Taking the youngster to the airport to watch the big jets zoom in? Take along this compact little VHF receiver and let them listen to the pilots and control tower talking on the 118 megacycle aircraft frequencies. With a range of 49 to 150 megacycles, the Three-Way VHF'er will also tune in the 50 and 144-megacycle amateur bands, Civil Air Patrol frequencies, commercial FM broadcast stations and some TV sound channels.

**COMMENTS**

**3-WAY VHF'ER**

A 50—150-MC. VHF RECEIVER

By Jack Hjeljork, K9QOE

**K9QOE OPERATES** the three-way VHF receiver (left) in his office, and (bottom) in his automobile. Receiver is car mounted on brackets hung from the sides of G-E Transistorized Progress Line [19] Two-way radio. Jack is District Sales Manager in Chicago for General Electric's Communication Products Department. His previous stint in G-E HAM NEWS was "Inductive Tuning for High-C RF Oscillators" (September-October, 1961, Vol. 16 No. 5).

**DESIGNED** around the newer series of automobile-type tubes which require only 12 volts DC plate supply, the Three-Way VHF'er can be used either at home or in the car without the need for the usual mobile vibrator or transformer power supply. Total current drain of the complete receiver is approximately 1 ampere at 12 volts DC so there is no danger of depleting the car battery during extended listening periods.

For maximum flexibility the receiver, is designed for three different types of operation through the use of two plug-in modules. As shown in the block diagram, Fig. 1, the unit may be operated as:

- a. VHF tuner with audio output fed to an existing amplifier;
- b. VHF converter with output on the broadcast band to feed into the station receiver or auto radio;
- c. Complete VHF receiver with self-contained audio amplifier.

Continuous frequency coverage from 49 to 150 megacycles is obtained without bandswitching or plug-in cards by use of a 'tuned' filter section which was widely used some years ago in TV receiver front ends. A good source of Filter sections is the back-room and basement graveyards of defunct TV sets in TV repair shops. The Inductance front end can be easily identified by the lack of a "click" type channel selector switch. Crossley, DeArmond and Dunlop are some of the manufacturers who incorporated the Inductance in 50 and 12-inch TV receivers.
The usual Inductor TV front end covered a range of 14 to 250 megacycles; however, in this receiver the upper tuning limit is dictated by the superregenerative detector circuit which stops "superheterodyning" around 150 megacycles. Frequency coverage vs. tuning dial rotation is shown in Fig. 2. CIRCUIT DETAILS—The 1SEK RF stage in the schematic, Fig. 3, is a conventional pentode amplifier. But, unlike standard tube circuits, screen dropping and cathode bias resistors are not required. Plate and screen voltages are fed directly from a 12 to 15-volt DC source, and a high value grid resistor develops constant potential grid bias. With a plate supply of only 12 volts or so, a cathode bias resistor would reduce the effective plate voltage to less than ten volts, so a more efficient way of developing grid bias must be used.

One section of the Inductor is used to tune the grid circuit of the RF amplifier. A front panel tuning capacitor in series with the bottom of the Inductor permits trimming the RF stage to compensate for reactance introduced by various types of antennas and transmission lines. The antenna is coupled directly to the grid of the RF stage through a small coupling capacitor. Although this is not the ideal method of matching a low impedance transmission line, the continuously variable Inductor does not permit the usual tapped input coil connection. Plate voltage for the RF stage is fed through RFC, and the output of this stage is capacitively coupled to a triode-connected 1SEK superregenerative detector. The usual regeneration control is not needed because the detector superregenerates smoothly without critical setting of plate voltage. Output of the detector is fed through a miniature audio interstage transformer to the front panel volume control and then to the "audio" terminal on the rear of the cabinet.

Resistor R3 connected across the volume control prevents "drogge howl," an audio oscillation sometimes encountered with regenerative transformer-coupled detectors. If a transformer different than that specified on the parts list is used in this receiver the detag for does not actually howl but the audio output sounds extremely hollow. For a given transformer, R3 should be as high in value as possible consistent with elimination of this condition.

The two tube portion of the receiver can be used by connecting the audio output to the phone input jack of the crystal controlled type to an existing audio amplifier or hi-fi amplifier with high impedance input.
To use the receiver as a converter or as a complete receiver with self-contained audio, the appropriate module is plugged in. Poor banana type jacks and plugs on the receiver chassis and modules automatically make the required input, output and power connections when a module is plugged in and it is then only necessary to make connections to terminals on the rear of the cabinet. When the converter module is used a length of coaxial cable (RG-174/U or RG-8/U) terminating in a phone-connector type plug is plugged into the "converter" jack and the other end of this line is then connected to the antenna input terminal of the broadcast receiver.

The converter module consists of a 12AU7 pentode which operates at 45 electron-coupled, modulated oscillator with output in the broadcast band. Audio output from the superegenerative detector is fed into the signal grid of the 19AJ6 to modulate the oscillator circuit made up of the number one grid.

**TABLE I—Parts List—2-Way VHFTR**

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>20-mfd, 50-volt electrolytic (G-E EQ11-15)</td>
</tr>
<tr>
<td>C2, C3</td>
<td>300-mfd, 15-volt tubular electrolytic (G-E Q41-30)</td>
</tr>
<tr>
<td>C4, C5</td>
<td>1500-mfd, 50-volt cera type electrolytic (G-E EC1-27)</td>
</tr>
<tr>
<td>C6</td>
<td>1200-mfd, 600-mv. rectifiers (G-E 1H15)</td>
</tr>
<tr>
<td>L1</td>
<td>3.5-ohm per section, 2, or 3-section 6-turn spiral &quot;inductor&quot;</td>
</tr>
<tr>
<td>L2</td>
<td>Adjustable inductance iron-core broadcast receiver oscillator coil (L. W. Miller 567-73, Osc, or equivalent)</td>
</tr>
<tr>
<td>L3</td>
<td>Secondary of 6.3-volt, 1-amp, element transformer (Stearns P-1234)</td>
</tr>
<tr>
<td>Q1, Q2</td>
<td>G-330, A or G-22 PNP AF output transistors</td>
</tr>
<tr>
<td>RFC</td>
<td>RFC_1, RFC_2, RFC_3, RFC_4, RFC_5</td>
</tr>
<tr>
<td>RFC_6, RFC_7</td>
<td>2.5-mh, four-pin type RF choke (Nativa- 1H100, 250 mh, or equivalent)</td>
</tr>
</tbody>
</table>

**FIG. 3. SCHEMATIC DIAGRAM of the basic VHFTR. Note simple RF circuitry made possible by low-voltage auto radios tubes. All fixed capacitors are mica or ceramic with values in picofarads unless otherwise indicated. Resistance are in ohms, 3½-watt rating unless marked.**

**FIG. 4. AUDIO AMPLIFIER schematic diagram which can be constructed as a plug-in module, or built into the complete receiver. Transistor output stage provides about 1-watt output.**

---

**TOP VIEW** of the receiver showing the Inductor behind the two 12EX7 tubes, and L7 to their right. Modules plug into banana jacks in open area at rear of receiver.

**BOTTOM VIEW** of the receiver, showing simple wiring and the insulated washers on three of the four banana jacks. Non-insulated jack is in the lower left position.
cathode and screen. RF output is taken off the plate and fed via a small coupling capacitor to the "converter" jack. The modulated signal is then tuned in on the broadcast receiver in conventional fashion. Adjustment of the turning slug in the oscillator coil permits setting the output of the converter to a clear portion of the broadcast band. Like the 12BE6, the 12AD6 Hengko requires only 15 volts DC for plate and screen potential.

The audio module shown in Fig. 4 is made up of a transformer-coupled 12DJ7 space-charge v-tube transformer-coupled to a pair of G-E 2N3414 transistors in class "B". The 12DJ7 is unlike a conventional p-tube in that the number one grid (grd near the cathode) is not the signal input grid. In the 12DJ7 this is a space-charge grid connected directly to the 12 volt DC plate supply. This grid accelerates electron flow and permits the tube to operate much more efficiently from the low potential plate supply. Signal voltage is fed into the number two grid and audio output is taken from the plate in the usual manner. Resistance coupling such as is usually employed in conventional audio stages cannot be used with any degree of success with the 12-volt audio tubes because the voltage drop across the plate load resistors would lower the effective plate supply below usable limits.

The 2N3414 output transistors develop approximately 5 watts output to drive either the internal or an external speaker. A small 3½ inch oval speaker is included on the cabinet and its output is adequate for home station use. For mobile operation a larger, more efficient external speaker should be used to overcome the higher noise level usually encountered.

The 8-ohm speaker output terminal is parallelled with the converter output jack to eliminate the need for a separate plug and socket on the module and chassis. When the converter module is used, the external and internal loudspeaker connections should be removed, otherwise the loudspeaker voice coil will short the converter output and decrease the signal level fed to the broadcast receiver. A slip-pin connector is used to disconnect the built-in loudspeaker for converter operation.

A low-pass filter consisting of feedthrough capacitors C1, C2 and RFC is used in the 12-volt DC input lead to prevent ignition noise from feeding into the receiver. If mobile operation is not contemplated this filter can be eliminated and the power connection can directly to the on-off switch. The receiver power input cable should contain an in-line two ampere fuse as protection against melted ignition system. Wires in case the receiver develops an internal short.

CONSTRUCTION —

The receiver is built into a standard gray hammarston finish aluminum chassis measuring 3½ x 6 inches (Bud CU-3209 or similar). One end of the chassis is used as the front panel so that only 3½ x 6 inches are required for under-the-dash mobile mounting. A strip of 14-gauge aluminum 5/16 x 7/8 inches serves as the main chassis. If a hinging brace is available this chassis can be fabricated with right angle bends which are then bolted to the "U" shaped cabinet enclosure. In lieu of this, the chassis can be cut to size and small right-angle brackets can be used as shown in the photographs to secure the plate to the cabinet with No. 4 machine screws and nuts. Two angle brackets are used on each of the three sides which come in contact with the cabinet.

The main chassis drawing, Fig. 5, shows the location of the necessary holes. It is advisable to check the dimensions of the Inductorator mounting holes because these may vary — depending on the vintage of the Inductorator used — and they may not agree with those shown on the drilling diagram. The Inductorator is shimmmed slip from the chassis 3/32 of an inch to permit the plastic terminal strips to clear, since these project from the bottom of the unit. If the specified Greg Model 1221 Microdial is used the Inductorator shaft must extend from the front panel by 4 to 10 of an inch, so do not cut this shaft until the final position of the Inductorator is determined.

The chassis plate is positioned inside the cabinet so that the Inductorator shaft is exactly centered on the panel end of the cabinet. These dimensions are shown on the front panel drawings, Fig. 6, which are required to secure the Inductorator to the chassis and these are necessary as the existing threaded holes in the unit. Slip soldering lugs under the two screws nearest the cabinet side as these points will be
FIG. 7. LAYOUT DIAGRAMS for the converter and audio module subassemblies. Material is also 14-gauge aluminum. Locate the holes for the brass pins from the mating (oil holes in the main chassis)

used as ground connections. The lug near the front panel is used as a ground point for trimmer capacitor C4 and the rear lug is used as a ground point for electrolytic capacitors C6 and C11.

A two terminal strip bolted an inch forward of the 12S6S RF socket serves as the tie point for the antenna coax cable and for the termination of RFC, and plate by-pass C8. No. 18 tinned bus wire is used for RF section 1. One heater pin, the cathode and the suppressor of the RF tube sear are strapped together and grounded to a lug under the front terminal strip mounting screw.

The No. 4 machine screws and nuts which secure transformer T1 are used to secure terminal strips to the rear of the detector socket. A three terminal strip is used nearer the socket to serve as tie points for RFC10, the 100 ohm resistor R10, and one end of electrolytic capacitor C10. The detector RFC is connected between this terminal strip and the Inductor section.

The two terminal strip under the rear screw of the transformer body serves as a tie point for by-pass capacitor C11, audio coupling capacitor C12, and the transformer lead connections to the shielded wire running to the volume control through a small cut-out in the chassis. The two No. 4 screws and nuts which balance up the two screws used to secure the chassis to the front panel are also used as grounding tie points for the shielded wire routed across the inside of the front panel to the volume control.

Imulated shoulder washers are used to mount the model banana jack on the chassis. The location of these should be staggered as shown to prevent the possibility of a module being plugged in incorrectly. A small cut-out on the cabinet and corner of the chassis permits routing of leads to the speaker and audio terminal strip.

Fret-through capacitors C16 and C17 are soldered to small, right-angle brackets bolted to the screws which secure the power input plug. RFC14 is then soldered between these capacitors.

BG-174/U coaxial cable, 1/4 inch in diameter, is used to connect the antenna input terminal to the front terminal strip. If this type cable is not readily available the slightly larger RG-60/U can be used.

The 21/4-inch loudspeaker specified on the parts list just fits nicely between the bottom of the chassis and the cabinet cover plate and this clearance should be checked if a different type of speaker is used. This location of the speaker is to be preferred because sound is directed out on the driver's side of the cabinet when the receiver is mounted on the usual center of the automobile dash above the floorboard loudness.

The Rectifier Microdot is designed for center mounting to Micropot meters and the instruction sheet accompanying the dial does not show any other method of mounting. The following procedure should be followed. Disassemble the dial by loosening the No. 3 set screw on the outer edge of the dial. (Do not try to loosen the screw on the end of the knob.) Slide the back plate. Remove the dial locking plate.

The back plate has a series of small holes which will accept No. 4 machine screws. Carefully enter the backplate on the front panel Inductor shaft making sure the No. 3 set screw hole is toward the bottom of the plate so the dial will be correctly oriented. Using the backplate as a template, mark two mounting holes on the panel and drill with a No. 28 drill. Bolt the back plate to the panel using flat-headed No. 4 machine screws and nuts. Getting the nuts on the bolts will take a bit of doing because the bolt ends will be partially behind the Inductor. Remove the Inductor cover to gain more access if required.

With the back plate bolted to the panel, set the Inductor shaft to mass produce (wipers on outside edge of concentric nut). Set the dial mechanism to 0-0 and grip it on the back plate. Tighten the No. 3 set screw and the Allen head set screw in the knob. If the dial hands at some point it may be necessary to remove the front plate and reposition the back plate slightly until good alignment between the Inductor shaft and dial is obtained.

Construction of the modules is straightforward and all necessary details can be seen in the photographs, and layout drawings, Fig. 7.

A.C. POWER SUPPLY for the VHF receiver is shown in Fig. 8. Approximately 3/4 of an ampere at 12 volts D.C. is required when the unit is operated as a complete receiver. A 2A14 is specified as a heat sink, however this is accurate by three section filters.

The filament of the relay transformer is rectified by a half wave rectifier of the full wave rectifier type. The second winding of a small 6.3 volt filament

FIG. 8. SCHEMATIC DIAGRAM for the AC power supply for the VHF receiver. Components are described in Table I — PARTS LIST.

TABLE II-HOLE SIZE CHART

A" drill-No. 31 (1.20) clears 4-40 screw.
B" drill-No. 36 (1.147) clears 4-32 screw.
C" drill-No. 9 (1.986) clears 13-32 screw.
D"-1/32 inch in diameter.
E"-1/64 inch in diameter.
F"-1/80 inch in diameter.
G"-socket punch—1/64 inch diameter for 2-pin miniature tube socket.
H"-socket punch—1/64 inch diameter for 6-pin miniature tube socket.

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The filament of the relay transformer is rectified by a half wave rectifier of the full wave rectifier type. The second winding of a small 6.3 volt filament

BOTTOM VIEW of the plug-in modules, with (left) the converter module using a 12AX7 pentagrid converter tube, and (right) the audio amplifier module. The 2N4114 output stage transistors plug into 2-pin miniature transistor sockets.
MOBILE RADIO CONTROL UNIT

By John J. Borence, 2Q2V1A

While the operation of radio equipment is not exceedingly difficult, the amateur operating mobile has to contend with the driving of the automobile. This alone is a full time job. In order to simplify radio operation and provide a safety factor, necessary in traffic, the finger tip remote control head described here is recommended for installations where the radio equipment cannot be located close to the driver's seat.

In the installation shown in the picture, a Heathkit transceiver model CW-10 for the Citizen's Band is installed in a convenience spot in the car. This does not always allow easy operation of the controls. Attaching a small remote control head a handy location on the dash will provide easy operation of the set. The remote head can be easily adapted to work with many other transceivers and separate transmitter-receiver units on the market.

This unit consists of a 397-jack on-off switch, power pilot light, Volume control, and hanger for the microphone. Since this transceiver is crystal controlled on both transmit and receive, no tuning facility is required.

The wiring of the control head is very simple and uncluttered. By using sub-miniature parts the box size can be reduced even more. 12 volts DC is brought directly into the switch, as shown in the schematic diagram, Fig. 1. From the switch the voltage goes to the pilot lamp (one side of which is grounded), then to the existing transceiver fuse.

Volume is controlled by means of a pad across the receiver speaker. The receiver volume-on-off switch is left to the ON FULL position. The schematic is self-explanatory on the pad operation. Only one wire info, and two wires out of the control head, are required. The control head is grounded when mounted under the dash.

The pilot lamp can be eliminated if the transceiver already has one; however, a bright light nearer to the eyes aids the possibility of a dead battery due to the set being left on accidentally while the car is parked. The microphone shows a phone-to-talk switch built in. If the mike to be used has the talk-receive switch on the cabinet, a similar switch should be added to the control head.

Only a simple cabinet is required; and it consists of a small utility box cut to the dimensions shown or to the size required by the parts that you elect to use. Mount all parts rigidly and anchor all wiring securely so for all mobile applications. Crimp wire to their connections and solder well. Road vibrations are hard on electronic equipment.

Installation of the control head in the car depends entirely on the make. It would be impossible to go into precise details with such a variety of dashboards available. However, this is one of the basic objectives of the unit; it should be easy to mount in almost every car on the road, large or small. The most difficult task is in beating the transceiver itself. Again this will depend on the car, but it is probably that a convenient spot out of the way will be found.

After locating the transceiver and mounting the control unit it is ready to be tested on the air. If the radio is mounted too far from the control unit the microphone cable may need to be lengthened so that too long a stretch doesn't result. To operate the set, simply turn on the key switch. You may also need to adjust the sensitivity on the receiver section but once set, it should not need further adjustment. With pre-set receiver and transmitter (usually crystal controlled, a must for Citizen's band) all that remains is to talk into the microphone.

The unit shown has gone many miles in the author's car, covering most states on the eastern seaboard on both business and pleasure and has been well worth the construction time in added convenience.

The Mobile Radio Control Unit is illustrated under the radio in 2Q2V1A's "Wiring" car. The transistorized Heathkit receiver in the back seat is the Heathkit DX-5. The Heathkit Receiver in the front seat is the Heathkit GL-3.

John also has authored several articles for electronics magazines. One of his first offerings was "Economical Highway FM" in the November 1960 issue of Radio-Electronics.

<table>
<thead>
<tr>
<th>TABLE 1—PARTS LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Red Mini-B to mini (about 4 x 3/4 x 3/4&quot;)</td>
</tr>
<tr>
<td>1 3/4-inch brass ground panel bracket assembly (BIA/LCO 810H or 810B)</td>
</tr>
<tr>
<td>1 6 or 12 volt G2 bulb in 6 volt pilot lamp</td>
</tr>
<tr>
<td>1 6&quot; x 4&quot; x 4&quot; aluminum (aluminum, or transparent)</td>
</tr>
<tr>
<td>1 Oak tray type switch (on-off switch), available at auto stores (or Arrow-Hart or Henn &amp; Co.)</td>
</tr>
<tr>
<td>1 Oak tray type switch (on-off switch), available at auto stores (or Arrow-Hart or Henn &amp; Co.)</td>
</tr>
<tr>
<td>1 Knob for pot (optional type HP)</td>
</tr>
<tr>
<td>1 Optican 6200A Transformer (Commercial Transformer)</td>
</tr>
<tr>
<td>1 Transformer, 1000 ohms, 50 volt (Commercial Transformer)</td>
</tr>
<tr>
<td>1 Mounting hardware essential to set installation</td>
</tr>
</tbody>
</table>

FIG. 1. SCHEMATIC DIAGRAM of the transceiver control unit. A wide choice of components is available to those in Table 1—Parts List, are available and may be substituted.
transformer. Any small transformer can be used here provided the DC resistance of the secondary winding does not exceed two ohms. Neon lamp NE-51 is connected in series with R1, R50, to serve as a pilot light. The supply is built on a small 4 x 6 inch chassis (Model CB-240J).

TUNE-UP AND ADJUSTMENT

The VHF portion of the receiver can be checked by plugging it into the station receiver's phono input jack or into an audio amplifier (these modules out). With 12 volts DC applied, the familiar super-regenerative noise should be heard when the tubes warm up. If the detector does not super-regenerate check RFC and make sure the fine wire with which it is wound has not broken.

Frequency coverage can be checked with a grid-dip meter or signal generator. The low end of the band should hit between 48 and 49 megacycles with the detector components shown in the parts list. If the low end of the range is too high in frequency increase the value of fixed capacitor C6 across the detector Inductor to 7 or 8 mfd. If desired, a small mica trimmer can be used for C6 to act the low frequency end of the range. The receiver should superregenerate to approximately 150 to 160 megacycles before giving up with a howl of protest.

To check the converter module plug it in and connect the converted output to a broadcast receiver. If an AC-DC entertainment or a transistor type broadcast receiver is available it can be instance of the secondary winding feeds the converter output jack to the vicinity of high audio input jack.

The tuning slug in the oscillator coil must be turned in until approximately 4-inch of the tuning screw protrudes above the coil. Otherwise this screw will not clear the cover of the socket. To adjust C6 the trimmer condenser is turned so that the converter signal should be heard above hum in the broadcast receiver.

Adjust the tuning screw on the oscillator coil until the desired response is heard. If output is desired in the frequency range of 150 to 160 megacycles a small mica trimmer across the oscillator coil can be used to change the frequency. Once the converter oscillator is tuned in on the broadcast receiver, tune in a signal on the VHF receiver and increase the setting of the volume control on the VHF receiver until its output modulates the oscillator. The average VHF signal will modulate the oscillator from 60 to 80 percent and the VHF receiver volume control can generally be turned full on and left there. Further volume adjustment can then be made with the broadcast receiver volume control.

If initial tests are made with the audio amplifier module plugged in for loudspeaker operation be sure to double check the polarity of the power leads. Reversed polarity will ruin the output transistors.

As with any other simple receiver, an efficient antenna system should be used for best results. For mobile operation a resonant quarter-wave鞭 cut to the desired frequency and fed with RG-58/U is recommended. Unfortunately, no antenna system other than a special one such as the Donica will give uniformly good pick-up over the entire frequency range capable of being covered by the receiver. If good, all-frequency operation is desired for mobile operation the multi-resonant whip antenna shown in Fig. 10A will give good results in the most active portions of the spectrum. This antenna consists of three separate whips which can be made from discarded automobile antennas.

whips or aluminum rod. Secure the bottoms of the whips to a metal plate and use Lucite or other plastic spacers as shown in the diagram to maintain whip spacing of 3 inches. This antenna will give good pick-up on the 50- and 144-megacycle ham bands as well as on the 100-megacycle FM band and the 118-megacycle aircraft frequencies.

A similar antenna system for home use is shown in Fig. 10B. This multi-resonant antenna is constructed from lengths of 300-ohm twin-lead which are secured to supports as high in the air as possible.

With either of the simple antenna systems shown the three-way VHFer will give good reception of commercial FM stations 10 to 20 miles away. Depending on their altitude, commercial aircraft can be copied out to 50 to 40 miles. Local 50 and 144-megacycle stations will also give good copy but don't expect to hear that 144-megacycle DX station your buddy down the street is copying with a 471A converter and 15A4 receiver.

OTHER FREQUENCIES

In anticipation of requests for operation of the receiver on frequencies other than 49 to 150 megacycles a number of tests were made with the Inductor-type tuned circuits. The frequency coverage of the receiver can be lowered to 27 megacycles by adding fixed inductance in series with the Inductor. However, when this is done the effective frequency coverage is drastically curtailed because the Inductor becomes a small part of the effective tuned circuit and tuning range drops to less than five megacycles. The Inductor acts "as is" and simply adding fixed capacitors in parallel with the coil doesn't appeal to the super-regenerative detector to "act as if" under these conditions.

It extended lower frequency coverage is desired the better approach would be to replace the Inductor with a tuning-gain capacitor and suitable coils for the desired frequency range. Have fun!
Recipient — 1961 EDISON RADIO AMATEUR AWARD
William G. Welsh, W1SAD

Thrill of far-away places is brought home to youngsters via amateur radio by William G. Welsh.

FRIENDLY help, anywhere, is the coin by which the recipient of the 1961 Edison Award lives.

6th EDITION—SPECIAL DX LOG ISSUE

The double-size 16-page 6th Edition of the Special DX Log Issue, published in March-April, 1963 (Vol. 17, No. 3), is now available from more than 700 G-E Tube Distributors in the United States, as usual. It contains an updated listing of ARL Official Countries for the DXCC Award, zone list for WAS Award, plus listings of Deleted and Banned Countries, Cross Index of Official Countries, and other handy information for the DX operator. Copies may also be ordered by mail directly from the G-E HAM NEWS office address on page 2 at the following prices:

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