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Have a rack-mounted station? This GADGET RACK model, designed for relay-rack mounting—plus another table model and two handy accessories—continues the GADGET RACK series which began in the September–October, 1958 issue.

—Lighthouse Larry
new G-E SERVICE DESIGNED receiving tubes

High-reliability techniques—long fa-
mous in the production of General Elec-
tric’s Five-Star and Computer tubes for
critical applications—have been ex-
tended to include the most-used tube
types in television and radio receivers.
Thus, the expanded G-E SERVICE DE-
SIGNED tube line now has many tube
types found in amateur radio gear.
The principal improvements are:
(1) “Snow-White” manufacturing
processes to minimize short circuits be-
tween tube elements.
(2) A new accelerated heater cycling
test to insure proper tube performance
under wide variations in line voltage.
(3) A new G-E developed method of
testing for shorts and opens.

(4) Building entertainment class
tubes to meet life tests twice as rigid
as Joint-Army-Navy specifications.
(5) A new method of applying uni-
form insulation coating on heater wire.
(6) Extending still military-type
class strain specifications to all SERV-
EX DESIGNED receiving tubes.
(7) Development of new materials,
including a new anode permitting
greater heat dissipation and longer life.
Many other improvements are being
made on individual tube types.
As for the G-E SERVICE DE-
SIGNED tubes listed below for when
you need replacements for the tubes
in your amateur gear.

183-GT 32C6 332U 33U6 6AU6-A 6CG7-GA 6SH8 12A77
112 3DL6 5U4-GG 6AX7 6550-7 6C67 12A77-A 13
2K3 48U6 3Y3/3A4U 686N 6G6P-A 12A6-GTA 12A77-A
2K3-A 487A 3Y3-GT 686N 6G6P-A 12A6-GTA 12A77-A
3A4-A 5AQ7 6AF4 4607-A 4C22 6T6-A 12A77-A
191-A 5677-A 6AL5 6356 4567 6B8-A 12A6-GTA 12A77-A
38BN 5CGB 6AL5 6356 4567 6B8-A 12A6-GTA 12A77-A
382S 5258 6AU-07A 6CG6-A 6G46 4C22 7EY6 17A54-GT 12A77-A
38A6 5623-A 6QA 6E3 6A3 8CO7 17A54-GT 12A77-A
382S 5623-A 6QA 6E3 6A3 8CO7 17A54-GT 12A77-A
more GADGET RACK Ideas

A GADGET RACK frame—made from easily-worked aluminum angle and sheet—can be fitted into practically any type of relay rack or cabinet. The model shown is 8% inches high, but could be any multiple of 1% inches in height.

THE AVAILABILITY of aluminum angle stock in most hardware stores is a boon to the home constructor of radio equipment. A surprisingly strong GADGET RACK frame was fabricated from angle 3% x 8% x 1% of an inch in size with a 1/4-inch-thick wall (Reynolds No. 7)—using ordinary hand tools. It shows no sign of sagging even with several pounds of power supply fastened to the rear panel.

Most constructional details show in the front and rear views of our model on this page. The assembly sketch, FIG. 1, illustrates how the pieces in the upper front corner joints overlap. The critical dimensions are marked on this diagram. Note that angle having 1-inch sides must be used if the minimum width between the relay rack uprights is between 17% and 17% inches.

Length of the side pieces will be dependent on the depth of the rack cabinet and the amount the power supply unit extends behind the frame.

FLAT-HEAD MACHINE SCREWS should be used to assemble all joints. Countersink all screw heads flush with the metal surface in order to clear the relay rack side rails.

The rear panel—8% x 17% x 1/16 of an inch thick on this model—is fastened to the frame with small angle brackets cut from the aluminum angle stock. Holes were punched in this panel for the row of accessory interconnection sockets. The sockets were then wired according to the schematic diagram (FIG. 1, page 3) in the last issue and connections were made to the power supply unit before it was fastened in place. Circuit for the power supply also is identical.

THE POWER SUPPLY was constructed on a 1/16-inch-thick aluminum plate 4 x 15 inches in size. Copper plates of 1/4-inch square brass rod 3 inches long drilled and tapped at both ends, fasten the plate onto the rear panel. Side and end plates were cut from 1/16-inch-thick aluminum sheet, but perforated sheet or screening will provide more ventilation.

Constructional details are shown in the view on page 4.

RACK MODEL of the GADGET RACK with most accessories removed. Socket at left on rear panel has eight contacts for power control panel; other sockets have eleven contacts for interconnection system between accessories. Signal input panel plugs into socket at right.

REAR VIEW of rack model, showing power supply fastened to rear panel. Socket between transformer and choke is a 20A/G8 rectifier. Power socket for external equipment is located below filter capacitor.

FIG. 1. SKETCH showing assembly of angles for sides, top and bottom, and rear panel support. Table below gives dimensions.

| Item | Description | Dimension
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dim. &quot;A&quot;</td>
<td>overall width</td>
<td>19&quot;</td>
</tr>
<tr>
<td>Dim. &quot;B&quot;</td>
<td>rack clearance</td>
<td>17%&quot;</td>
</tr>
<tr>
<td>Dim. &quot;C&quot;</td>
<td>panel space</td>
<td>17%&quot;</td>
</tr>
</tbody>
</table>

3
Of course, the power supply may be assembled with the components on the top deck, instead of extending rearward. A conventional chassis of similar proportions could then be used, with the accessory sockets mounted along the side wall facing forward. Other practical chassis are Miniboxes, or Seerak chassis plates and side rails.

The cabinet gadget rack is adaptable to the rear-mounted power supply; the model below having been constructed to show this. Most utility cabinets have a slot about 2 1/2 inches high extending across the rear wall. Thus, it is a simple matter to mount the accessory sockets on a plate large enough to overlap this opening by 1/4 of an inch on all sides and fasten the power supply to it. The bottom surface of the power supply should be flush with the cabinet bottom or feet; otherwise the weight of the power supply may cause the cabinet to "rear up" when it is devoid of accessories. In both the cabinet and relay rack models, accessories may be held in place with self-tapping screws driven into small holes drilled in the flanges above and below the front opening. Or, these holes may be drilled and tapped for machine screws. The latter method is preferable in the aluminum angle. Our models will serve as a guide to plasing a GADGET RACK tailored to your particular requirements. Conceivably, a unified transmitter, receiver, or group of converters for the VHF bands could be assembled. Why are men now you may already have your GADGET RACK under construction!
CHANNEL SPOTTER

100/20-kilohertz calibrator

THE CHANNEL SPOTTER not only provides frequency markers at 100-kilohertz intervals, but equally important sub-markers every 20 kilohertz.

The importance of having a 100-kilohertz frequency standard around the amateur station is well recognized. It's almost a necessity to identify edges of the amateur bands, and subdivisions in the bands, on your receiver, to avoid out-of-band operation of your transmitter.

Having additional frequency markers available at 20-kilohertz intervals, however, is handy for spotting frequencies for message handling and other prearranged schedules, local rag-chewing channels, and innumerable other uses. A specific frequency can be found within a kilohertz or two by interpolation, even on receivers having bandspread dials calibrated only from 0 to 100; or only every 50 or 100 kilohertz.

The circuit, shown in the schematic diagram, Fig. 1, has only two tubes. A 6AU6 pentode functions as a 100-kilohertz crystal oscillator. Output from the cathode circuit drives one section of a 12AT7 twin triode, operating in a frequency divider circuit.

This circuit is similar to a multivibrator in that 100-kilohertz signals in the left-hand triode are amplified and applied to the grid of the right-hand triode. When S1 is in the 20-kilohertz position, a 10,000-ohm cathode resistance biases this section of the tube near cutoff plate current. An increasing positive bias, applied through the 2.2-megohm resistor and 2-megohm potentiometer, permits both sections of the tube to operate as a multivibrator. When the potentiometer is properly adjusted, the multivibrator produces one cycle of oscillation for every five 100-kilohertz oscillations and so divides this frequency by five. The output signal is applied to the antenna circuit of the GADGET RACK bus-bar system through pin 10 on P1

When S2 is switched to the 100-kilohertz position, the 12AT7 becomes a simple amplifier for the 100-kilohertz signal. This stage is disabled in the OFF position of S2, and very little signal feeds through from the oscillator.

Construction is quite simple. Either a plate-and-post type chassis, or a Minibox drilled as illustrated in the parts layout diagram, Fig. 2, may be used. Locations of components are not critical, but should be generally similar to the diagram. All wiring can be insulated hookup wire, except the output signal lead running to pin 10 on P2; this should be shielded wire. Make the connecting cable whatever length is necessary to reach the proper accessory socket in the GADGET RACK.

(continued on page 7)

FIG. 1. SCHEMATIC DIAGRAM of the CHANNEL SPOTTER calibrator. Pin 4 on P1 is for plate voltage; pin 10 is the monitoring contact. All resistors are by-watt carbon types; all in feet unless otherwise specified. Other parts values are: C4=50-and air trimmer; A1C type 2N1467; 4N22 plug; AMPHENOL BU-PA111; 5—2-pole, 3-position, single-throw toggle switch (Gallows 3225); XTAL=100-kilohertz quartz standard frequency crystal.

FIG. 2. PANEL AND CHASSIS LAYOUT diagram for the CHANNEL SPOTTER. Note marked "X" are No. 26 drill for cover plates or plate-and-post chassis. The crystal mounting will depend upon the type of holder.
NEED MORE AUDIO GAIN in your transmitter? If so, try this versatile unit which combines a preamplifier, level limiter and handy phone patch into a single package.

SOME TRANSMITTERS just don’t have enough audio amplification to provide a highly read-

able phone signal under today’s crowded amateur band conditions. This unit over-

comes these problems with a tube line-up selected for desired characteristics in each

circuit. In addition, a phone patch for all-

important public service work is built in.

THE SCHEMATIC DIAGRAM, FIG. 1, shows a high-impedance microphone input at J1,

coupled to the left-hand section of a 12AT7 twin triode. This tube has been designed to

have a very low hum level. The output of this preamplifier drives a 6BA6 remote-cutoff

tenode in the limiter. A second 6BA6 pen-

tode is the automatic gain control tube. NEG-

ative bias for controlling the gain of the

limiter stage is obtained by further amplify-

ing the output signal in a 12AT7 twin triode

and applying it to a 6AL5 twin diode. The

bias is developed across the 1-megohm re-

sistor and filtered by the .05-mfd capacitor

shown just to the left of this tube.

This bias is applied to the number 3 grid of the 6BA6’s and the right-hand section of

the 12AX7. This triode works as a DC am-

plifier and the variations in plate current cause the .01 DC milliammeter in series with the

cathode to indicate the relative amount of compression.

The phone patch circuit utilizes a three-

winding transformer from the vertical oscil-

lator of a television receiver. The telephone

line connects to the medium-impedance wind-

ing, the 6BA6 limiter to the highest-

impedance winding, and the speaker voice

circuit to the lowest-impedance winding.

In position “1” of J2, the patch circuit and

telephone line are not connected. In position

“2,” the patch operates only in one direction; it feeds the telephone signal into the ampli-

 fier. In position “3,” the circuit operates as a

two-way patch, also feeding the signal from the

speaker circuit back to the telephone line.

CONSTRUCTION practice for this unit is

pretty much the same as for the previous

GADGET RACK accessories. The recom-

mended layout for a plate-and-post type chassis is shown in FIG. 2. The unit also could be

built on a 4 x 6 x 3-inch aluminum chassis with a panel 4 1/4 inches wide.

The only critical components are the phone

patch transformer, Tj, which should be kept

away from power transformers to minimize
CHANNEL SPOTTER
continued from page 5
THE TUNEUP is simply a matter of applying heater power to check that circuit, and, if okay, applying plate voltage. Turn $S_2$ to the 100-KC position and check for signals at multiples of 100 kilocycles on a broadcast band receiver. A broadcasting station on one of these frequencies will serve as a standard for adjusting the oscillator to preci- sely 100 kilocycles by turning $C_4$. Or, tune 100-KC position and check for signals at the 3-megacycle signal from WWV and adjust $C_3$ until the fiftieth harmonic from the 100-kilocycle oscillator coincides with it.

Next, turn $S_2$ to the 20-KC position and adjust the 2-megohm potentiometer until four signals can be counted between each 100-kilocycle marker signal on your receiver. Finally, if an oscilloscope is available, connect the hum pickup and the meter, $M$. The meter shown on page 1 has a flange only 1½ inches square, but the layout allows space for round or square meters having the standard body diameter of 2½ inches. A rotary tap switch can be substituted for the lever-action switch shown for $S_2$, by drilling a hole ⅛ of an inch in diameter in place of the slot.

CONNECTIONS to this unit, other than those made through $P_1$, consist of a two-wire shielded lead from the telephone line to $J_6$.

FIG. 1. SCHEMATIC DIAGRAM for the combination audio oscillator/mixer-phonograph pick-up unit. All relocate-ments not otherwise marked are ½-watt power- rating. All capacitors values not otherwise marked are in mfd. Potentiometers should have a 10-watt rating.

NOTE: If the Marit A-3001 vertical oscillator trans- former is used for $T_1$, connections should be made as follows: Brown and black leads to $J_2$ red and blue leads to the PATCH GAIN potentiometer, and the yellow and green leads to the speaker circuit.

Other standard transformers may have the same color-coding on leads.

PARTS LIST

$J_1$ female connector to 67 microphone plug.
$J_2$ XLR type 3-wire connector.
$J_3$ end connector.
$J_4$ grille type jack.
$J_5$ insulated phone tip jack.
$J_6$ 3-prong plug. 1-3 inch diameter. (Lutron Type TM-11 shown on model GE type DW-91 also suitable.)
$P_1$ 1-prong male octal plug. (Amphenol B-64-3-24).
$S_1$ 4-pole, 3-position, non-latching lever action switch. (Moffet 864); or see equivalent which makes and breaks type K switch.
$T_1$ three-winding vertical output transformer. (Marit A-3001; or equivalent).
1958
ALL-AMERICAN AWARDS

THREE RADIO AMATEURS

were among ten electronics technicians honored for outstanding community service in 1958.

Three radio amateurs were among the candidates for the 1958 Awards. Three were winners; another, Henry Falcinelli, WK9IL, was awarded an honorable mention plaque. The others, who received certificates of commendation, are: WIAO, WD7YR, WALT, W8QPP, W7JMM, M5NLL, K5HJY, W9HBM, and W6HVD.

The ALL-AMERICAN AWARDS program, to honor electronics service technicians who have distinguished themselves through community service, is sponsored annually by General Electric's Receiving Tube Department in Owensboro, Ky.

B. A. Neal, W2IZK—Editor

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Three shining radio amateurs, shown above (left to right) receiving their trophies and checks for $500 at the 1958 All-American Awards presentation, are: Vernon Townsed, WPPCY; Wayne Lamore, KOCIC; and Albert Kaszkur, W3WZCR.

Townsend, of Wisconsin, Wis., while serving as Dunn County RACES Radio Officer, quickly organized emergency communications and operated his mobile station steadily for three days after a tornado devastated Western Wisconsin last June. Lamore, of Buffalo, N.Y., has conducted extra-curricular courses in electronics at several schools in Wisconsin, in addition to family activities in the Little League, Boy Scouts and other youth groups; and he has worked on the local emergency service. Kaszkur, of Mass., has aided technical programs in schools through donations of supplies, taught radio courses, and promoted amateur radio interest as an officer of the Brockton chapter of the Electronic Technicians Guild of Massachusetts.