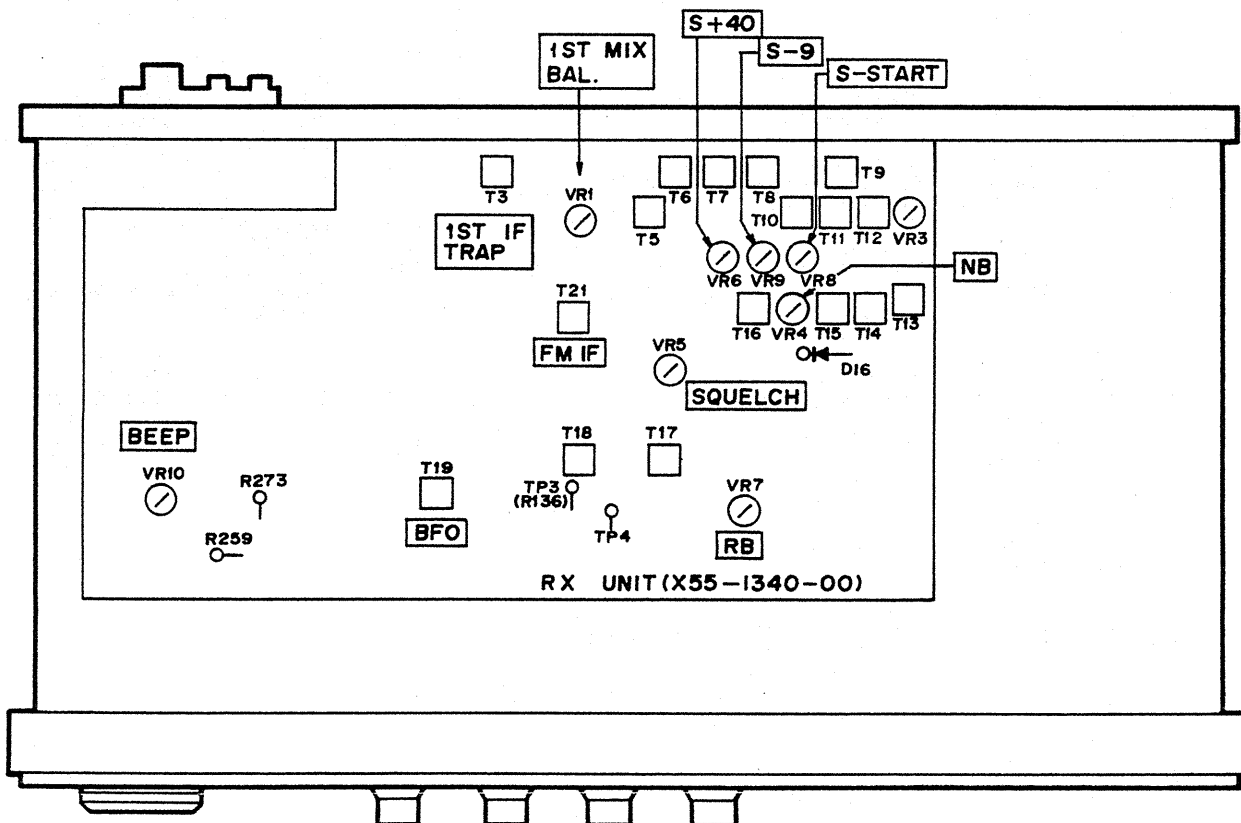
Downloaded by   
 Amateur Radio Directory   
  
[www.hamdirectory.info](http://www.hamdirectory.info)

ADJUSTMENT POINT

▼ TOP VIEW



▼ BOTTOM VIEW



## TERMINAL FUNCTION

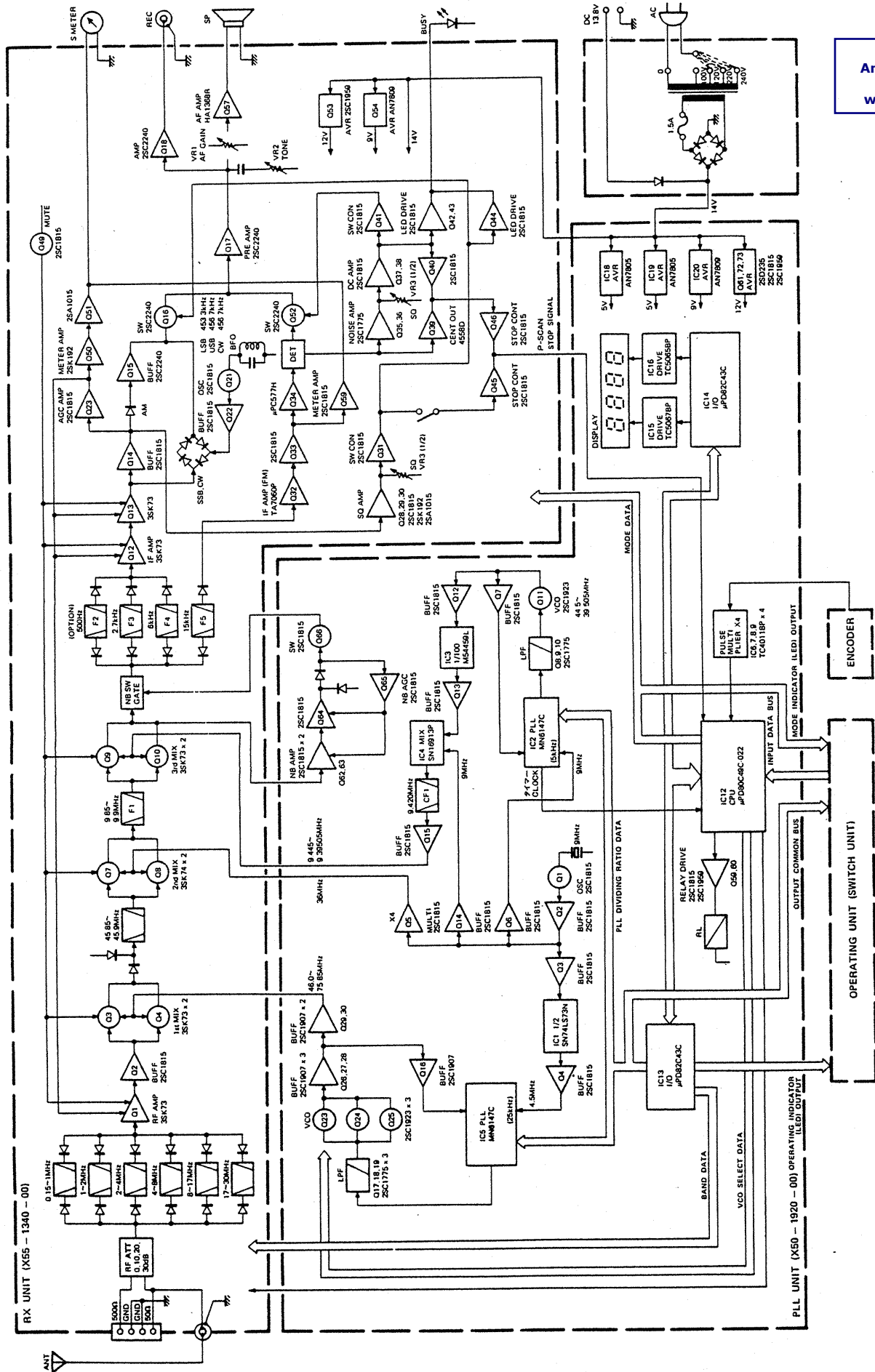
## PLL unit

| Connector No. | Terminal No. | Name | Destination | Function                           |
|---------------|--------------|------|-------------|------------------------------------|
| 1             |              | L03  | RX          | 3rd Local OSC output               |
| 2             |              | L02  | RX          | 2nd Local OSC output               |
| 3             |              | L01  | RX          | 1st Local OSC output               |
| 4             | 1            | 5A   | Encoder     | 5V line                            |
|               | 2            | EN2  | Encoder     | Pulse input                        |
|               | 3            | EN1  | Encoder     | Pulse input                        |
|               | 4            | GND  | Encoder     |                                    |
| 5             | 1            | FSP  | Switch      | Program SCAN speed adjust terminal |
|               | 2            | 5B   | Switch      | 5V line                            |
| 6             | 1            | AMB  | RX          | AM, 9V line                        |
|               | 2            | FMB  | RX          | FM, 9V line                        |
|               | 3            | USB  | RX          | USB, 9V line                       |
|               | 4            | LSB  | RX          | LSB, 9V line                       |
|               | 5            | CWB  | RX          | CW, 9V line                        |
| 7             | 1            | CWL  | Switch      | CW LED (Y) light                   |
|               | 2            | LSL  | Switch      | LSB LED (Y) light                  |
|               | 3            | USL  | Switch      | USB LED (Y) light                  |
|               | 4            | FML  | Switch      | FM LED (G) light                   |
|               | 5            | AML  | Switch      | AM LED (G) light                   |
|               | 6            | GND  | Switch      |                                    |
| 8             | 1            | SFL  | Switch      | AUTO-M LED (G) light               |
|               | 2            | HDL  | Switch      | HOLD LED (R) light                 |
|               | 3            | PSL  | Switch      | P.SCAN LED (Y) light               |
|               | 4            | MSL  | Switch      | M.SCAN LED (G) light               |
|               | 5            | 5C   | Switch      | 5V line                            |
| 9             | 1            | HBA  | RX          | BPF select signal                  |
|               | 2            | HBB  | RX          | BPF select signal                  |
|               | 3            | HBC  | RX          | BPF select signal                  |
|               | 4            | HBD  | RX          | BPF select signal                  |
| 10            | 1            | -6   | RX          | -6V line                           |
|               | 2            | MUT  | RX          | MUTE control                       |
| 11            | 1            | GND  | SP          |                                    |
|               | 2            | SP   | SP          | Speaker line                       |
| 12            | 1            | ESP  | Phone jack  |                                    |
|               | 2            | GND  | Phone jack  |                                    |
| 13            | 1            | 14V  | RX          | RX 14V line                        |
|               | 2            | GND  | RX          |                                    |
| 14            | 1            | 14   | Switch      | 14V line                           |
|               | 2            | 14V  | Switch      | 14V line                           |
|               | 3            | 14L  | Switch      | 14V line                           |
| 15            | 1            | GND  | Switch      |                                    |
|               | 2            | 14   | Switch      | 14V line                           |
| 16            | 1            | PSS  | RX          | Program SCAN stop input            |
|               | 2            | VHB  | RX          | VHF signal output (VHF:H)          |
|               | 3            | BEP  | RX          | BEEP control output (BEEP:H)       |
| 17            | 1            | TEL  | Switch      | Timer error, LED(R)light           |
|               | 2            | 5C   | Switch      | 5V line                            |
| 18            | 1            | P50  | Switch      | Output common bus                  |
|               | 2            | P51  | Switch      | Output common bus                  |
|               | 3            | P52  | Switch      | Output common bus                  |
|               | 4            | P53  | Switch      | Output common bus                  |
| 19            | 1            | P13  | Switch      | Input data bus                     |
|               | 2            | P14  | Switch      | Input data bus                     |
|               | 3            | P15  | Switch      | Input data bus                     |
|               | 4            | P52  | Switch      | Output common bus                  |
|               | 5            | P53  | Switch      | Output common bus                  |
| 20            | 1            | P11  | Switch      | Input data bus                     |
|               | 2            | P12  | Switch      | Input data bus                     |
|               | 3            | P52  | Switch      | Output common bus                  |
| 21            | 1            | P10  | Switch      | Input data bus                     |
|               | 2            | P11  | Switch      | Input data bus                     |
|               | 3            | P12  | Switch      | Input data bus                     |
|               | 4            | P13  | Switch      | Input data bus                     |
|               | 5            | P14  | Switch      | Input data bus                     |
|               | 6            | P15  | Switch      | Input data bus                     |
|               | 7            | P16  | Switch      | Input data bus                     |
| 22            | 1            | MUP  | Switch      | Unlock AF muting output            |
|               | 2            | GND  | Switch      |                                    |
| 23            | 1            | VBJ  | RX          | VHF converter, Band input          |
|               | 2            | VBI  | RX          | VHF converter, Band input          |
|               | 3            | VBH  | RX          | VHF converter, Band input          |
|               | 4            | AGC  | RX          | VHF converter, AGC input           |
| 24            |              | VHI  | RX          | VHF converter, IF output           |
| 25            | 1            | NBA  | RX          | NB, IF input                       |
|               | 2            | GND  | RX          |                                    |
| 26            | 1            | GND  | Switch      |                                    |
|               | 2            | NBS  | Switch      | NB switch, GND:ON                  |
| 27            | 1            | NBG  | RX          | NB switching pulse output          |
|               | 2            | GED  | RX          |                                    |
| 28            | 1            | DIM  | Switch      | Dimmer switch                      |
|               | 2            | 5D   | Switch      | 5V line                            |

## RX unit

| Connector No. | Terminal No. | Name | Destination    | Function                               |
|---------------|--------------|------|----------------|--|
| 31            | 1            | MAT  | UHF Receptacle |  |
|               | 2            | GND  |                |  |
| 32            | 1            | RAT  |                | Receiver input                         |
|               | 2            | GND  |                |  |
| 33            | 1            | NBA  | PLL            | NB, IF output                          |
|               | 2            | GND  | PLL            |  |
| 34            | 1            | NBG  | PLL            | NB, Switching pulse input              |
|               | 2            | GND  | PLL            |  |
| 35            | 1            | CWB  | Switch         | CW, 9V line input                      |
|               | 2            | AMB  | Switch         | AM, 9V line input                      |
|               | 3            | AMW  | Switch         | AM wide, 9V line input                 |
|               | 4            | SSB  | Switch         | SSB, 9V line input                     |
|               | 5            | CWN  | Switch         | CW narrow, 9V line input               |
| 36            | 1            | 14V  | PLL            | 14V input                              |
|               | 2            | GND  | PLL            |  |
| 37            | 1            | -6   | PLL            | -6V input                              |
|               | 2            | MUT  | PLL            | Muting control signal input            |
| 38            | 1            | SSQ  | Switch         | SSB, squelch Adj input                 |
|               | 2            | GND  | Switch         |  |
| 39            | 1            | SAS  | Switch         | AGC select (SSB SLOW)                  |
|               | 2            | AAS  | Switch         | AGC select (AM SLOW)                   |
|               | 3            | AAF  | Switch         | AGC select (AM FAST)                   |
|               | 4            | SAB  | Switch         | AGC select (SSB AGC reference voltage) |
|               | 5            | AAB  | Switch         | AGC select (AM AGC reference voltage)  |
| 40            | 1            | FSQ  | Switch         | FM squelch Adj input                   |
|               | 2            | GND  | Switch         |  |
| 41            | 1            | AV1  | Switch         | AF pre-amp, output                     |
|               | 2            | GND  | Switch         |  |
| 42            | 1            | AMB  | PLL            | AM, 9V input                           |
|               | 2            | FMB  | PLL            | FM, 9V input                           |
|               | 3            | USB  | PLL            | USB, 9V input                          |
|               | 4            | LSB  | PLL            | LSB, 9V input                          |
|               | 5            | CWB  | PLL            | CW, 9V input                           |
| 43            | 1            | 9V   | Switch         | 9V line output                         |
|               | 2            | BSY  | Switch         | BUSY LED (G)                           |
| 44            | 1            | PSS  | PLL            | Program scan stop signal output        |
|               | 2            | VHB  | PLL            | High when VHF, RX                      |
|               | 3            | BEP  | PLL            | Beeper control input                   |
| 45            | 1            | SM   | Smeter         | S-meter (+)                            |
|               | 2            | GND  | Smeter         |  |
| 46            | 1            | HBA  | PLL            | Band data input                        |
|               | 2            | HBB  | PLL            | Band data input                        |
|               | 3            | HBC  | PLL            | Band data input                        |
|               | 4            | HBD  | PLL            | Band data input                        |
| 47            | 1            | VBJ  | PLL            | VHF converter, Band data output        |
|               | 2            | VBI  | PLL            | VHF converter, Band data output        |
|               | 3            | VBH  | PLL            | VHF converter, Band data output        |
|               | 4            | AGC  | PLL            | VHF converter, AGC output              |
| 48            | 1            | PH   | Phone jack     | AF output                              |
|               | 2            | GND  | Phone jack     |  |
| 49            | 1            | GND  | Switch         |  |
|               | 2            | AV2  | Switch         | AF power AMP input                     |
| 50            | 1            | REC  | REC jack       |  |
|               | 2            | GND  |                |  |
|               |              | L01  | PLL            | 1st Local OSC input                    |
|               |              | L02  | PLL            | 2nd Local OSC input                    |
|               |              | L03  | PLL            | 3rd Local OSC input                    |
|               |              | VHI  | PLL            | VHF converter, IF                      |

BLOCK DIAGRAM



## DCK-1 D.C. OPERATION KIT (OPTION)

### PARTS LIST

| Ref. No. | Part No.    | Description                   | Re-<br>marks |
|----------|-------------|-------------------------------|--------------|
| -        | B50-2703-00 | Instruction sheet             |              |
| -        | E08-0203-25 | Cable with 2P connector       |              |
| -        | E31-2027-05 | Cable with terminal           |              |
| -        | E30-1646-05 | DC cable ass'y                |              |
| -        | F05-1023-05 | Fuse UL 1A x 2                |              |
| -        | H25-0029-04 | Protective bag 60 mm x 110 mm |              |
| -        | H25-0117-04 | Protective bag 80 mm x 250 mm |              |

### **MANUALMAN**

P. A. Markavage Phone (732) 238-8964  
27 Walling St., Sayreville, NJ 08872-1818  
Web <http://www.manualman.com>  
e-mail [manualman@juno.com](mailto:manualman@juno.com)

*Quality Is The Number 1 Customer Priority*

A product of

**TRIO-KENWOOD CORPORATION**

17-5, 2-chome, shibuya, shibuya-ku Tokyo 150, Japan

### **TRIO-KENWOOD COMMUNICATIONS**

1111 West Walnut Street, Compton, California, 90220, U.S.A.

### **TRIO-KENWOOD COMMUNICATIONS, GmbH**

D-6374 Steinbach TS, Industriestrasse 8A, West Germany

### **TRIO-KENWOOD ELECTRONICS, N.V.**

Leuvensesteenweg 504, B-1930 Zaventem, Belgium

### **TRIO-KENWOOD (AUSTRALIA) PTY. LTD.**

4E Woodcock Place, Lane Cove N.S.W. 2066, Australia