INSTRUCTION MANUAL

FOR

MODEL NRD-345

HF RECEIVER

NRD-345 HF RECEIVER

JRC *Japan Radio Co., Ltd.*

CONTENTS

Explanation of Main Technical Terms

CPU ···················· Central Processing Unit

DDS ···················· Direct Digital Synthesizer

FET ···················· Field Effect Transistor

HF ···················· High Frequency

MF ···················· Medium Frequency

PLL ···················· Phase Locked Loop

PPM ···················· Parts Per Million

SECTION 1: UNIT OVERVIEW

1.1 FUNCTIONS

The NRD-345 is an HF receiver that continuously covers the 100 kHz to 30 MHz range.

1.2 FEATURES

(1) HIGH SENSITIVITY AND DYNAMIC RANGE

An RF amplifier with four parallel-connected JFETs and a double balanced mixer with quadruple-connected FETs provide high sensitivity and dynamic range.

(2) ONE-CHIP DDS-ICs

The latest Direct Digital Synthesis (DDS) ICs are used in the PLL circuit to reduce the circuit size and improve the C/N ratio.

(3) 5 Hz TUNING RESOLUTION

Although the display only shows a tuning resolution of 10 Hz, the MAIN TUNING DIAL can actually tune in 5 Hz steps. In addition, a high-precision optic type rotary encoder is used in the MAIN TUNING DIAL system.

(4) AM SYNCHRONOUS DETECTION

The NRD-345 is standard-equipped with an AM synchronous detection circuit.

(5) FAX RECEPTION

The NRD-345 has a FAX mode to enable FAX reception.
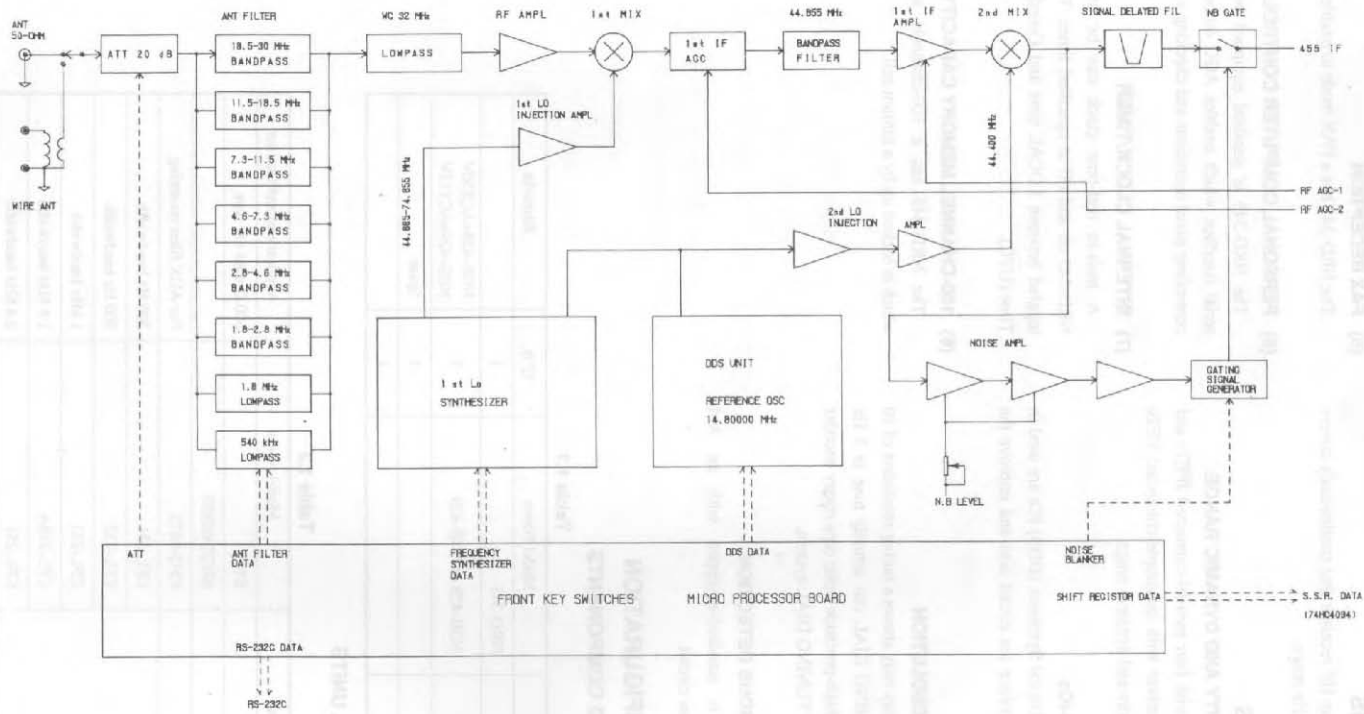
(6) PERSONAL COMPUTER CONTROL

The NRD-345 is standard equipped with an RS-232C serial interface which enables AGC output in addition to controlling panel operations and checking system status.

(7) INTERNAL CLOCK/TIMER

A built-in real-time clock can be used to turn the NRD-345 on and off at specified times. The clock can be toggled between LOCAL time and Coordinated Universal Time (UTC).

(8) 100-CHANNEL MEMORY CAPACITY

The NRD-345 has a 100-channels memory capacity which is backed up by a lithium cell.

1.3 UNIT CONFIGURATION

1.3.1 STANDARD COMPONENTS

Table 1.1

Product Name	Model Name	Q'ty	Remarks
Body	NRD-345	1	
AC adapter	NBB-428 or NBB-429	1	NBB-428=AC230V NBB-429=AC115V
Fuse		1	Spare
Instruction Manual		1	

1.3.2 OPTIONAL UNITS

Table 1.2

Product Name	Model Name	Applications and Outline
Headphone	ST-3	600 Ω dual-ear type
RS-232C cable	6ZCJD00350	
AUX filter board	CFQ-8673	For AUX filter mounting
AUX filter	CFL-231	300 Hz bandwidth
	CFL-232	500 Hz bandwidth
	CFL-233	1 kHz bandwidth
	CFL-218A	1.8 kHz bandwidth
	CFL-251	2.4 kHz bandwidth
DC cable	CFQ-8744	$\ell = 2$ m

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NRD-345 Receiver. Functional Block Diagram.
Figure 1.1 (sheet 1/2)
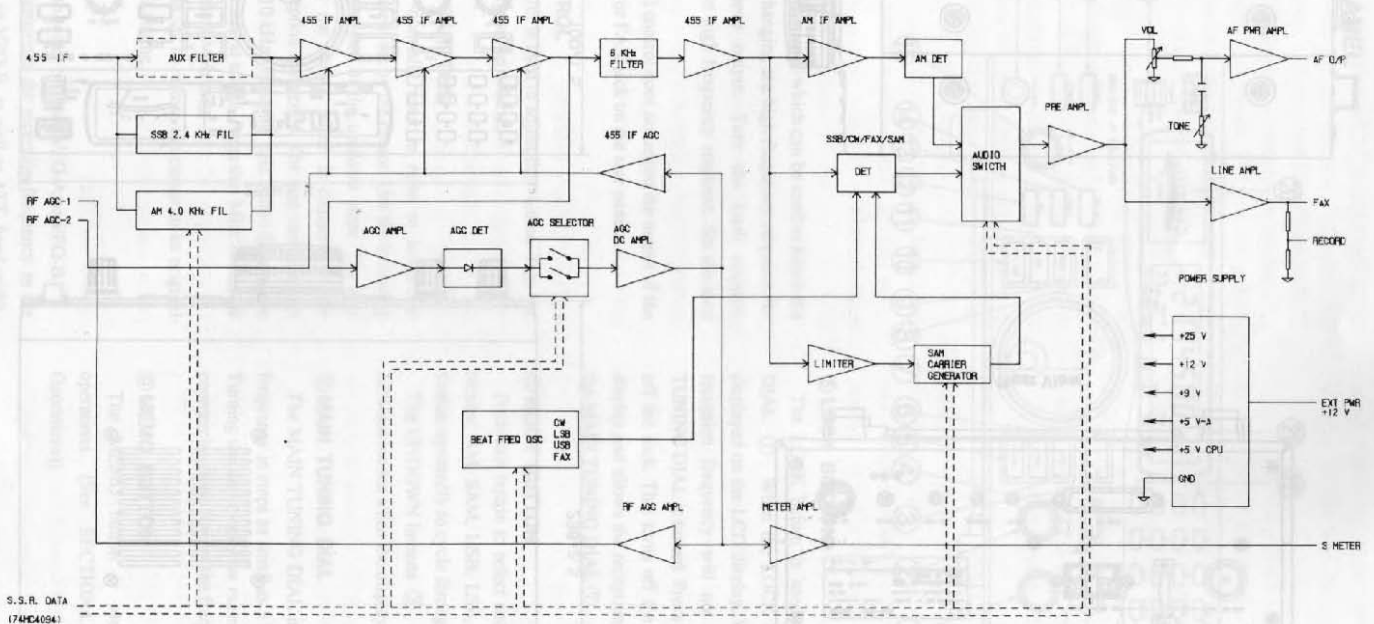
NRD-345 Receiver. Functional Block Diagram.
Figure   1.2 (sheet 2/2)

1.5 EXTERNAL DIAGRAMS
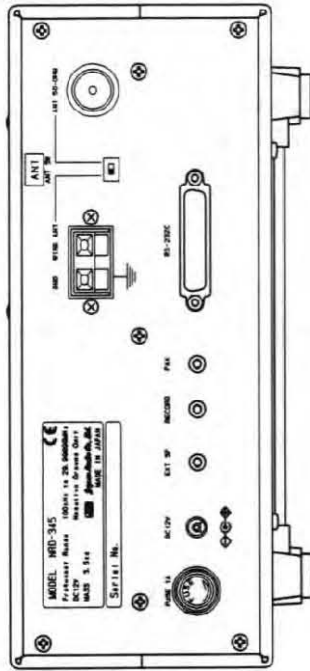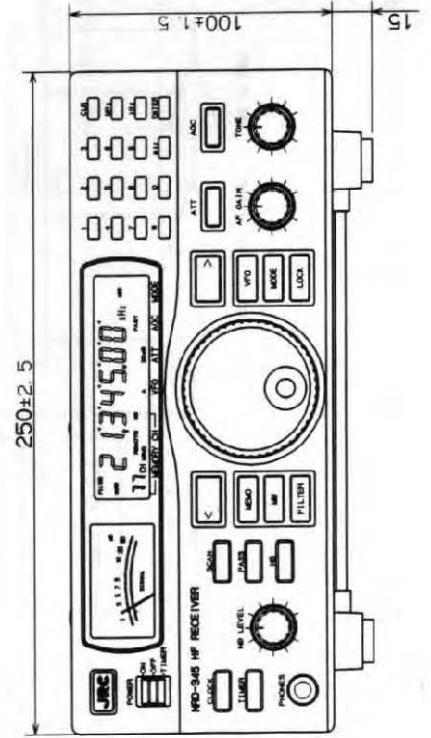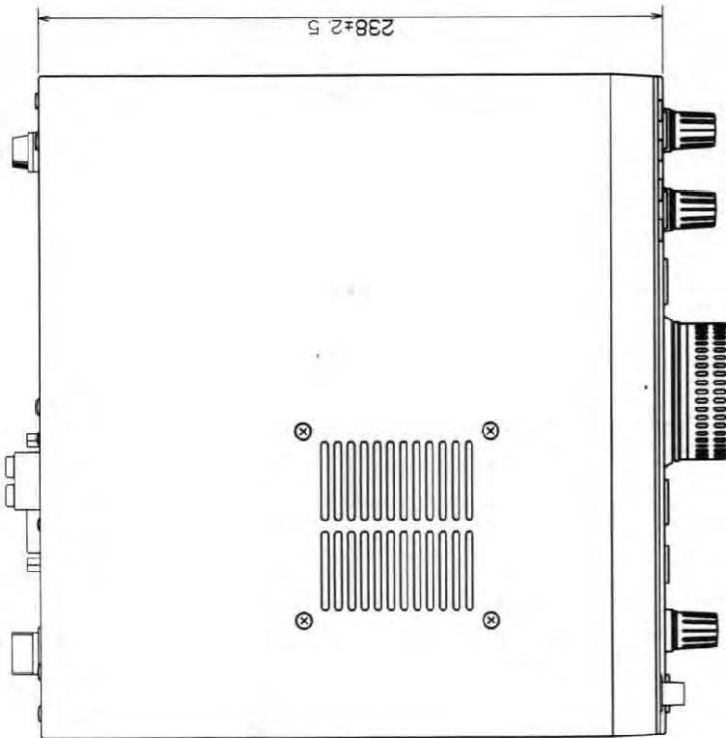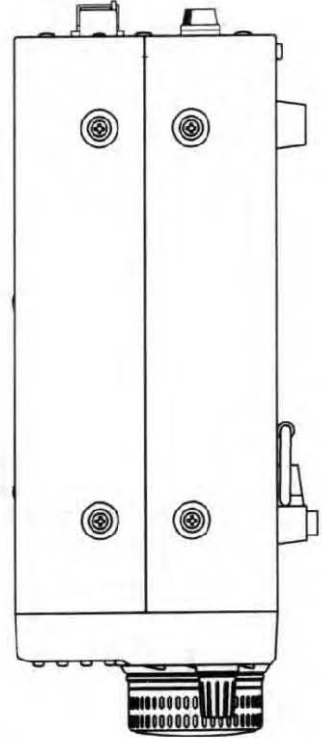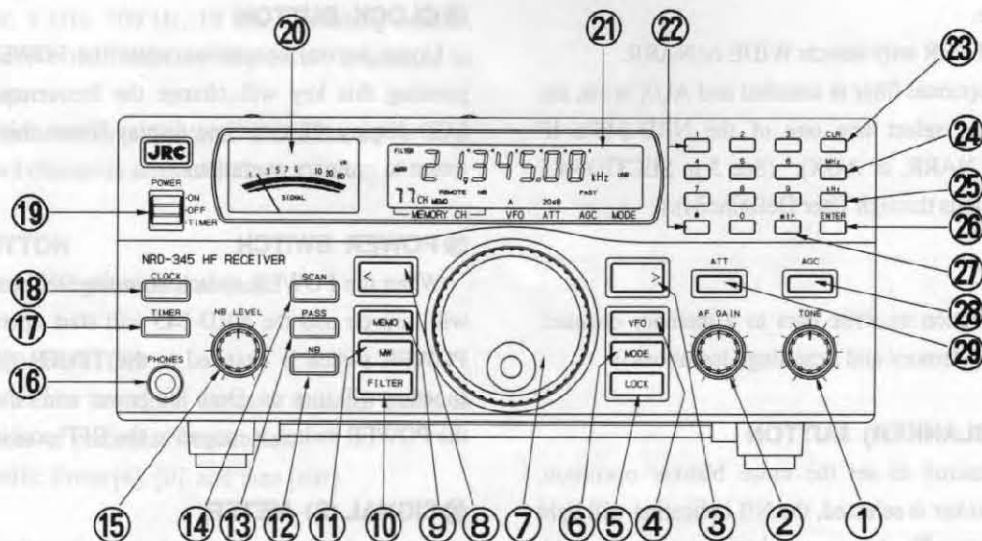
Rear View

SECTION 2: OPERATING CONTROLS

2.1 FRONT PANEL

① TONE CONTROL

The TONE control is a knob which can be used to adjust the NRD-345's tone by changing the high frequency response for speaker and headphone output. Turn the knob counter-clockwise to lower the high frequency response. Set the tone as desired.

Note that the TONE control does not adjust the output of the recording (REC) jack or FAX jack on the rear panel.

② AF GAIN CONTROL

The AF GAIN control is used to adjust the volume. Turn the knob clockwise to increase the volume.

③ >, ⑧ <UP/DOWN BUTTONS

These buttons are normally used to raise or lower the frequency in the increment set by the cursor. Use the following procedure to change the size of the up/down steps. The step width is indicated by the cursor, which is displayed to the upper right of the reception frequency. The step can be set in the range of 10 Hz to 10 kHz. Press the kHz button ㉕ to move the cursor upward one step at a time. Press the MHz button ㉔ to move the cursor to the 1 MHz step.

Press the kHz button ㉕ to restore the cursor to its original setting from the 1 MHz setting.

④ VFO BUTTON

This button is used to select between VFO-A or VFO-B.

The VFO button memorizes the reception frequency in the each status of VFO-A or VFO-B, as well as ATT, band width, mode, AGC and NB.

⑤ LOCK BUTTON

The LOCK button is used to lock the MAIN TUNING DIAL ⑦ . When the LOCK button is pressed, [LOCK] is displayed on the LCD display. When this button is locked, the reception frequency will not change even if the MAIN TUNING DIAL is turned. Press the LOCK button again to turn off the lock. This turns off the LOCK indicator on the LCD display and allows the reception frequency to be changed with the MAIN TUNING DIAL ⑦ .

⑥ MODE BUTTON

Press this button to select and display one of the following modes: AM, SAM, USB, LSB, CW, FAX. Press the MODE button repeatedly to cycle through the modes in sequence.

The UP/DOWN buttons ③ , ⑧ can also be used to switch between modes when the display is blinking.

⑦ MAIN TUNING DIAL

The MAIN TUNING DIAL is used to change the reception frequency in steps as small as 5 Hz (the display shows 10 Hz). Turning the dial clockwise raises the frequency, and turning it counterclockwise lowers the frequency.

⑨ MEMO BUTTON

The MEMO button is used to set memory channel operations. (See SECTION4.2 (Memory and Scanning Operations)).

⑩ FILTER BUTTON

The FILTER button is used to select the IF FILTER. Press this button once to toggle between WIDE and NARR filters. The FILTER indication in the upper right part of the LCD display will change.

Normally the FILTER only selects WIDE or NARR.

However, if an optional filter is installed and AUX is set, the FILTER button can select any one of the NRD-345's IF FILTERS (WIDE, NARR, or AUX). (See 3 in SECTION4.5 (Modifying Operations through User Definitions).)

⑪ MW BUTTON

Press the MW button to write data to a memory channel. (See SECTION4.2(Memory and Scanning Operations)).

⑫ NB (NOISE BLANKER) BUTTON

Press the NB button to set the noise blanker operation. When the noise blanker is selected, the NB indication will light up on the LCD display ㉑. After setting the noise blanker with this button, use the NB LEVEL control ⑮ to find the optimum level.

⑬ PASS BUTTON

This button is used to pass over undesired channels when scanning during the pause-scan operation. (See SECTION4.2 (Memory and Scanning Operations)).

⑭ SCAN BUTTON

This button is used for pause-scanning. (See SECTION4.2 (Memory and Scanning Operations)).

⑮ NB LEVEL CONTROL

This control is used to adjust the noise blanker operations. Find the optimum level based on the reception conditions and the noise level.

Important: The NB LEVEL control will not work if the noise blanker is not turned on with the NB button ⑫. Turning the NB LEVEL control too far to the right may cause distortion in the desired signal.

Caution

This control will work only if the noise blanker is turned ON at NB button ⑫. If this control is turned too far to the right, the desired signal may be distorted.

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⑯ PHONES (headphones) JACK

This jack is used for headphone output. Stereo headphones can also be used. When headphones are used, output to the internal speaker and external speaker is turned off.

⑰ TIMER BUTTON

This button is used to turn the timer on or off. (See SECTION4.3 (CLOCK/TIMER OPERATIONS).)

⑱ CLOCK BUTTON

Under normal operations while the POWER switch is on, pressing this key will change the frequency display on the LCD display ㉑ to a time display. Press this button again to return to ordinary operations.

⑲ POWER SWITCH

When the POWER switch is in the ON position, the power will turn on and the NRD-345 will start operating. When the POWER switch is changed to the TIMER position the timer function will turn on. Both the power and timer turn off when the POWER switch is moved to the OFF position.

⑳ SIGNAL (S) METER

The received signal strength is displayed on a scale of 1-9, 9+10 dB-60 dB.

㉑ LCD DISPLAY

The LCD display shows the frequency, memory channels, time, etc. The LCD back light cannot be turned off.

㉒ NUMERICAL KEYPAD

The numerical keypad is used to set frequencies, channels, and the time.

㉓ CLR (CLEAR) BUTTON

If you make an entry error while entering frequency, channel, or time data using the numerical keypad ㉒, press the CLR button to erase the entered data and restore the pre-entry settings.

㉔ MHz BUTTON

This button is used to set the frequency in MHz steps using the numerical keypad ㉒.

·Entered data are registered when this button is pressed.

You can also use this button to select the minimal increments for changing the frequency using the MAIN TUNING DIAL ⑦. Pressing this button lights up the [◀] mark on the upper right part of the MHz digit frequency display, and that digit will be the minimum increment.

㉕ kHz BUTTON

This button is used to set the frequency in kHz steps using the numerical keypad ㉒. Press this button to register the entered data.

The kHz button can also be used to select the minimum

increment step for changing the frequency with the MAIN TUNING DIAL ⑦ . Pressing the kHz button moves the selector mark [◀], located to the upper right part of the frequency display, through the following frequency step settings: 10 kHz, 1 kHz, 100 Hz, 10 Hz. A blinking selector mark is shown above the frequency step which is selected as the minimum step.

(Note: If the selector mark is displayed above the 10 Hz step, the frequency will change in steps of 5 Hz.)

㉖ ENTER BUTTON

Press this button to register entered data.

㉗ mtr (METER) BUTTON

Use this key to enter broadcast bands or amateur bands as meter bands instead of particular frequencies.
Example for 7 MHz: Press [4], [0], and then [mtr].

㉘ AGC BUTTON

This button is used to select AGC OFF or a time constant (SLOW or FAST). Press this button once to change the AGC indication between SLOW and FAST on the LCD display.

Operations for selecting AGC OFF.

Set the POWER switch ⑲ to ON while holding down the AGC button. The only AGC options will be SLOW, FAST, and OFF not displayed. Perform the operation again to prevent AGC OFF from being selected.

㉙ ATT BUTTON

Use this button to input the 20 dB high frequency attenuator to the antenna input terminal.

This option should be used if the desired signal is being blocked by a very strong interference signal. A 20 dB indication appears on the LCD display ㉑ while the 20 dB ATT is being used.

2.2 REAR PANEL

㉚ ANT Lo-Z (low impedance) CONNECTOR

This connector is used to connect an antenna of low (50 Ω) impedance. To ensure optimum performance for the NRD-345, use the best possible antenna.

㉛ ANT SWITCH

The ANT switch is used to toggle between low impedance (Lo-Z) ANT 50-0HM and high impedance (Hi-Z) WIRE ANT impedance antenna inputs. Set the ANT switch to the antenna input impedance which is being used.

㉜ RS-232C CONNECTOR

This connector allows the NRD-345 to be remotely controlled through a personal computer. A connector cable is not supplied with the NRD-345. Use the optional 6ZCJDOO350 RS-232C cable (male-male cross connection, DSUB-25 pin connector).

㉝ FAX (LINE OUT) JACK

The LINE OUT jack is used to receive faxes. The output is the same as the signal which is output to the RECORD jack ㉞.
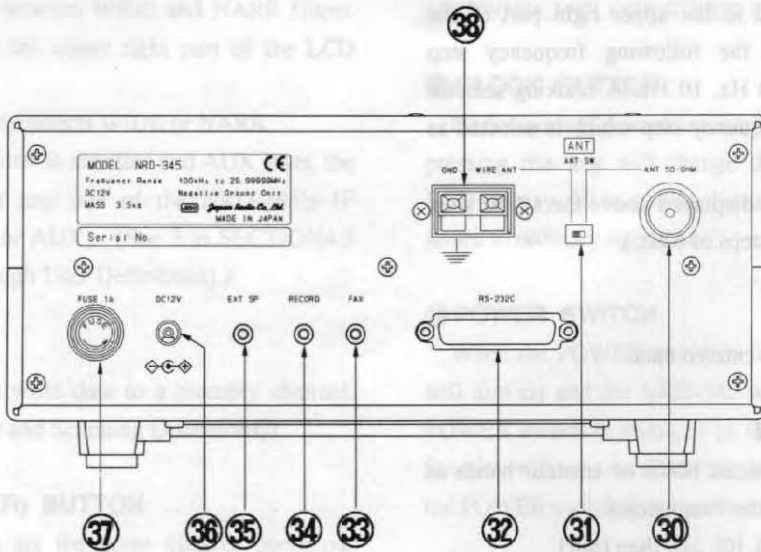
㉞ RECORD JACK

This jack is used to record a received signal using a tape recorder, etc. The output level of this jack is fixed, and is not affected by the AF GAIN control ② . The output impedance is 600 Ω .

㉟ EXT SP (SPEAKER) JACK

This jack is used to connect an external speaker. Use a φ 3.5 monaural plug. Use an external speaker with a characteristic impedance of 4 Ω or 8 Ω .

㊱ POWER CONNECTOR

Connect the supplied AC adapter cable to this connector.

㊲ POWER FUSE

Power fuse (1A).

㊳ ANT Hi-z (high impedance) TERMINAL

This terminal is a high impedance terminal which is used to connect an antenna.

SECTION 3: INSTALLATION

3.1 INSTALLATION LOCATION

To ensure many years of optimum performance, place your NRD-345 in a well ventilated area and avoid places that are exposed to direct sunlight, hot air from heaters, dust, vibration, or moisture.

When using your NRD-345 on a tabletop, use the stand attached to the body lower cover.

■ How to Use the Stand

3.2 INSTALLING THE RECEIVER

Before operating the NRD-345, the following procedures should be folllowed.

3.2.1 ANTENNA CONNECTION

For optimum performance, an outdoor antenna should be used. Use a 50 Ω antenna which is suitable for the reception frequency. Connect the antenna to the Lo-Z coaxial connector on the rear panel. (Switch the antenna switch ㉛ to the ANT 50-OHM side.) If you are using 4-6 meters o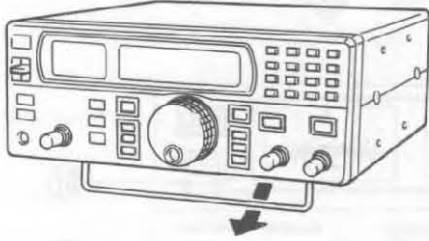f vinyl-coated wire or similar material as a simple antenna, connect the antenna to the Hi-Z antenna terminal on the rear panel. (Switch the antenna switch ㉛ to the WIRE ANT side.) When using a simple antenna, be sure there is sufficient space between the antenna and noise sources such as computers.

■ Yagi Antenna

■ Long-wire Antenna

to NRD-345 ◄
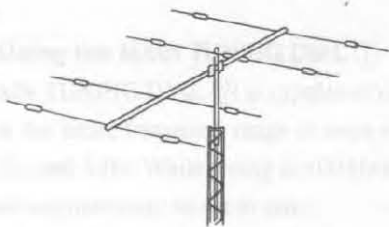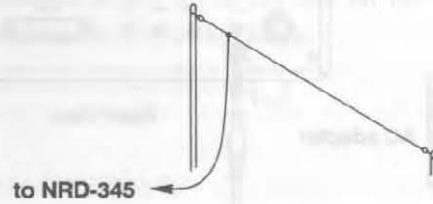
3.2.2 GROUNDING THE RECEIVER

Use the thickest possible copper wire as a ground line to prevent electrical shock and related hazards, and to reduce static interference from other equipment. Connect the ground to the GND terminal on the rear panel.

NOTE

Never connect the earth lead to gas or electrical wire piping. This is dangerous.

■ Connecting the Earth
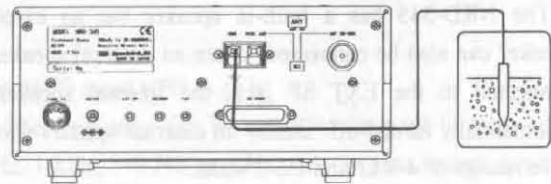
3.2.3 CONNECTING THE POWER

Always used the NRD-345 accessory's AC adapter when operating the equipment using an AC power source. Plug the AC adapter into a wall outlet and insert the other end in the power jack with the DC 12V label on the rear panel. If you plan to use another type of DC power source, make sure that the source is stable under the following conditions:

Voltage: 12.0V ± 10%

Current: Minimum 0.8A

Never reverse the power terminal connection as this may damage the radio.

(If the fuse blows on the rear panel, be sure to replace it with a fuse rated for 1A.

Do not use a fuse with a rating higher than 1A.)
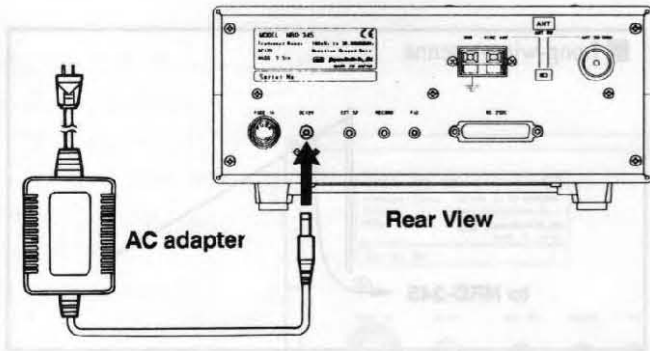
Rear View

AC adapter

3.2.4 CONNECTING AN EXTERNAL SPEAKER

The NRD-345 has a built-in speaker but an external speaker can also be connected. When an external speaker is connected to the EXT SP jack, the internal speaker is automatically turned off. Ideally an external speaker should have ratings of 4-8 Ω and 1.5-3 watts.

3.2.5 CONNECTING HEADPHONES

We recommend using JRC's ST-3 communication equipment headphones (optional). If you plan to use headphones made by another manufacturer, make sure the impedance is 8-32 Ω . Stereo headphones can also be used.

SECTION 4: OPERATING THE NRD-345

See Section 2 (OPERATING CONTROLS) for the names of the various buttons and controls and descriptions of their functions.

4.1 RECEIVING DIFFERENT TYPES OF SIGNALS

The following sections describe the basics of receiving signals with the NRD-345.

4.1.1 PRELIMINARY SETTINGS

After all antenna and power connections have been made, set the POWER switch ⑲ to ON and set the receiver controls and buttons as described below.
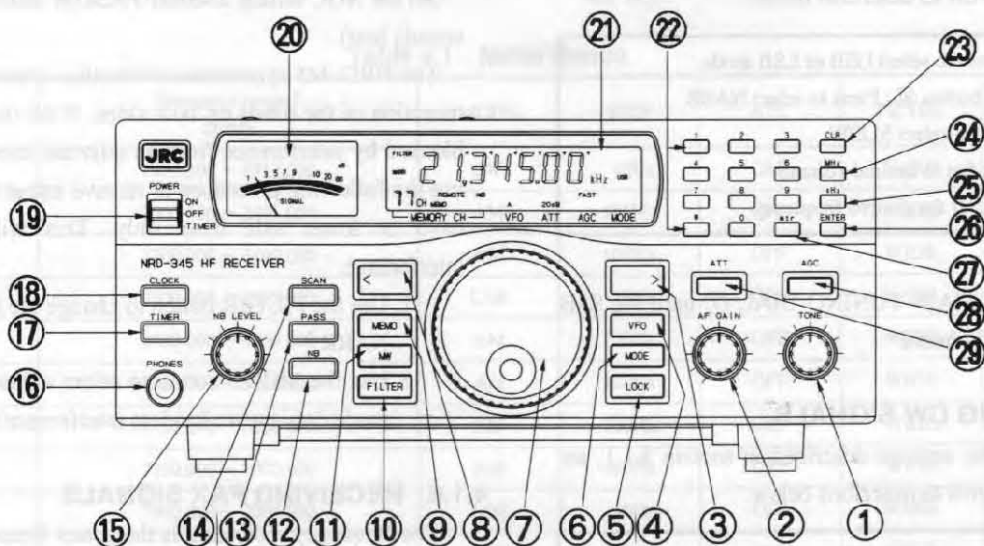
LOCK button ⑤: OFF

AF GAIN control ②: Full counterclockwise position

TONE control ①: Mid position

NB LEVEL (noise blanker level) control ⑮: Full counter-clockwise position

ATT (attenuator) button ㉙: OFF

4.1.2 SETTING THE FREQUENCY

There are three different ways to set the frequency of the NRD-345:

Method 1: Using the MAIN TUNING DIAL ⑦

The MAIN TUNING DIAL ⑦ is capable of continuously tuning over the entire frequency range in steps of 10 kHz, 1 kHz, 100 Hz, and 5 Hz. While tuning in 100 Hz steps, the 10 Hz digit will automatically be set to zero.

Normally the MAIN TUNING DIAL ⑦ is used to change frequencies within a single 1 MHz band.

Method 2: Using the UP button (>) and DOWN button (<) (③ and ⑧)

Before using these buttons use the VFO (frequency)

button ④ to set VFO-A or B.

The frequency can be raised or lowered in steps of 10 kHz, 1 kHz, 100 Hz, or 5 Hz with the auto repeat function. This method is useful when searching over a relatively wide range of frequencies.

Method 3: Using the NUMERICAL KEYPAD ㉒

There are two different ways to enter frequency data through the NUMERICAL KEYPAD. These methods differ according to the frequency unit (kHz or MHz). In the following example, a frequency of 12.3456 MHz is entered.

1. If the unit is kHz, enter the following sequence:

   1 2 3 4 5 • 6 kHZ

2. If the unit is MHz, enter the following sequence:

   1 2 • 3 5 5 6 MHz

If you accidentally enter the wrong sequence, press the CLR (clear) button ㉓ and then re-enter the frequency. The CLR (clear) button ㉓ can be used to clear the entered data and restore the pre-entry frequency as long as the [kHz] key or [MHz] key has not been pressed.

4.1.3 RECEIVING SSB SIGNALS

The frequency indications LSB and USB are both suppressed reaction signal frequencies.

In addition to the settings described in section 5.1.1, set the following controls as described below.

MODE button ⑥: Press to select USB or LSB mode
FILTER (bandwidth) button ⑩: Press to select NARR
AGC button ㉘: Press to select SLOW
AF GAIN control ②: Set to desired volume
Reception frequency: Set the desired frequency

Slowly turn the MAIN TUNING DIAL ⑦ until the SSB signal can be clearly heard.

4.1.4 RECEIVING CW SIGNALS

In addition to the settings described in section 5.1.1, set the following controls as described below.

MODE button ⑥: Press to select CW
FILTER (bandwidth) button ⑩: Press to select NARR filter
AGC button ㉘: Press to select FAST
AF GAIN control ②: Set to desired volume
Reception frequency: Set the desired frequency

Use the MAIN TUNING DIAL ⑦ to make adjustments so that the CW signal is received and the AF (audio) output signal is set to approximately 800 Hz. (If the demodulated tone is at 800 Hz in CW mode, the local reception frequency and the remote transmission frequency will be zeroed in.)

If the optional narrow band filter is installed in AUX and the filter setting is switched to AUX with the FILTER (bandwidth) button ⑩, the signal will be clear and free of noise and interference.

4.1.5 RECEIVING AM SIGNALS

In addition to the settings described in section 5.1.1, set the following controls as described below.

MODE button ⑥: Press to select AM mode
FILTER (bandwidth) button ⑩: Press to select WIDE
AGC button ㉘: Press to select FAST
AF GAIN control ②: Set to desired volume
Reception frequency: Set the desired frequency

Deep phasing can cause overmodulation distortion when receiving a short-wave broadcast, especially at night. In such cases, change the mode to SAM to reduce the problem.

First, properly tune the reception frequency in AM mode. Next, press the MODE button to change to SAM mode in order to reduce the overmodulation distortion caused by fading. If the reception frequency is not correctly tuned in SAM mode, there will be distortion in the received sound signal. Therefore the reception frequency must be set correctly.

Set the AGC setting to either FAST or SLOW (whichever sounds best).

The NRD-345 synchronous detection system involves the reception of the bands on both sides. If the desired signal is blocked by interference from an adjacent broadcast station, use the following procedure to receive either the upper side band or lower side band only. This will reduce the interference.

1. Use the FILTER button to change the filter setting to NARR.
2. Use the MODE button to select either USB or LSB mode (whichever has less interference).

4.1.6 RECEIVING FAX SIGNALS

The frequency indication is the center frequency between a mark signal and a space signal.
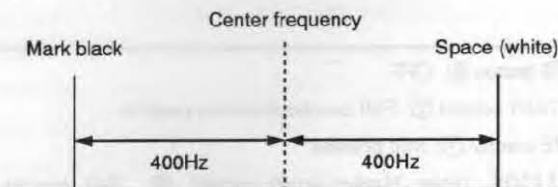
In addition to the settings described in section 5.1.1, set the following controls as described below.

MODE button ⑥: Press to select FAX mode
FILTER (bandwidth) button ⑩: Press to select NARR
AGC button ㉘: Press to select FAST
AF GAIN control ②: Set to desired volume
Reception frequency: Set the desired frequency

When the center frequency of the transmitted signal matches the reception frequency, the center frequency for AF (audio) output will be 1.9 kHz.
Use the FAX (LINE OUT) jack ㉝ on the rear panel to connect a FAX.

4.1.7 mtr BUTTON (METER BAND INPUT)

This key makes it easier to enter a reception frequency for a short-wave broadcast or amateur radio. Frequencies for short-wave broadcasts and amateur radio are assigned in bands as shown in Table 4.1. The frequency ranges are the NRD-345 default settings.

To set the broadcast band for meter #31, enter the following key sequence: 3 , 1 , mtr . The setting will be registered together with the most recent settings for frequency, filter, ATT, AGC, etc.

These settings are saved if they are held for at least 20 seconds within a particular meter band frequency range.

The NRD-345 default settings are presented in Table 4.1.

Use the following procedure to restore the default settings.

Turn the POWER switch ⑲ on while holding down the mtr key.

Table 4.1 Meter Bands

meter	Frequency range * (kHz)	MODE	STEP	ATT	FILTER	AGC
160	1907.500 − 1912.500	CW	10Hz	OFF	NARR	SLOW
120	2300.000 − 2495.000	AM	100Hz	OFF	WIDE	FAST
90	3200.000 − 3400.000	AM	100Hz	OFF	WIDE	FAST
80	3500.000 − 3575.000	LSB	10Hz	OFF	NARR	SLOW
75	3900.000 − 4000.000	AM	100Hz	OFF	WIDE	FAST
60	4750.000 − 5060.000	AM	100Hz	OFF	WIDE	FAST
49	5950.000 − 6200.000	AM	100Hz	OFF	WIDE	FAST
41	7100.000 − 7300.000	AM	100Hz	OFF	WIDE	FAST
40	7000.000 − 7099.990	LSB	10Hz	OFF	NARR	SLOW
31	9500.000 − 9900.000	AM	100Hz	OFF	WIDE	FAST
30	10100.000 − 10150.000	USB	10Hz	OFF	NARR	SLOW
25	11650.000 − 12050.000	AM	100Hz	OFF	WIDE	FAST
21	13600.000 − 13800.000	AM	100Hz	OFF	WIDE	FAST
20	14000.000 − 14350.000	USB	10Hz	OFF	NARR	SLOW
19	15100.000 − 15600.000	AM	100Hz	OFF	WIDE	FAST
17	18068.000 − 18168.000	USB	10Hz	OFF	NARR	SLOW
16	17550.000 − 17900.000	AM	100Hz	OFF	WIDE	FAST
15	21000.000 − 21449.990	USB	10Hz	OFF	NARR	SLOW
13	21450.000 − 21850.000	AM	100Hz	OFF	WIDE	FAST
12	24890.000 − 24990.000	USB	10Hz	OFF	NARR	SLOW
11	25670.000 − 26100.000	AM	100Hz	OFF	WIDE	FAST
10	28000.000 − 29700.000	USB	10Hz	OFF	NARR	SLOW

* At initialization, each band is set to the lowest frequency.

4.2 MEMORY AND SCANNING OPERATIONS

4.2.1 Writing information to a memory channel

The NRD-345 is capable of storing up to 100 memory channels. In addition to a frequency setting, each channel contains settings for the mode, AGC, ATT, filter, and NB.

In addition, the lithium cell provides a long-term backup for the information stored in memory.

(1) Writing to channel 00 for the first time

① Starting in normal status, enter settings for the reception frequency, mode, AGC, ATT, and filter.

② When the MW button is pressed, 00CH will blink.

③ Press the ENTER button ㉖ to conclude the writing process. The set frequency will be displayed and 00CH will stop blinking. Normal user commands can now be entered again.

Repeat the above steps for channel 01 and subsequent channels. The data write channel is automatically set as the lowest-numbered channel to which data have not been written.

(2) Writing data to a channel which is not set automatically

Use the following steps when data have already been written to channels 00 through 15 in order to write to channel 25 (and check the frequency, mode, AGC, and other settings before writing to channel 25.)

① Press the MW button ⑪. Since data have been written to all channels up to channel 15, channel 16 will automatically be set as the write channel.

② Use the UP button ③ to go to channel 25. (Or use the numbers keys to enter ⎡2⎤ and ⎡5⎤.) 25CH will start blinking.

③ Press the ENTER button ㉘ to stop the channel from blinking and complete the writing process. Normal user commands can now be entered again.

(3) Overwriting a channel to which data have already been written

Use the following steps to change the settings for channel 03 when data have been written to channels 00 through 15. Check the frequency, mode, AGC, and other settings before writing to channel 03.

① Press the MW button ⑪. Since data have been written to all channels up to channel 15, channel 16 will automatically be set as the write channel.

② Use the DOWN button ⑧ to go to channel 03. (Or use the numbers keys to enter ⎡0⎤ and ⎡3⎤.) 03CH will start

blinking.

③ Press the ENTER button ㉘ to stop the channel from blinking and complete the writing process. Normal user commands can now be entered again.

4.2.2 ERASING MEMORY CHANNEL INFORMATION

The following erasing procedures assume that memory channel information is saved in all channels from channel 00 to channel 30.

(1) Erasing memory channel information on a specified channel for example 09

① a) Press the CLR button ㉓ for one and a half seconds to change the LCD display ㉑ to [E 00-00].

② b) Erase the contents of channel 09 by entering the following sequence using the NUMERICAL KEYPAD ㉓ and the ENTER button ㉘ : ⎡0⎤, ⎡9⎤, ⎡0⎤, ⎡9⎤, ⎡ENTER⎤.

③ The information is erased and normal status is restored.

④ To make sure that the information has been erased, enter the following sequence:

⎡MEMO⎤, ⎡9⎤, ⎡ENTER⎤. Make sure that a dashed line (------) is displayed, that the previously stored information is erased, and that no information is written to channel 09. Press the VFO button ④ to restore normal status.

(2) Erasing memory channel information on channels 00 through 12

① Press the CLR button ㉓ for one and a half seconds to change the LCD display to [E 00-00].

② Erase the contents of channels 00 through 12 by entering the following sequence using the NUMERICAL KEYPAD ㉒ and the ENTER button ㉘ : ⎡0⎤, ⎡0⎤, ⎡1⎤, ⎡2⎤, ⎡ENTER⎤.

③ The information is erased and normal status is restored.

4.2.3 Using memory channels for signal reception (the example shows reception on channel 8)

① Press the MEMO button ⑨.

② Pressing this button causes to be displayed on the LCD display ㉑.

③ Use the UP/DOWN button ③, ⑧ to select channel 8 (or enter ⎡0⎤ and ⎡8⎤ through the number keys).

④ Use the procedure described in step ③ to select other channels as well.

⑤ Press the VFO button ④ to restore normal operations.

If a dashed line (------) is displayed instead of a number in

the frequency display field after changing channels, the selected channel is not used (i.e., no settings have been written to it).

The NRD-345 can store settings for a total of 100 channels (channel 00 through channel 99).

4.2.4 Pause-scanning operation

① Press the SCAN button ⑭.

② When this button is pressed, the memory channels with settings are pause-scanned.

③ Press the button again to stop the pause-scan process on the current channel.

④ Press the button again to start pause-scanning again. (Note: It takes some time for the scanning process to start due to the pause time setting described below.)

⑤ Pressing the UP button ③ during the pause-scanning process increases the channel number. Pressing the DOWN button ⑧ lowers the channel number.

⑥ Press the VFO button ④ to return to normal operations.

(1) Requirements for pause-scan operations

① There must be memory channel information on at least two channels.
   If data have only been written to channel 00 and all other channels are empty, pause-scanning will not work.

② PASS must not be set on any of the channels which contain settings. (Pause-scanning will not work if PASS is set for even some of the memory channels.)

③ The pause-scan range setting (described below) must include the channels to which settings have been written.
   (The following examples pertain to cases in which settings have been written to memory channels 00 through 30.)
   a) If the pause-scan range is set for channels 00 through 20, pause-scanning will work since the range includes the channels which have settings.
   b) If the pause-scan range is set for channels 40 through 60, pause-scanning will not work since the range does not include the channels which have settings.

(2) Setting the pause-scan range

(The following example pertains to a case in which the pause-scan range is set for channels 08 through 20.)

① Press the SCAN button ⑭ for one and a half seconds to change the LCD display to [CH 00-99]. The [CH] will blink. (This is the default range setting.)

② Enter the following sequence using the NUMERICAL KEYPAD ㉒ and the ENTER button ㉘ to set the pause-scan range for channels 08 through 20: $\boxed{0}$, $\boxed{8}$, $\boxed{2}$, $\boxed{0}$, $\boxed{\text{ENTER}}$.

③ The setting process is now completed and normal status is restored.

(3) Setting pause-scan PASS channels

You may want to skip pause-scanning on some channels. To do this, set pause-scan PASS on the channels which are to be skipped.

① Setting pause-scan PASS on a single channel
   a) Press the MEMO button ⑨ to enter memory channel reception status.
   b) Use the UP/DOWN buttons ③, ⑧ to select the channel on which pause-scan PASS is to be set.
   c) Press the PASS button ⑬ to display [PASS] in the MEMORY CH area on the LCD display ㉑. Pause-scan PASS is now set for the selected channel. After PASS has been set for a channel, [PASS] will be displayed for the channel even during memory channel reception.

② Setting pause-scan PASS on a range of channels
   (The following example shows how to set pause-scan PASS for channels 10 through 20.)
   a) Hold down the PASS button ⑬ for one and a half seconds to display [P 00-00] on the LCD display ㉑. The [P] will blink. (This is the default range setting.)
   b) Enter the following sequence using the NUMERICAL KEYPAD ㉒ and the ENTER button ㉘ to set pause-scan PASS for channels 10 through 20: $\boxed{0}$, $\boxed{0}$, $\boxed{2}$, $\boxed{0}$, $\boxed{\text{ENTER}}$.
   c) The setting process is now completed and normal status is restored.
   d) To check the settings, after pressing the MEMO button ⑨ use the UP/DOWN buttons ③, ⑧ to view channels 10 through 20. [PASS] will be displayed for all of these channels.

(4) Changing the pause time (the pause time on a given channel during pause-scanning) (the example described below shows how to change the pause time from 5 seconds to 2 seconds)

① Hold down the TIMER button ⑰ for at least one and a half seconds.

② The LCD display ㉑ will show [PAUSE6], with the [PAUSE] portion blinking.

③ Enter the number $\boxed{2}$.

④ Press the ENTER button ㉘. The reception frequency will be displayed and normal operations will be restored.

⑤ To check the setting, again hold down the TIMER button ⑰ for at least one and a half seconds. [PAUSE2] will be displayed, indicating that the pause setting has changed from 5 seconds to 2 seconds.

⑥ Press the CLR button ㉓ to return to normal operations.

4.3 CLOCK/TIMER OPERATIONS

4.3.1 DISPLAYING AND SETTING THE TIME

Time settings can be entered as LOCAL time and UTC time.

1) Setting procedure (for setting 9:35 a.m. as the current time)

① Press the CLOCK button ⑤. The LCD display ㉑ will change to the clock display.

② Use the NUMERICAL KEYPAD ㉒ to enter ⓪, ⑨, ③, and ⑤. Next, press the ENTER button ㉖ to set 9:35 a.m. as the time. Enter two digits in both the hours field and the minutes field.

Setting 7: 45 a.m. as the current time: ⓪, ⑦, ④, ⑤, ENTER

Setting 2: 05 p.m. as the current time: ①, ④, ⓪, ⑤, ENTER

③ To set UTC time as well, hold down the CLOCK button ⑱ and use the UP/DOWN bottons ③, ⑧ to change the LCD display ㉑ from LOCAL to UTC.

④ Enter the UTC time as follows.

(In this example, the LOCAL time is nine hours behind.)

⓪, ⓪, ③, ⑤, ENTER

The clock will stop during a power outage or if the AC adapter is removed. The next time the AC adapter is plugged in, the clock will be displayed as 00:00. When this happens it will be necessary to reset the LOCAL time.

Once the UTC time has been entered, the NRD-345 stores the difference between the LOCAL time and the UTC time. Therefore the UTC time will be set automatically once the LOCAL time is re-entered.

2) Adjusting the clock setting to within 30 seconds of the correct time

① Press the CLOCK button ⑱ to display the clock.

② Press the MEMO button ⑨ to display a rapidly blinking colon mark (:).

③ Set the correct time based on an accurate watch or time notification service, then press the ENTER button ㉖.

④ If the seconds field is in the range of 0 to 29 (too fast), set it to 0. If the seconds field is in the range of 30 to 59 (too slow), set it to 0. The minutes field will advance by one minute.

⑤ Press the MEMO button ⑨ again to stop the colon mark from blinking.

4.3.2 USING THE TIMER FUNCTION

TIMER ON: Time required for the timer function to turn on the NRD-345 power.

TIMER OFF: Time required for the timer function to turn off the NRD-345 power.

> **Note**
>
> TIMER ON/OFF is enabled only for LOCAL time.

The procedure for using the timer function is described below based on the following settings.

a. Reception frequency: 9.710 MHz

b. Reception start time: Power turns on at 16:00 (LOCAL), or 4:00 p.m.

Setting procedure

① Set the frequency to 9.710 MHz.

② Enter settings for the mode, filter, AGC, and ATT.

③ Press the CLOCK button ⑱. The LCD display ㉑ will change to the clock display. Check the current time. If it needs to be corrected, use the time display and setting procedures presented above.

④ Press the TIMER button. The LCD display ㉑ will appear as follows.

12 : 30 ....This represents the previously set time.
On

[On] indicates that the power will be turned on.

[OF] indicates that the power will be turned off (e. g., sleep mode).

⑤ On the TIMER setting screen, use the UP/DOWN buttons ③, ⑧ to select whether to turn the power on or off. The UP/DOWN buttons ③, ⑧ toggle between [ON] and [OF] (OFF).

⑥ Use the NUMERICAL KEYPAD ㉒ to enter ①, ⑥, ⓪, and ⓪, then press the ENTER button ㉖. 16:00 will be displayed. Enter two digits in both the hours field and the minutes field.

⑦ Move the POWER switch to the TIMER position.

When the above steps are performed, the NRD-345 will stop operating and the LCD display will turn off. The NRD-345 is now set to turn on at 16:00.

4.3.3 Setting sleep mode (setting the power to turn off after a set period of time in sleep mode)

① Press the TIMER button. The LCD display ㉑ will appear as follows.

12 : 30 .... This represents the previously set time.
On

[On] indicates that the power will be turned on.

[OF] indicates that the power will be turned off (e. g., sleep mode).

② On the TIMER setting screen, use the UP/DOWN buttons ③ , ⑧ to select whether to turn the power on or off. The UP/DOWN buttons ③ , ⑧ toggle between [ON] and [OF] (OFF). Select [OF] (OFF).

③ Use the NUMERICAL KEYPAD ㉒ and the ENTER button ㉖ to set the time at which the power is to turn off.

④ Move the POWER switch ⑲ to the TIMER position.

When the above steps are performed, the NRD-345 will continue operating but the power will turn off at the time set under TIMER OF (OFF).

<table><tr><td>**Note**</td></tr></table>

TIMER OF (OFF) is enabled only for LOCAL time.

4.4 OPERATING THE NRD-345 THROUGH A COMPUTER

The NRD-345 is standard-equipped with an RS-232C interface which allows various controls to be performed through a computer.

Use the optional 6ZCJD0O350 RS-232C cable to connect your computer with the NRD-345 (cross connection, DSUB-25 pin connector, male-male connector).

■ RS-232C Connection
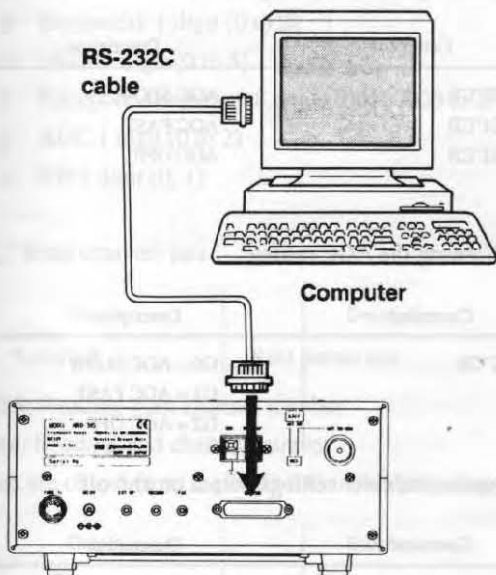
4.4.1 Set up

The first step is to enter communication parameters for the computer.

Enter the following TERMINAL parameter settings.

Communication rate: 4800 bps

Data length: 8 bits

Stop bit: 1 bit

Parity: None

X parameter: None

This concludes the preparations for computer-based control of the NRD-345.

<table><tr><td>**Note**</td></tr></table>

The frequency will be set and read for VFO-A only. (VFO-B cannot be used.)

4.4.2 Description of control commands

● "H" TURNING COMPUTER CONTROL ON/OFF

Command	Description
"H1"CR	Computer control is turned on. REMOTE is displayed on the LCD display.
"H0"CR	Computer control is turned off. REMOTE is turned off on the LCD display.

To control the NRD-345 through a computer, set computer control to ON.

When computer control is set to ON, REMOTE and LOCK are displayed on the LCD display. In this condition none of the controls on the front panel of the NRD-345 except the POWER switch will work.

To enable command input on the front panel of the receiver, set computer control to OFF.

Computer control can be turned off even if the POWER switch on the NRD-345 has been turned off.

● "A" Entering an ATT setting

Command	Description
"A0"CR	ATT OFF
"A1"CR	ATT ON

● "A" Viewing the ATT setting

Command	Description
"A"CR	Indicated by An A0 = ATT OFF A1 = ATT ON

● "B" Entering an IF FILTER setting

Command	Description
"B0"CR	FILTER WIDE
"B1"CR	FILTER NARR
"B2"CR	FILTER AUX Note: When AUX FILTER is set.

● "B" Viewing the IF FILTER setting

Command	Description
"B"CR	Indicated by Bn B0 = WIDE
	B1 = NARR
	B2 = AUX

● "C" Setting the memory channel reception method

Command	Description
"C00"CR	Set channel 00
"C08"CR	Set channel 08
"C25"CR	Set channel 25

● "C" Viewing the memory channels

Command	Description
"C"CR	Cnn
	nn: Channel number

● "D" Setting the MODE

Command	Description
"D0"CR	MODE AM
"D1"CR	MODE SAM
"D2"CR	MODE USB
"D3"CR	MODE LSB
"D4"CR	MODE CW
"D5"CR	MODE FAX

● "D" Viewing the MODE setting

Command	Description
"D"CR	Indicated by Dn D0 = AM
	D1 = SAM
	D2 = USB
	D3 = LSB
	D4 = CW
	D5 = FAX

● "E" Write to channel

Command	Description
"E1"CR	Write to channel

This command writes the frequency, mode, band width, AGC, ATT, and NB status to the channel indicated on the channel display.

Viewing various receiver settings through a computer

● "F" Setting the reception frequency

The commands shown below pertain to cases in which the frequency is entered in MHz. See how the commands correspond to the settings.

Command	Description
"F9.71"CR	Reception frequency: 9.710 MHz
"F14.235"CR	Reception frequency: 14.235 MHz
"F0.145"CR	Reception frequency: 145 kHz
"F0.945"CR	Reception frequency: 945 kHz
"F1.134"CR	Reception frequency: 1134 kHz
"F0.04"CR	Reception frequency: 40 kHz

The commands shown below pertain to cases in which the frequency is entered in kHz.

Be sure to enter eight digits.

Command	Description
"F09710000"CR	Reception frequency: 9.710 MHz
"F14235000"CR	Reception frequency: 14.235 MHz
"F00145000"CR	Reception frequency: 145 kHz
"F00945000"CR	Reception frequency: 594 kHz
"F01134000"CR	Reception frequency: 1134 kHz
"F00040000"CR	Reception frequency: 40 kHz

● "F" Viewing the reception frequency

Command	Description
"F"CR	Fnnnnnnnn
	The reception frequency is displayed in Hz.

● "G" Entering an AGC setting

Command	Description
"G0"CR	AGC SLOW
"G1"CR	AGC FAST
"G2"CR	AGC OFF

● "G" Viewing the AGC setting

Command	Description
"G"CR	Gn G0 = AGC SLOW
	G1 = AGC FAST
	G2 = AGC OFF

● "I" Turning receiver settings output on and off

Command	Description
"I0"CR	Output OFF
"I1"CR	Output ON

When output is turned on, the REMOTE segment on the NRD-345 LCD lights and the current settings are output to the computer in the format shown below.

Output	Description
"Iabdfgh"CR	Settings output

I: Header code

a: Attenuator, 1 digit (0, 1)

b: Bandwidth, 1 digit (0 to 2)

d: Mode, 1 digit (0 to 5)

f: Reception frequency, 8 digits (00100000 to 29999990)

g: AGC, 1 digit (0 to 2)

h: NB, 1 digit (0, 1)

If the settings on the panel are changed while output is on, the changes are output to the computer in the format shown above. When output is turned off, the REMOTE segment on the NRD-345 LCD turns off. Output is also turned off if the POWER switch is turned off.

● "J" Memory channel writing method

Command	Description
"Jlnn"CR	nn = Data write channel numbers 00-99

Writing data to memory channels using different settings (frequency, mode, filter, etc.)

● "K" Writing memory channels with the setting changed

Command	Description
"Kccabdfgn"CR	Sets the channel data.

K: Header sign

cc: Channel No. (00 to 99)

a: Attenuator 1 digit (0, 1)

b: Bandwidth 1 digit (0 to 2)

d: Mode 1 digit (0 to 5)

f: Reception frequency 8 digits (00100000 to 29999990)

g: AGC 1 digit (0 to 2)

n: NB 1 digit (0, 1)

● "L" Read channel data

Output	Description
"Lssee"CR	Read channel data

SS: Reading-start channel number

ee: Reading-end channel number

Data are output from the NRD-345 in the following format.

Output	Description
"Lssabdfgn"CR	Start channel data
"Lnnabdfgn"CR	Intermediate channel data
"Leeabdfgn"CR	End channel data

L: Header code

ss: Reading-start channel (e.g., 00)

mm: Intermediate channel number (e.g., 10)

ee: Reading-end channel number (e.g., 19)

a: Attenuator, 1 digit (0, 1)

b: Bandwidth, 1 digit (0 to 2)

d: Mode, 1 digit (0 to 5)

f: Reception frequency, 8 digits (00100000 to 29999990)

g: AGC, 1 digit (0 to 2)

n: NB, 1 digit (0, 1)

There are sixteen characters per channel. A total of 3200 characters are output when all channels are used (16 characters per channel × 200). THIS PARAGRAPH IS NOT CONSISTENT WITH THE CLAIM THAT NRD-345 HAS ONLY 100 CHANNELS Data output takes approximately 7 seconds (3200 × 10 ÷ 4800).

● "M" Viewing the AGC level

Command	Description
"M"CR	Mnnn nnn = 000~255

● "N" Entering a noise blanker setting

Command	Description
"N0"CR	NOISE BLANKER OFF
"N1"CR	NOISE BLANKER ON

● "N" Viewing the noise blanker setting

Command	Description
"N"CR	Indicated by Nn N0 = NOISE BLANKER OFF N1 = NOISE BLANKER ON

Entering memory channel settings through a computer

Writing data to memory channels using current settings (frequency, mode, filter, etc.)

● "P" Setting the pause time for memory scanning (setting range: 1 to 9 seconds)

Command	Description
"Pn"CR n = 1~9	Sets pause time to nn seconds. n = 1~9

● "P" Viewing the pause time setting

Command	Description
"P"CR	Indicated by Pn

● "Q" Setting the procedure for exiting a memory channel

Command	Description
"Q"CR	Return to VFO-A

Entering clock/timer settings through a computer

● "R0" Setting the LOCAL time

Command	Description
"R0 hhmm"CR	hh = 00~23: hours
	mm = 00~59: minutes

● "R0" Viewing the LOCAL time setting

Command	Description
"R0"CR	R0 hhmm ss(LOCAL time)
	hh = hours, mm = minutes
	ss=seconds

● "R1" Setting the UTC time

Command	Description
"R1 hhmm"CR	hh = 00~23: hours
	mm = 00~59: minutes

● "R1" Viewing the UTC time setting

Command	Description
"R1"CR	R1 hhmm ss(UTC time)
	hh = hours, mm = minutes
	ss=seconds

● "R2" Setting the timer ON time

Command	Description
"R2 hhmm"CR	hh = 00~23: hours
	mm=00-59: minutes

● "R2" Viewing the timer ON time setting

Command	Description
"R2"CR	R2 hhmm
	hh = hours, mm = minutes

● "R3" Setting the timer OFF time

Command	Description
"R3 hhmm"CR	hh = 00~23: hours
	mm = 00-59: minutes

● "R3" Viewing the timer OFF time setting

Command	Description
"R3"CR	R3 hhmm
	hh = hours, mm = minutes

● "R4n" Displaying the current time on LCD

Command	Description
"R4n"n = 0	LOCAL time
n = 1	UTC time

● "R5"

Command	Description
R5	Changes the LCD frequency display to the TIMER-ON display.

● "R6"

Command	Description
R6	Changes the LCD frequency display to the TIMER-OFF display.

● "R7"

Command	Description
R7	Changes the LCD TIMER-ON/OFF display to the frequency display.

● "S" Set channel data

Command	Description
"Sccabdfgn"CR	Channel data settings

S: Header code

cc: Channel number (00 to 99)

a: Attenuator, 1 digit (0, 1)

b: Bandwidth, 1 digit (0 to 2)

d: Mode, 1 digit (0 to 5)

f: Reception frequency, 8 digits (00100000 to 29999990)

g: AGC, 1 digit (0 to 2)

n: NB, 1 digit (0, 1)

Once channel data are set, the LCD display is updated with the new settings.

● "V" Setting the step frequency for frequency scanning

Command	Description
"V1"CR	Step frequency: 10 Hz
"V2"CR	Step frequency: 100 Hz
"V3"CR	Step frequency: 1 kHz
"V4"CR	Step frequency: 10 kHz
"V6"CR	Step frequency: 1 MHz

● "W" Entering an AUX FILTER setting

Command	Description
"W0"CR	AUX FILTER OFF
"W1"CR	AUX FILTER ON

● "W" Viewing the AUX FILTER setting

Command	Description
"W"CR	Indicated by Wn W0 = AUX FILTER OFF W1 = AUX FILTER ON

● "X" Setting the meter band settings

Command	Description
"Xnnn"CR	Xnnn : Enter a three digit meter band number wherein nnn = 160-010. The following information is displayed: Xnnn An Bn Dn Fnnnnnnnn Gn Nn

● "X" Viewing the meter band settings

Command	Description
"X"CR	The state of each meter band will be displayed. Xnnnabdfgn will be displayed. Xnnn:3-digit number in meter bands 160 to 010.

a: Attenuator 1 digit (0, 1)

b: Bandwidth 1 digit (0 to 2)

d: Mode 1 digit (0 to 5)

f: Reception frequency 8 digits (00100000 to 29999990)

g: AGC 1 digit (0 to 2)

n: NB 1 digit (0, 1)

● "Y" Setting frequency scanning (UP/DOWN) based on step frequency

Command	Description
"Y+"CR	Scanning in direction of increasing frequency
"Y − "CR	Scanning in direction of decreasing frequency
"Y0"CR	Stop frequency scanning

● "Z" Erasing all memory channel contents

Command	Description
"Zn"CR	n = 1 Erase all memory n = 2 Initializing the user settings n = 3 Set Z1 and Z2 simultaneously

4.4.3 Sample program

The sample program shown below is made in BASIC for the NEC PC-98 Series. Note you may need different RS-232C port settings if you are using a non-NEC PC.

```
10    OPEN"COM:N81NN"AS #1        Open the RS-232C port
20    ,
30    PRINT#1, "H1"
40    PRINT#1, "F07050000"        Set the remote control on
50    PRINT#1, "A0"               Set the frequency to 7.05MHz
60    PRINT#1, "D3"               Set the attenuator OFF
70    PRINT#1, "G0"               Set the LSB mode
80    PRINT#1, "H0"               Set the AGC SLOW
90    ,                           Set the remote control OFF
100   CLOSE                       Close the RS-232C port
110   END
```

Table 4.2   NRD-345 Computer control

Item	Command sent from computer to NRD-345 (← : Ch, hex 0D)		Response sent from NRD-345 to computer
A: Attenuator (ATT) setting	A0 ←	ATT OFF	
	A1 ←	ATT ON	
A: Check attenuator (ATT) setting	A ←		A0 = ATT OFF A1 = ATT ON
B: IF FILTER setting	B0 ←	WIDE	
	B1 ←	NARR	
	B2 ←	AUX	
B: Check IF FILTER setting	B ←		B0 = WIDE B1 = NARR B2 = AUX
C: Memory Channel selection	Ccc ←	cc:00 – 99	
C: Check memory channel	C ←		Cnn nn = Channel number
D: Mode setting	D0 ←	AM	
	D1 ←	SAM	
	D2 ←	USB	
	D3 ←	LSB	
	D4 ←	CW	
	D5 ←	FAX	
D: Check mode setting	D ←		D0 = AM D1 = SAM D2 = USB D3 = LSB D4 = CW D5 = FAX
E: Write to channel	E1 ←	Write to channel	
F: Reception frequency setting	Fmmkkkhhh ←	mm:MHz kkk:kHz hhh:Hz	
(example)	F12345670 ←	12.345670MHz	
F: Check reception frequency setting	F ←		Fnnnnnnnn The reception frequency is displayed in Hz.
G: AGC setting	G0 ←	SLOW	
	G1 ←	FAST	
	G2 ←	OFF	
G: Check AGC setting	G ←		G0 = AGC SLOW G1 = AGC FAST G2 = AGC OFF
H: External control	H0 ←	OFF	
	H1 ←	ON	
I: Receiver settings output	I0 ←	Output OFF	
	I1 ←	Output ON	Iabdfgn ← a: Attenuator (0, 1) b: Bandwidth (0 to 2) d: Mode (0 to 5) f: Frequency (mmkkkhhh) g: AGC (0 to 2) h: NB (0, 1)

Item	Command sent from computer to NRD-345 (← : Ch, hex 0D)	Response sent from NRD-345 to computer
J: Write to channel	J1cc ←　　　Write to channel cc: 00 to 99	
K: Channel data settings	Kccabdfgn ← 　cc:　Channel number (00 to 99) 　a:　Attenuator (0, 1) 　b:　Bandwidth (0 to 2) 　d:　Mode (0 to 5) 　f:　Reception frequency (mmkkkhhh) 　　　(100 kHz to 29.999990 MHz) 　g:　AGC (0 to 2) 　h:　NB (0, 1)	
L: Read channel data	Lssee ← 　　　ss: Start channel 　　　ee: End channel	Lssabdfgn ← 　| Leeabdfgn ←
M: Check AGC level	M ←	Mnnn: nnn = 000~255
N: Noise blanker setting	N0 ←　　　NB OFF	
	N1 ←　　　NB ON	
N: Check noise blanker setting	N ←	Nn:　N0 = NB OFF 　　　N1 = NB ON
P: Pause time setting	Pn ← Pause time setting 　　n: 1 to 9 seconds	
P: Check pause time setting	P ←	Pn: 　　n = 1~9
Q: Return to VFO A from memory channel	Q ←　　　Return to VFO-A	
R: Read/change time	R0hhmm ←　Set LOCAL time 　hh: hours (00 to 23) 　mm: minutes (00 to 59)	
	R0 ←　　　Read LOCAL time	R0 hhmmss ← 　hh: hours (00 to 23) 　mm: minutes (00 to 59) 　ss:seconds(00 to 59)
	R1hhmm ←　Set UTC time 　hh: hours (00 to 23) 　mm: minutes (00 to 59)	
	R1 ←　　　Read UTC time	R1 hhmmss ← 　hh: hours (00 to 23) 　mm: minutes (00 to 59) 　ss:seconds(00 to 59)
	R2hhmm ←　Set TIMER ON time	
	R2 ←　　　Display TIMER ON time	R2 hhmm
	R3hhmm ←　Set TIMER OFF time	
	R3 ←　　　Display TIMER OFF time	R3 hhmm
	R40 ←　　LOCAL time display	
	R41 ←　　UTC time display	
	R5 ←　　　TIMER ON display	
	R6 <　　　TIMER OFF display	
	R7 ←　　　Frequency display	

Item	Command sent from computer to NRD-345 (← : Ch, hex 0D)		Response sent from NRD-345 to computer
S: Set channel data (LCD display changes)	Sccabdfgn ← cc: Channel number (00 to 99) a: Attenuator (0, 1) b: Bandwidth (0 to 2) d: Mode (0 to 5) f: Reception frequency (mmkkkhhh) (1000 kHz to 29.999990 MHz) g: AGC (0 to 1) h: NB (0, 1)		
V: Set frequency increment step	V1 ←	10Hz step	
	V2 ←	100Hz step	
	V3 ←	1kHz step	
	V4 ←	10kHz step	
	V5 ←	1MHz step	
W: AUX FILTER setting	W0 ← W1 ←	AUX FILTER OFF AUX FILTER ON	
W: Check AUX FILTER setting	W ←		W0 = AUX FILTER OFF W1 = AUX FILTER ON
X: Meter Band setting	Xnnn ← nnn: 160~010 Meter Band		
X: Check Meter Band setting	X ←		Xnnn abdfgn
Y: Frequency up/down	Y+ ←	Frequency up	
	Y − ←	Frequency down	
	Y0 ←	Stop	
Z: Clear all memory channels and replace user definitions with factory defaults	Z1 ←	Clear all memory channels	
	Z2 ←	Replace user definitions with factory defaults	
	Z3 ←	Set Z1 and Z2 simultaneously	

4.5 MODIFYING OPERATIONS WITH USER DEFINITIONS

1) Turning on the power while holding down the CLR button initializes the VFO A/B setting. FREQ = 10.000 MHz, MODE = AM, STEP = 100 Hz, FILTER = WIDE, ATT = OFF, AGC = FAST, NB = OFF

2) Turning on the power while holding down the MENO button clears all MEMORT CHANNELS DATA.

3) Turning on the power while holding down the FILTER button sets the AUX indication to ON. If an optional AUX filter is not installed, no signal will be output if this is set to ON.

4) Turning on the power while holding down the mtr button resets all meter band data to the factory settings. (See Fig. 4-1)

5) The ENTER button can be pressed in normal status to toggle the PLL DATA setting between EVEN and ODD. A mark [■] is shown on the LCD display when this is ODD.

For example, when the frequency range from 3.799 to 3.805 MHz is used in a complicated manner, this setting will change the VCO switching range as shown below. This is useful in avoiding switching noise.

EVEN	3.6~3.8 MHz	ODD	3.7~3.9 MHz
	3.8~4.0 MHz		3.9~4.1 MHz

6) When you turn the power ON with MODE switch ⑥ held down, you can alternately select switching of beep tone ON/OFF.

SECTION 5: ADJUSTMENT AND MAINTENANCE

5.1 ADJUSTMENT

Your NRD-345 was fully adjusted and inspected at the factory before shipping, and therefore should not require any adjustments other than the ones described below. Fine adjustments other than those described below require sophisticated measurement equipment. In the event that your receiver requires such adjustments, please contact JRC or the dealer where you bought the unit.

■ Preparation for adjustment

Unplug the AC adapter from the main unit.

Refer to section 7.2 'REMOVING COVERS' to remove the upper and lower covers.

At this time, do not to remove the connector at the tip of the speaker cable. (If this is necessary, connect the external speaker to the SP jack ㉟ on the rear panel.)

(1) REFERENCE OSCILLATOR FREQUENCY ADJUSTMENT

① Plug the AC adapter to the main unit.

② Turn the power switch ON and select the CW mode to receive the standard time station (JJY, WWV, etc.). At this time, adjust as far as 10Hz digit of the receiving frequency to the frequency of the reference wave +800Hz.

③ Adjust the trimmer capacitor CVO, located at the top of the shield case of the RF unit (CMA-648), until no beat note is heard.

This completes the adjustment of reference oscillator frequency. Turn the POWER switch ⑲ OFF and attach the top and bottom covers.

(2) BEEP TONE ADJUSTMENT

A beep sound will be heard when a numeric key operation or an incorrect operation has been made.

To adjust the volume of the beep tone, follow these steps.

① Plug the AC adapter to the main unit.

② Adjust the beep volume RV7 on the IF AMP unit CAE-368 as desired.

③ When adjustment is completed, turn the POWER switch ⑲ OFF and attach the top and bottom covers.

5.2 MAINTENANCE

(1) ELECTRIC COMPONENTS

The ICs, transistors and diodes of the NRD-345 are extremely sensitive and will be destroyed even if short-circuited for an extremely short period of time.

Therefore it is important to take special care.

(2) FUSE

If the power fuse is blown, try to determine the cause of the problem before replacing the fuse. It is located on the back panel.

(3) CR2032 LITHIUM CELL (made by Matsushita)

The NRD-345 memory channel information is backed up by a lithium cell. This cell should function properly for approximately 5 years before requiring replacement. If the memory channel information errors occur, or if the information is not saved to memory, the lithium cell will need to be replaced. The model name of the lithium cell is CR2032 (3V).

Contact JRC or the dealer where you bought your NRD-345 if you are unable to obtain a new battery or would like your battery to be replaced by service personnel.

● Replacing the lithium cell

① Remove the AC adapter plug from the NRD-345.

② Remove the top and bottom covers as shown in item 7.2

③ Remove the front panel.

④ Remove the shield plate on the CPU circuit board.

⑤ See Figure 5.1 to replace the lithium cell, which is attached to the CPU circuit board.

⑥ Attach the shield plate to the CPU circuit board.

⑦ Attach the front panel to the NRD-345.

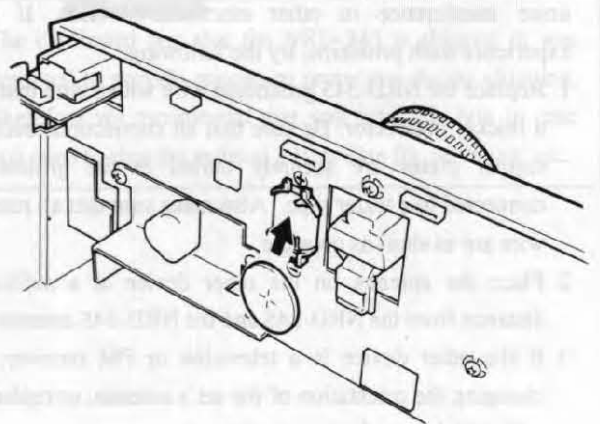⑧ Attach the top and bottom covers. This completes the procedure.

Figure 5.1

5.3 TROUBLESHOOTING

The NRD-345 has many features, but may not perform as desired if it is operated improperly. If you experience a problem, first review the operating procedures presented in this manual before deciding that the problem is due to an equipment failure. This section presents various symptoms which can occur if the NRD-345 is not handled or operated properly. None of these symptoms are indicative of an equipment failure. Therefore it is important to carefully review the possible causes of a problem before placing a repair order. If the NRD-345 still does not operate properly after going through the troubleshooting procedures, determine what the detailed symptoms are and contact JRC's customer service center or the dealer where you bought the unit.

5.3.1 SIMPLE PROBLEMS

No.	Symptom	Cause	Solution
1	No display appears when the power is switched on.	1. The power is not fully connected. 2. The fuse is blown.	1. Check whether the connector is plugged in. 2. After determining the cause of the problem, replace the fuse with a new fuse that has the same rating.
2	The display works but there is no sound when the power is switched on.	The headphones are connected to the PHONES jack.	Disconnect the headphones.
3	Distorted sound and/or poor audio quality.	1. AGC is OFF. 2. The receiver is off tuned frequency. 3. The wrong mode is selected. 4. The noise blanker is on.	1. Set AGC to FAST or SLOW. 2. Adjust MAIN TUNING DIAL. 3. Select the proper mode for the incoming signal. 4. Set the noise blanker to OFF.
4	The display is too dark.	1. ATT is on. 2. The antenna is not connected.	1. Set ATT to OFF. 2. Properly connect the antenna. Check whether the antenna selector switch on the back side is set properly.

5.3.2 MORE SERIOUS PROBLEMS

(1) TELEVISION, RADIO, STEREO, OR OTHER EQUIPMENT IS RECEIVING INTERFERENCE WHICH SEEMS TO BE FROM NRD-345

The NRD-345 has been RFI shielded sufficiently for practical use. However, inadequate grounding, an improper antenna installation location, and other factors can result in noise interference in other electronic devices. If you experience such problems, try the following:

1. Replace the NRD-345 grounding wire with a wire that has a thicker conductor. Be sure that all connections such as copper plates are securely buried in the ground or connected to a water pipe. Also make sure that all runs of wire are as short as possible.

2. Place the antenna on the other device at a sufficient distance from the NRD-345 and the NRD-345 antenna.

3. If the other device is a television or FM receiver, try changing the orientation of the set's antenna, or replace it with a higher-performance antenna.

4. Try plugging the NRD-345 and the other device into separate outlets.

5. Use a thicker ground wire on the other device.

6. Insert a noise filter or isolation transformer in the power supply line.

(2) OBVIOUS NOISE INTERFERENCE WHICH IS PROBABLY DUE TO ARTIFICIAL NOISE DURING RECEPTION

There are numerous artificial and natural noise sources that can affect receivers. Natural noise can be caused by thunder, rain, and snow storms. Artificial noise is produced by motorcycle and auto ignitions, power lines, sewing machines, personal computers, fluorescent lights, hair dryers, and other devices. In addition, nearby radio stations may cause noise which is only a problem during transmission.Basically, measures to prevent artificial noise interference must be taken at the noise source. However, changing the NRD-345 receiving antenna design and changing the location where it is installed may be helpful. In addition, improving your grounding system is often an effective means of reducing interference.

Even if there are strong noise sources in your area, your receiver should work well as long as the signal you are trying to receive has sufficient field strength. Noise leads to interference only when you are trying to receive a weak signal.

(3) INTERFERENCE DUE TO INTERMODULATION

If your receiver is close to live broadcast stations or other sources of strong radio emissions, you may simultaneously receive signals from one or more stations at a frequency where you would normally not expect to receive such broadcasts. This type of occurrence is called intermodulation. If you seem to be experiencing such a problem, turn the NRD-345 ATT button to ON. If this does not solve the problem, lower the antenna height and/or use a shorter antenna. These steps will almost always solve the problem.

(4) RECEIVER SENSITIVITY SEEMS LOW

The field strength of a signal from a given station can vary widely according to factors such as sun spots, the season, the time of day, and the frequency. This is especially true at high frequencies. Therefore a comparison of receiver sensitivities is only meaningful if you compare output S/N ratios at the same time of day, using the same frequency and the same antenna.

The sensitivity you hear may also vary according to the speaker volume. If you think your receiver has poor sensitivity, be sure to consider factors such as the frequency and antenna orientation.

SECTION 6: CUSTOMER SERVICE

6.1 IF THE EQUIPMENT FAILS:

This product was passed through rigorous quality control procedures and testing before it was shipped. In the event of a failure, please contact the dealer where you bought the product or a JRC office. Try to describe the problem in as much detail as possible.

- **Product warranty:**

The dealer will provide you with a product warranty with the necessary information filled in (date of purchase, dealer name). Check the information in the warranty and store it in a safe place.

- **If the product needs to be repaired:**

Before placing a repair order, please review the information presented in the troubleshooting section (page 21). If the problem persists, follow the steps shown below.

If the warranty is still valid:

Contact the dealer where you bought the product. Your product will be repaired based on the terms of the warranty. Therefore the warranty should be attached to the product when it is presented to the dealer.

If the warranty has expired:

Contact the dealer where you bought the product. If the product's functions can be restored through repair work, it will be repaired at your expense if you so desire.

- **If you are unsure about the availability and terms of after-service:**

Contact the dealer where you bought the product or JRC's customer service center.

Note
The cardboard box that the NRD-345 is shipped in was designed to provide maximum protection during shipping. Therefore we recommend that you save this box in case you need to ship the radio at a later date for servicing, etc.

SECTION 7: OPTIONAL UNITS

7.1 INTRODUCTION

Several optional units are available to help you operate the NRD-345 more effectively and more easily.

■ IF FILTERS

Five types of crystal filters are available for SSB and CW signals. One filter can be installed in the AUX position. A CFQ-8673 attachment board is needed to do this.

①TYPES

CFQ-8673 ...... AUX FILTER BOARD

Screws for mounting: 2 (Ⓐ)

Washers: 2 (Ⓑ)

CFL-231	......	300 Hz
CFL-232	......	500 Hz
CFL-233	......	1 kHz
CFL-218A	......	1.8 kHz
CFL-251	......	2.4 kHz

Each IF filter comes with the following accessories.

Nuts for mounting: 2 (Ⓒ)

Washers: 2 (Ⓓ)

Instruction manual: 1

Printed circuit board puller: 1

(Not used with the NRD-345.)

②INSTALLATION

Be sure to turn the NRD-345 POWER/TIMER ON/OFF switch (19) to OFF and remove the power cable before installing a filter. Also do not unnecessarily touch any of the units inside the NRD-345.

a) Solder the selected filter to the CFQ-8673, then fasten it with screws.
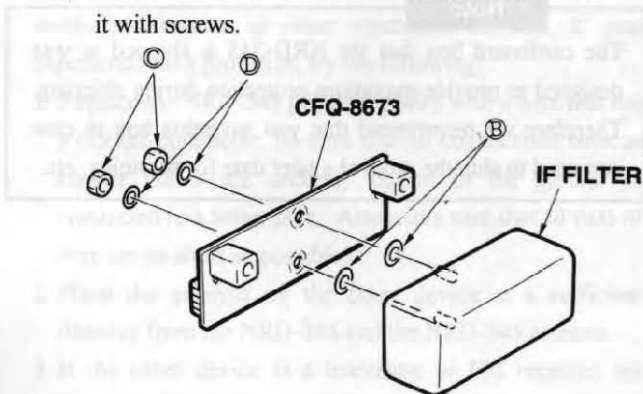

Figure 7.1

b) After attaching the filter, insert the CFQ-8673 in the optional socket on the CAE-368 IF AMP unit of the NRD-345. Fasten it with two screws.
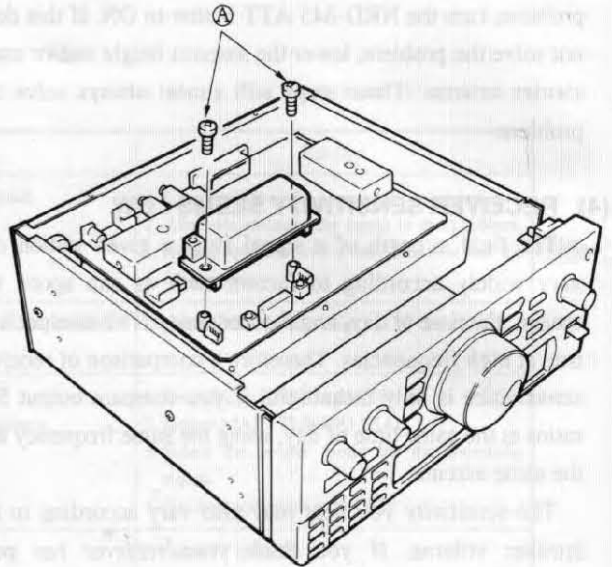

Figure 7.2

3) Filter AUX selection

The default setting when the NRD-345 is shipped is to not allow filter AUX to be selected. Change this setting as described below after you have attached an optional filter.

Turn the POWER switch ⑲ to ON while holding down the FILTER button ⑩ to enable AUX selection. The new setting is stored in memory, so it will not need to be set again.

■ ST-3 Headphones

The ST-3 headphones are designed for communication equipment.

■ 6ZCJDOO350 RS-232C cable

This special cable is designed to connect the NRD-345 with a personal computer.

7.2 HOW TO REMOVE THE COVERS

Remove the upper or lower cover as shown in Figure 7.3. Remove the six screws on each cover to remove the cover.

The speaker is attached to the upper cover, so remove the cover gently taking care to prevent the speaker cable from being cut. If necessary, remove the connector on the cable end from the internal unit.
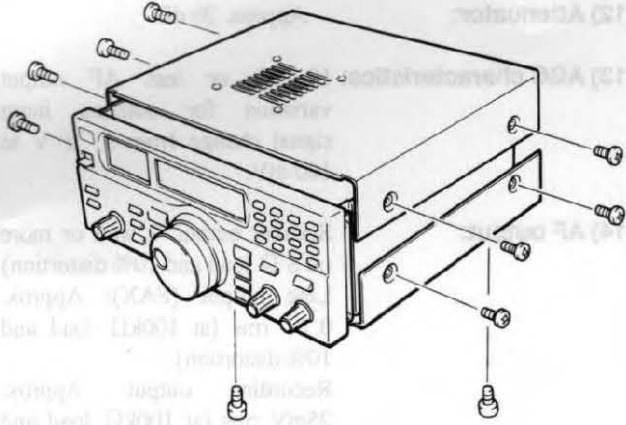

Figure 7.3

SECTION 8: ABOUT DISCARDING THE UNIT

Before you discard this unit, remove the lithium cells from CPU unit CDE-866 attached to the front of the unit.

Before returning the lithium cell to us, fix insulating tape to its + and - terminals.

SECTION 9: SPECIFICATIONS

(1) Operating Frequency Range:
100 kHz to 30 MHz

(2) Modes of Reception: AM, SAM (synchronous detection), USB, LSB, CW, FAX

(3) Frequency stability: ± 10 ppm or less after 5 to 60 minute warm-up period; ± 5 ppm per hour or less thereafter

(4) Minimum tuning step: 5 Hz

(5) Memory channels: 100

(6) Receiving system: Double superheterodyne
First IF: 44,855 MHz
Second IF: 455 kHz

(7) Sensitivity:

	SSB, CW, FAX	AM
0.1 -0.54MHz	0dB μ (1 μ V)	10dB μ (3.2 μ V)
0.54 -1.8 MHz	15dB μ (5.6 μ V)	25dB μ (17.8 μ V)
1.8 -30 MHz	-10dB μ (0.3 μ V)	6dB μ (2 μ V)

S+N/N: 10 dB; modulation: 400Hz, 30% (AM mode)

(8) Selectivity

Bandwidth	6 dB	60 dB
WIDE	4 kHz or more	10 kHz or less
NARR	2 kHz or more	6 kHz or less
※ AUX	500Hz or more	1.6 kHz or less

※ *The AUX bandwidth is measured with the CFL-232 optional filter installed.*

(9) Image rejection: 70 dB or more

(10) IF rejection: 70 dB or more

(11) Antenna impedance: 50 Ω at Lo-Z terminal; 450 Ω at Hi-Z terminal

(12) Attenuator: Approx. 20 dB

(13) AGC characteristics: 10 dB or less AF output variation for antenna input signal change from 3 μ V to 100 mV.

(14) AF output: Speaker output: 1 watt or more (at 8 Ω load and 10% distortion)
Line output (FAX): Approx. 0.7V rms (at 100kΩ load and 10% distortion)
Recording output: Approx. 25mV rms (at 100kΩ load and 10% distortion)

(15) Power requirements: 12V DC, 0.8A, 15V maximum allowed instantaneous input

(16) Dimensions: 250 mm (width) × 100 mm (height) × 238 mm (depth)

(17) Weight: Approx. 3.5 kg

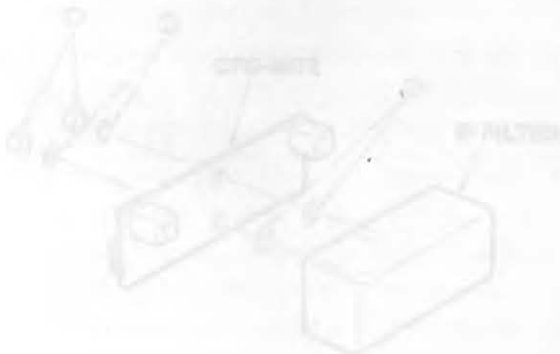*Note: The above ratings and circuits are subject to change without notice when performance is improved.*