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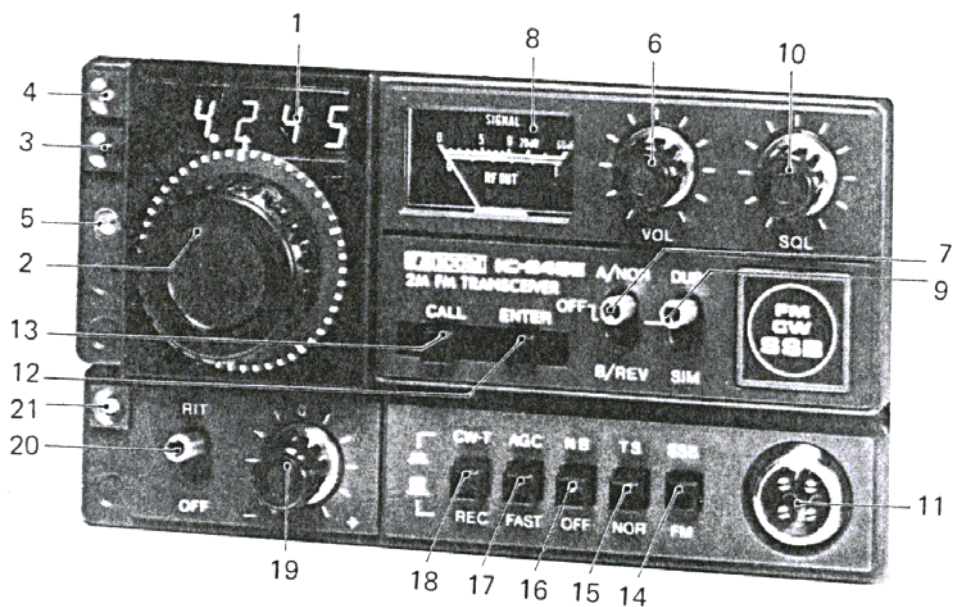
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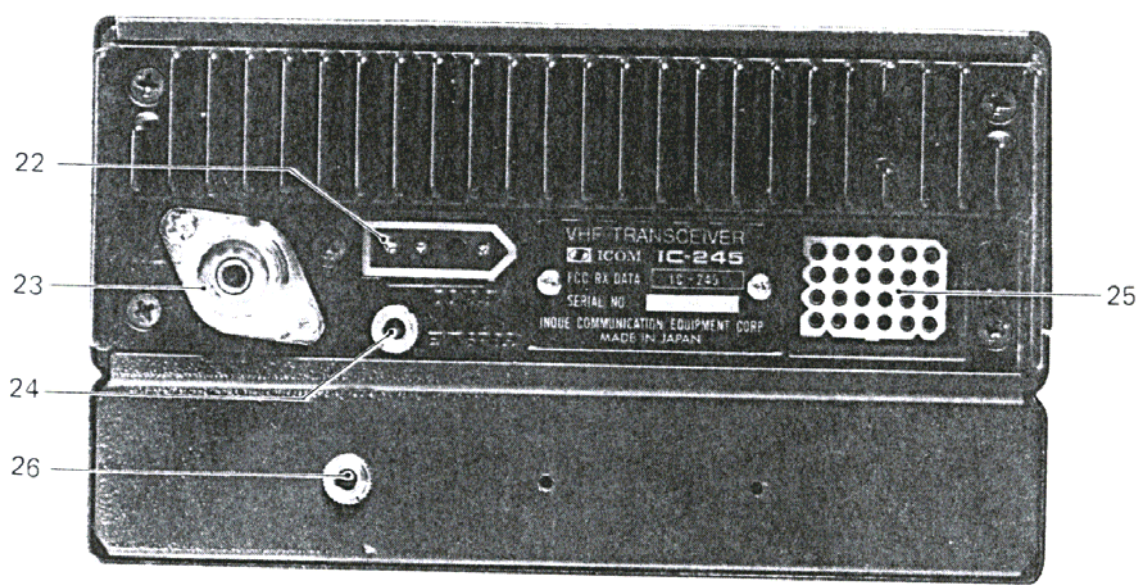
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|   |  |
|---|--|
| Antenna impedance   | 50 ohms unbalanced   |
| Power source voltage  | DC 13.8V $\pm$ 15%   |
| Grounding polarity  | Negative ground  |
| Power consumption<br>(with DC 13.8V supply)<br>in reception | at minimum AF volume 0.6A<br>at maximum AF volume 0.8A   |
| in transmission   | at SSB (PEP 10W) 2.8A<br>at CW FM (10W output) 2.8A<br>at FM (10W output) 2.8A   |
| Outline dimensions<br>(in m/m)                              | (H) 90 x (W) 155 x (D) 235<br>(protruding portions not included)   |
| Weight  | Approx. 2.7Kg  |
| <b>Transmitter unit</b>                                     |  |
| Frequency range   | 144.0MHz – 146.0MHz<br>Continuously variable. Digital 2 VFO<br>system.   |
| RF output power   | SSB 10W (PEP)<br>CW 10W<br>FM 10W  |
| Type of modulation  | FM variable reactance frequency modulation   |
| Maximum frequency<br>deviation (FM)                         | $\pm$ 5KHz   |
| Spurious level  | Lower than -60dB   |
| SSB carrier suppression ratio                               | More than 40dB   |
| Microphone  | 500 ohms dynamic microphone with push-<br>to-talk switch (IC-SM2 electric condenser<br>microphone usable)  |
| <b>Receiver unit</b>  |  |
| Frequency Range   | Same as transmitter  |
| Receiving System  | SSB, CW Single Super Heterodyne  |
| Intermediate Frequency                                      | FM Double Super Heterodyne<br>SSB, CW 10.7MHz<br>FM 10.7MHz, 455KHz  |
| Sensitivity   | SSB, CW 0.5 $\mu$ V at (S+N)/N 10dB or better<br>Noise Suppression Sensitivity<br>20dB 0.6 $\mu$ V or less                                       |
| Squelch Sensitivity (FM)                                    | 0.4 $\mu$ V or less  |
| Suprious Sensitivity  | -60dB or better  |
| Selectivity   | SSB, CW $\pm$ 1.2KHz or better at -6dB<br>$\pm$ 2.4KHz or better at -60dB<br>FM $\pm$ 7.5KHz or better at -6dB<br>$\pm$ 15KHz or better at -60dB |
| Audio Output  | More than 1.5W (into 8 $\Omega$ )  |
| Audio Output Impedance                                      | 8 ohms   |

### FRONT VIEW



### BACK VIEW



## SECTION III CONTROLS

### Front Panel Configuration

The front panel controls are shown in Fig.

| CONTROL or CONNECTION       | DESCRIPTION   |
|-----------------------------|---|
| 1 Frequency Display         | The operating frequency display of the set is shown by a 4-figure LED digital indicator with MHz to KHz digits. The frequency displayed is the carrier frequency of each communication mode (FM, SSB or CW), thus eliminating retuning when a mode is changed.  |
| 2 Tuning Knob               | The tuning knob selects receiving and transmitting frequencies. Rotating, one vernier graduation shifts the frequency by 100Hz (5KHz by one complete rotation) in SSB and by 5 KHz steps (500KHz by one complete rotation) in FM. Push the TS switch (12) to change frequencies in 5KHz steps in SSB. For SSB operation frequencies are changed in 100KHz, and in FM, in 5KHz steps.  |
| 3 RECEIVE LED               | Illuminated during reception. In FM operation, it is illuminated only when the squelch opens.   |
| 4 TRANSMIT LED              | Illuminated during transmission.  |
| 5 Photo Sensor              | A sensor used to detect the brightness of surroundings. When operating the set in the dark, the sensor actuates the dimmer circuit to furnish easier reading of meters and the frequency readout by reducing the light intensity level.   |
| 6 VOL (Volume Control) Knob | A knob used to control the audio-level of the received signals. Turning clockwise will increase the audio level. Set the volume to the proper audio level as desired.   |
| 7 VFO Switch                | A selector switch used to either "A/Norm" or "B/Rev" VFO. When set to "A", both reception and transmission will operate with "A" VFO and when set to "B", they will operate with B-VFO. When changing from A to B VFO, the frequency used before change over of the selector switch is memorized in A VFO. Even after changing frequency with B-VFO, the memorized A-VFO frequency is still usable by restoring the switch to "A" position. (From B to A, the same function is provided.) |
| 8 Meter                     | When receiving, this meter will operate as an S-meter to indicate signal strength and when transmitting, the meter shows relative RF-power output.  |

|    |                      |   |
|----|----------------------|---|
| 9  | Function Switch      | A switch used to turn on and off the power source and to change from simplex to duplex operation.   |
| 10 | SQL (Squelch) Knob   | A knob used to adjust the squelch operation level in FM reception. When the set is adjusted to the noise shut-off point with no signal, a voice will be audible when signals are received.    |
| 11 | MIC Connector        | Use the microphone supplied with the set. An optional desk type ICOM microphone, IC-SM2, can also be used without modification. Other microphones of 500–600 ohms impedance can also be used. |
| 12 | Enter Switch         | Used to enter or lock in a frequency, split for duplex operation.   |
| 13 | Tone Switch          | Activates tone circuit.   |
| 14 | SSB/FM Switch        | Push in for SSB, pop out for FM.  |
| 15 | TS/Norm Speed Switch | Push in for 5KHz steps in SSB, or pop out for NORMAL 5KHz FM, 100Hz SSB operation.  |
| 16 | Noise Blank Switch   | Push in to activate Noise Blanker Circuit.  |
| 17 | AGC/FAST Switch      | Push in to activate fast AGC action.  |
| 18 | CW-T/RECEIVE Switch  | Push to transmit, pop out to receive CW signals.  |
| 19 | RIT Control          | Varies receiver frequency approximately $\pm 1$ KHz.  |
| 20 | RIT Switch           | Place in RIT position to activate RIT circuit.  |
| 21 | RIT LED              | Is illuminated when RIT circuits is activated.  |

The following is a detailed description of the rear panel connections. Refer to Fig.

| CONTROL or CONNECTION     | FUNCTION   |
|---------------------------|--|
| 22 DC Power Connector     | When using a DC power supply of 13.8V, connect the supplied DC power cable to this connector.                |
| 23 ANT(Antenna) Connector | A connector for antennas having an impedance of 50 ohms. Use an M-type coaxial connector.                    |
| 24 External Speaker Jack  | External speakers of 8 ohms impedance when used, are connected to this jack. When external speakers are con- |

below shows terminal connections of this connector. Care should be taken not to apply voltage other than -0.5V to +5V to terminals between No.15 and No.24 as they are connected with the C-MOS IC. Optional connecting plugs are available.

26 Key Jack

Insert Key Plug for CW operation.

### Terminal No. Connection

1. Output from discriminator.
2. DC 13.8V in conjunction with power switch operation.
3. Connected to push-to-talk T.R. change-over switch. When grounded, set operates in transmission mode.
4. Output from receiver detector stage. Fixed output regardless of AF output or AF gain control level.
5. TX shutdown terminal. When grounded, no RF power is transmitted.
6. DC 9V available when transmitted. (relay can not be directly actuated).
7. Input for external ALC voltage.
8. Ground.
9. NC (no connection)
10. NC (no connection)
11. NC (no connection)
12. NC (no connection)
13. NC (no connection)
14. NC (no connection)
15. LOCK Input to lock dial externally.
16. UDC Input to control up-down externally.
17. SCAN Input to scan frequency.
18. CL Input to clear frequency.
19. FCL Input to clear counter in specified digit and input for MSB date.
20. K0 Input for frequency control data.
21. K1 Input for frequency control data.
22. K2 Input for frequency control data.
23. K3 Input for frequency control data.
24. K4 Input for frequency control data.

## SECTION IV INSTALLATION

Install the IC-245E with the following precautions.

Avoid a place subject to direct sunshine, high temperature, high humidity, excessive vibration, dust and other adverse influences.

Select a place where operation of controls, knobs and switches is easy and the meter and the dial are clearly readable.

Use the special mounting bracket supplied with the set.

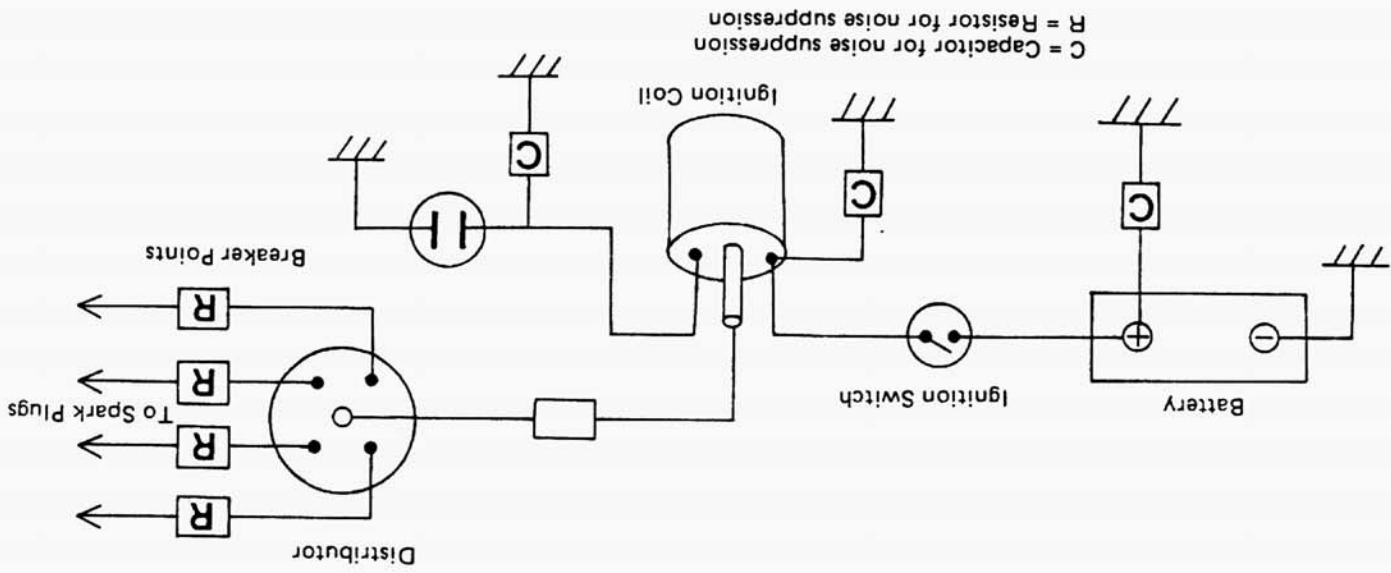
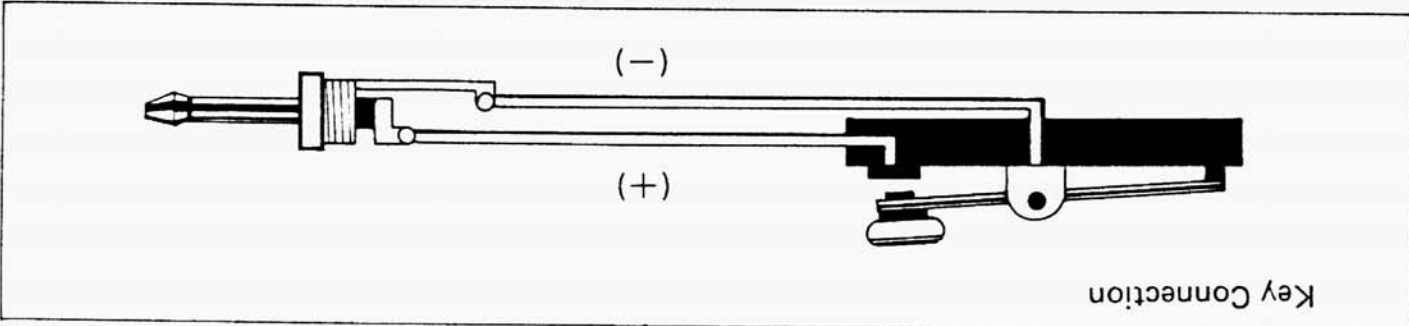
Choose a place for installation with enough structural strength to bear the weight of the set. Avoid placing the set near a heater or an air conditioner exhaust.

Be sure there is adequate space for ventilation around the set in the car.

Install the set in an easy-to-see location for driving safety.

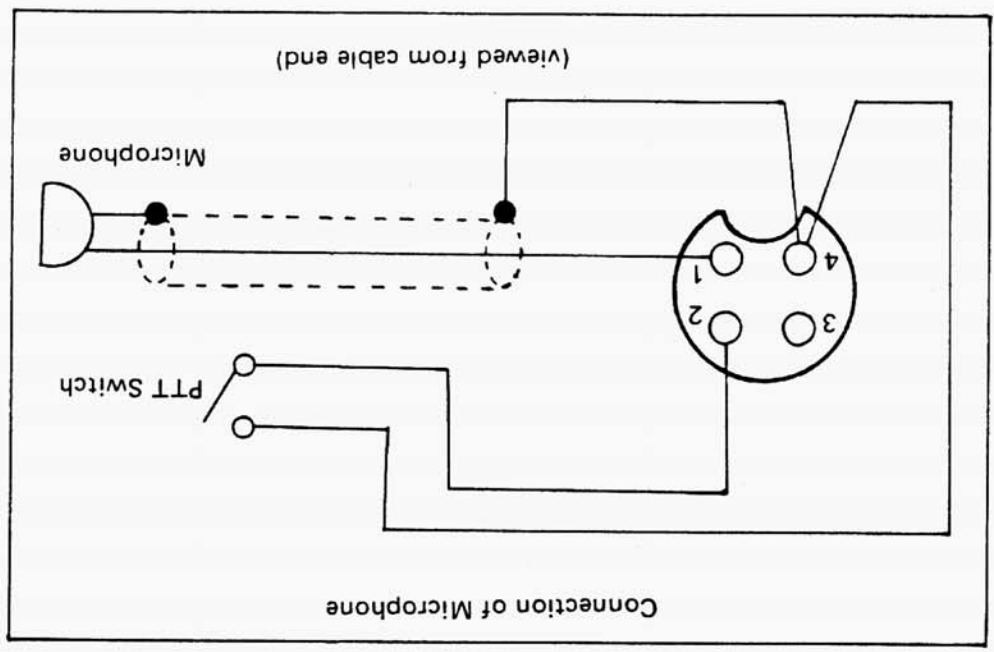
### Mobile Mounting

Install the set using the mobile mounting fixture supplied.



### Ignition Noise

Care has been taken to suppress ignition noise within the set. However, in some kinds of auto-mobiles, excessive noise may occur. In that case, provide a filter circuit as shown in this figure. Remarkable noise suppression is furnished by this arrangement.



- (1) Fasten the mobile mounting angle bracket on the lip of the dash with the mounting bolts supplied.
- (2) Fasten the mobile mounting holder A to the angle bracket with the four ornamental screws.
- (3) Install the set in the mobile mounting holder A.
- (4) Hook up pawls of the mounting holder B into holes provided on the holder A.
- (5) Clamp the set by tightening the holder B and lock the quick fastener by pulling down the knob.

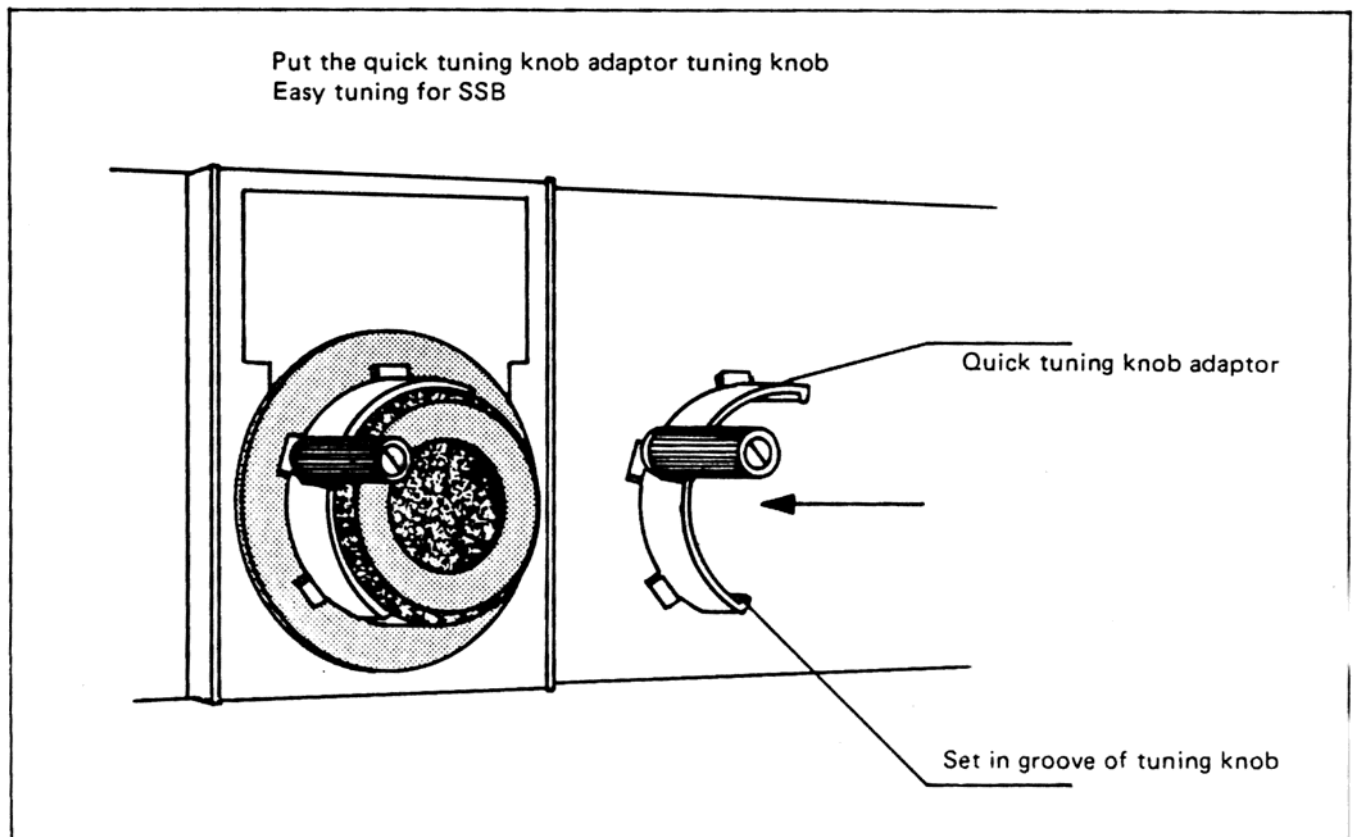
### Removal

Unlock the quick fastener and loosen the holder B.

Adjustment of installation angle and position.

- (1) With the quick fastener, the unlocked set can be moved back and forth to select a suitable position. (Note that if the set is pulled out too far, the built-in speaker will be partially covered by the mounting bracket.)

### ● Installation of quick tuning knob adaptor





position the set at the most convenient angle for easy operation.

### **Fixed Station Use**

When the set is used as a fixed station, use the supplied mobile mounting fixtures supplied with the IC-3PA power supply.

### **Power Supply for a Fixed Station**

The rated power supply voltage of this set is  $13.8V \pm 15\%$ . Use a stabilized voltage power source of 13.8V with current capacity of more than 3A for a fixed station set. Reliable ICOM power supplies are ideal for this station use.

### **External Speaker**

When used as a fixed station, the face of the speaker is placed downward. Therefore, we recommend the use of an external speaker. Be sure to use a speaker of 8 ohms impedance. An external speaker is an integral part of regulated ICOM power supplies.

The set is designed for use with an antenna having a matched impedance of 50 ohms.

Transmission power loss in VHF antenna systems tends to be greater. Select a low-loss VHF antenna for best performance.

Install a high performance antenna in an elevated position. Make sure the antenna connection to the coaxial cable is fixed to withstand vibration and sealed against moisture.

Grounded antennas for automobiles, such as whip antennas, should be grounded positively to the chassis.

Do not connect a whip antenna directly to the antenna connector. Use a coaxial cable between the antenna and the antenna connector. Keep the antenna more than 1 meter away from the set.

### **External Speakers**

Although the IC-245E is provided with a built-in speaker, there is a jack located on the rear panel of the set for an external speaker of 8 ohms impedance. When the external speaker is used, the built-in speaker will not operate. Headphones of 8-16 ohms impedance can also be used.

### **DC Power Cable**

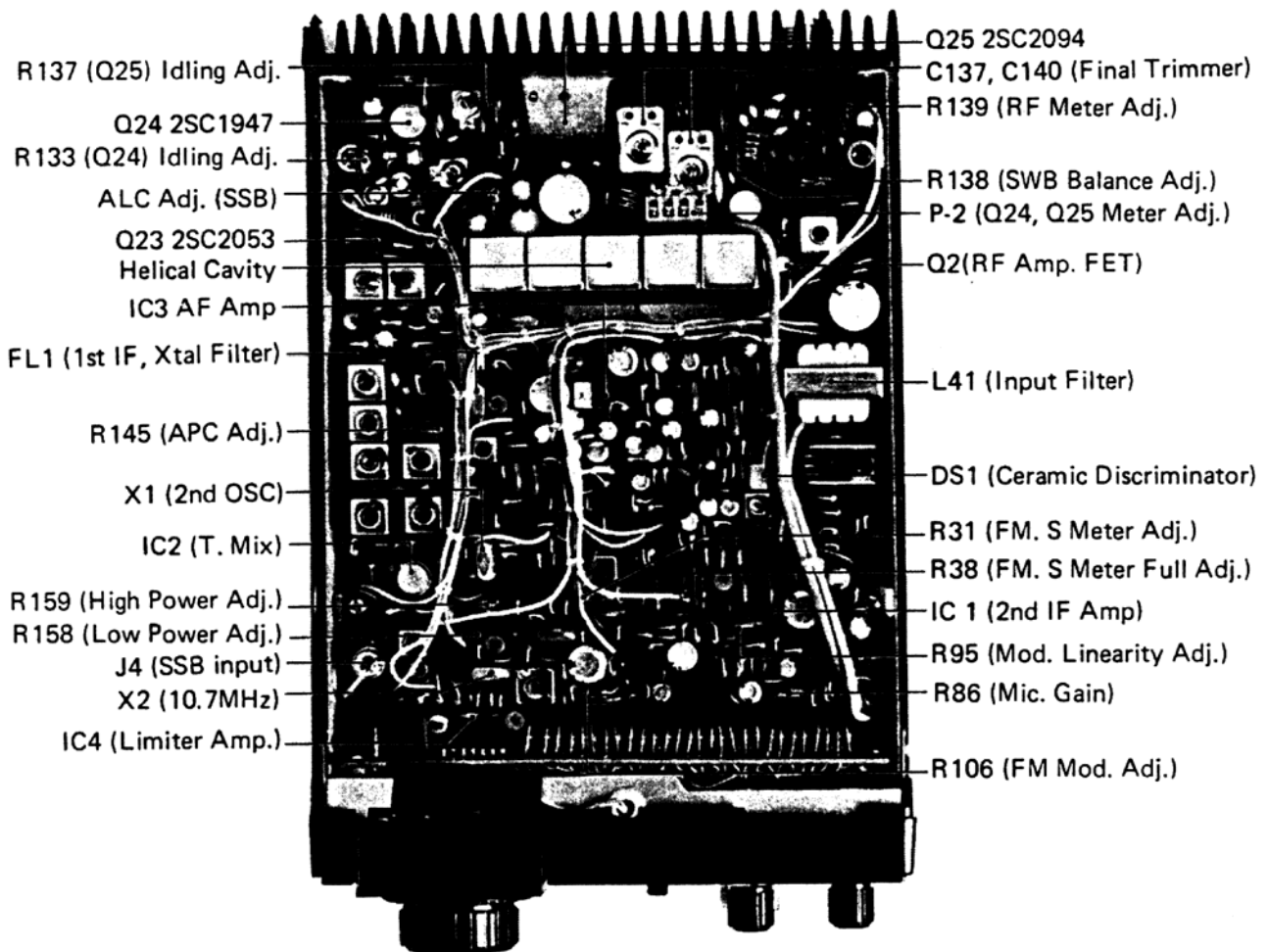
When using a DC power source such as a battery, connect the DC power cable to the battery before making the connection to the set. Connect the red cable to POSITIVE (+) and the black cable to the NEGATIVE (-) terminals of the battery after making certain of the polarity. Reversing polarity will blow out the fuse in the power cable due to actuation of the protective circuit. Make certain that the FUNCTION switch is at OFF before connecting the DC power cable to the DC power outlet. Verify that the DC power source voltage falls between 12 to 15V. Make certain that the power switch is at OFF, and connect the DC power cable to the DC outlet of the set.

(TOP)

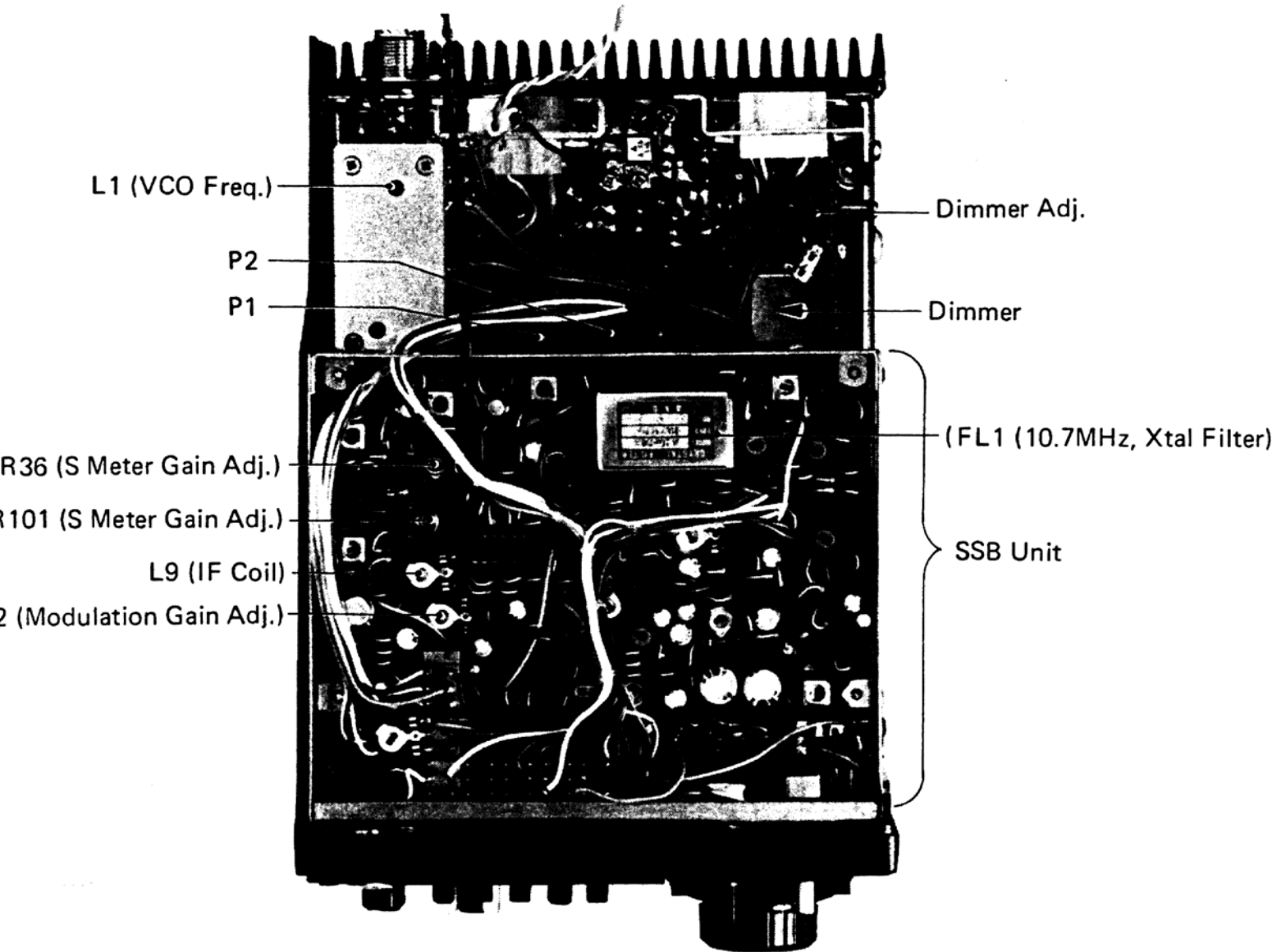
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(BOTTON)



## SECTION VI OTHER REMARKS

Do not attempt to connect or remove the power cable, antenna, external speaker or microphone while the power switch is ON. This may damage your set.

Do not transmit without connecting the antenna.

This set is made for the negative (−) ground system. The set can not be installed to a car having (+) positive ground without modification.

If fuses are blown, check the cause of trouble before replacing them with new ones.

If the power switch is turned on and off rapidly, the frequency display may indicate erroneous figures. If erroneous figures are shown, turn off the power switch and wait several seconds before turning the switch on again.

The set has been aligned very accurately with precision test instruments. Never try to alter the setting of variable resistors, coils and trimmers inside the set.

The PLL unit contains a C MOS LSI which is the heart of the set and requires extreme care and knowledge in handling. Therefore, the unit is sealed and when the seal is broken the warranty is voided. Repair of this unit can be expensive.  
by qualified persons.

In addition to the PLL unit, the digital-driver unit also utilizes a C MOS IC. As the IC is very sensitive and will be damaged by excessive current or a large static potential, only a skillful technician familiar with handling the C MOS IC should check the circuitry. Even when a skillful technician checks the circuit, the following cautions must be taken.

The soldering iron tip, tools and measuring instruments must be properly grounded.

Do not plug in or unplug the C MOS IC or use a soldering iron while the unit is powered.

Do not apply signals to C MOS IC input terminals without the power being applied. Do not use a multimeter to measure resistance in the IC circuit unless power is applied.

Do not apply voltages other than 0.5 to +5V to the C-MOS IC circuit.

## SECTION VII OPERATION

### Reception

Preliminary procedures. After the antenna and the microphone have been connected, set knobs and switches as follows.

|                    |                         |
|--------------------|-------------------------|
| FUNCTION Switch    | OFF (middle)            |
| VFO Switch         | A                       |
| VOL (Volume) Knob  | fully counter-clockwise |
| SQL (Squelch) Knob | fully counter-clockwise |

After setting, place the FUNCTION switch to "SIMPLEX" the power. The meter is illuminated, RECEIVE indicating lamp lights and a frequency of (4000) is shown on the frequency display. This shows the set is now operating in (141.000MHz).

## HOW TO TUNE

### Tuning Knob

The tuning knob is provided with a click stop and it tunes smoothly even as a mobile station. Frequency drift due to vibration turning the tuning knob is prevented by the click stop. Transmitting and receiving frequencies are shown by four LED (Light Emitting Diodes) digits in the frequency display window in steps of 100Hz. Rotating the tuning dial clockwise will increase the frequency. In FM, each vernier movement is equivalent to a 5KHz frequency shift and one complete rotation equals a 250KHz change. Clockwise rotation increase the frequency. 100Hz digits are not shown at the frequency display window, but can be read on the vernier scale of the tuning knob.

If the tuning dial is rotated further to increase the frequency after reaching the upper end of the frequency band (145.995MHz), the frequency will return to the lower end of the frequency band (144.000) automatically and will continue to increase from that point. Conversely, further rotation of dial to decrease the lower end, 144.000MHz, will return the frequency to the upper end (145.995). Thus, no off-band tuning is given. The frequency shown at the frequency display window is the carrier frequency of each communication mode of FM, SSB (USB) and CW, thus eliminating a need for returning or recalibration of the dial when the mode is changed.

### VFO Switch

This switch selects either the "A" or "B" VFO built into the set. When set on "A" or "B", both reception and transmission frequencies are controlled by that VFO and that is the frequency shown in the frequency display window. The frequency of "A" VFO is retained and memorized in the LSI before switching to "B" VFO, and "A" VFO will function at that same frequency when the switch is restored to "A". This capability allows effective communication using "A" VFO as a fixed calling frequency while searching for QSY frequencies with "B" VFO. It is also used for a temporary memory device. Rotation of the tuning dial will vary the frequency of the VFO functioning and change the corresponding frequency display window in any VFO operation mentioned above.

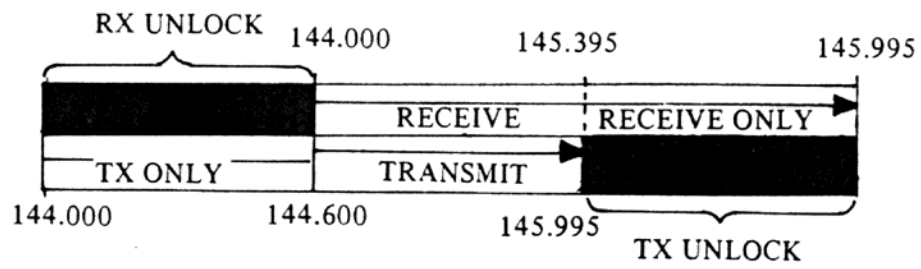
### DUPLEX PROGRAM INSTRUCTIONS

1. Set VFO switch to "A/Norm" VFO.
2. Set FUNCTION switch to SIM(simplex).
3. Push in "ENTER" button so it locks in (ENTER).
4. Enter Transmit frequency (Example; 145.000MHz)
5. Set VFO switch to "B/Rev" position.
6. Enter receive frequency (Example; 145.000MHz)
7. Set VFO switch in a position and FUNCTION switch is Dup (Duplex) position.
8. Push in "Enter" button so it pops out.
9. Frequency DISPLAY will show receive frequency (145.000MHz) and when the PTT button is pressed, the TRANSMIT frequency (145.000MHz) is displayed. Rotating the tuning knob clockwise will increase the receive frequency and the TRANSMIT frequency will follow at the 600KHz difference.

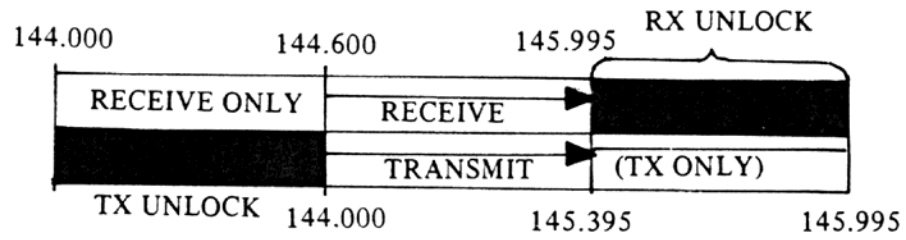
### Duplex Program Instructions

In the European 2 meter FM duplex plan, the TRANSMIT frequency is generally 600KHz lower than the RECEIVE frequency.

## REVERSE DUPLEX



## NORMAL DUPLEX



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## **Memory**

This set utilizes a C MOS LSI for setting the frequency. The memorized frequency remains as is when the power is off, however, the LSI is partially powered. In this set, the function switch need not remain ON (up) to keep the LSI memory working. However, the memory is lost when the power cable is disconnected from the power source or the AC power source is unplugged. If you wish to maintain frequency memory during periods when power is disconnected, connect batteries as shown in Fig. 10 to the DC power outlet to supply power when the power is off. The LSI will operate with battery voltage of 6-12V, but that of 9V is best. As current consumption is about 5mA, a dry cell battery can be used for a considerable period (2 months with a U-1 type dry cell battery).

## **FM Reception**

Turn the VOL (volume) knob clockwise slowly until readable FM noise is heard. Search for an incoming signal with the tuning knob. When the signal is tuned in, the S meter pointer shows maximum deflection swings and voice signals are heard. Carefully tune a signal by rotating the tuning knob to obtain the widest swing of the S meter pointer and to hear distortion free voice signals tuned in without distortion.

## **SQL (Squelch) Knob**

With the squelch knob turned fully counter clockwise and the set on a frequency where no signal is received, FM noise will be heard. Turn the SQUELCH knob clockwise slowly to the point where the noise is abruptly suppressed and the receive lamp turns off. With the SQUELCH knob at this setting, the set is silent until a signal is received or a station is tuned in. Then the set will receive signals and the RECEIVE lamp will light up. If in-coming signals are weak or the set is used as a mobile radio, where the SQUELCH operation is unstable, readjust the SQUELCH knob as required.

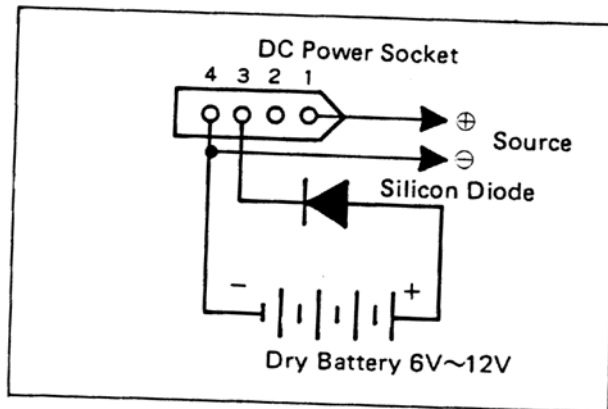
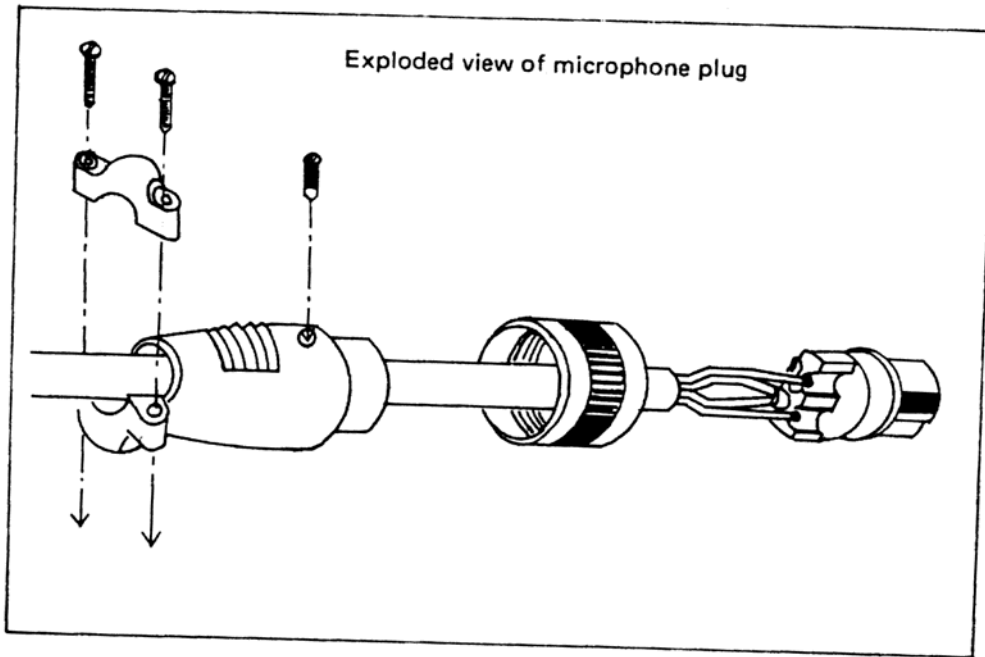
## **FM Transmission**

Depress the PTT switch on the microphone (press-to-talk). The TRANSMIT indicator lamp will light and the power meter will swing to the level of the power showing the set is ready to transmit. An FM signal will be transmitted when a voice activates the microphone. Releasing the PTT button will return the set to the reception operation and the TRANSMIT indicating lamp off. When transmitting the meter is automatically changed to the RF power level meter and is calibrated in terms of relative power output, not in absolute value (1, 2, 3W and so on). The meter is adjusted to make the pointer swing about 80% of the full RF scale with 10W output into a pure resistance load of 50 ohms (terminated type RF power meter). The meter deflection will vary according to antenna matching.  
antenna matching.

## **Other Facility**

### **Auto Dimmer**

The photosensor actuates the dimmer circuit by detecting darkness around the set such as at night. When actuated, the lamps for meters and the frequency display window are dimmed. This furnishes easier meter and frequency indicator reading by eliminating the dazzling effect of bright lamps in dark surroundings.



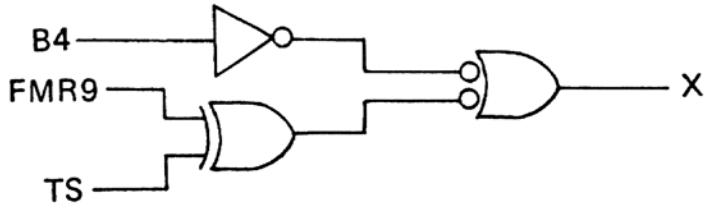


**X-Control**

| B4 | FM9 | TS | X |
|----|-----|----|---|
| 0  | 0   | 0  | 1 |
| 0  | 0   | 1  | 0 |
| 0  | 1   | 0  | 0 |
| 0  | 1   | 1  | 1 |
| 1  | *   | *  | 1 |

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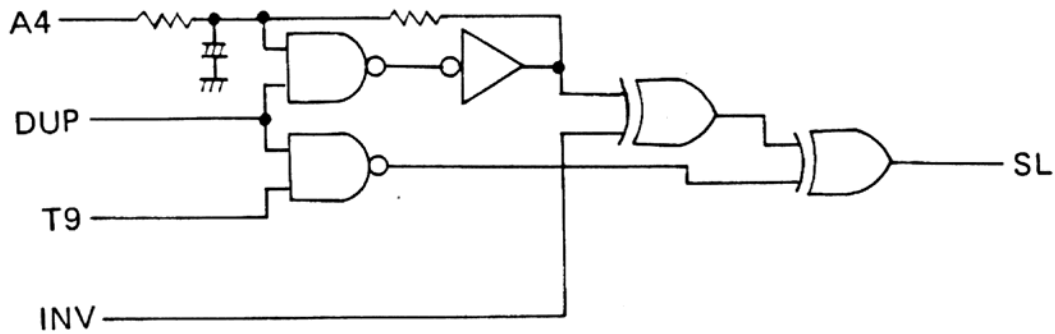
\* = 0 or 1



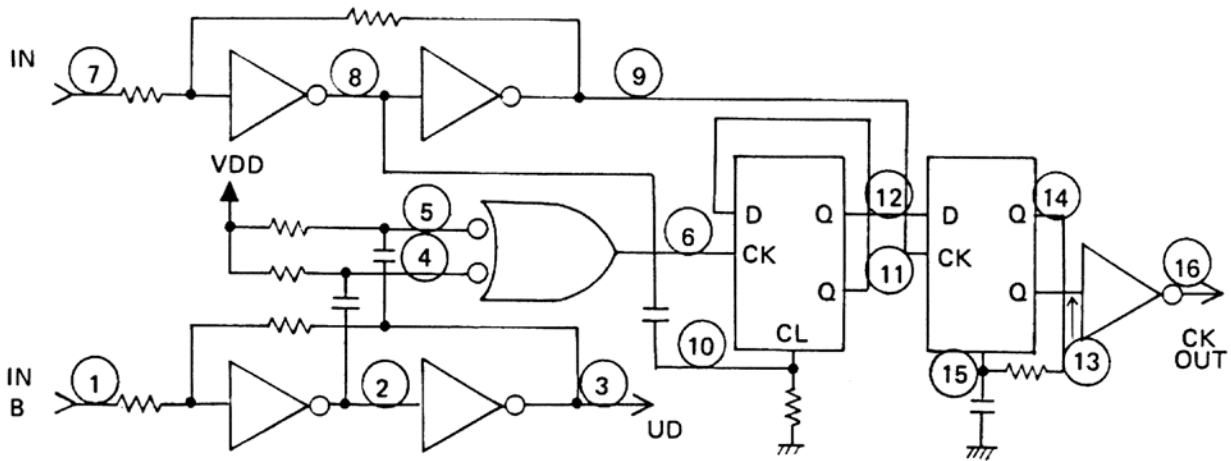
**SL-Control**

| DUP | T9 | A4 | INV | SL |
|-----|----|----|-----|----|
| 0   | *  | *  | 0   | 1  |
| 0   | *  | *  | 1   | 0  |
| 1   | 0  | 0  | 0   | 1  |
| 1   | 0  | 0  | 1   | 0  |
| 1   | 0  | 1  | 0   | 0  |
| 1   | 0  | 1  | 1   | 1  |
| 1   | 1  | 0  | 0   | 0  |
| 1   | 1  | 0  | 1   | 1  |
| 1   | 1  | 1  | 0   | 1  |
| 1   | 1  | 1  | 1   | 0  |

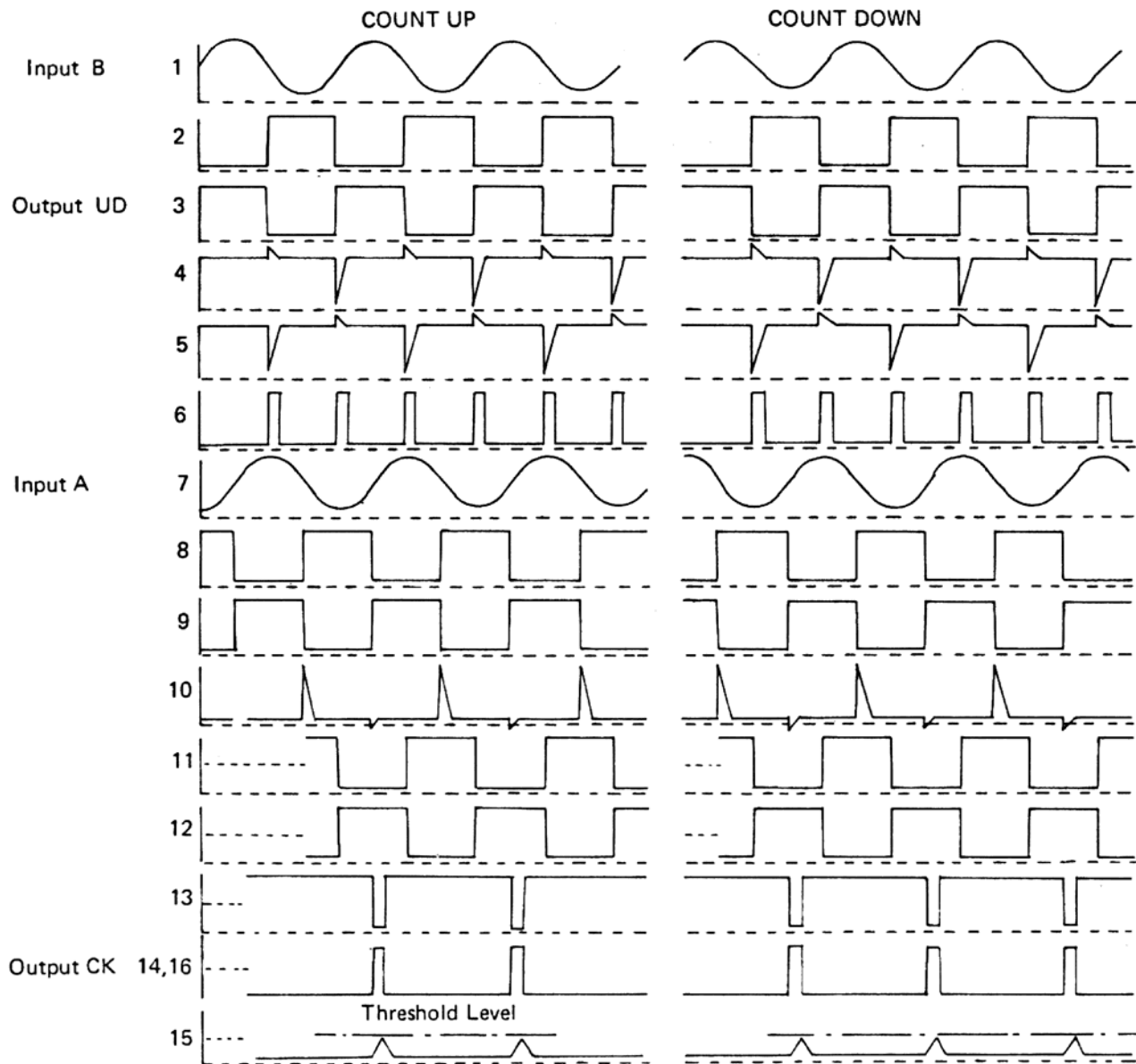
\* = 0 or 1

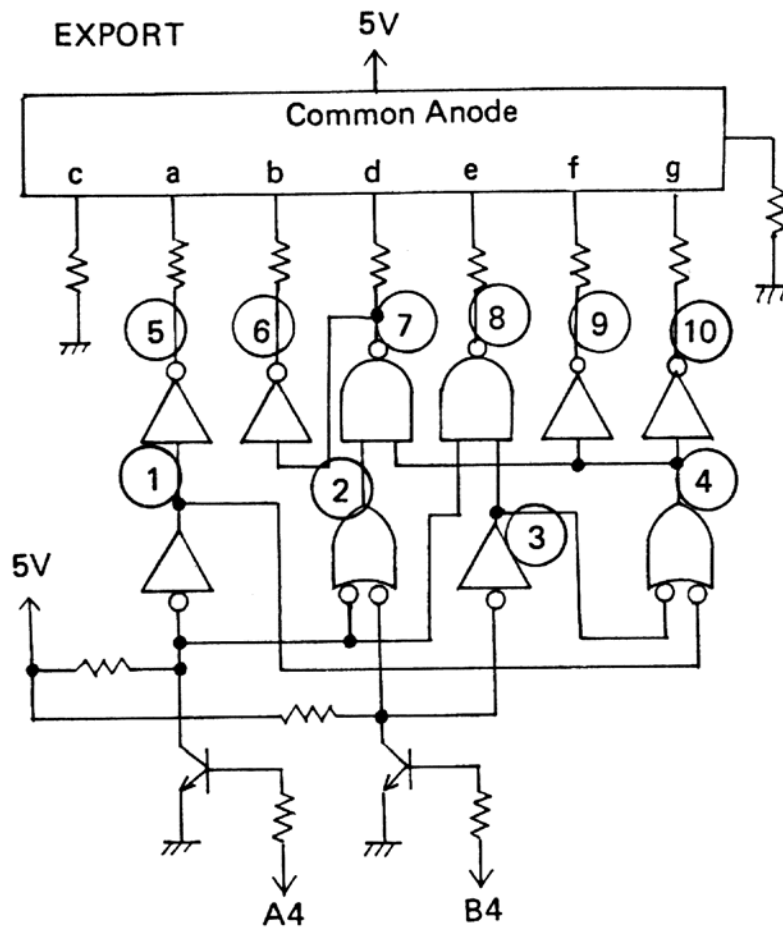


# DIAL PHASE CLOCK



## TIMING CHART

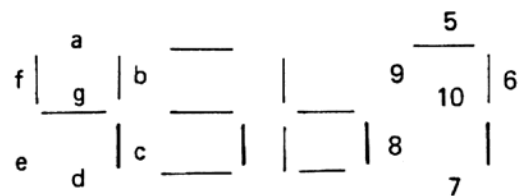




### TRUTH TABLE

EXPORT

| Input |    | Output |   |   |   |   |    |   |   |   |   |
|-------|----|--------|---|---|---|---|----|---|---|---|---|
| B4    | A4 | 5      | 6 | 7 | 8 | 9 | 10 | 1 | 2 | 3 | 4 |
| 0     | 0  | 1      | 0 | 1 | 1 | 0 | 0  | 0 | 0 | 0 | 1 |
| 0     | 1  | 0      | 1 | 0 | 1 | 0 | 0  | 1 | 1 | 0 | 1 |
| 1     | 0  | 1      | 1 | 0 | 0 | 0 | 0  | 0 | 1 | 1 | 1 |
| 1     | 1  | 0      | 0 | 1 | 1 | 1 | 1  | 1 | 1 | 1 | 0 |



### EF UNIT

|      |          |                         |
|------|----------|-------------------------|
| R-1  | Variable | PR-15K B10K             |
| R-2  | Variable | PR-15K A10K             |
| R-5  | Sensor   | MPY 54C69               |
| S-1  | Switch   | S2023-48C               |
| S-2  | Switch   | S2012-48C               |
| S-3  | Switch   | M02-6102                |
| D-1  | LED      | 303E                    |
| D-2  | LED      | 103S                    |
| D-3  | Diode    | 1SS53                   |
| D-5  | Diode    | GP08A                   |
| D-6  | Diode    | GP08A                   |
| C-1  | Ceramic  | 20P 50V                 |
| C-2  | Ceramic  | .01 50V                 |
| L-1  | Coil     | LA-115                  |
| PL-1 | Lamp     | White 5 $\phi$ 50mA 14V |
| M-1  | Meter    | YN-40A-2                |
| SP-1 | Speaker  | 66-52UT                 |

### DRIVER

|     |                  |                  |
|-----|------------------|------------------|
| IC1 | IC               | M53247P          |
| IC2 | IC               | M53247P          |
| IC3 | IC               | M53247P          |
| IC4 | IC               | M53204P          |
| IC5 | IC               | M53200P          |
| IC6 | IC               | $\mu$ PD4011C    |
| IC7 | IC               | $\mu$ PD4011C    |
| IC8 | IC               | $\mu$ PD4013C    |
| Q1  | Transistor       | JA1600G          |
| Q2  | Transistor       | 2SC945R          |
| Q3  | Transistor       | 2SC945R          |
| Q4  | Photo Transistor | PH101            |
| Q5  | Photo Transistor | PH101            |
| D1  | LED              | SR106C           |
| D2  | LED              | SR106C           |
| C1  | Milar            | 0.0047 $\mu$ 50V |
| C2  | Ceramic          | 470P 50V         |
| C3  | Ceramic          | 470P 50V         |
| C4  | Ceramic          | 0.0022 $\mu$ 50V |
| C5  | Ceramic          | 0.01 $\mu$ 50V   |

### DRIVER (DISPLAY)

|      |           |        |
|------|-----------|--------|
| IC9  | 7-Seg LED | TLR313 |
| IC10 | 7-Seg LED | TLR313 |

|      |           |        |
|------|-----------|--------|
| IC11 | 7-Seg LED | TLR313 |
| IC12 | 7-Seg LED | TLR313 |

### MAIN UNIT

|      |            |                   |
|------|------------|-------------------|
| R31  | Trimmer    | 3K ohm FR-10      |
| R38  | Trimmer    | 10K FR-10         |
| R55  | Thermistor | 33D28             |
| R86  | Trimmer    | 10K ohm FR-10     |
| R95  | Trimmer    | 3K ohm FR-10      |
| R105 | Thermistor | 33D28             |
| R106 | Trimmer    | 1K ohm FR-10      |
| R113 | Thermistor | 23D29             |
| R133 | Trimmer    | 1K ohm FR-10      |
| R135 | Trimmer    | 5K ohm FR-10      |
| R137 | Trimmer    | 100 ohm FR-10     |
| R138 | Trimmer    | 100 ohm FR-10     |
| R139 | Trimmer    | 30K ohm FR-10     |
| R145 | Trimmer    | 100K ohm FR-10    |
| R158 | Trimmer    | 3K FR-10          |
| R159 | Trimmer    | 3K FR-10          |
| C1   | Ceramic    | 0.001 $\mu$ F 50V |
| C2   | Ceramic    | 0.001 $\mu$ F 50V |
| C3   | Dip Mica   | 10pF 50V          |
| C4   | Ceramic    | 0.01 $\mu$ F 50V  |
| C5   | Ceramic    | 0.01 $\mu$ F 50V  |
| C6   | Ceramic    | 0.01 $\mu$ F 50V  |
| C7   | Ceramic    | 0.01 $\mu$ F 50V  |
| C8   | Ceramic    | 0.01 $\mu$ F 50V  |
| C9   | Ceramic    | 0.01 $\mu$ F 50V  |
| C10  | Ceramic    | 0.01 $\mu$ F 50V  |
| C11  | Ceramic    | 30 pF 50V         |
| C12  | Ceramic    | 0.01 $\mu$ F 50V  |
| C13  | Stycon     | 100 pF 50V        |
| C14  | Stycon     | 200 pF 50V        |
| C15  | Ceramic    | 0.01 $\mu$ F 50V  |
| C16  | Ceramic    | 2 pF 50V          |
| C17  | Milar      | 0.039 $\mu$ F 50V |
| C18  | Milar      | 0.039 $\mu$ F 50V |
| C19  | Milar      | 0.01 $\mu$ F 50V  |
| C20  | Milar      | 0.039 $\mu$ F 50V |
| C21  | Milar      | 0.039 $\mu$ F 50V |
| C22  | Milar      | 0.039 $\mu$ F 50V |
| C23  | Milar      | 0.01 $\mu$ F 50V  |
| C24  | Milar      | 0.056 $\mu$ F 50V |
| C25  | Milar      | 0.01 $\mu$ F 50V  |
| C26  | Milar      | 0.001 $\mu$ F 50V |
| C27  | Milar      | 0.056 $\mu$ F 50V |
| C28  | Milar      | 0.01 $\mu$ F 50V  |

### EF UNIT

|      |          |                         |
|------|----------|-------------------------|
| R-1  | Variable | PR-15K B10K             |
| R-2  | Variable | PR-15K A10K             |
| R-5  | Sensor   | MPY 54C69               |
| S-1  | Switch   | S2023-48C               |
| S-2  | Switch   | S2012-48C               |
| S-3  | Switch   | M02-6102                |
| D-1  | LED      | 303E                    |
| D-2  | LED      | 103S                    |
| D-3  | Diode    | 1SS53                   |
| D-5  | Diode    | GP08A                   |
| D-6  | Diode    | GP08A                   |
| C-1  | Ceramic  | 20P 50V                 |
| C-2  | Ceramic  | .01 50V                 |
| L-1  | Coil     | LA-115                  |
| PL-1 | Lamp     | White 5 $\phi$ 50mA 14V |
| M-1  | Meter    | YN-40A-2                |
| SP-1 | Speaker  | 66-52UT                 |

### DRIVER

|     |                  |                  |
|-----|------------------|------------------|
| IC1 | IC               | M53247P          |
| IC2 | IC               | M53247P          |
| IC3 | IC               | M53247P          |
| IC4 | IC               | M53204P          |
| IC5 | IC               | M53200P          |
| IC6 | IC               | $\mu$ PD4011C    |
| IC7 | IC               | $\mu$ PD4011C    |
| IC8 | IC               | $\mu$ PD4013C    |
| Q1  | Transistor       | JA1600G          |
| Q2  | Transistor       | 2SC945R          |
| Q3  | Transistor       | 2SC945R          |
| Q4  | Photo Transistor | PH101            |
| Q5  | Photo Transistor | PH101            |
| D1  | LED              | SR106C           |
| D2  | LED              | SR106C           |
| C1  | Milar            | 0.0047 $\mu$ 50V |
| C2  | Ceramic          | 470P 50V         |
| C3  | Ceramic          | 470P 50V         |
| C4  | Ceramic          | 0.0022 $\mu$ 50V |
| C5  | Ceramic          | 0.01 $\mu$ 50V   |

### DRIVER (DISPLAY)

|      |           |        |
|------|-----------|--------|
| IC9  | 7-Seg LED | TLR313 |
| IC10 | 7-Seg LED | TLR313 |

|      |           |        |
|------|-----------|--------|
| IC11 | 7-Seg LED | TLR313 |
| IC12 | 7-Seg LED | TLR313 |

### MAIN UNIT

|      |            |                   |
|------|------------|-------------------|
| R31  | Trimmer    | 3K ohm FR-10      |
| R38  | Trimmer    | 10K FR-10         |
| R55  | Thermistor | 33D28             |
| R86  | Trimmer    | 10K ohm FR-10     |
| R95  | Trimmer    | 3K ohm FR-10      |
| R105 | Thermistor | 33D28             |
| R106 | Trimmer    | 1K ohm FR-10      |
| R113 | Thermistor | 23D29             |
| R133 | Trimmer    | 1K ohm FR-10      |
| R135 | Trimmer    | 5K ohm FR-10      |
| R137 | Trimmer    | 100 ohm FR-10     |
| R138 | Trimmer    | 100 ohm FR-10     |
| R139 | Trimmer    | 30K ohm FR-10     |
| R145 | Trimmer    | 100K ohm FR-10    |
| R158 | Trimmer    | 3K FR-10          |
| R159 | Trimmer    | 3K FR-10          |
| C1   | Ceramic    | 0.001 $\mu$ F 50V |
| C2   | Ceramic    | 0.001 $\mu$ F 50V |
| C3   | Dip Mica   | 10pF 50V          |
| C4   | Ceramic    | 0.01 $\mu$ F 50V  |
| C5   | Ceramic    | 0.01 $\mu$ F 50V  |
| C6   | Ceramic    | 0.01 $\mu$ F 50V  |
| C7   | Ceramic    | 0.01 $\mu$ F 50V  |
| C8   | Ceramic    | 0.01 $\mu$ F 50V  |
| C9   | Ceramic    | 0.01 $\mu$ F 50V  |
| C10  | Ceramic    | 0.01 $\mu$ F 50V  |
| C11  | Ceramic    | 30 pF 50V         |
| C12  | Ceramic    | 0.01 $\mu$ F 50V  |
| C13  | Stycon     | 100 pF 50V        |
| C14  | Stycon     | 200 pF 50V        |
| C15  | Ceramic    | 0.01 $\mu$ F 50V  |
| C16  | Ceramic    | 2 pF 50V          |
| C17  | Milar      | 0.039 $\mu$ F 50V |
| C18  | Milar      | 0.039 $\mu$ F 50V |
| C19  | Milar      | 0.01 $\mu$ F 50V  |
| C20  | Milar      | 0.039 $\mu$ F 50V |
| C21  | Milar      | 0.039 $\mu$ F 50V |
| C22  | Milar      | 0.039 $\mu$ F 50V |
| C23  | Milar      | 0.01 $\mu$ F 50V  |
| C24  | Milar      | 0.056 $\mu$ F 50V |
| C25  | Milar      | 0.01 $\mu$ F 50V  |
| C26  | Milar      | 0.001 $\mu$ F 50V |
| C27  | Milar      | 0.056 $\mu$ F 50V |
| C28  | Milar      | 0.01 $\mu$ F 50V  |

|     |              |               |     |
|-----|--------------|---------------|-----|
| C29 | Electrolytic | 10 $\mu$ F    | 16V |
| C30 | Milar        | 0.01 $\mu$ F  | 50V |
| C31 | Milar        | 0.01 $\mu$ F  | 50V |
| C32 | Milar        | 0.001 $\mu$ F | 50V |
| C33 | Electrolytic | 10 $\mu$ F    | 16V |
| C34 | Milar        | 0.056 $\mu$ F | 50V |
| C35 | Milar        | 0.056 $\mu$ F | 50V |
| C36 | Milar        | 0.056 $\mu$ F | 50V |
| C37 | Milar        | 0.056 $\mu$ F | 50V |
| C38 | Milar        | 0.056         | 50V |
| C39 | Electrolytic | 4.7           | 16V |
| C40 | Milar        | 0.0022        | 50V |
| C41 | Milar        | 0.001         | 50V |
| C42 | Milar        | 0.0047        | 50V |
| C43 | Milar        | .022          | 50V |
| C44 | Milar        | .0047         | 50V |
| C45 | Electrolytic | 1 $\mu$       | 50V |
| C46 | Milar        | 0.01          | 50V |
| C47 | Milar        | 0.01          | 50V |
| C48 | Milar        | 0.039         | 50V |
| C49 | Milar        | 0.0022        | 50V |
| C50 | Milar        | 0.1 $\mu$     | 50V |
| C51 | Milar        | 0.039         | 50V |
| C52 | Electrolytic | 1.            | 50V |
| C53 | Electrolytic | 10            | 16V |
| C54 | Electrolytic | 10            | 16V |
| C55 | Electrolytic | 3.3           | 25V |
| C56 | Electrolytic | 3.3           | 25V |
| C57 | Electrolytic | 3.3           | 25V |
| C58 | Milar        | 0.01          | 50V |
| C59 | Electrolytic | 33            | 10V |
| C60 | Electrolytic | 0.47          | 50V |
| C61 | Milar        | 0.01          | 50V |
| C62 | Milar        | 0.01          | 50V |
| C63 | Ceramic      | 100p          | 50V |
| C64 | Milar        | 0.001         | 50V |
| C65 | Milar        | 0.001         | 50V |
| C66 | Electrolytic | 10            | 16V |
| C67 | Electrolytic | 4.7           | 16V |
| C68 | Milar        | 0.001         | 50V |
| C69 | Electrolytic | 47            | 10V |
| C70 | Electrolytic | 4.7           | 16V |
| C71 | Electrolytic | 220           | 10V |
| C72 | Milar        | 0.01          | 50V |
| C73 | Ceramic      | 100p          | 50V |
| C74 | Electrolytic | 33            | 10V |
| C75 | Milar        | 0.001         | 50V |
| C76 | Electrolytic | 100           | 10V |
| C77 | Electrolytic | 4.7           | 16V |

|      |              |          |     |
|------|--------------|----------|-----|
| C78  | Milar        | 0.01     | 50V |
| C79  | Ceramic      | 100p     | 50V |
| C80  | Milar        | 0.01     | 50V |
| C81  | Electrolytic | 220      | 10V |
| C82  | Milar        | 0.0033   | 50V |
| C83  | Milar        | 0.1      | 50V |
| C84  | Milar        | 0.0047   | 50V |
| C85  | Milar        | 0.01     | 50V |
| C86  | Ceramic      | 10p      | 50V |
| C87  | Ceramic      | 0.01     | 50V |
| C88  | Ceramic      | 200p     | 50V |
| C89  | Ceramic      | 100p     | 50V |
| C90  | Ceramic      | 10p      | 50V |
| C91  | Ceramic      | 0.01     | 50V |
| C92  | Ceramic      | 0.01     | 50V |
| C93  | Ceramic      | 0.01     | 50V |
| C94  | Ceramic      | 0.01     | 50V |
| C95  | Ceramic      | 6p       | 50V |
| C96  | Ceramic      | 10p      | 50V |
| C97  | Ceramic      | 0.35p    | 50V |
| C98  | Ceramic      | 0.35p    | 50V |
| C99  | Ceramic      | 0.35p    | 50V |
| C100 | Ceramic      | 0.35p    | 50V |
| C101 | Ceramic      | 6p       | 50V |
| C102 | Ceramic      | 6p       | 50V |
| C103 | Ceramic      | 6p       | 50V |
| C104 | Ceramic      | 6p       | 50V |
| C105 | Ceramic      | 4p       | 50V |
| C106 | Ceramic      | 0.001    | 50V |
| C107 | Ceramic      | 0.01     | 50V |
| C108 | Ceramic      | 0.01     | 50V |
| C109 | Ceramic      | 0.01     | 50V |
| C110 | Electrolytic | 4.7      | 16V |
| C111 | Ceramic      | 0.001    | 50V |
| C112 | Ceramic      | 0.5p     | 50V |
| C113 | Ceramic      | 7p       | 50V |
| C114 | Ceramic      | 30p      | 50V |
| C115 | Ceramic      | 0.01     | 50V |
| C116 | Ceramic      | 0.01     | 50V |
| C117 | Ceramic      | 0.001    | 50V |
| C118 | Ceramic      | 0.001    | 50V |
| C119 | Trimmer      | CVO5C120 |     |
| C120 | Ceramic      | 15P      | 50V |
| C121 | Trimmer      | CVO5C120 |     |
| C122 | Electrolytic | 10       | 16V |
| C123 | Ceramic      | 0.01     | 50V |
| C124 | Electrolytic | 47       | 16V |
| C125 | Ceramic      | 0.01     | 50V |
| C126 | Ceramic      | 0.001    | 50V |

|      |              |            |     |
|------|--------------|------------|-----|
| C127 | Electrolytic | 47 $\mu$   | 10V |
| C128 | Ceramic      | 0.01       | 50V |
| C129 | Trimmer      | CVC20-11   |     |
| C130 | Ceramic      | 15P        | 50V |
| C131 | Ceramic      | 0.001      | 50V |
| C132 | Trimmer      | CVE50-11   |     |
| C133 | Ceramic      | 68p        | 50V |
| C134 | Electrolytic | 330        | 16V |
| C135 | Ceramic      | 0.01       | 50V |
| C136 | Ceramic      | 0.001      | 50V |
| C137 | Trimmer      | 70p type-C |     |
| C138 | Ceramic      | 20p        | 50V |
| C139 | Ceramic      | 50p        | 50V |
| C140 | Trimmer      | 70p type-C |     |
| C141 | Ceramic      | 20p        | 50V |
| C142 | Ceramic      | 2p         | 50V |
| C143 | Ceramic      | 30p        | 50V |
| C144 | Ceramic      | 6p         | 50V |
| C145 | Ceramic      | 15p        | 50V |
| C146 | Ceramic      | 0.01       | 50V |
| C147 | Ceramic      | 1p         | 50V |
| C148 | Ceramic      | 0.01       | 50V |
| C149 | Ceramic      | 20p        | 50V |
| C150 | -            | -          | -   |
| C151 | Electrolytic | 1          | 50V |
| C152 | Electrolytic | 3.3        | 25V |
| C153 | Ceramic C    | 0.01       | 50V |
| C154 | Electrolytic | 3.3        | 35V |
| C155 | Electrolytic | 33         | 10V |
| C156 | Electrolytic | 0.47       | 50V |
| C157 | Ceramic      | 0.001      | 50V |
| C158 | Electrolytic | 10         | 16V |
| C159 | Electrolytic | 47         | 16V |
| C160 | Electrolytic | 220        | 10V |
| C161 | Milar        | 0.0033     | 50V |
| V162 | Electrolytic | 47         | 16V |
| V163 | Milar        | 0.1        | 50V |
| C164 | Electrolytic | 470        | 16V |
| C163 | Electrolytic | 47         | 10V |
| C166 | Electrolytic | 10         | 16V |
| C167 | Ceramic      | 0.01       | 50V |
| C168 | Ceramic      | 0.04       | 50V |
| C169 | Ceramic      | 0.001      | 50V |
| C170 | Ceramic      | 0.01       | 50V |
| C171 | Electrolytic | 0.47       | 50V |
| C172 | Ceramic      | 6P         | 50V |
| C173 | Ceramic      | 0.01       | 50V |
| C174 | Ceramic      | 0.01       | 50V |
| C175 | Ceramic      | 0.01       | 50V |

|      |         |       |     |
|------|---------|-------|-----|
| C176 | Ceramic | 100p  | 50V |
| C177 | Ceramic | 0.01  | 50V |
| C178 | Ceramic | 0.001 | 50V |
| C179 | Ceramic | 0.001 | 50V |
| C180 | Ceramic | 20p   | 50V |
| C181 | Ceramic | 0.01  | 50V |
| C182 | Ceramic | 0.02  | 50V |

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MAIN UNIT

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|     |            |               |
|-----|------------|---------------|
| IC1 | IC         | $\mu$ pc577H  |
| IC2 | IC         | TA7045M       |
| IC3 | IC         | $\mu$ pc575C2 |
| IC4 | IC         | BA-401        |
| Q1  | Transistor | 2SA639 Q      |
| Q2  | F E T      | 3SK40 K       |
| Q3  | F E T      | 3SK40 M       |
| Q4  | Transistor | 2SC945 P      |
| Q5  | F E T      | 2SK49 H2      |
| Q6  | Transistor | 2SC945 R      |
| Q7  | Transistor | 2SC945 P      |
| Q8  | Transistor | 2SC945 P      |
| Q9  | Transistor | 2SC1571 G     |
| Q10 | Transistor | 2SC945 P      |
| Q11 | Transistor | 2SC945 P      |
| Q12 | Transistor | 2SC945 P      |
| Q13 | Transistor | 2SC945 P      |
| Q14 | Transistor | 2SC1571 G     |
| Q15 | Transistor | 2SC1571 G     |
| Q16 | Transistor | JA1050 G      |
| Q17 | Transistor | 2SC1571 G     |
| Q18 | Transistor | 2SC945 R      |
| Q19 | Transistor | 2SC945 R      |
| Q20 | Transistor | 2SC945 P      |
| Q21 | Transistor | 2SC945 P      |
| Q22 | F E T      | 3SK40 M       |
| Q23 | Transistor | 2SC2053       |
| Q24 | Transistor | 2SC1947       |
| Q25 | Transistor | 2SC2094       |
| Q26 | Transistor | JA1050 G      |
| Q27 | F E T      | 2SK44 D       |
| Q28 | Transistor | JA1050 G      |
| Q29 | Transistor | 2SC945 P      |
| Q30 | Transistor | JA1600 G      |
| Q32 | Transistor | 2SC945 P      |
| Q33 | Transistor | 2SD359 D      |
| D1  | Diode      | 1SS55         |
| D2  | Diode      | 1SS55         |
| D3  | Diode      | 1SS53         |

|     |          |          |
|-----|----------|----------|
| D4  | Diode    | 1SS53    |
| D5  | Diode    | 1SS53    |
| D6  | Diode    | 1N60     |
| D7  | Diode    | 1N60     |
| D8  | Diode    | 1N60     |
| D9  | Diode    | 1N60     |
| D10 | Diode    | 1N60     |
| D11 | Diode    | 1S1555   |
| D12 | Diode    | 1SS53    |
| D13 | Diode    | 1N60     |
| D14 | Diode    | 1N60     |
| D15 | Vari Cap | 1S2688C  |
| D16 | Diode    | 1SS53    |
| D17 | Diode    | 1SS53    |
| D18 | Diode    | 1SS53    |
| D19 | Diode    | 1SS53    |
| D20 | Diode    | 1SS53    |
| D21 | Diode    | 1SS53    |
| D22 | Diode    | 1S1555   |
| D23 | Diode    | 1S1555   |
| D24 | Diode    | 1S2473   |
| D25 | Diode    | 1S2473   |
| D26 | Diode    | 1N60     |
| D27 | Diode    | 1N60     |
| D28 | Diode    | 1SS53    |
| D29 | Diode    | 1SS53    |
| D30 | Diode    | 1SS53    |
| D31 | Diode    | 1SS53    |
| D32 | Diode    | 1SS53    |
| D33 | Diode    | 1SS53    |
| D34 | Diode    | 1SS53    |
| D35 | Diode    | 1SS53    |
| D36 | Diode    | XZ096    |
| D37 | Diode    | SR10N-2R |
| L1  | Coil     | LS-4     |
| L2  | Coil     | LB-1-3A  |
| L3  | Coil     | LB-1-1   |
| L4  | Coil     | LB-1-1   |
| L5  | Coil     | LB-1-1   |
| L6  | Coil     | LB-1-3A  |
| L7  | Coil     | LR-17    |
| L8  | Coil     | LS-81    |
| L9  | Coil     | 101      |
| L10 | Coil     | LS-79    |
| L11 | Coil     | LS-20    |
| L12 | Coil     | 102      |
| L13 | Coil     | LS-16    |
| L14 | Coil     | 102      |
| L15 | Coil     | LS-80    |

|      |              |                       |
|------|--------------|-----------------------|
| L16  | Coil         | 100                   |
| L17  | Coil         | 101                   |
| L18  | Coil         | LS-66 A               |
| L19  | Coil         | 101                   |
| L20  | Coil         | LS-73                 |
| L21  | Coil         | LS-73                 |
| L22  | Coil         | LS-73                 |
| L23  | Coil         | LS-73                 |
| L24  | Coil         | LS-73                 |
| L25  | Coil         | LS-73                 |
| L26  | Coil         | LS-73                 |
| L27  | Coil         | LA-71                 |
| L28  | Coil         | LA-97                 |
| L29  | Coil         | LA-97                 |
| L30  | Coil         | LW-1                  |
| L31  | Coil         | LA-96                 |
| L32  | Coil         | LA-31                 |
| L33  | Coil         | LW-1                  |
| L34  | Coil         | LA-74                 |
| L35  | Coil         | LA-73                 |
| L36  | Coil         | LW-5                  |
| L37  | Coil         | LA-71                 |
| L38  | Coil         | LA-71                 |
| L39  | Coil         | LR-13                 |
| L40  | -            | -                     |
| L41  | Choke Trans  | TC-1B                 |
| L42  | Coil         | LS-73                 |
| L43  | Choke Coil   | 101                   |
| FL1  | Filter       | 10M20A                |
| FL2  | Filter       | CFU-455E              |
| FL3  | Filter       | CFU-455E              |
| DS 1 | Ceramic Disc | 455D                  |
| X-1  | Xtal         | HC/18 $\mu$ 10.245MHz |
| X-2  | Xtal         | HC/18 $\mu$ 10.703MHz |
| L44  | Choke Coil   | 100                   |

PLL

|     |            |               |
|-----|------------|---------------|
| R17 | Trimmer    | RGP102 B30K   |
| R18 | Trimmer    | RGP102 B3.3K  |
| R20 | Thermistor | 33D28         |
| R64 | Trimmer    | FR-10 10K     |
| C1  | Chemical   | 4.7 $\mu$ 25V |
| C2  | Ceramic    | .01 $\mu$ 50V |
| C3  | Chemical   | 47 $\mu$ 10V  |



|     |          |                 |
|-----|----------|-----------------|
| C4  | Chemical | 22 $\mu$ 16V    |
| C5  | Chemical | 47 $\mu$ 10V    |
| C6  | Chemical | 4.7 $\mu$ 50V   |
| C7  | Dip-mica | 39p 50V         |
| C8  | Dip-mica | 39p 50V         |
| C9  | Trimmer  | CVO5D180        |
| C10 | Milar    | .1 $\mu$ 50V    |
| C11 | Chemical | 10 $\mu$ 16V    |
| C12 | Milar    | .0047 50V       |
| C13 | Chemical | 47 $\mu$ 10V    |
| C14 | Ceramic  | 0.01 $\mu$ 50V  |
| C15 | Chemical | 33 $\mu$ 25V    |
| C16 | Milar    | .0022 $\mu$ 50V |
| C17 | Milar    | .0047 $\mu$ 50V |
| C18 | Chemical | 10 $\mu$ 16V    |
| C19 | Ceramic  | .01 $\mu$ 50V   |
| C20 | Ceramic  | .01 $\mu$ 50V   |
| C21 | Ceramic  | .01 $\mu$ 50V   |
| C22 | Ceramic  | 40p 50V         |
| C23 | Dip-mica | 15p 50V         |
| C24 | Ceramic  | 40p 50V         |
| C25 | Ceramic  | .01 $\mu$ 50V   |
| C26 | Ceramic  | .01 $\mu$ 50V   |
| C27 | Ceramic  | .01 $\mu$ 50V   |
| C28 | Ceramic  | .01 $\mu$ 50V   |
| C29 | Ceramic  | .01 $\mu$ 50V   |
| C30 | Ceramic  | .01 $\mu$ 50V   |
| C31 | Ceramic  | .01 $\mu$ 50V   |
| C32 | Ceramic  | .01 $\mu$ 50V   |
| C33 | Ceramic  | .01 $\mu$ 50V   |
| C34 | Trimmer  | CVO5D180        |
| C35 | Trimmer  | CVO5D120        |
| C36 | Chemical | 3.3 $\mu$ 25V   |
| C37 | Ceramic  | .001 50V        |
| C38 | Sticon   | 820P 50V        |
| C39 | Sticon   | 200P 50V        |
| C40 | Ceramic  | .01 $\mu$ 50V   |
| C41 | Sticon   | 100P 50V        |
| C42 | Sticon   | 820P 50V        |
| C43 | Ceramic  | .01 $\mu$ 50V   |
| C44 | Dip-mica | 39P 50V         |
| C45 | Ceramic  | .01 $\mu$ 50V   |
| C46 | Ceramic  | 10P 50V         |
| C47 | Ceramic  | .01 $\mu$ 50V   |
| C48 | Ceramic  | .01 $\mu$ 50V   |
| C49 | Ceramic  | 8P 50V          |
| C50 | Ceramic  | .5P 50V         |
| C51 | Ceramic  | 10P 50V         |
| C52 | Ceramic  | 0.01 $\mu$ 50V  |

|              |              |                   |
|--------------|--------------|-------------------|
| C53          | Milar        | .1 $\mu$ 50V      |
| C54          | Ceramic      | .01 $\mu$ 50V     |
| C55          | Chemical     | 22 $\mu$ 16V      |
| C56          | Ceramic      | .01 $\mu$ 50V     |
| C57          | Chemical     | 22 $\mu$ 16V      |
| C58          | Ceramic      | .01 $\mu$ 50V     |
| Feed Through |              | C60 ~ C100        |
| C100         | Kantsu-con   | B363YN820M        |
| C101         | Ceramic      | 470 pF 50V        |
| C102         | Ceramic      | 470 pF 50V        |
| C103         | Ceramic      | 470 pF 50V        |
| C104         | Ceramic      | 0.01 $\mu$ 50V    |
| C105         | Ceramic      | NPO 20p 50V       |
|              |              |                   |
| Q1           | Transistor   | 2SC945            |
| Q2           | FET          | 2SK44             |
| Q3           | Transistor   | 2SC945            |
| Q4           | Transistor   | 2SC1312-G         |
| Q5           | -            | -                 |
| Q6           | Transistor   | 2SC1312-G         |
| Q7           | Transistor   | 2SC945            |
| Q8           | Transistor   | JA1050-G          |
| Q9           | Transistor   | 2SC385            |
| Q10          | Transistor   | 2SC763-C          |
| Q11          | Transistor   | 2SC763-C          |
| Q12          | Transistor   | 2SC945            |
|              |              |                   |
| IC1          | LSI          | SC3062            |
| IC2          | IC           | $\mu$ PD4011      |
| IC3          | IC           | $\mu$ PD4030      |
| IC4          | IC           | TA7045M           |
| IC5          | IC           | $\mu$ PC577H      |
| IC6          | IC           | MC7805CP          |
| IC7          | DC Converter | DP-1              |
| IC8          | IC           | MC78L08           |
|              |              |                   |
| X1           | Xtal         | HC-18/U 5.000MHz  |
| X2           | Xtal         | HC-18/U 14.700MHz |
| X3           | Xtal         | HC-18/U 14.922MHz |
|              |              |                   |
| D2           | Diode        | 1SS53             |
| D3           | Diode        | 1SS53             |
| D4           | Diode        | 1SS53             |
| D5           | Diode        | 1SS53             |
| D6           | Diode        | 1SS53             |
| D7           | Varicap      | MV-201            |
| D8           | Varicap      | MV-201            |

|     |         |        |
|-----|---------|--------|
| D9  | Diode   | 1SS53  |
| D10 | Diode   | 1SS53  |
| D11 | Diode   | 1SS53  |
| D12 | Diode   | 1SS53  |
| D13 | Varicap | ITT410 |
| D14 | Varicap | ITT410 |

|    |       |        |
|----|-------|--------|
| L1 | Trans | LR-11B |
| L2 | Choke | 100    |
| L3 | Coil  | LS-93  |
| L4 | Coil  | LS-2   |
| L5 | Coil  | LS-3A  |
| L6 | Coil  | LS-3A  |
| L7 | Choke | 101    |
| L8 | Choke | 102    |

### DIMMER

|      |              |              |
|------|--------------|--------------|
| Q201 | Transistor   | 2SC945-F     |
| Q202 | Transistor   | 2SC945-P     |
| Q203 | Transistor   | JA1050-G     |
| Q204 | Transistor   | JA1600-G     |
|      |              |              |
| D201 | Diode        | 1SS53        |
|      |              |              |
| R201 | Trimmer      | 100K FR-10   |
| R202 | Trimmer      | 1K ohm R25J  |
| R203 | Trimmer      | 1K R25J      |
| R204 | Trimmer      | 4.7K R25J    |
| R205 | Trimmer      | 1K R25J      |
| R206 | Trimmer      | 470 R25J     |
| R207 | Trimmer      | 100 R25J     |
| R208 | Trimmer      | 1K R25J      |
| R209 | Trimmer      | 10K R25J     |
| R210 | Trimmer      | 220 R25J     |
| R211 | Trimmer      | 22K R25J     |
| R212 | Trimmer      | 1K R25J      |
|      |              |              |
| C201 | Electrolytic | 4.7 16V      |
| C202 | Electrolytic | 10 $\mu$ 16V |

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# SECTION X VOLTAGE CHARTS

| Unit      | No. | Transmit       |        |                    |                   | Receive        |        |                    |                   | Notes |
|-----------|-----|----------------|--------|--------------------|-------------------|----------------|--------|--------------------|-------------------|-------|
|           |     | Base or Gate 1 | Gate 2 | Collector or Drain | Emitter or Source | Base or Gate 1 | Gate 2 | Collector or Drain | Emitter or Source |       |
| U-116 PLL | Q1  | 8.5            |        | 8.6                | 7.8               |                |        |                    |                   |       |
| "         | Q2  | 0              |        | 8.6                | 3.9               |                |        |                    |                   |       |
| "         | Q3  | 0              |        | 0.9                | 0                 |                |        |                    |                   |       |
| "         | Q4  | 0              |        | 7.8                | 0                 |                |        |                    |                   |       |
| "         | Q6  | 0              |        | 7.8                | 0.3               |                |        |                    |                   |       |
| "         | Q7  | 7.5            |        | 7.6                | 7.0               |                |        |                    |                   |       |
| "         | Q8  | 4.5            |        | 5.0                | 5.0               |                |        |                    |                   |       |
| "         | Q9  | 1.8            |        | 8.3                | 1.0               |                |        |                    |                   |       |
| "         | Q10 | 1.4            |        | 8.4                | 0.8               |                |        |                    |                   |       |
| "         | Q11 | 1.4            |        | 8.4                | 0.8               |                |        |                    |                   |       |

| Unit      | No.  | Transmit    |     |     |     |     |     |     |     |   |    |     |     |    |    | Notes             |
|-----------|------|-------------|-----|-----|-----|-----|-----|-----|-----|---|----|-----|-----|----|----|-------------------|
|           |      | 1           | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9 | 10 | 11  | 12  | 13 | 14 |                   |
| U-116 PLL | IC-1 | (see below) |     |     |     |     |     |     |     |   |    |     |     |    |    |                   |
|           | IC-2 | 0           | 0   | 5   | 0   | 0   | 5   | 0   | 0   | 5 | 5  | 5   | 0~5 | 0  | 5  |                   |
|           | IC-3 | 5~0         | 0   | 0   | 0   | 5   | 5   | 0   | 5   | 0 | 5  | 0~5 | 5   | 5  | 5  |                   |
|           | IC-4 | 5           | 2.6 | E   | 1.9 | 5   | 6.7 | 7.5 | 7.5 |   |    |     |     |    |    |                   |
|           | IC-5 | 5.1         | 1.9 | 1.9 | E   | 5.4 | 3   | 6   |     |   |    |     |     |    |    |                   |
|           | IC-6 | 10.6        | E   | 5.0 |     |     |     |     |     |   |    |     |     |    |    | 1=B<br>2=C<br>3=E |

| Unit      | No.  | Receive |      |     |     |     |    |     |     |     |     |     |     |     |     | Notes  |
|-----------|------|---------|------|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|--|
|           |      | 1       | 2    | 3   | 4   | 5   | 6  | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  |  |
| U-116 PLL | IC-7 | 5       | -9.3 |     |     |     |    |     |     |     |     |     |     |     |     |  |
| "         | IC-8 | 13.8    | 0    | 8.4 |     |     |    |     |     |     |     |     |     |     |     |  |
| U-116 PLL | IC-1 | 1       | 2    | 3   | 4   | 5   | 6  | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  |  |
|           |      | 5       | 1.5  | 0.8 | 1.4 | 5   | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |  |
|           |      | 15      | 16   | 17  | 18  | 19  | 20 | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  |  |
|           |      | 0       | 0    | 0   | 0   | 0~5 | 0  | 0~5 | 0~5 | 0~5 | 0~5 | 0~5 | 0~5 | 0~5 | 0~5 |  |
|           |      | 29      | 30   | 31  | 32  | 33  | 34 | 35  | 36  | 37  | 38  | 39  | 40  |     |     |  |
|           |      | 0~5     | 0~5  | 0~5 | 0~5 | 0~5 | 0  | 5   | 0   | 0   | 0   | 0   | 2.8 |     |     | 21~28<br>D.LSW.ON-5V<br>T.S SW.ON-0<br>29~33<br>D.L SW ON-5V |

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