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Heath GR-740 Scanner

ICOM IC-751 HF Transceiver

Product Review

Conducted By Paul K. Pagel,* N1FB

ICOM IC-751 HF Transceiver

Billed in the press release as "the most advanced, highest performing HF transceiver with general-coverage receiver for the amateur world today," the IC-751 is ICOM's top-of-the-line amateur HF transceiver. The IC-751 features a 100-W output, solid-state transmitter, a high-performance receiver (including general coverage) and an elaborate frequency control/memory system. It may be operated from either of the optional 13.8-V dc power supplies: the IC-PS35, which fits inside the '751, or the external IC-PS15.

Describing every one of the '751's features would fill many pages. Accordingly, Table 1 lists the various front, top and rear-panel controls and connections. This review will highlight some of the unusual and not-so-obvious features of the radio.

Frequency Control

The main tuning knob of the '751 serves several functions. The TS switch sets the tuning speed to approximately 200 kHz per turn for quick QSY within a band. Normally, the tuning rate changes in 10-Hz increments, but if the knob is rotated quickly, the tuning rate jumps to a higher speed. This speed is specified as 50 or 100 Hz per step in different parts of the manual.

The second function the tuning knob performs is band switching. When the BAND switch is pressed, the main tuning knob switches the band up and down. In the HAM mode, the '751 tunes to a factory-preset spot on the next higher or lower band (for example, 14.050 or 7.050 if you were on the 10-MHz band). In the GENERAL mode, the frequency shifts up and down in 1-MHz increments when the BAND switch is pressed.

The dial-lock switch disables the tuning knob, preventing accidental frequency changes. This feature is especially handy during mobile operation.

Another function of the main tuning knob is switching among the memory channels. There are 32 memory channels available in the IC-751, so no ordinary switch would do! (Just try to remember what frequency is stored in which channel.)

The memory system is versatile. Each memory recalls not only the stored frequency, but also the mode of operation. For example, recalling memory 7 may put you on 14.003 CW, while memory 15 might store 3.830 LSB. Frequencies and modes may be written into the memories right from the dial. Similarly, by pressing the M TO VFO switch, you may turn frequency control over to the VFO at the memory channel selected.

The IC-751 has two built-in VFOs. These VFOs may be used to operate split (DUPLEX) while DX chasing or to switch rapidly between two different nets or roundtables. The VFOs need not be set to the same band or even to the same mode, so the effect is similar to having two transceivers in one box.

Table 1
IC-751 Controls and Connections

Front Panel

General

POWER switch
TRANSMIT/RECEIVE switch
METER switch
SPEECH synthesizer switch
Mode switches
VOX GAIN control
VOX DELAY control

Frequency Control

HAM/GENERAL coverage switch
SCAN start/stop switch
MODE-selective scan switch
Dial lock switch
TS tuning rate switch
DIAL FUNCTION select switch
BAND select switch
RIT/XIT control
RIT switch
XIT switch
RIT/XIT CLEAR switch
VFO A/B switch
VFO A=B equalizing switch
DUPLEX (split) switch
VFO/MEMORY switch
MEMORY WRITE switch
MEMORY TO VFO switch

Transmitter

Mic connector (8 pin)
MIC-GAIN control
RF PWR control
COMP speech-processor switch
MONITOR switch

Receiver

PHONES jack (1/4-in)
AGC switch
AF GAIN control
RF GAIN control
SQUELCH control
TONE control
FILTER switch
NOTCH filter switch
PASS BAND TUNING control
NOTCH filter control
Noise blanker WIDE switch
NB LEVEL control

Top Panel

PREAMP/ATT switch
MARKER switch
CALIBRATOR control
MONITOR control
ANTI-VOX control

Rear Panel

ANTENNA connector (SO-239)
KEY jack (1/4-in)
EXT. SPEAKER jack (1/8-in)
ALC jack (phono)
TR RELAY control (phono)
RECEIVE ANT IN jack (phono)
RECEIVE ANT OUT jack (phono)
SPARE jack (phono)
X-VERTER jack (phono)
GND terminal
DC 13.8V jack (molex)
ACCESSORY jack (molex)

The transmitter and the receiver frequency may be offset up to ±9.9 kHz from the operating frequency. The RIT/XIT control, continuously variable, sets the offset. The amount of offset is displayed next to the main frequency readout. The RIT/XIT CLEAR switch resets the offset to zero.

The IC-751 features a scanning system similar to that usually found in VHF transceivers. There are three scanning modes. The first scans through the memory channels from highest to lowest. The second, activated by the MODE-S switch, scans only those memory channels programmed with the specified mode (for example, only those memory channels with CW). The third function scans those VFO frequencies between specified start and stop points. For example, you might set it to scan from 28.500 to 29.000 if you were

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ICOM IC-751 HF Transceiver, Serial No. 1982

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: Receive — 0.1 to 30 MHz; transmit — 1.8-2.0, 3.45-4.1, 6.95-7.5, 9.95-10.5, 13.95-14.5, 17.95-18.5, 20.95-21.5, 24.45-25.1, 27.95-30.0 MHz.	As specified.
Modes of operation: CW, SSB, FM, AM, RTTY (FSK)	As specified.
kHz/turn of knob: Not specified.	2/200.
Frequency display: 6 digit.	5/16 in high white fluorescent digits.
Frequency resolution: 100 Hz.	As specified.
S meter sensitivity (μV for S9 reading): Not specified.	Preamp in (preamp out): 160 m, 22 (50); 80 m, 16 (48); 40 m, 17 (40); 30 m, 25 (46); 20 m, 28 (57); 15 m, 25 (82); 10 m, 25 (84).
Transmitter power (input): SSB, CW, RTTY, FM — 200 W; AM — 40 W.	Power output (SSB, CW, RTTY, FM): 160 m, 96; 80 m, 98; 40 m, 99; 30 m, 100; 20 m, 102; 15 m, 101; 10 m, 103 W. Power output (AM): 25 W all bands.
Harmonic suppression: More than 40 dB.	60 dB. See Fig. 1.
Spurious suppression: More than 60 dB.	60 dB. See Fig. 1.
Third-order IMD: −32 dB.	−33 dB. See Fig. 2.
Receiver sensitivity: SSB, CW, RTTY (1.6-30 MHz) — less than 0.15 μV for 10 dB S/N; FM — less than 3 μV for 12-dB SINAD.	Receiver dynamics measured with optional 500-Hz 9-MHz IF and 250-Hz 455-kHz IF filters installed.

	80 m Preamp in/out	*20 m Preamp in/out*
Noise floor (MDS) dBm:	−142/−134	−138/−134
Blocking DR (dB):	Noise limited	Noise limited
Two-tone 3rd-order IMD DR (dB):	91/93	93/93
Third-order intercept (dBm):	−5.5/5.5	1.5/5.5
Receiver quieting (μV for 12-dB SINAD):	0.4/0.85	Not measured.

Squelch sensitivity: Less than 0.3 μV	Preamp in: 0.24 min., 0.48 max. Preamp out: 0.30 min., 0.95 max.
Receiver audio output @ 10% THD: More than 3 W.	3.3 W.
Color: Two-tone green.	
Size (HWD): 4.5 × 12 × 14 in (115 × 306 × 355 mm).	
Weight: 18.75 lb (8.5 kg).	

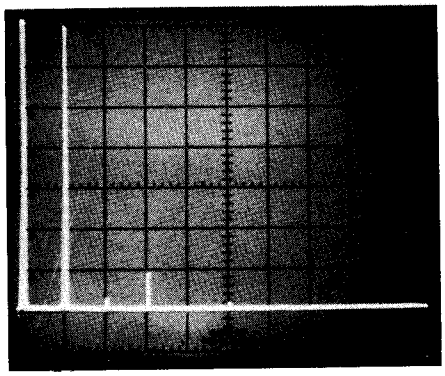

Fig. 1 — Worst-case spectral display of the ICOM IC-751. Vertical divisions are each 10 dB; horizontal divisions are each 10 MHz. Output power is approximately 100 W at a frequency of 10.125 MHz. All spurious emissions and harmonics are at least 60 dB below peak fundamental output. The IC-751 complies with current FCC specifications for spectral purity.

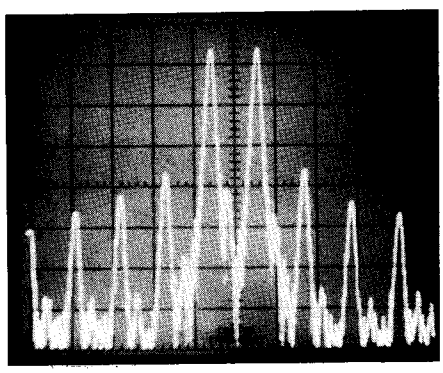

Fig. 2 — Spectral display of the IC-751 output during transmitter two-tone IMD test. Third-order products are approximately 36 dB below PEP, and fifth-order products are 44 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz. The transceiver was being operated at rated input power on the 20-meter band.

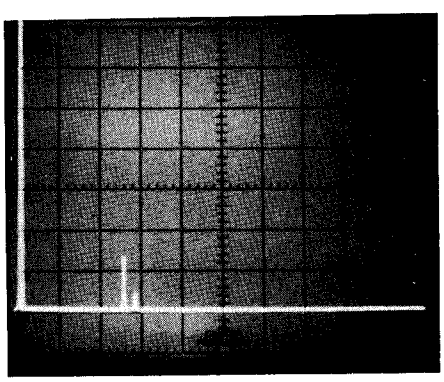

Fig. 3 — Spectral display of backwave emitted by the IC-751. Frequency is 28.050 MHz. Vertical divisions are each 10 dB; horizontal divisions are each 10 MHz. This signal is present with the IC-751 in the CW mode, the CW key open and the TR switch on the front panel closed. This signal is approximately 56 dB below the fundamental, and is audible in a receiver. Backwave is present on all bands.

looking for activity on a "dead" 10-meter band.

Transmitter

The IC-751 delivers approximately 100-W output in all modes but AM. The transmitter is all solid-state, and it features SWR protection that reduces output power as the SWR rises. A fan is provided to cool the final transistors. The fan comes on in transmit after the heat sink reaches a predetermined level. A few minutes of CW or RTTY operation will heat the IC-751 to this level. If the heat sink reaches 50° C during extended operation, the fan will run continuously. If the temperature reaches 90° C, the fan shifts into a higher speed and the transmitter power output decreases to 50 W.[1]

On-the-air checks indicate that the built-in speech processor makes a marginal difference in intelligibility when signals are weak. You can get an idea of the difference between processor-in and processor-out by listening to your signal in the headphones with the MONITOR switch on.

ICOM has included QSK for the CW operator. This feature works reasonably well at speeds below about 20 WPM. There is no popping or clicking in the headphones during QSK operation; the only sound is the relays cycling at high speed.

Above 20 WPM, the QSK circuitry truncates the characters, making copy difficult. Above 30 WPM or so, the QSK feature is unusable because the dots are shortened so much that they are barely perceptible. See Fig. 4 for the keying waveform.

FSK is included for the RTTY operator. All necessary modem connections may be made through the multipin accessory socket on the rear panel. The '751 will not key high-voltage equipment directly, but instructions for connecting a keying relay or a level converter are included. The manual also provides information on hooking up an AFSK generator, if that is your preferred mode of operation.

For the VHF operator, a transverter hookup is offered. When +8 V is applied to pin 11 of the accessory socket, approximately 30 mV of 28-MHz drive is available. Connection between the transverter receive converter and the IC-751 receive converter is also made at the X-VERTER jack.

Receiver

ICOM has taken an interesting approach to the old problem of allowing the operator to select the right amount of front-end gain for given band conditions. Most transceivers have an attenuator switch that allows you to switch in a fixed pad ahead of the front end when necessary. Some of the better rigs allow selection of two or three fixed values. The '751 has a top-panel switch that allows the operator to turn the front-end preamp off if necessary. If conditions warrant, the next switch position allows the operator to add a fixed 20-dB attenuator ahead of the mixer.

The review unit came equipped with an optional 500-Hz filter at the 9-MHz IF and a

[1] $°F = \left(\frac{9}{5}C\right) + 32$; mm = in × 25.4.

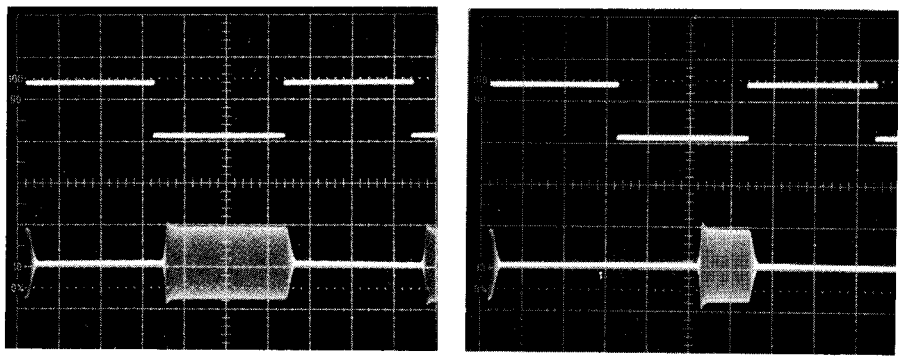

Fig. 4 — CW keying waveform of the IC-751. Upper trace is the actual key closure. Lower trace is the RF envelope. Each horizontal division is 50 ms. Both photos are of a string of dots sent at the same speed, approximately 35 WPM. The photo on the left shows the waveform with the IC-751 set up for semi break-in operation. The photo on the right shows the waveform with the transceiver set up for QSK operation. In the QSK mode, dots are shortened to approximately 50 percent of the proper length. See text for details.

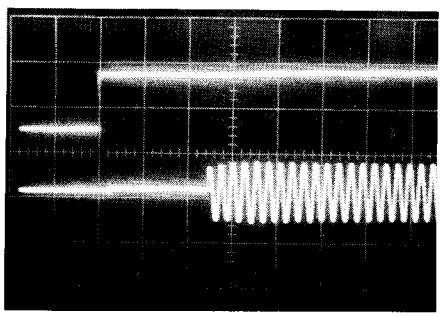

Fig. 5 — Receiver turnaround time for AMTOR. Upper trace is the TR relay opening. Lower trace is receiver audio. Each horizontal division is 5 ms. Turnaround time is less than 15 ms.

250-Hz filter at the 455-kHz IF. These filters worked very well, even under crowded band conditions. Selecting CW on the mode switch places the wide SSB filters in the line, while selecting CW NARROW puts the optional narrow filters into action.

Additional selectivity is available from the notch filter and passband-tuning controls. These two features are helpful in reducing QRM on SSB, CW or RTTY signals. The passband tuning is most effective on CW and RTTY if optional narrow filters are installed.

The noise blanker is very effective against impulse noise. When the blanker is on, however, strong signals tend to overload the receiver. The WIDE noise blanker switch is designed to help when the "woodpecker" is on, but during my operation with the review unit this feature was not effective.

To facilitate connection of an external preamp or a separate receive antenna (for example, a Beverage for the low bands), ICOM has included RECEIVE ANT IN and RECEIVE ANT OUT jacks on the rear panel. These jacks may also be used to hook up an external receiver for use along with the '751 or to hook up an external receiving converter without worrying about transmitting through it (if it were connected to the antenna jack).

Operation

The IC-751 has the quality "feel" that I have associated with ICOM equipment since I first used an IC-701 several years ago. The switches and controls provide the operator with just the right amount of feedback. The front-panel controls are spread out enough that the rig is easy to use, and most of the controls seem to be in the right place.

The general-coverage receiver is excellent. With an assortment of amateur antennas, it is possible to enjoy reception of music and news from all over the world. Although the optional AM filter is not necessary, the serious SWL will probably want one.

The IC-751 is a compact, full-featured transceiver that is at home anywhere. It is small enough to be used as a mobile rig. With the internal PS-35 power supply, it is an ideal portable or DXpedition radio. If you own other ICOM equipment, you can use one of the PS-15 external power supplies with several different pieces of equipment.

Reliability Problems

Although the review transceiver worked flawlessly during the review period, obtaining a working IC-751 proved to be a real task. The following is a log of the problems we encountered with various IC-751 transceivers.

On August 11, 1983, we received IC-751 serial no. 1114 from ICOM on loan for review. During lab testing, we discovered that an IF section was out of alignment and returned the unit to ICOM on August 16. ICOM sent us IC-751 serial no. 1227 on November 21, 1983. During lab tests, we discovered that this unit suffered from reduced power output as frequency increased. Power dropped from full output on 160 meters to zero output on 10 meters after the rig was on for a few minutes. We returned the unit to ICOM for repair on November 23. The problem turned out to be defective final power amplifier transistors. After this repair, the unit operated normally.

Meanwhile, we purchased an IC-751 from an authorized ICOM dealer on December 27, 1983. During lab testing, we discovered that this unit (serial no. 1982) would not go into transmit. We returned the rig to the dealer, who found a burnt-up resistor. Serial no. 1982 was returned to us January 24, 1984. Again, lab testing revealed a problem. This time, the IC-751 would not transmit FM properly — the output power dropped rapidly in transmit. We again returned the rig to the dealer, who found a defective 8-V regulator. On March 5, 1984 we were able to perform the necessary laboratory testing and begin the review.

Although the review transceivers worked well after repair, it was disconcerting to see three different transceivers of the same model defective right out of the box. The transceiver has some nice features, and, once working, performs well, but a prospective buyer would do well to seek out other IC-751 owners and ask about their experiences, and purchase the rig from a dealer who provides after-sale support.

Manufacturer: ICOM America, Inc., 2112-116th Ave., N.E., Bellevue, WA 98004. Price class: IC-751, $1400; IC-PS35 internal power supply, $160; IC-PS15 external power supply, $150; FL-32 filter, $60; FL-53A filter, $97. — *Mark Wilson, AA2Z*

HEATH GR-740 SCANNER

Heath's GR-740 is a microprocessor-controlled 40-channel scanner that allows you to monitor several frequencies including the 2-meter and 70-cm amateur bands. With the '740, you can receive frequencies that carry police, fire, aircraft, marine, weather, hospital, ambulance and other communications. It's a versatile unit that can be used for base station, mobile or portable operation — an ideal adjunct to any amateur station.

Description

Documentation

An assembly/instruction manual and pictorial booklet are supplied. As usual, the writers have generally done a good job, and each instruction is clearly spelled out. You're also provided with two large, easy-to-read (no magnifying glasses needed!) schematic diagrams. One diagram is for the RF circuit board and chassis wiring; the second covers the keyboard, display and controller circuit boards.

The assembly and adjustment sections are followed by an installation and operations chapter. Although the scanner is capable of being powered by an external dc supply, the information presented focuses on ac-line operation, attachment of an external antenna, use of an external speaker and a couple of paragraphs discussing the use of memory-backup batteries. It certainly is possible to use the GR-740 in a mobile environment, but nothing about that is mentioned.

Approximately four pages are devoted to explaining how to use the scanner, and three more pages contain lists of frequency allocations for the 30-50, 146-174 and 420-512 MHz bands. (Information concerning the operating frequencies of your local police and fire departments can usually be obtained easily; many electronic-parts suppliers and Radio Shack stores have that information.) Some troubleshooting information, alignment instructions, manufacturer's specifications for the scanner and a theory-of-operation section complete the manual.

Physical

The GR-740 is enclosed in a brown-vinyl-covered steel cabinet equipped with a sloping color-coordinated plastic front panel. An 11-position alphanumeric display is situated in the center of the panel. Immediately below the display is a 24-key keyboard. Function labels beneath each key, and color coding of the keys, identify each key function. A slide switch (A/B) at the bottom right-hand side of the keyboard selects one of two sets of 20 memory channels to be scanned. The ON/OFF/VOLUME and SQUELCH controls are positioned to the right of the front panel. An AUTO SQUELCH position

Heath GR-740 40-Channel Scanner

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 30-50, 118-136, 144-174, 421-512.45 MHz.	As specified.
Sensitivity (μV): ±5-kHz deviation, 12-dB SINAD: 30-50 MHz, 0.4; 144-174 MHz, 0.4; 421-512 MHz, 0.8.	Worst cases: 30.75 MHz, 0.24; 146.34 MHz, 0.19; 421.5 MHz, 0.58.
Aircraft: 1 μV for 10-dB S/N, 60% modulation.	118 MHz, 0.66.
Scan/search speed: 5 or 15 channels per second.	As specified.
Audio output (8-ohm load): 0.75-W RMS, 10% THD.	1.02 W.
Squelch sensitivity: Not specified.	Min./Auto (μV): 31 MHz, 0.14/0.24; 46 MHz, 0.06/0.15; 145.2 MHz, 0.1/0.28; 432.2 MHz, 0.27/0.6.
Power requirements: 120-V ac, 50/60 Hz, 20 W; or 13.8-V dc, 9 W.	0.56A @ 13.8-V dc (7.7 W).
Size (HWD): 3-1/4 × 10-5/8 × 7-3/4 in (83 × 270 × 197 mm).	
Weight: 5 lb (2.3 kg).	

(click stop) provides a factory-set, fixed squelch level.

The speaker is located at the bottom left of the front panel. Provisions for a 19-inch (measured from the cabinet top), removable telescopic antenna are made at the top left rear of the scanner. The antenna passes through an insulator and screws into a receptacle mounted on the internal PC board.

On the rear panel are jacks for an external antenna, external dc power, external speaker, a two-wire ac plug (the line cord is removable) and a grounding screw. The antenna jack accepts automotive-type (Motorola) plugs; one is supplied with the kit. A 1/8-in plug is required for external-speaker hookup (none is supplied). When using an external speaker, the internal speaker is muted. No mating dc connector is provided.

The back panel also allows access to the memory-backup battery holder. Two AA cells (not supplied) are required. Without the batteries, you'll lose the keyed-in scanner frequencies each time power is removed — purposely or inadvertently — from the '740. Note that the ON/OFF switch does not switch the ac-line (primary) side of the power transformer; it switches the dc bus.

Basic Circuit Description

Two parallel RF amplifier stages are employed: A bipolar transistor is used for the 420.45 to 512.45-MHz amplifier, and a dual-gate MOSFET provides amplification at 32-50, 118-136 and 144-174 MHz. RF-stage networks are varactor-tuned.

Following the RF amplifiers are separate mixers producing a common 10.8-MHz first IF. A four-pole crystal filter is used at 10.8 MHz. The second IF is at 400 kHz, where the signal is passed through a ceramic filter before being limited and demodulated. Two IC demodulator subsystems are used: one for FM, the other for AM (aircraft-band signals). Demodulated output is amplified and fed to the speaker. All internal reference frequencies are derived from a crystal-controlled synthesizer. A microprocessor does the "housekeeping," and receives its input from the keyboard and channel-memory IC.

Construction

It took me 3½ hours to make three minor manual updates and build the '740, and about 15 minutes to go through the adjustment procedures. There's virtually no PC-board "component stuffing" to do; almost all of that's been done for you.

Three factory-preassembled PC boards are used in the scanner: the RF, controller and display boards. Construction consists primarily of attaching wires to and from the boards, and then securing the boards to the chassis. Probably the toughest part of assembly is attaching the display board to the bezel bosses. A pair of small, circular clamps are used to do this, and access to the area is restricted. Heath cautions that patience is required to place the clamps properly and, believe me, they're not kidding!

This kit is a bit different from the many other Heath kits I've assembled since my first (the DX-40/VF-1 of eons past). The chassis is gray steel. Sheet-metal screws are used plentifully, as opposed to the "machine screw/washer/nut" fasteners I'm used to. Even the "control lockwasher/flat washer/control nut" assembly doesn't apply; you twist mounting tabs to secure the potentiometer/switch combinations in place. This kit is designed to go together quickly — assembly-line fashion. I'm glad to say mine worked the first time power was applied! Definitely, the GR-740 can be assembled by beginners.

Adjustment

No difficult alignment procedures are involved. You need nothing but a VOM and a single alignment tool; the latter is supplied by Heath. You have two coil slugs to adjust — that's it! Should the scanner need alignment at some later date, Heath has thoughtfully supplied a complete alignment procedure. Such alignment requires a calibrated AM/FM signal generator, however.

During the adjustment procedure, I noted what I thought was a conflict of information. Pages 29 and 43 refer to a voltage level at a test point (TP1). The tolerance given for the measurement is ±0.05 V, but one procedure says a 0.1-V potential should be measured there, and the other procedure calls for 0.4 V! Actually, both values are correct. According to Heath, the voltage measured at TP1 depends on the alignment procedure being used. If a general alignment is being done — as if all adjustments were thrown off — the 0.4-V value is measured early in the procedure. On a factory-aligned board (as you receive it in the kit), it's necessary only to tweak the coil slug to optimize the value at 0.1 V.

In Operation

After I spent a few moments studying the operations instructions, the scanner was providing me with weather information, 2-meter repeater, air-to-ground, taxi and paging-service chatter. While scanning, left-to-right rolling zeros appear on the display. When a busy frequency is found, the scanner stops and displays data pertinent to that channel.

A "P" in the first display position indicates the PRIORITY channel is active. Channel 1 of each bank of 20 channels is the priority channel. When the PRIORITY key is pressed, the scanner samples channel 1 every two seconds and, if active, switches immediately to it, regardless of other activity. To disable the PRIORITY func-

tion, press the PRIORITY key again.

The second and third display positions show the active-channel number. To identify which bank of channels is active, a dot in the upper-left corner of the second display position is illuminated for channels 1-10. For channels 11-20, a dot in the upper-left corner of the third display position is lit. The position of the A/B switch determines which of the two banks of 20 channels is chosen.

Pressing the DELAY key results in a scan delay of two seconds. This allows time to catch replies when two or more stations are operating on the same channel. Pressing DELAY a second time defeats the function. When a delay is in effect, the fourth display position shows a "d."

An "L" in the fifth display position shows that LOCKOUT of that particular channel is active. Selected by pressing the LOCKOUT key, this function locks out a channel during scanning periods. An "A" in the fifth position indicates the AIRCRAFT key has been pressed to request scanning of the aircraft band (118-136 MHz). Similarly, pressing the MARINE key initiates scanning of the frequencies between 156.05-157.48 and 160.625-162.025 MHz. A dash (-) in the fifth display position is illuminated at this time. Display positions 6-11 indicate the frequency of the channel being received.

The SCAN key starts a scan of the selected channels. SEARCH initiates a scan for signals between two operator-selected frequencies, and restarts a scan after HOLD has been pressed.

LIMIT/HOLD allows you to enter two selected frequencies as upper and lower search limits and stops a search between the selected frequencies. Lastly, the SPEED key permits selection of scan/search rates of five or 15 channels per second.

Should you enter a frequency outside the range of the GR-740, ERROR is displayed. Simply entering the proper frequency corrects the error condition.

Comments

Although the manual makes no mention of it, there are threaded receptacles on each side of the cabinet to accept gimbal-bracket mounting screws. In the finishing stages of assembly, they're plugged with plastic inserts for the sake of appearance.

The dc-power jack is a type you don't ordinarily see in a ham shack — a circular jack with a flat blade in the center. Heath did not supply a mating female connector for use with an external dc-supply cable. I didn't have any such connector in my supply of parts, and Radio Shack doesn't list them as a catalog item. That being the case, I'd suspect at least some other hams would have difficulty obtaining a matching connector as I did. There's enough rear-panel space to mount another type of connector in parallel with the existing one, however.

I live a few miles from two airports, and much of the air traffic passes overhead. On a few occasions, I've noticed that air-to-ground signals will interfere with 2-meter repeater monitoring. At times, I can listen to both conversations at once! Also, when monitoring the aircraft band, the GR-740 is subject to overload from strong air-to-ground signals, resulting in distorted recovered audio. These have proved to be only minor annoyances.

A GR-740 complements any ham shack. With it, you'll not only be able to monitor 2-meter and 70-cm repeaters, but fire and police department, aircraft, marine and a host of other services as well. The latest weather information for your area is readily available, too.

The GR-740 is available from the Heath Company, Benton Harbor, MI 49022; tel. 616-982-3411. Price class: $250. — *Paul K. Pagel, N1FB* QST

(Continued from page 33)

and ideal times of day. We can only generalize because of the continual change in solar activity. We can, however, suggest the bands on which to concentrate for working local or DX contacts, day versus night. This data is presented in Table 1 for your assistance in setting up your antennas for favored bands.

Summary

Your best source of detailed information concerning the ionosphere and radio propagation is *The ARRL Antenna Book*. I have attempted here to provide a simplified, plain-language introduction to the propagation phenomenon, and to suggest steps you can take to make your first on-the-air experience a pleasant and rewarding one. Also, you will need some knowledge in this subject area if you are to pass your amateur license examination. The mysteries of the sky are many, and we have ignored a host of them in the interest of keeping this article short. I encourage you to engage in further study of this fascinating subject. QST

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Strays

I would like to get in touch with...

☐ anyone who has built or used a VHF/UHF to HF Crossband Link. Andrew Rothschild, KA2TFF, 115 Central Park West, New York, NY 10023.

☐ anyone with a wiring diagram for a Superior Instruments Co. Industrial Analyzer, Model 630. Howard G. Wacker, W3BRK, 4513 Cerise St., Pittsburgh, PA 15214.

☐ anyone with a schematic diagram or manual for a Teletype Corp Communications Teletype Model 39506JC and associated power-supply/electronic unit WE5U001. Joe Morgan, W5PRV, 624 Kerrville So. Dr., Kerrville, TX 78028.

☐ anyone having an instruction manual or schematic diagram for a Navy CTU-60018 Oscilloscope or a Triumph Model 830 Oscillograph-Wobbulator. Sam Beverage, W1MGP, Box 858, North Haven, ME 04853.

☐ any radio amateur who has the 600, 900, 1200 MMF Special Mica Condenser, part no. 22.1316, for a Johnson Valient transmitter. Bill Gentile, W5VRO, 416 Skyline, Van Buren, AR 72956.

☐ anyone with a schematic diagram or alignment instructions for a 1948 Model RME-45 Communications Receiver. Albert L. Harmon, W1KBH, Rte. 3, Box 282, Conway, SC