



# DIGITAL FREQUENCY CONTROLLER

## Model DFC-230



**INSTRUCTION MANUAL**

## INTRODUCTION

You are the owner of our newest product, the DFC-230 DIGITAL FREQUENCY CONTROLLER. Please read this instruction manual carefully before placing your DFC-230 in service.

The unit has been carefully engineered and manufactured to rigid quality standards, and should give you satisfactory and dependable operation for many years.

### AFTER UNPACKING;

Save the boxes and packing material in the event your unit needs to be transported for remote operation, maintenance, or service.

The following explicit definitions apply in this manual:

**NOTE:** If disregarded, inconvenience only, no risk of equipment damage or personal injury.

**CAUTION:** Equipment damage may occur, but not personal injury.

### CONTENTS

FEATURES .....	3
SPECIFICATIONS .....	3
BEFORE USE .....	4
CONTROLS and CONNECTORS .....	4
OPERATION .....	7
SCHEMATIC DIAGRAM .....	11

### ACCESSORIES

The DFC-230 is supplied with the following accessories:

- \* Dynamic microphone with UP-DOWN switch (T90-0316-05) ..... 1 piece
- \* Mounting bracket (with screws) (J02-0069-05) ..... 1 assy.
- \* Pin plug (1P) (E14-0101-05) ..... 1 piece

# FEATURES

## 1. Built-in digital VFO

The digital VFO frequency shifts up or down in 20 Hz steps by using the microphone UP-DOWN switches. Frequency can also be shifted rapidly, if desired.

## 2. Built-in 4 channel frequency memory circuit

Four different frequencies are stored in the memory circuit for more sophisticated transceiver operation.

## 3. Frequency shift with microphone

Operating frequency is shifted in three modes; step shift, either SLOW or FAST, by manipulating the UP-DOWN switches on the microphone, and fast-forward by holding the FAST STEP switch on the front panel.

## 4. Digital VFO/MEMORY RIT switch

Both Digital VFO and memory circuits can be RIT controlled. RIT frequency is adjustable with the microphone UP-DOWN switch or the controller main dial.

## 5. Four-digit LED (green) frequency display

Easy-to-read green LED display indicates frequencies covering 100 KHz to the 100 Hz order, 900.0 to 599.9 or 400.0 to 99.9 according to the transceiver's operating band.

## 6. Split frequency operation

Split frequency operation with the transceiver's VFO and DFC-230 is possible through use of the function switch.

## 7. Memory operation check with piezo-electric buzzer

By depressing the M IN and MR push switches, memory functions can be checked by the TONE buzzer.

## 8. CAL terminal

The built-in 10 MHz standard frequency oscillator can be calibrated to WWV.

# SPECIFICATIONS

<b>Oscillation frequency:</b>	5.40–6.10 MHz
<b>Output voltage:</b>	0.2 V
<b>Frequency stability:</b>	1 x 10 <sup>-5</sup> (at room temperature) 3 x 10 <sup>-5</sup> (at 0–50°C)
<b>Power requirement</b> (supplied from transceiver):	DC 9V, 30mA DC 13.8V, 380 mA Memory backup DC 13.8V, 10 mA
<b>Semiconductors:</b>	CPU . . . . . 1 ICs . . . . . 31 Transistors . . . . . 47 Diodes . . . . . 64
<b>Dimensions:</b>	147 (148) W x 51 (51) H x 166 (175) D mm (Figures in ( ) include projections.)
<b>Weight:</b>	Approx. 1.3 kg

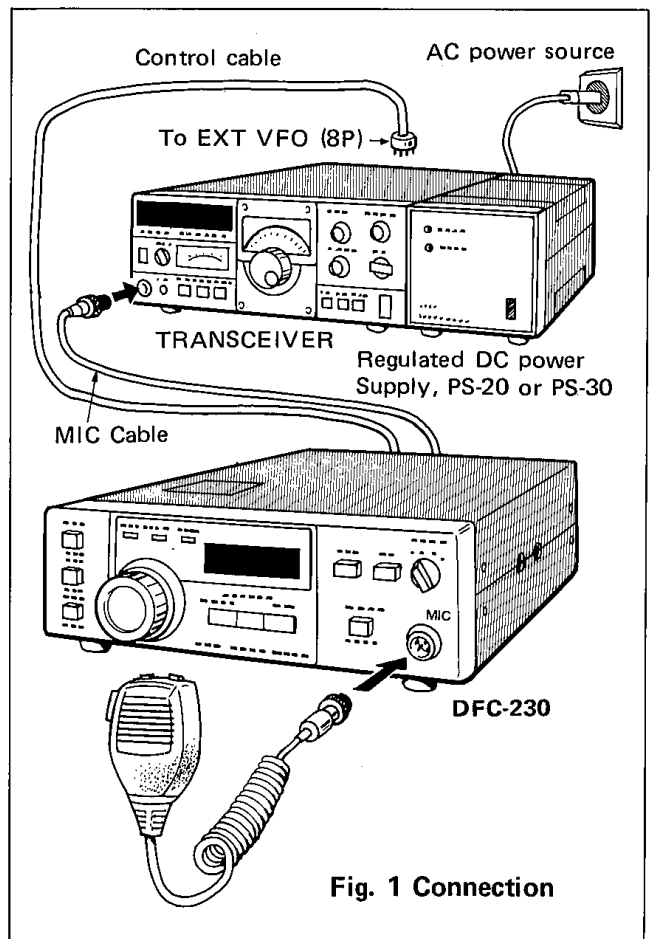
# BEFORE USE

## \* Connection

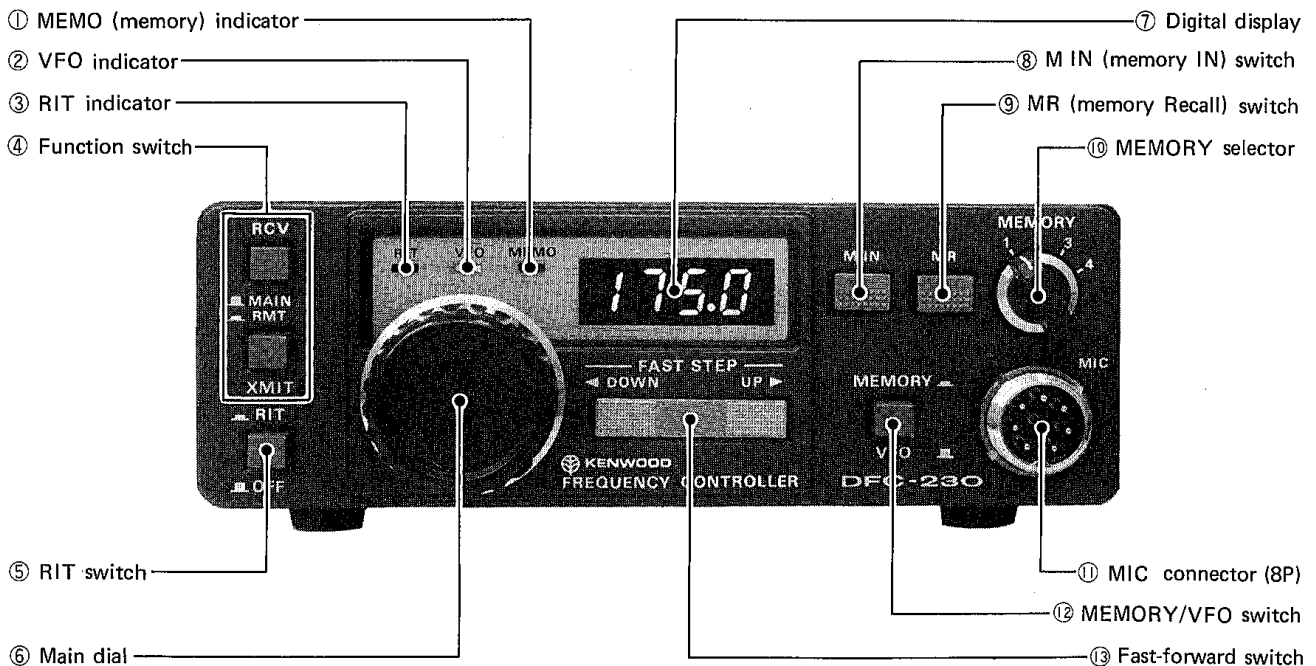
Connect the unit as shown in the illustration.

### [Note]

Turn OFF the transceiver power switch before connecting. This protects the transceiver and DFC-230 from accidental damage.



# CONTROLS and CONNECTORS



## FRONT PANEL

### 1. MEMO (memory) indicator

This indicator will light when a memory channel is in operation.

### 2. VFO indicator

This indicator will light when the controller VFO is in operation.

### 3. RIT indicator

This indicator will light when the controller RIT switch is ON.

### 4. Function switch

This switch is used for split frequency operation between the transceiver and the DFC-230 VFO or memory.

\* RCV (receive) switch .... Selects MAIN (transceiver VFO) or RMT (controller VFO or memory).

\* XMIT (transmit) switch .... Selects MAIN (transceiver VFO) or RMT (controller VFO or memory).

### 5. RIT switch

In the RIT (↔) position, the digital VFO and memory channels operate in RIT mode. Operating frequency is adjustable with the main dial, microphone UP-DOWN switch or fast-forward switch.

In the RIT OFF (⏏) position, RIT function is disabled and the operating frequency is reset to the original frequency.

RIT frequency range is the same as that the the controller VFO.

### 6. Main dial

This control selects operating frequency continuously in 20 Hz steps. One full rotation of the control shifts the frequency by 6 kHz.

### 7. Digital display

LEDs display the operating frequency in 4 digits (100 Hz – 100 kHz). The frequency displayed indicates the digital VFO or memory frequency. Transceiver VFO frequency is not displayed.

### 8. M IN (memory IN) switch

This switch is used to store the digital VFO frequency into the memory. With the switch depressed, the piezo-electric buzzer will sound to indicate that the displayed VFO frequency is stored in the memory.

### 9. MR (memory recall) switch

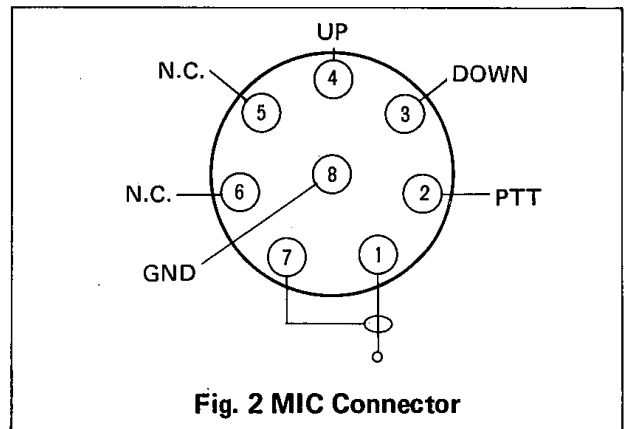
This switch is used to output memory frequencies from each channel to the digital VFO.

### 10. MEMORY selector

This switch is used to select memory channels 1 through 4. The operating frequency can be stored in or called back from the channel selected by this switch.

### 11. MIC connector (8-pin)

For connection of the supplied microphone.

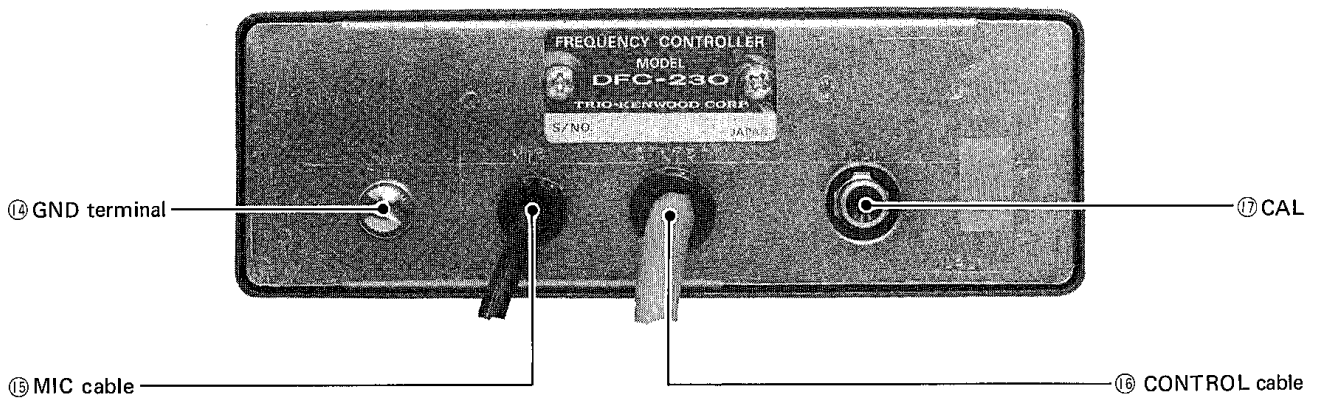


### 12. MEMORY/VFO switch

This switch is used to select the digital VFO or MEMORY.

### 13. Fast-forward switch

By using this switch, the operating frequency is shifted rapidly.



## REAR PANEL

### 14. GND terminal

Connect this terminal to the transceiver GND terminal.

### 15. MIC cable

Connect this cable to the transceiver MIC connector.

### 16. Control cable

Connect to the transceiver EXT VFO connector.

### 17. CAL terminal

Connect to the transceiver antenna terminal to calibrate the digital VFO standard frequency oscillator against WWV.

### 18. PTT switch

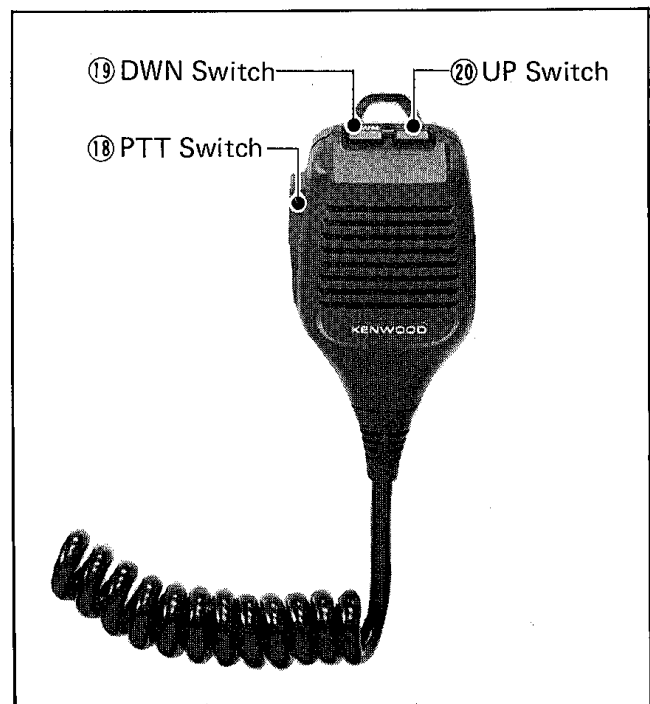
Press-to-talk switch used for transmission.

### 19. DOWN switch

This switch is used to shift down the digital VFO frequency. Depress and hold the switch to shift the frequency rapidly.

### 20. UP switch

This switch is used to shift up the digital VFO frequency. Depress and hold the switch to shift the frequency rapidly.



# OPERATION

## \* Power ON

Turn ON the transceiver power switch and the DFC-230 will be ready for operation.

## \* Function switch

The RCV (receive) and XMIT (transmit) switches are used to select the MAIN (transceiver) or RMT (DFC-230) VOF's in RCV (receive) and XMIT (transmit), to achieve split frequency operation.

Refer to Table 1 for the functions of these switches.

**Note:** Split frequency operation between the digital VFO and memory channels is not possible.

Function switch Position		Transceiver	DFC-230 VFO or memory
RCV	XMIT		
MAIN	MAIN	Transmit/ receive	—
MAIN	RMT	Receive	Transmit
RMT	MAIN	Transmit	Receive
RMT	RMT	—	Transmit/ receive

## \* Digital VFO

The digital VFO frequency can be shifted in 20 Hz steps by using the main dial, microphone UP-DOWN switches or the fast-forward switch.

(a) Main dial .... One full rotation of the dial shifts the frequency by 6 kHz.

(b) Fast-forward switch .... Depress and hold the UP or DOWN switch and the frequency will shift rapidly at about 80 kHz/sec.

(c) Microphone UP-DOWN switches .... The frequency is shifted in 3 modes; step shift, SLOW shift (depress and hold the UP or DOWN switch) and FAST shift (depress UP or DOWN switch and hold).

## \* MEMORY function

\* By depressing the M IN switch, the digital VFO frequency is stored in the selected memory channel.

**Note:** Transceiver VFO frequency cannot be stored in the memory.

\* By depressing the MR switch, the frequency stored in the memory channel is called back and input to the digital VFO. (At this time, the VFO frequency goes off,

but the memory frequency remains unchanged.)

\* Operation on memory frequency is achieved by setting the MEMORY/VFO switch to the MEMORY position.

**Note:** During memory operation or memory RIT operation, the M IN switch and the MR switch do not work.

## \* RIT switch operation

With the RIT switch ON, either the digital VFO or MEMORY will operate in the RIT mode. The operating frequency can be selected by the main dial, microphone UP-DOWN switches or the fast-forward switch. The RIT operation is disabled by turning the RIT switch OFF or by using the MEMORY/VFO switch. In this case, the operating frequency is reset to the original frequency. The RIT frequency is adjustable from 5.4 to 6.09998 MHz.

**Note:** During memory RIT operation, do not change the MEMORY selector position unless the RIT switch is OFF.

## \* Memory backup

When the PS-30/PS-20 power supply is used in combination with the TS-130S/V transceiver, memory is retained by backup power if the PS-30/PS-20 power switch is left ON).

Memory is also retained when battery is connected directly to the TS-130S/V without using an ON-OFF switch.

**Note:** \* Memory backup function is not available if the DFC-230 is connected to the TS-830S transceiver.

\* If the DFC-230 is connected to the TS-120S/V, memory backup function and 0.5 MHz display (for instance 3.500 MHz is displayed as 500.0) are not available. However, these functions can be realized by modifying the TS-120S/V as described below.

### Modification of TS-120S/V

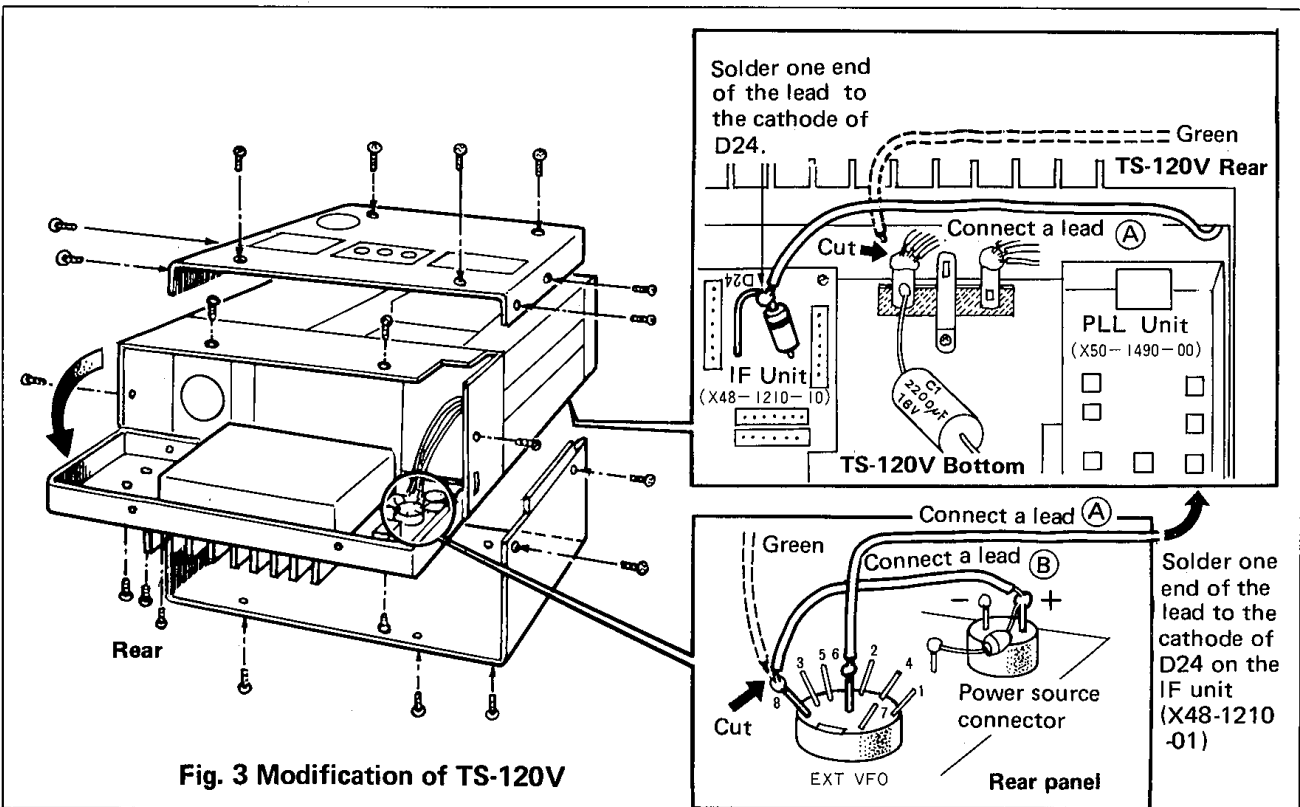
\* Modification to the TS-120S/V is accomplished by adding one lead to the EXT VFO connector and changing the connection of one other lead.

#### PROCEDURE

##### TS-120V (Fig. 3)

1. Remove the top and bottom covers.
2. Unscrew the six screws holding the rear panel. Remove the rear panel.

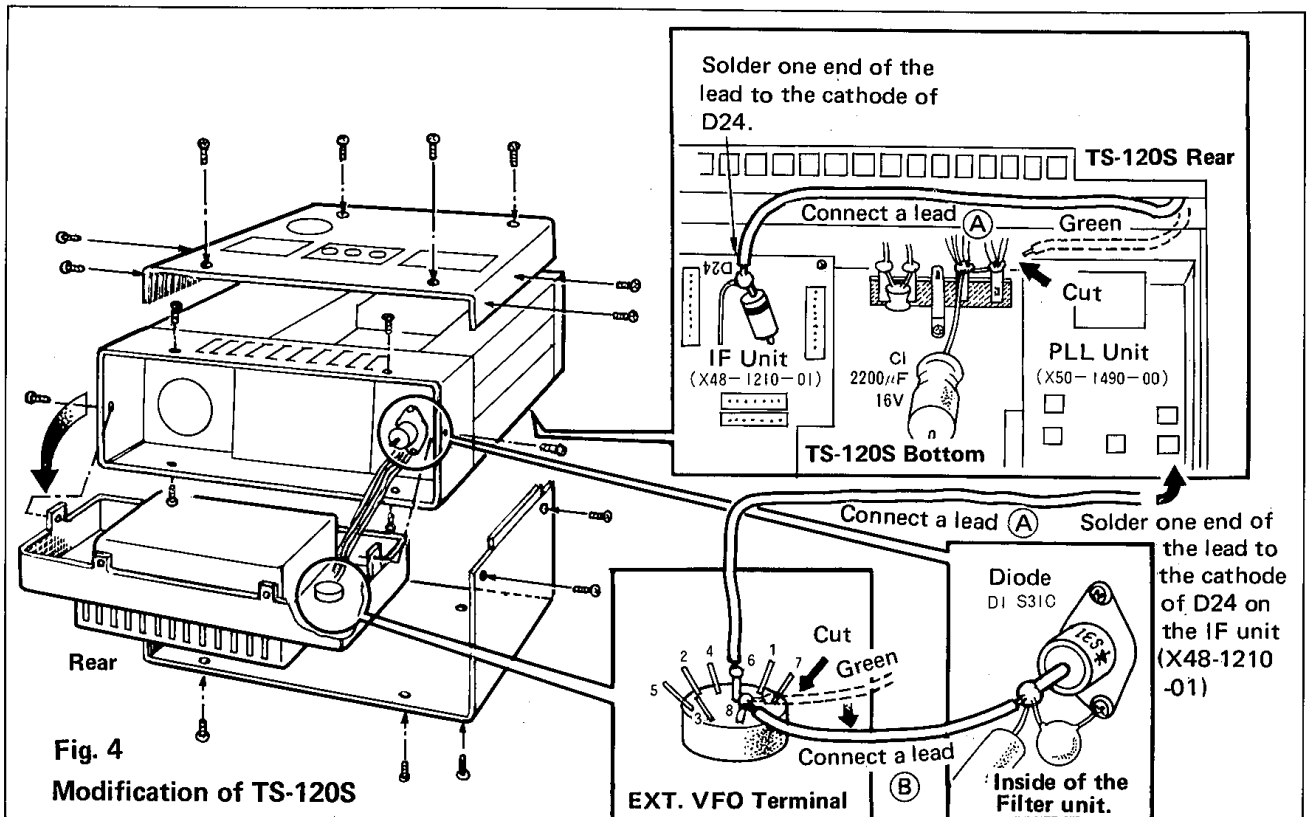
3. Connect a lead between the cathode of diode D24 located near connector No. 23 on the IF unit (X48-1210-01) or pin No. 9 of the connector (rear side of PC board) and pin No. 6 (center pin) of the EXT VFO (Connection "A").
4. Disconnect the green lead from pin No. 8 of the EXT VFO connector and reconnect it to the position (+) side of the power connector (Connection "B").
5. Replace the rear panel, top and bottom covers.



##### TS-120S (Fig. 4)

1. Remove the top and bottom covers.
2. Unscrew the six screws holding the final unit. Remove the final unit.
3. Connect a lead between the cathode of diode D24 located near connector No. 23 on the IF unit (X48-1210-01) or pin No. 9 of the connector (rear side of PC board) and pin No.

- 6 (center pin) of the EXT VFO connector (Connection "A").
4. Disconnect the green lead from pin No. 8 of the EXT VFO connector and reconnect it to the cathode of diode D1 (S31C) in the Filter unit (Connection "B").
5. Replace the final unit, top and bottom covers.



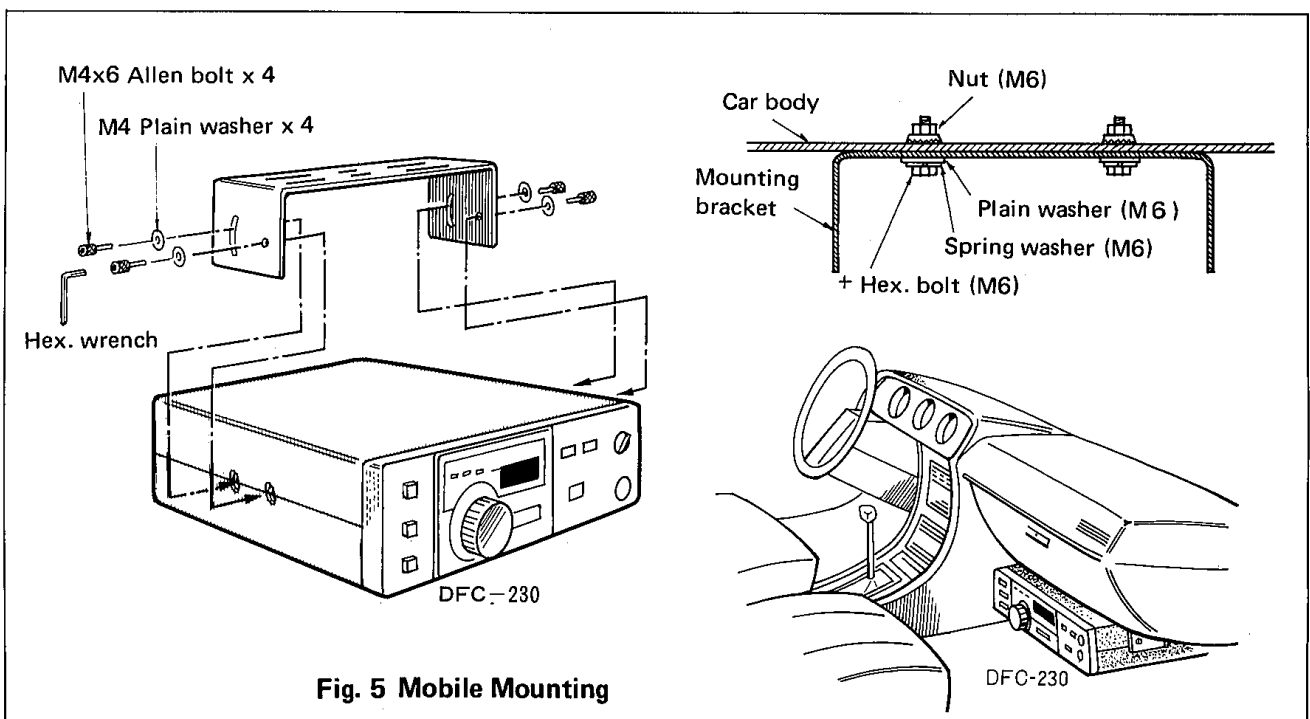
## MOBILE OPERATION

Use the supplied mounting bracket to install the unit in your car, except if it is to be installed in the car's glove box.

The mounting bracket can be used either on the

top or bottom of the unit as shown in Fig. 5.

**Note:** Mounting screws (Allen bolts, M4 x 6) are supplied. In case these screws are lost, be sure to use screws not longer than 6 mm.



# SCHEMATIC DIAGRAM

• Circuit design and ratings are subject to change for improvement without notice.

