



HF RECEIVER NRD-535

*JRC's New Professional-Grade
Communications Receiver with
Intelligent Features and High Performance*



Japan Radio Co., Ltd.

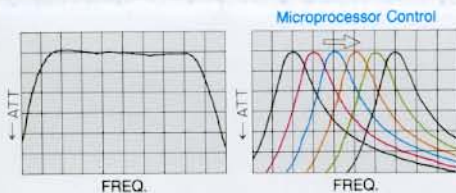
Communications with the World. Clear.

The NRD-535 HF Receiver is designed with JRC's high technology based on the abundant technical experience that JRC has had in the development and manufacture of professional radio receivers installed on ocean-going ships, fishing vessels and coast stations throughout the world. The NRD-535 incorporates upgraded features and performance compared with its predecessor in order to meet the need of the new generation. The professional grade communications receiver will satisfy even the most discerning listeners.

Variable Tuning

The NRD-535 adopts a variable tuning system (electronic tuning by capacitor diodes) in the front end of its double tuning circuit. The center frequency of the double tuning circuit is continuously controlled by a microprocessor to vary with the received frequencies. This system can substantially attenuate undesired signals and enhance signal selectivity, compared with the wide-band BPF system with a fixed bandwidth.

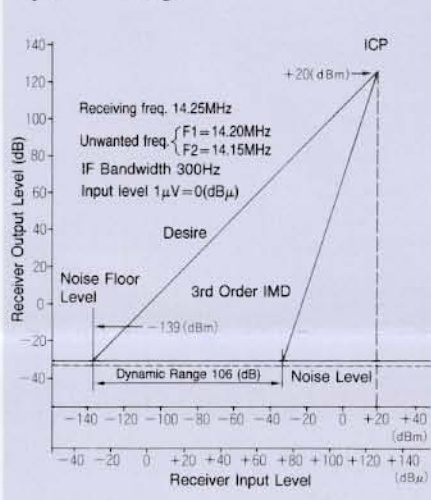
- Conventional BPF system
- Variable tuning system



High Sensitivity with Wide Dynamic Range

The dynamic range and sensitivity are enhanced by using 4 low-noise junction type FETs with excellent cross modulation characteristics each in the RF amplifier and the first mixer in the first stage. The RF amplifier incorporates 4 parallel-connected high power gain circuits to improve the receiving sensitivity. The first mixer is a quadruple-connected double balanced mixer to reduce the odd-order intermodulation product distortion (IMD), ensuring a wide dynamic range.

Dynamic Range

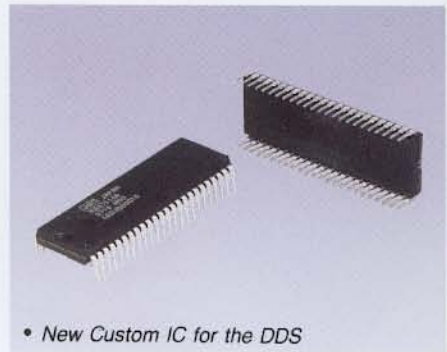


High-Speed Synthesizer Using One-Chip DDS IC

The frequency synthesizer consists of a phase-locked loop and a direct digital synthesizer (DDS) with its logic circuit configured as a one-chip IC in order to obtain full compatibility with both high purity of local signals and high-speed frequency switching. Unlike a PLL synthesizer, the DDS, which is widely used in high-class electronic testing equipment because of its excellent features, generates the frequencies directly and digitally, ensuring enhanced response (high-speed frequency

switching in 1-Hz step), high C/N (carrier to sideband noise ratio) and simplified circuit configuration.

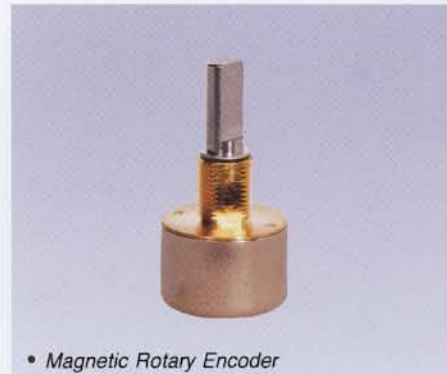
Note: The sideband noise of the local signal appears as a noise within the IF pass band by its mixing with a strong incoming signal close to the desired signal (reciprocal mixing), resulting in a deteriorated effective sensitivity of the receiver. This problem can be solved by enhancing the C/N of the local signal. On the other hand, if only the purity of the local signal is pursued in the synthesizer, the frequency switching time would be longer. The DDS can solve both problems.



• New Custom IC for the DDS

High Precision 1-Hz Step Tuning by Magnetic Rotary Encoder

The main dial adopts a high-precision magnetic rotary encoder. The main dial that generates 1,000 pulses per rotation is capable of tuning in 3 steps (100 kHz/rot, 10 kHz/rot and 1 kHz/rot). At 1 kHz/rotation, frequency control is available in 1-Hz step, ensuring tuning with analog VFO feeling.



• Magnetic Rotary Encoder



HF Receiver NRD-535

External Speaker NVA-319



Rear panel of NRD-535 HF Receiver

Clear Sound Reproduced from Weak Signals.

Various Interference Rejection

The NRD-535 incorporates various interference rejection functions as described below:

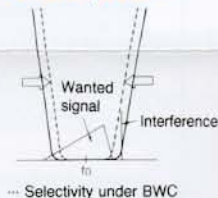
Exalted Carrier Selectable Sideband (ECSS) - Option

Sideband suppression and AM-synchronized detection is made to reduce distortion due to fading and beat disturbance by an adjacent station. When receiving an AM (DSB) signal under an interference from an adjacent station, its USB or LSB can be picked up whichever is not affected by the interference, ensuring effective interference rejection and high tone quality. Distortion due to fading is rejected by producing a signal synchronized with the carrier of the received signal and using it for detection.

Bandwidth Control (BWC) - Option

The pass bandwidth of the IF filter can be narrowed continuously (2.4kHz to approx. 500Hz) without varying its center frequency, ensuring effective interference rejection. This function is powerful in rejecting interference in a congested receiving band because the sharp attenuation curve of the filter is not varied. This function is available when the bandwidth control is to be set to INTER.

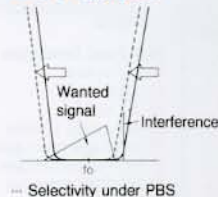
• BWC Operation



Pass-Band Shift (PBS)

In all the modes except in the FM mode, the equivalent center frequency of the IF filter is shifted up and down without varying its pass bandwidth, in order to expel undesired signals out of the band.

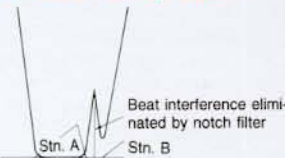
• PBS Operation



Notch Filter (NOTCH)

The notch filter with a sharp notch incorporated in the IF circuit eliminates beat interference close to the desired signal.

• Notch Filter Operation

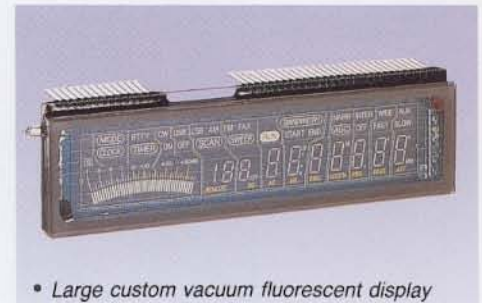


Noise Blanker (NB)

The noise blanker can effectively eliminate a wide range of noises from narrow automobile ignition noise to wide "woodpecker" noise by adjusting the level control.

Easy-To-See Multi-Function Display

The large custom vacuum fluorescent display on the front panel is a multi-function display to indicate various data including frequency, memory channel, mode and bandwidth. In addition, the signal strength is displayed in the form of a digital bar graph.



• Large custom vacuum fluorescent display

Remote Control from Personal Computer

By connecting an RS-232C interface cable (option), 28 items of operational functions including the receiving frequency can be remote-controlled from a personal computer, providing an expanded range of operation. By recalling the setting conditions of the receiver, the S-meter value and the time of realtime clock, panoramic and scheduled receptions are available.



OPERATING PANEL AND DISPLAY

- | | |
|-------------------------------|----------------------------------|
| 1 Vacuum fluorescent display | 17 Lock switch with LED |
| 2 AGC switch with LED | 18 Left/Down switch |
| 3 Bandwidth switch with LED | 19 PBS control |
| 4 Tuning rate switch with LED | 20 RF gain control |
| 5 ECSS switch with LED | 21 BWC control |
| 6 Channel switch with LED | 22 Notch control |
| 7 Frequency switch with LED | 23 Level control |
| 8 Numerical keys | 24 Squelch control |
| 9 Memory switch | 25 Squelch operation check LED |
| 10 Frequency entry switch | 26 Record jack |
| 11 MHz switch | 27 Headphones jack |
| 12 Tone control | 28 Noise blanker switch |
| 13 AF gain control | 29 Power on/off and timer switch |
| 14 Clear switch | 30 Noise blanker level check LED |
| 15 Right/Up switch | 31 Mode switches |
| 16 Main tuning control | 32 Function switches |
| | 33 Function switching check LED |
| | 34 Internal speaker (top panel) |

Actual Size

HF RECEIVER NRD-535



All-Mode Operation

Reception is available in RTTY, CW, USB, LSB, AM, FM and FSK modes. Mode selection is easy by pushing mode switches. By installing the optional RTTY Unit, the shift width can be selected from one of 170Hz, 425Hz and 850Hz and demodulation in accordance with CCITT No.2 code for 37 to 75 baud rate is available. The demodulated output can be displayed on the CRT of the computer through the RS-232C cable. The indicator output terminal for RTTY tuning by cross pattern is also fitted on the rear panel. Direct connection of a facsimile machine is also possible.

Large Memory Capacity of 200 Channels

Various data per channel including frequency, mode, AGC time constant, ATT on/off and IF filter bandwidth can be stored in a 200-channel internal memory (C-MOS RAM). The stored data can be backed up by an internal lithium battery.

Highly Stable Crystal Oscillator Kit - Option

The synthesizer is controlled by a single standard frequency oscillator. Its frequency stability can be improved to be within ± 0.5 ppm (at -20°C to $+50^{\circ}\text{C}$) by using the CGD-135 highly stable crystal oscillator kit.



• CGD-135 highly stable crystal oscillator kit



• Completely modular plug-in design

Complete Modular Design

All the printed circuit boards are of complete modular plug-in design. Each unit is plugged into the motherboard, and it employs surface-mount components extensively, ensuring uniform quality, enhanced reliability.

New Panel Design with Excellent Operability

The cosmetic design of the operating panel is new and original and the arrangement of the controls and switches is functional and easy to operate.



ar Sound Reproduced from Weak Signals

H F RECEIVER

NRD-535

NRD-535D

Built-in CFL-243 BWC Unit, CMF-78 ECSS Unit and CFL-233 IF Filter

ADDITIONAL FUNCTIONS

- **Memory Channel Search**

The memory channels can be searched without changing the receiving frequency.

- **Scan Reception**

All the channels between designated two channels can be scanned. The scan rate is user-defined and adjustable from 0.5 s/CH to 5 s/CH.

- **Sweep Reception**

All the frequencies between designated two frequencies can be swept with a sweep rate between 0.05 s/step and 0.5 s/step. The sweep rate is user-defined and set by the main dial.

- **Automatic Scan/Sweep Stop**

If the squelch is opened during scan or sweep operation, the scanning or sweeping is automatically stopped and the scanned or swept frequencies are continuously received. This function is user-defined.

- **Scan Hold Input**

The scan operation can be temporarily stopped by earthing the scan hold terminal on the rear panel.

- **All-Mode Squelch**

Squelch operation is available in all modes.

- **Muting control**

The AF output of the receiver can be muted by earthing the mute terminal on the rear panel.

- **Clock/Timer**

In the TIMER mode, the internal realtime clock turns the relay on/off so that time control is available of a tape recorder connected to this receiver. In the normal receiving mode, the relay can be set to CONSTANT ON, CONSTANT OFF, or ON/OFF on squelch.

- **Tone Control**

Tone quality of the AF output can be controlled.

- **RTTY Fine Tuning**

By installing the CMH-530 RTTY unit (option), fine tuning is available.

- **Dimmer Control**

- **RF Attenuator**

- **Direct Entry of Frequencies from Numerical Keys**

- **Internal Speaker**

- **Main Dial Lock**

- **Up/Down Switches**

- **Recording output**

- **AGC Time Constant Switch**

- **IF Filter Switching in 4 Steps**

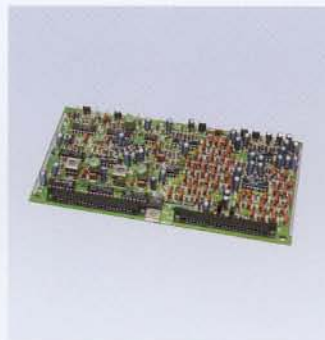
- **User-Defined Function Change**

OPTIONS

Option Units



• CFL-243 BWC Unit



• CMF-78 ECSS Unit



• CMH-530 RTTY Unit

NVA-319 External Speaker



Input impedance 8 Ω
 Max. input power 3 W
 Dimensions
 (mm) 180W \times 130H \times 280D

ST-3 Headphones



Weight Approx. 300g

IF Filters



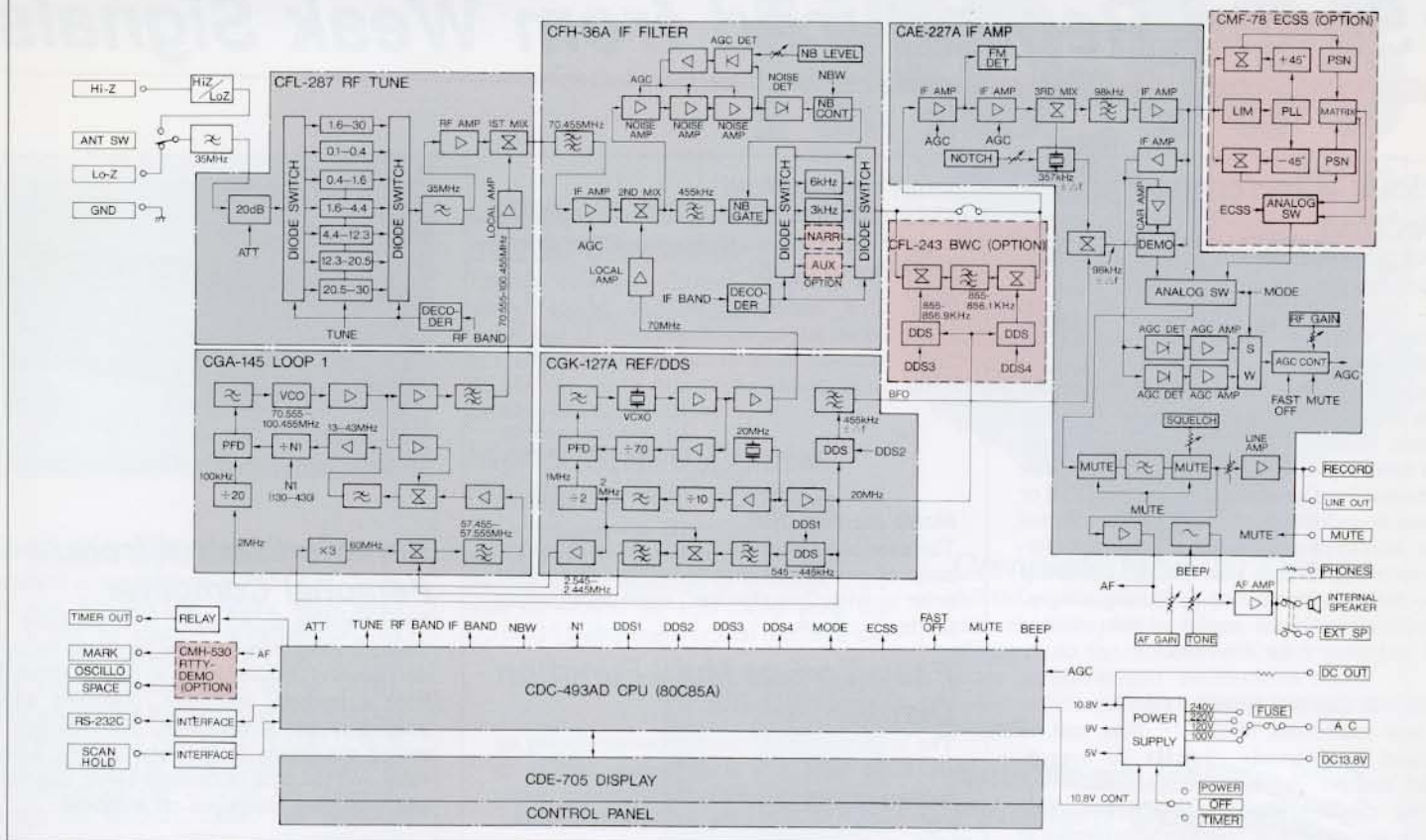
- CFL-231 (300Hz)
- CFL-232 (500Hz)
- CFL-233 (1kHz)
- CFL-218A (1.8kHz)
- CFL-251 (2.4kHz)

NVA-88 External Speaker

6ZCJD00350 RS232C Cable

CGD-135 Highly Stable Crystal Kit

BLOCK DIAGRAM



SPECIFICATIONS

Frequency range: 0.1 to 30 MHz
 Type of reception: RTTY, CW, SSB (USB/LSB), AM, FM, FSK
 Frequency stability: ± 10 ppm or less 5 min. to 60 min. after powering on and within ± 2 ppm for one hour thereafter.

Minimum adjustable frequency step: 1 Hz
 Frequency memory: 200 channels
 Receiving system: Triple superheterodyne (FM - double superheterodyne)
 1st IF 70.455 MHz
 2nd IF 455 kHz
 3rd IF 97 kHz (except FM)

Sensitivity:	RTTY, FAX, CW, SSB			AM	FM
	0.1 - 0.5 MHz	0.5 - 1.6 MHz	1.6 - 30 MHz		
	14 dB μ	6 dB μ	-10 dB μ	24 dB μ	-
				6 dB μ	-6 dB μ

S/N: 10 dB, bandwidth: INTER, modulation (AM): 400 Hz, 30%, 12 dB SINAD (FM)

Selectivity:	Bandwidth	
	6 dB	60 dB
AUX	12 kHz or more	-
WIDE	6 kHz or more	15 kHz or less
INTER	2 kHz or more	6 kHz or less
NARR*	1 kHz or more	3 kHz or less
FM	12 kHz or more	-

Note*: Fitted with the CFL-233 filter option. For AUX, the filter option can be installed.

Image rejection: 70 dB or more
 IF rejection: 70 dB or more
 PBS variable range: ± 1 kHz or more
 Notch filter attenuation: 40 dB or more
 Antenna impedance: 50 Ω (Lo-Z terminal) 600 Ω (Hi-Z terminal)
 Antenna input attenuator: Approx. 20 dB
 AGC characteristics: The AF output varies 10 dB or less for the antenna input of 3 μ V to 100 mV

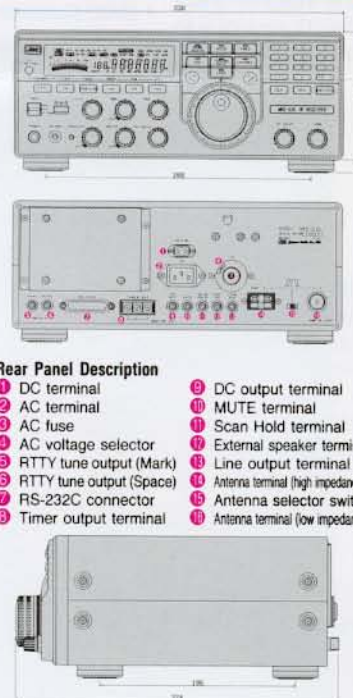
AF outputs:
 Speaker output 1 W or more with 4 Ω load at 10% distortion
 Line/recorder output 1mW or more with 600 Ω load at 10% distortion

RS-232C interface: 4800 baud (character format: 1 start bit, 8 data bits, no parity bit, 1 stop bit)

Power supply: 100/120/220/240 Vac $\pm 10\%$, 35 VA
 12 to 16 Vdc (13.8 Vdc standard), 25 W
 330 W \times 130 (143) H \times 287 (324) D mm, (): max. dimensions with projections.

Dimensions: Approx. 9 kg
 Weight:
 Accessories: 1 fuse, 1 coax. plug, 5 pin plugs, 1 headphone plug, 1 record plug, AC power cable, DC power cable, Instruction manual

DIMENSIONS



- Rear Panel Description**
- ① DC terminal
 - ② AC terminal
 - ③ AC fuse
 - ④ AC voltage selector
 - ⑤ RTTY tune output (Mark)
 - ⑥ RTTY tune output (Space)
 - ⑦ RS-232C connector
 - ⑧ Timer output terminal
 - ⑨ DC output terminal
 - ⑩ MUTE terminal
 - ⑪ Scan Hold terminal
 - ⑫ External speaker terminal
 - ⑬ Line output terminal
 - ⑭ Antenna terminal (high impedance)
 - ⑮ Antenna selector switch
 - ⑯ Antenna terminal (low impedance)

* Specifications subject to change without notice.

For further information, contact:

JRC Japan Radio Co., Ltd.
 Since 1915

Main Office: Akasaka Twin Tower(Main), 17-22, Akasaka 2-chome, Minato-ku, Tokyo 107, JAPAN
 Telephone: Tokyo (03)3584-8836
 Facsimile: Tokyo (03)3584-8878
 Telex: 2425420 JRCTOK J
 Cable: JAPANRADIO TOKYO

Overseas Branches: London, New York
 Liaison Offices: Jakarta, Bangkok, Manila, New Delhi, Seattle, Rio de Janeiro, Harlow, Rotterdam, Las Palmas