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HARRIS
COMMUNICATIONS AND
INFORMATION HANDLING

RF-280 / RF-280A
HF-VHF TRANSCEIVER
**OPERATORS'
HANDBOOK**

PM-1376

IMPORTANT

Insert TAB into slot in
back cover before placing
book in tray.

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X SPECIFICATIONS

Frequency Range: 1.5 to 79.9999 MHz
Frequency Stability: ± 1 part in 10^6
Load Impedance: 50 ohms, nominal
Output Power: 1.5 - 29.9999 MHz, 100W PEP
and average
30 - 79.9999 MHz, 50W PEP
and average
Sensitivity: SSB: 0.5 μ V for 10 dB S+N/N
FM: 0.6 μ V for 10 dB SINAD
Size: 19.4 H x 48.3 W x 45.7 D cm
Weight: 34 kg

Specifications subject to change without notice.

Note

The specifications listed on this page are condensed. For a complete list of technical specifications, refer to the RF-280 Maintenance Manual, publication number PM-1330.

INTRODUCTION

A proficient radio station operator must be well versed in calling and on-the-air procedures as well as local, national and international laws concerning radio broadcasting. He must also have a thorough understanding of the station equipment with regard to its capabilities, limitations and operation.

This handbook is designed to provide you, the operator, with the information you need to better understand the RF-280/RF-280A Transceiver. Included in this handbook are complete operating instructions, detailed information on each control and indicator, interconnecting cable data, primary power requirements and brief specifications.

The information presented in this handbook is divided into two sections, A and B. Section A covers operating controls and indicators, tuning procedures, operating procedures and emergency operating procedures. Section B covers operator maintenance data. This includes information on fuses, cables and cabling, primary power and condensed specifications.

The maintenance data provided in this handbook is limited to those tasks that can be quickly performed by the station operator. If further maintenance is required, it must be referred to a higher level maintenance group. The RF-280 Maintenance Manual (pub. no. PM-1330) is available for this group.

SECTION A OPERATION

I OPERATING CONTROLS, INDICATORS AND CONNECTORS (Figure 2)

A. ON FRONT PANEL

1,2. POWER switch and Meter

In receive mode, meter indicates receive signal strength in "S" units. When transmitting, meter indicates forward or reflected power in watts as selected by POWER switch.

Switch Position	Meter Indication
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FWD	Indicates rf power (in watts) being transmitted. Switch is spring-loaded in this position.
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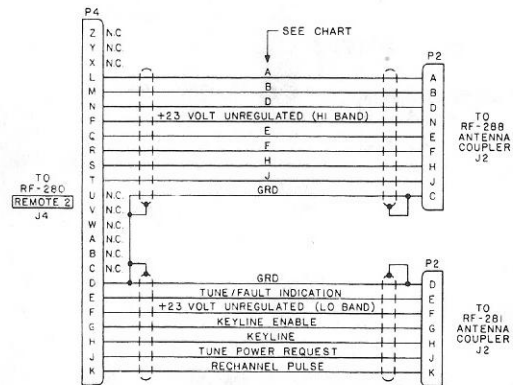
REF	Indicates rf power (in watts) being reflected back from the antenna system.
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3. RECEIVE TUNE SIGNAL switch

When pressed, disables squelch, and applies a broadband noise signal to the receiver.

4. TUNE control

Tunes the preselector to the operating frequency by using the broadband noise signal supplied by RECEIVE TUNE SIGNAL switch. "On-frequency" tuning is indicated by a sharp increase in the background noise level at the speaker or a peak on the S meter.



CHART

FREQUENCY (MHZ)	+23 VOLTS ON CABLE WIRES:
30-32.9999	A, D
33-36.9999	A, E
37-41.9999	A, F
42-46.9999	A, H
47-52.9999	A, J
53-55.9999	B, D
56-59.9999	B, E
60-64.9999	B, F
65-69.9999	B, H
70-79.9999	B, J

NOTE: +23 VOLTS IS ALWAYS PRESENT ON +23 VOLT UNREGULATED (HI BAND) LINE

Figure 6. Antenna Coupler Cables.

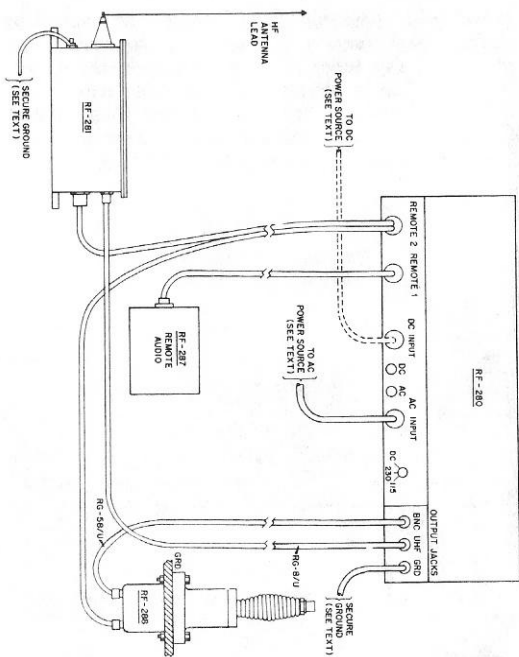


Figure 5. Typical Station Interconnection Diagram.

5. TRANSMIT AUDIO control

Controls transmit audio drive level, clockwise rotation increases drive level. AUTO (detent position) provides automatic audio compression for better dynamic range by reducing the peak-to-average ratio of the audio signal.

Note

This control is disabled in the FM Mode.

6. SQUELCH control

Selects one of the two separate squelch modes of operation as follows:

TONE (detent position)

Provides 150 Hz sidetone squelch in FM mode only. In TONE operation, the transmitted FM signal is modulated by a 150 Hz signal in addition to the voice message. The receiver accepts only a 150 Hz tone-coded signal and rejects all other on-frequency signals. The 150 Hz tone is not applied to the speaker or AUDIO connector.

Note

All other modes are un-squelched.

Not in TONE (variable)

Provides variable squelch control for all receive modes of operation. SQUELCH threshold is adjusted so desired received signal just breaks squelch silence. Must be re-adjusted after any change in frequency or mode of operation.

7. RECEIVE RF GAIN control

Controls sensitivity of receiver; clockwise rotation increases receiver sensitivity to maximum. Normally set fully clockwise but can be adjusted counterclockwise for improved operation on extremely strong signals or to reduce background noise.

8. RECEIVE AUDIO control

Controls audio level (volume) to speaker, earphones, or headset.

9. NOISE BLANKER control

Provides reduced sensitivity to impulse noise (RFI). Fully clockwise provides maximum suppression. OFF position disables noise blanker circuit.

10. SPEAKER switch

ON position, selects front panel speaker for monitoring received audio signals. OFF position disables speaker. Audio signal is always present at PHONE jack.

11. PHONE jack

Connector for headphones to monitor received audio signals.

12. CW KEY jack

Connector for hand-key used to key cw transmission.

IX AIR FILTER

Periodically (depending on usage and operating environment) remove the air filter for inspection. Shake off any loose dirt that has accumulated and hold filter to a light source (25 watt light bulb). If you can see the light through the filter, replace in tray. If not, wash filter in a mild detergent, rinse with clear water and air dry before replacing.

CAUTION

Do not operate transmitter without filter.

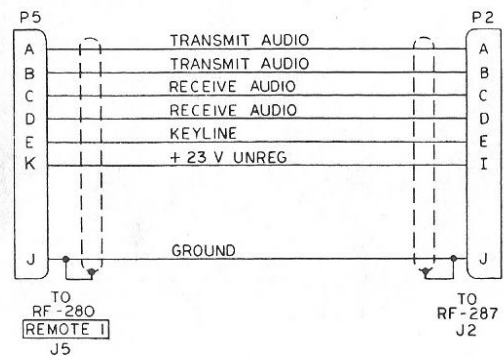


Figure 4. Remote Audio Cable.

Table 3. Fuse Information

FUSE	TYPE	FUNCTION
F1 (DC) (rear panel)	25 amp	1. Primary power fuse for 24 vdc operation. 2. Inverter relay control fuse for 12 vdc operation.
F2 (AC) (rear panel)	8 amp (115 vac) 4 amp (230 vac)	1. Primary power fuse for 115 vac or 230 vac operation. 2. Inverter relay control fuse for 24 vdc operation. 3. Inverter relay control fuse (in series with F1) for 12 vdc operation.
F3 (behind front panel)	1.5 amp slo-blo	+23 volt power fuse for RF-288 automatic antenna coupler.
F4 (behind front panel)	5 amp slo-blo	+23 volt power fuse for RF-281 automatic antenna coupler and RF-287 audio remote control.

13. RESET indicator

Indicates, when illuminated, that protection circuitry has activated. To reset, set Mode switch at OFF for at least 5 seconds, then return switch to operating mode position.

14. KEYLINE switch

Switch Position	Equipment Response
LOCAL	Disconnects Key line from rear panel REMOTE connector. RF-280 can be keyed at front panel only. AUDIO connector or CW KEY jack.
REMOTE	RF-280 can be keyed at either the remote unit or front panel.

15. Mode switch

Six position switch that controls application of primary power to transceiver and selects mode of operation.

Note

In CW mode, transmitter is switched on by closing handkey.

16. VFO control

Allows VFO tuning of operating frequency ± 5 kHz from frequency set on front panel. OFF (detent position) disables VFO and operating frequency is the exact frequency set on front panel controls.

17. Frequency MHz and KHz controls

Six switches used to select transceiver operating frequency in increments of: 10 MHz, 1 MHz, 100 kHz, 10 kHz, 1 kHz and 0.1 kHz, from left to right, respectively. For example, to operate transceiver on 65.4321 MHz set switches left to right, to 6, 5, 4, 3, 2, 1.

18. AUDIO connector

Connector for local handset (RF-3013), headset w/boom microphone (RF-3014) or microphone.

B. ON REAR PANEL

19. REMOTE 2 connector

Connector for control cables to RF-281 and RF-288 automatic antenna couplers (see fig. 5).

20. REMOTE 1 connector

Connector for cable to remote audio control unit RF-287 (see fig. 4).

21. DC INPUT connector

Connector for cable to dc primary power source (see fig. 3).

22,23. FUSES

Primary power fuses. For additional information, see page 22.

24. AC INPUT connector

Connector for cable to ac primary power source.

VII CABLING

A typical RF-280 station interconnection diagram is illustrated in figure 5. The antenna coupler control cable(s) wiring diagram is shown in figure 6 and the remote audio cable to the RF-287 Audio Remote Control is shown in figure 4. The two antenna cables are coaxial cables (RG-8/U for HF and RF-58/U for VHF). As with the power cables, check and be sure that all cable plugs are secure at each end.

VIII FUSES

a. There are four fuses in the RF-280 transceiver that are accessible to you, the station operator. Two primary power fuses (F1 and F2) are located on the transceiver rear panel (fig. 2). Two antenna coupler fuses (F3 and F4) are located behind the transceiver front panel and are accessible when the cover is removed.

b. Table 3 lists the fuses and the specific function(s) of each. One thing to keep in mind however, is that F2, the rear panel AC fuse is **always** required (for dc operation as well as ac operation).

c. If a fuse continues to blow when replaced and all checks covered in this section have been made, higher level maintenance is required.

CAUTION

Do not use a fuse with a higher current rating than specified. Serious damage to the radio could result.

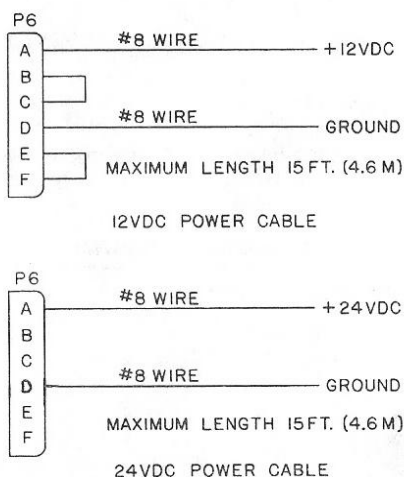


Figure 3. DC Power Cables.

c. The connection to ac primary power is made with the ac power cable from the AC INPUT connector on the transceiver rear panel to the station ac power. Be sure the ac power plug is secure in the AC INPUT connector.

d. The ground strap from the transceiver rear panel GROUND terminal to the station ground plane (fixed) or vehicle chassis (mobile) must be secure. The GROUND terminal wing nut must be tight, the ground strap must not be broken or frayed and the strap connection to the ground plane (or chassis) must be secure and clean.

25. Input Power switch

DC position

Sets transceiver for operation from 12 or 24 vdc power, depending on which dc inverter module is installed.

230 VAC position

Sets transceiver for operation from 230 volt 60 Hz single phase power.

115 VAC position

Sets transceiver for operation from 115 volt 60 Hz single phase power.

26. 30 - 80 MHz ANTENNA connector

BNC connector for coaxial cable to VHF antenna system.

27. 1.5 - 30 MHz ANTENNA connector

UHF connector for coaxial cable to HF antenna system.

28. GROUND terminal

Terminal for connection to ground system (see page 20).

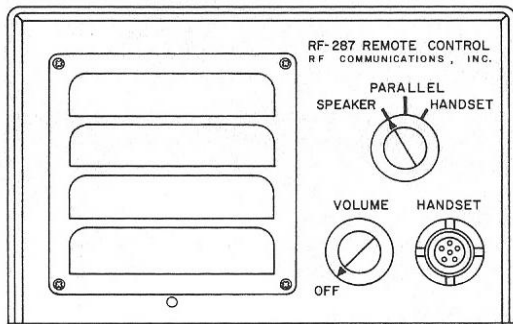


Figure 1. RF-287 Audio Remote Control Front Panel.

C. ON RF-287 REMOTE CONTROL (Figure 1)

VOLUME control

Controls audio level (volume) to speaker or handset. When set at OFF, dc power is removed from audio amplifier and keyline is disabled (open).

Function switch

SPEAKER position

Received audio from RF-280 is routed to remote control unit speaker only.

PARALLEL position

Received audio is routed to both the speaker and the HANDSET connector.

SECTION B OPERATOR MAINTENANCE

VI PRIMARY POWER

a. The type and amount of primary power required for operating the RF-280 Transceiver is listed in table 2.

Table 2. Primary Power Requirements

VOLTAGE ±10%	TYPE	MAXIMUM CURRENT
115 volts	50/60 Hz Single ϕ	5 amperes
230 volts	50/60 Hz Single ϕ	2.5 amperes
13.2 volts	Direct Current	50 amperes
26.4 volts	Direct Current	20 amperes

Note

RF output power will decrease slightly when input power approaches -10% of nominal voltage.

b. Connections to direct current primary power are made directly to the battery with one of the cables illustrated in figure 3. Be sure the connections are secure and clean. The other end of this cable is connected to the DC INPUT jack on the rear panel of the transceiver. Make certain the cable plug is fully inserted and secure in the jack.

h. To receive, release microphone switch. Radio automatically switches to receive.

i. For CW operation (CW mode), connect hand-key plug to CW KEY jack on radio and commence keying. Radio will transmit until keying is stopped.

j. To receive, stop keying and radio will automatically switch to receive.

V EMERGENCY OPERATION

If a primary power failure occurs and the RF-280 is set-up for multi-power operation, operation can continue by switching to the back-up power source. If your set-up has this feature, proceed as follows to change over to back-up power:

a. Set Mode switch at OFF.

CAUTION

Do not change position of power switch on rear panel unless Mode switch is at OFF.

b. On rear panel of RF-280, set power switch at DC. (figure 2).

c. On front panel of RF-280, set Mode switch at desired mode and operate as before (paragraph IV).

HANDSET position

Received audio is routed to the HANDSET connector only (speaker is disabled).

HANDSET connector

Connection for handset, microphone or cw hand key.

J2 connector (located on rear panel (not shown). (See figure 4) Connection to remote audio cable from RF-280.

II PREPARATION FOR OPERATION

Check that applicable control, antenna and power cables are connected, as required, to jacks on rear panel of transceiver. Be sure that power switch on rear panel is set at the position corresponding to the primary power being used.

CAUTION

Do not change rear panel power switch or apply (or connect to) primary power unless front panel Mode switch is at OFF. Premature power application can cause damage to the transceiver.

Before attempting to tune or operate the transceiver, connect microphone to AUDIO jack on front panel and set controls as indicated in table 1 Preliminary Control Settings. Controls not listed in table 1 can be in any position.

Table 1. Preliminary Control Settings

<u>Control</u>	<u>Position</u>
Mode	OFF
VFO	OFF (in detent)
SPEAKER	ON
NOISE BLANKER	OFF
RECEIVE RF GAIN	MAX
RECEIVE AUDIO	Mid-range
TRANSMIT AUDIO	AUTO (in detent)
SQUELCH	Full counterclockwise (but not in TONE detent)

III TUNING PROCEDURES, RF-280 TRANSCEIVER

The types of antenna systems coupled to the RF-280 radio and the operating frequencies involved dictate the tuning procedures to be used.

Complete the procedures in paragraph II, Preparation for Operation, before attempting to tune transceiver. Be sure front panel controls are at positions indicated in table 1.

Note

If the RESET indicator lights at any time during operating, an overload condition has occurred and activated the protection circuit. To reset, set Mode switch at OFF for at least five seconds, then set to operating mode. If condition persists, refer to next higher level maintenance personnel.

(resonant frequency of antenna is not the same as transceiver operating frequency or there is a defect in the antenna system). If reflected power is less than 10% of the forward power, the system is ready for operation.

IV OPERATION

Information can be exchanged in two ways with this radio: CW or voice. Methods of operation are identical except that for CW a hand-key (model RF-3012) is plugged into CW KEY connector J3 on the RF-280 front panel.

To operate, proceed as follows:

- a. Connect microphone to AUDIO jack J1.
- b. Set controls as indicated in table 1. Preliminary Control Settings.
- c. Set operating frequency using frequency control switches on front panel (i.e., for a frequency of 32.6541 MHz, set frequency control switches, from left to right to 3 2 6 5 4 1).
- d. Set Mode switch at desired operating mode.
- e. Set RECEIVE AUDIO control for desired listening level.
- f. Be sure radio is tuned (refer to paragraph III Tuning Procedures).
- g. For voice operation (LSB, USB, AM, or FM modes), press microphone switch and speak into microphone while holding it approximately one inch from your mouth.

B. VHF Range (30.0000 to 79.9999 MHz) with RF-288 Automatic Antenna Coupler

1. Set Mode switch at FM.
2. Set frequency controls at operating frequency. (Insure frequency set on controls is not less than 30.0000 MHz.)
3. Press RECEIVE TUNE SIGNAL switch while adjusting TUNE control for maximum noise from speaker or peak indication on meter. Release switch.
4. System is now ready for operation.

C. HF and VHF Range with Resonant Antenna

1. Set frequency controls at the antenna resonant frequency $\pm 1\text{-}1/2\%$.
2. Set Mode switch at AM.
3. Press RECEIVE TUNE SIGNAL switch while adjusting TUNE control for maximum noise from speaker or peak indication on meter. Release switch.
4. Press and hold microphone switch. Note indication on meter.
5. Hold POWER switch at REF and note indication on meter.
6. Release microphone switch. If meter indication in step 5 (reflected power) was more than 10% of the indication in step 4, there is an antenna problem

A. HF Range (1.5000 to 29.9999 MHz) with RF-281 Automatic Antenna Coupler

1. Set Mode switch at operating mode (USB, LSB, or AM).
2. Set frequency controls at operating frequency. (Insure frequency set on controls is not less than 1.5000 MHz.)
3. Press RECEIVE TUNE SIGNAL switch while adjusting TUNE control for maximum noise from speaker or peak indication on meter. Release switch.
4. Momentarily press microphone switch; a continuous tone from speaker indicates the RF-281 is tuning. When the tone stops, the system is ready for operation.

Note

If a malfunction is indicated (tone continues for more than 1 minute or begins to beep), set Mode switch to OFF for at least 5 seconds and repeat steps 1 through 4. If malfunction still exists, refer to section B and check fuse F4.

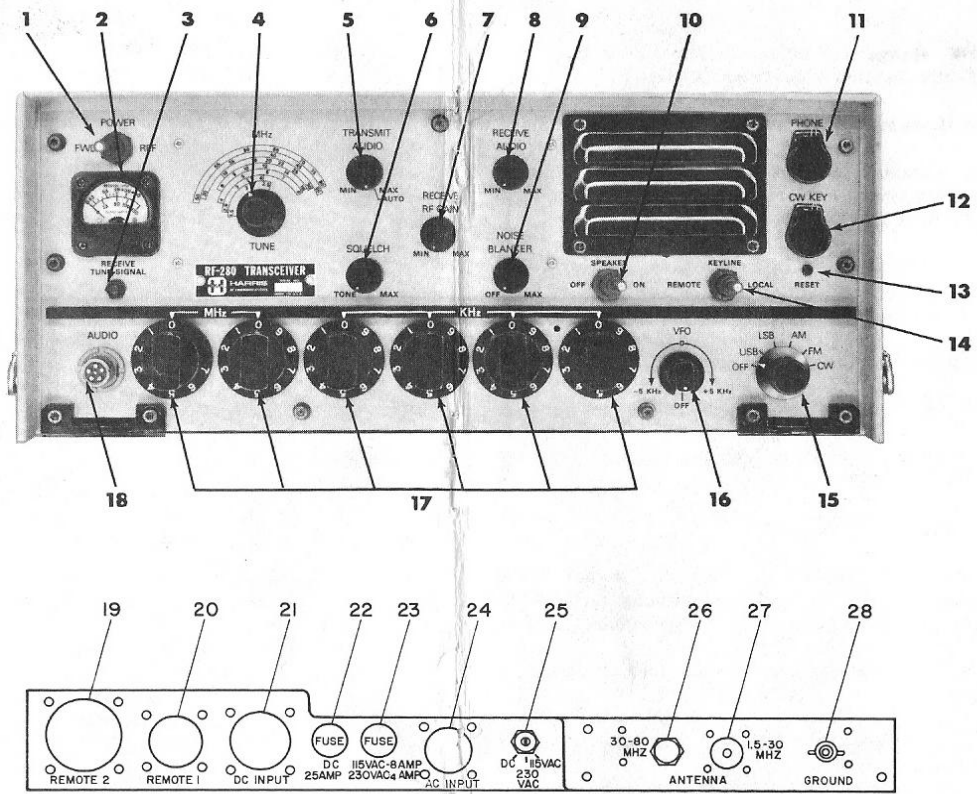


Figure 2. Operating Controls, Indicators and Connectors.