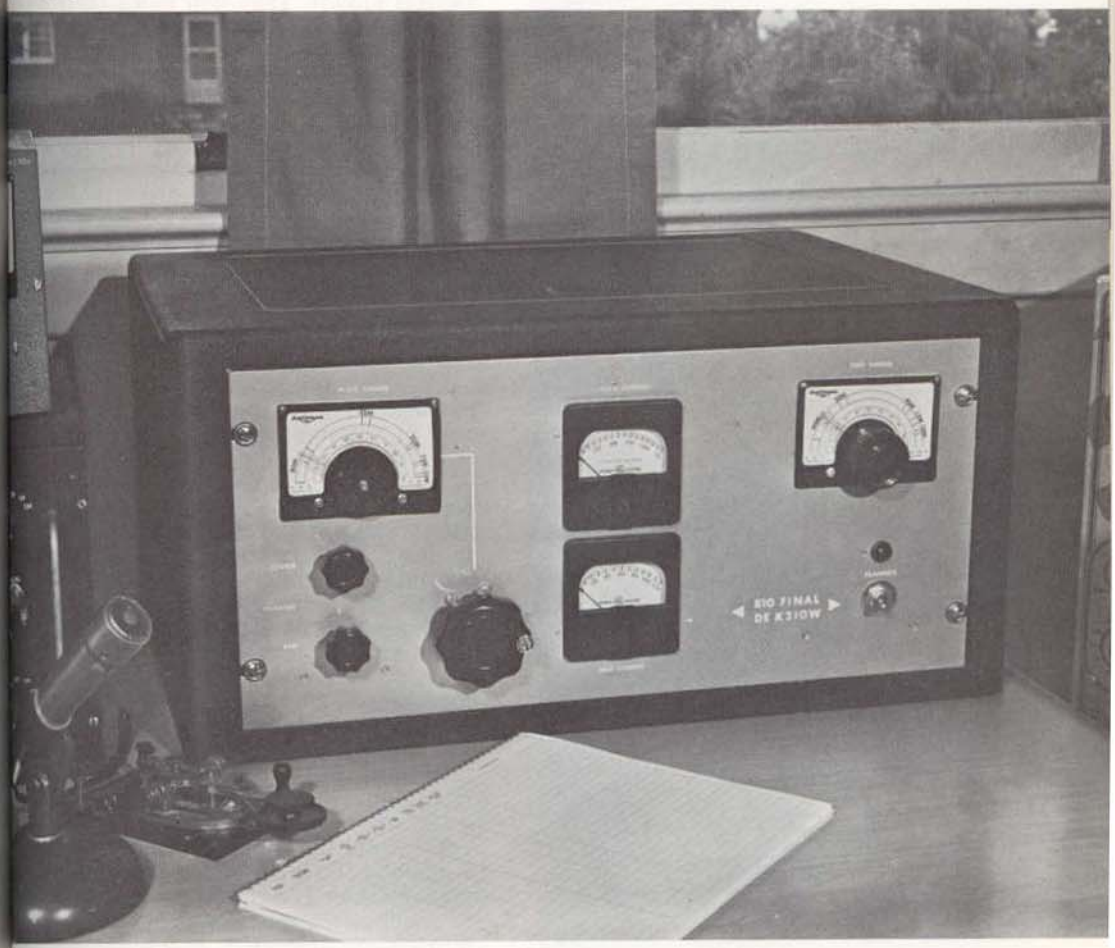
HAM NEWS

SEPTEMBER-OCTOBER, 1959

Also in this issue —



COMPACT TRIODE KILOWATT

featuring —
GL-810 Triodes in parallel
Simplified tuning controls
Rapid bandchanging from panel
Complete, simple TVI shielding

. . . see page 3

—Lighthouse Larry

MEET THE DESIGNER . . .

K2IOW again — Bob Hall of Schenectady, N. Y. has gone on from his latest offering, described herein, to whipping up more interesting gadgets at his workbench. The innocent-appearing 'scope in his ham shack (see page 3) includes a special circuit for transmitter monitoring. You'll read about it in an early issue.

COMING NEXT ISSUE . . .

A kilowatt band-switching grounded-grid linear with a pair of GL-813 pentodes, as pictured below, will be featured in the November-December, 1959 issue. It can be driven to full output by most popular sideband exciters, and will operate efficiently with plate voltages from 1500 to 2500.

Watch for this issue early in November at your G-E Tube Distributor.

WHILE CHECKING with our two-way radio folks on the mobile power supply offer, they amazed me with facts on the yearly growth of mobile radio communications.

Since all of this equipment requires periodic maintenance and service, a great opportunity exists for radio amateurs to utilize their unique background in servicing these systems. It can be a full-time vocation, or profitable sideline.

If you'd like more information, write to the National Service Manager, General Electric Co., Communication Products Dept., Mountain View Road, Lynchburg, Va. He will send you full details.

IT'S EDISON AWARD TIME AGAIN . . .

Nominations are now open for the 1959 Edison Radio Amateur Award. This will be your eighth opportunity to share in honoring a radio amateur who has rendered public service that reflects credit both on himself and fellow radio amateurs.

This year, the Award is extended to include the newly admitted states of Alaska and Hawaii. A candidate must have performed his worthy service while pursuing his hobby within the limits of the U.S.

Recipient of the Award will be chosen, as before, by a panel of distinguished, impartial judges. They will make their selection only from names you and others have submitted by letter. Make sure that the judges overlook no worthy candidate.

Complete details are given in our announcement in the October issues of *CQ* and *QST*. Read them and write your nominating letter *now*, before the postmark deadline of January 4, 1960.

Or, send a note to the *G-E HAM NEWS* office and we'll forward complete details.

NEW TUBE MAKING FILM . . .

Something new has been added to the field of electronics:

The first full-length educational motion picture based on the design and manufacture of receiving tubes — and with a love story woven into the background.

Entitled, "The Teacher Wore White," the new color movie runs about 40 minutes. The film is being made available throughout the nation for showing in educational programs.

The film is more than a factory tour. It is the story of Don Manning, a young engineer, and Susan Wells, a pretty instructor in charge of training new operators in a General Electric receiving tube plant. Her job, in the story, is to show the young engineer some fundamental details of receiving tube manufacturing; his job is to solve a tube design problem.

The film, in effect, is the story of the 7,000 employees of the General Electric Receiving Tube Department — how their personalities and their work are blended to produce many millions of tubes that go into radios, television and industrial electronic equipment throughout the nation.

The principal roles in the movie are played by professional actors, but the "extras" in the picture are real-life men and women in the General Electric receiving tube plants in Owensboro, Ky., Tell City, Ind., and Anniston, Ala.

Write for details on how your group can obtain this film.

COMPACT TRIODE KILOWATT

TRIODE TRANSMITTING TUBES *have been historically associated with large, bulky final amplifier constructional techniques.*

"But bulk is not essential," says K2IOW, "look at the compact triode final in my shack. It fits into a standard 8¾-inch high table rack cabinet, and has a pair of non-critical GL-810 triodes in parallel."

MODERN COMPONENTS, plus simplified circuitry, were primarily responsible for the evolution of this compact amplifier which can be operated in any of the popular transmission modes: class C for CW or AM phone; or as a class B linear amplifier for sideband. The two GL-810 triodes in parallel are fully capable of handling the maximum legal input in the above classes of service.

The amplifier can be driven by a transmitter with a power rating of from 75 to 150 watts, the range which spans most of the popular commercial transmitters. No power dissipating network is required, as is necessary when driving most tetrode and pentode kilowatt finals from these transmitters. Also, no screen voltage supply is needed.

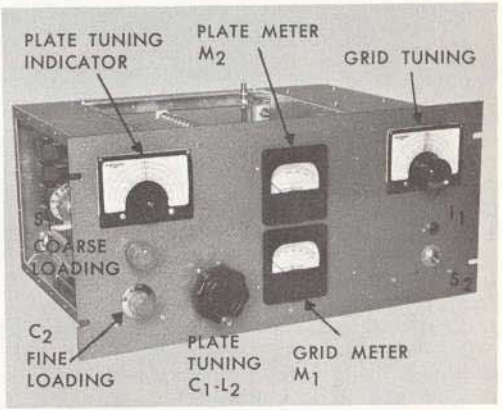
TELEVISION INTERFERENCE is a most important consideration these days and the COMPACT TRIODE KILOWATT has passed interference tests with flying colors. It has been operated less than four feet away from a vintage television receiver without causing interference to local channels 6, 10 and 13; nor to a fringe-area signal on channel 2. Some old receivers with a 21-megacycle intermediate frequency may encounter interference from this final, as they would with any high power transmitter on this band.

Band changing and tuneup take very little time, since there are only four panel controls, as identified in the front panel view on page 3. The grid and plate circuit controls can be preset to the correct band from the calibrated indicators. Once an operator becomes familiar with the procedure, it should not be necessary to reduce plate voltage during tuneup.

THE CIRCUIT for the amplifier is quite standard. Since the triode tubes must be neutralized, a push-pull grid circuit, the multi-band tuner (National MB-150), shown in the schematic diagram, FIG. 1,

(continued on page 5)

COMPLETE STATION at K2IOW with the Compact Triode Kilowatt at the right side of the operating desk. Other equipment includes an NC-240D receiver and speaker (extreme left); the 6L6-GC exciter which drives the 810 final; indicator for SWR bridge and High-C Bandswitching VFO atop the exciter; 5-inch 'scope for monitoring; and a 3-foot-high rack cabinet containing (top to bottom) class B GL-805 plate modulator, high voltage supply for the modulator, and a 2,000-volt DC supply for the 810 final.



PANEL VIEW of the 810 final. The large knob turns both the rotary inductor and input variable capacitor in the pi-network plate tuned circuit. Indicator dial at left shows band to which plate circuit is tuned. Dial at right is coupled to MB-150 multi-band tuner in grid circuit and provides convenient tuning rate.

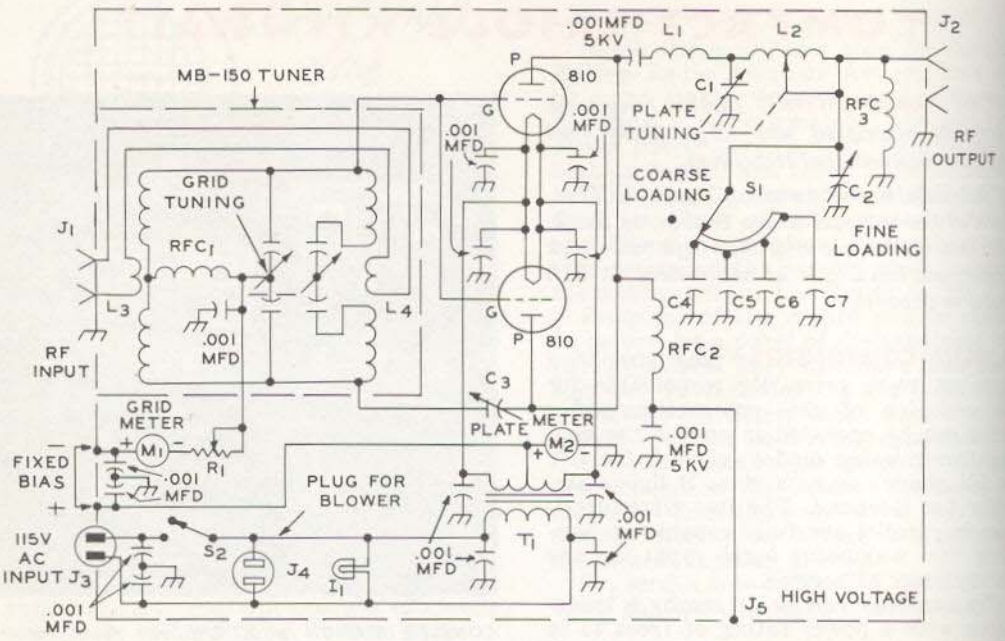


FIG. 1 SCHEMATIC DIAGRAM of the GL-810 triode final. Note that the grid bias return lead is connected directly to the center tap on the filament transformer (T_1) without going through the plate current meter (M_2). Thus, M_2 reads only plate current and not combined plate and grid current. All 0.001-mfd bypass capacitors are disc ceramic, 1,000 volts working, unless otherwise specified. All power and meter circuit wiring should be shielded.

PARTS LIST

C_1.....30 — 150-mmf variable, 0.175-inch air gap (Johnson 150D70; or National TMA-150).

C_2.....20 — 500-mmf variable, 0.045-inch air gap (Johnson 500E20, Cat. No. 154-3).

C_3.....2 — 10-mmf air variable, 0.375-inch air gap (Johnson N375, Cat. 159-375 neutralizing cap).

C_4, C_5, C_6.....500-mmf, 2,500-volt mica.

C_7.....0.001-mfd, 2,500-volt mica.

I_1.....115-volt candelabra base pilot lamp and bracket.

J_1 J_2.....chassis type coaxial cable connector.

J_3.....chassis type 2-prong male power connector.

J_4.....chassis type 2-prong female power connector.

J_5.....single prong high voltage connector (Millen type 37001, red plastic).

L_1.....0.3 uh, 3 turns of 0.062 x 0.250-inch copper strip, 1¾ inches in diameter, 1½ inches long, 2 turns per inch, with 1-inch leads.

L_2.....15 uh, 5-ampere rotary inductor, 27 turns, No. 12 wire (B & W No. 3852, used in this model; or Johnson Cat. No. 229-202).

L_3.....8 turns, No. 16 insulated wire, 1¼ inches in diameter, mounted inside center of larger coil on MB-150 tuner.

L_4.....2 turns, No. 16 insulated wire, wound over center of small coils on MB-150 tuner.

M_1.....0 — 150-ma DC milliameter (General Electric DO-41 or DO-71, 3½ inches square; or new type DW-91, 2½ inches square).

M_2.....O — 500-ma DC milliameter (to match M_1).

MB-150 National MB-150 multi-band tuner, modified per instructions in mechanical details.

R_1.....1,000 ohms, 25-watt potentiometer.

RFC_1.....2.5-mh r.f. choke; part of MB-150.

RFC_2....145-uh single layer r.f. choke (National R-175A; B & W No. 800, or Raypar No. RL-100 also suitable).

S_1.....11-position, single section progressive shorting tap switch, stop set for 5 positions (Centralab P1S ceramic wafer and P-123 index).

S_2.....single pole, 1 position toggle switch.

T_1.....10-volt, 10-ampere filament transformer, 115-volt primary.

RFC_3....2.5-mh pi-wound r.f. choke (National R-100).

was necessary. An r.f. voltage of the proper phase and amplitude to prevent regeneration or oscillation is fed back to the lower end of this tuner through C_3.

Greater link-coupling transfer efficiency was obtained in the multi-band tuner by replacing the original single link, only on the low-frequency coil, with individual links for it and the high frequency coils. This change is described in the construction details.

In the plate circuit, plate voltage is fed to the tubes through RFC_2. The pi-network is formed by capacitors C_1 and C_2, plus C_4, C_5, C_6 and C_7 in parallel, depending upon the setting of S_1; and coils L_1 and L_2 in series. All the capacitors across the pi-network output are needed when matching into low impedance loads — 100 down to 50 ohms — at 3.5 megacycles.

Mechanical ganging was employed between C_1 and L_2 to combine these controls and maintain a nearly constant L/C ratio in the plate tank circuit throughout the frequency range covered by this amplifier. A pair of worm gears having the proper ratio drives C_1 from maximum to minimum capacitance while L_2 is being cranked from maximum to minimum inductance.

The 28-megacycle inductance, L_1, was connected between the plates of the GL-810's and C_1 to remove C_1's minimum capacitance from the input side of the pi-network at this frequency. Thus, only the output capacitance of the two tubes appears across the input of the pi-network. About one half to two turns of L_2 are in the pi-network at 28 megacycles, and C_1 and C_2 are across the output side.

The power connections are identified on the schematic diagram. Fixed negative bias of about 80 volts is sufficient with the GL-810's operating at 2,000 volts on the plates. The bias supply should have good voltage regulation. K2IOW uses the electronically regulated bias supply circuit which has appeared in the "Power Supplies" chapter of *The Radio Amateur's Handbook* (ARRL) for several years.

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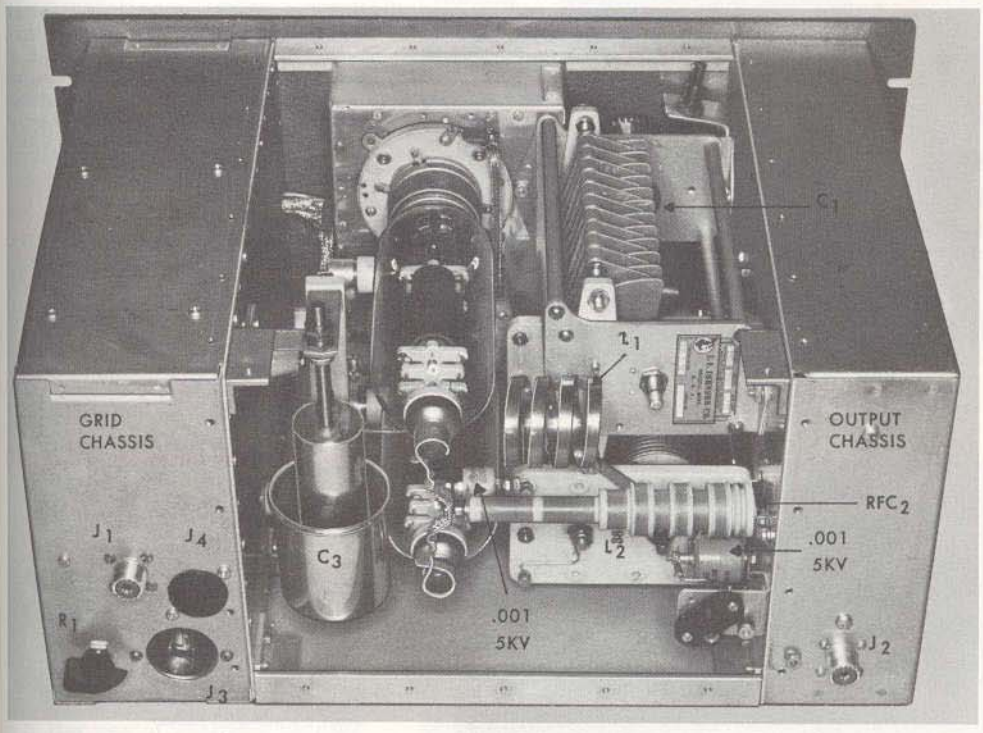
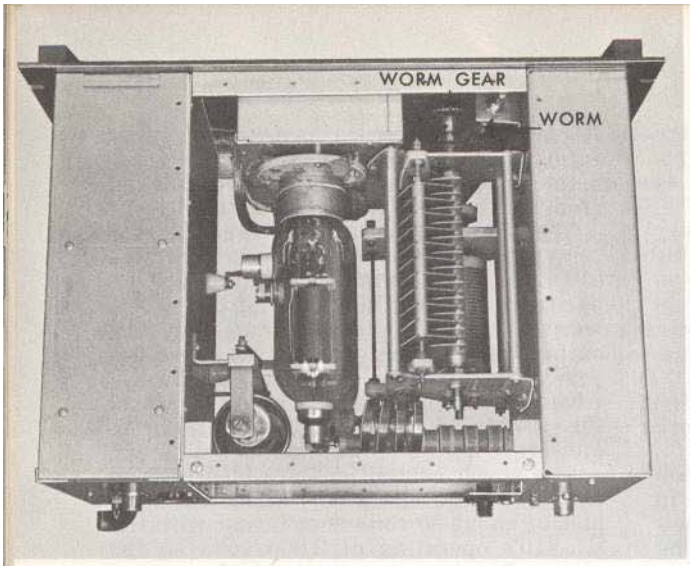
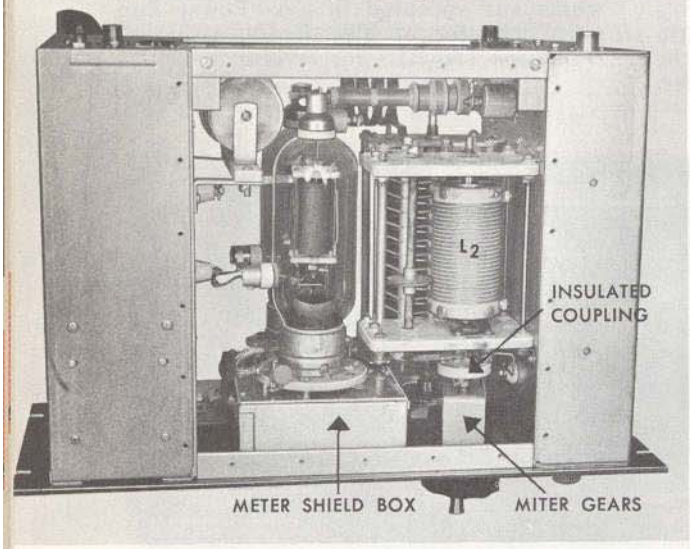


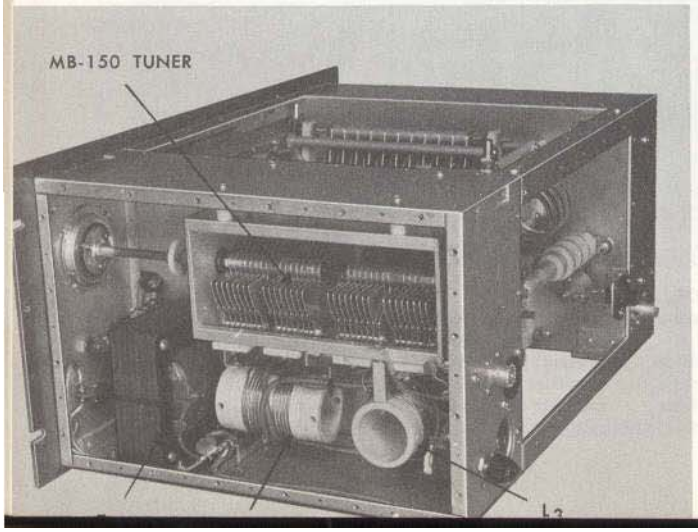
REAR VIEW, looking down into the final. A separate lead runs from each 810 plate cap to the plate circuit r.f. choke (RFC_3). Cylindrical blocking capacitor behind r.f. choke (0.001-mfd, 5,000 volts) connects to one end of 28-megacycle coil (L_1), made from copper strap. Other end of L_1 fastens to terminal on L_2. High voltage connector (J_5) is on small angle bracket just below base of r.f. choke, with bypass capacitor behind it. Aluminum angle in foreground connects upper rear corners of the chassis.



TOP VIEW, showing the white ceramic feedthrough insulator for connection between 810 grid caps and the MB-150 multi-band tuner, located inside chassis at left. Meters are shielded from r.f. compartment by the 5 x 7 x 2-inch chassis on which the 810 tube sockets are mounted with ¼-inch long spacers.



BOTTOM VIEW, showing the shielded leads running from the filament transformer (T_1) inside the grid chassis to the 810 tube sockets. Each filament pin is bypassed individually with shortest possible leads. Neutralizing capacitor (C_N) fastens to grid chassis with 2-inch-long angle brackets.



SIDE VIEW of the 4-inch deep grid circuit chassis, showing the modified MB-150 grid tuner. Note the 2-turn link coil (L_4) on the high frequency coil; see PARTS LIST for details. Insulated extension shaft runs between MCN dial and shaft on MB-150 tuner.

THE TRIODE KILOWATT was a pleasure to build, and it's a joy to operate. The vertical chassis arrangement lends itself to easy construction, requiring a minimum of framework to support shielding. The usual workshop hand tools, plus a ¼-inch electric drill, were used for all the mechanical work except the meter and indicator dial holes. The latter can be cut with a circle cutter, hole saw or counterbore.

The pictures and accompanying captions on pages indicate placement of the major components in the amplifier. Precise locations of the chassis and holes on the panel, and critical dimensions, can be determined from the top and front view sketches in FIG. 2. The knob shaft which drives C_1 and L_2 may require slightly different placement, depending on the actual parts used, and the gear drive assembly.

BOTH CHASSIS and other components on the panel were fastened with No. 8-32 screws driven into tapped holes in the 8¾ x 19-inch aluminum rack panel (Bud PA-1105, or equivalent). All screws were cut off and filed flush with the panel surface before painting. During assembly, the three chassis were lined up and clamped to the back of the panel. Holes were drilled from the panel front with a No. 29 drill and threaded with an 8-32 tap. Use turpentine to prevent the tap from becoming clogged with aluminum chips. Matching holes in the chassis were enlarged.

THE GRID CHASSIS, which had to be 4 inches deep to house the MB-150 tuner, was assembled from *See-Zak* chassis plates and side rails. An 8 x 12-inch plate (P-812) forms the chassis deck, inside the amplifier. A pair of 4 x 8-inch side rails (R-48) form the chassis front and rear; while a pair of 4 x 12-inch side rails (R-412) form the top and bottom side walls. The outside of the chassis was covered with shielding later.

The MB-150 tuner hangs upside down on pillars ¾ of an inch long inside the grid chassis, with the tuning shaft 6¼ inches above the bottom wall. Drill holes in the chassis top to match those in the capacitor frame on the tuner. There's sufficient room between the chassis front wall and the MB-150 tuner for a normal-size 10-volt, 10-ampere filament transformer (T_1), but some king-size transformers may not fit. Be sure to allow room for I_1 and S_2 in front of T_1.

The shield box for the meters — also the mounting for the 810 tube sockets — is 5 x 7 x 2 inches over-all (see detail view on page 9). A See-Zak chassis plate (P-57) forms the deck; while the end and side rails are 2 x 5 inches (R-25), and 2 x 7 inches (R-27), respectively. A conventional aluminum chassis of this size can be used, but must be fastened in place with self-tapping screws driven into the bottom lip from the front of the panel.

THE PLATE CIRCUIT pi-network is mounted on the top deck of an 8 x 12 x 3-inch aluminum chassis (Bud AC-424, or equivalent), as shown in the detail view on page 10. The capacitor (C_1) and rotary inductor (L_2) are coupled together through a right angle drive on the shaft of L_2; in turn connected through a panel bearing and shaft assembly to a worm (Boston No. LTHB) and a worm gear (Boston No. G-1029) on the shaft of C_1. The worm gear ratio — 50 to 1 — was selected to enable the rotor of C_1 to turn 180 degrees while the rotary inductor is being cranked through the 27 turns required to move the contact roller from end to end. The shafts on C_1 and L_2 are 4¼ inches apart.

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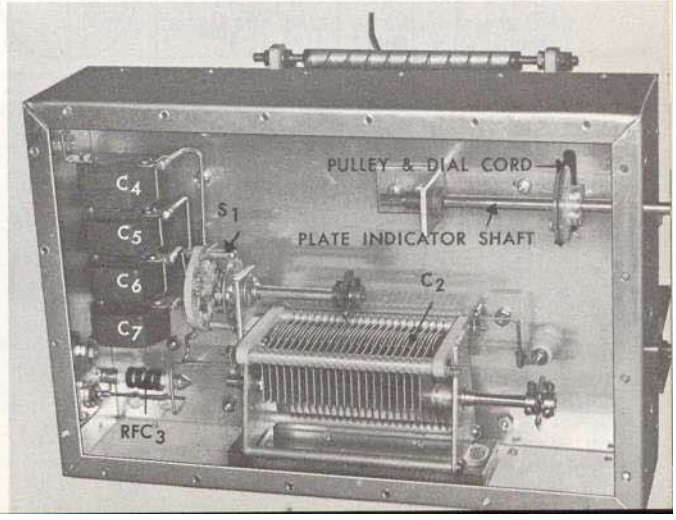

INSIDE VIEW of the output chassis, showing the coarse (C_4-C_7) and fine (C_2) loading capacitors in pi-network. Extension shafts are used to turn C_2 and S_1. Note method of mounting plate circuit indicator shaft, and pulley for dial cord, which runs to same size pulley on shaft of C_1 (See view of pi-network on page 10).

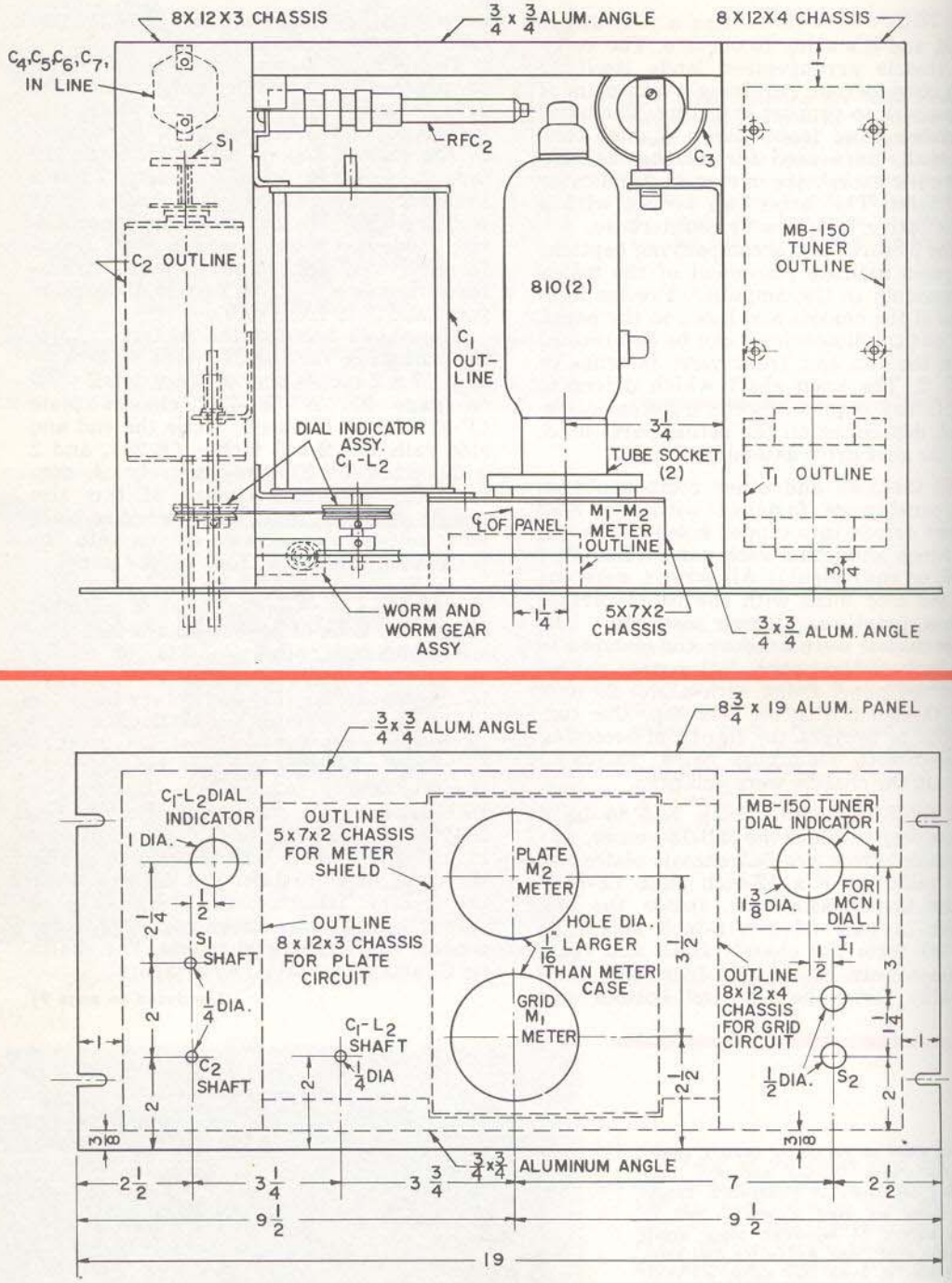

FIG. 2. TOP AND FRONT layout diagrams for the 810 triode final. Positions of all major components have been indicated, but may vary in accordance with the sizes of parts actually used in duplicating this amplifier. Panel layout allows room for meters with 3½-inch diameter flanges on cases. Spacing between the shafts on C_1 (top) and L_2 (bottom) is 4¼ inches. Note notches in angle behind panel to clear meter shield.

The knob shaft for L_2 was run through a box-section aluminum extrusion which houses the miter gears (2-Boston No. G-464). However, the lower end of the vertical shaft could be supported by a panel bearing mounted in an angle bracket similar to that at the upper end of the shaft. A panel bearing on the knob shaft for L_2 could support it at the panel.

Alignment of the miter gears is accomplished simply by sliding them into the proper relative positions before tightening the set screws. The worm gear on C_1 is then lined up with the vertical shaft. Provide a slot in the upper angle bracket for the vertical shaft. This permits the shaft to be moved for proper meshing of the worm gears. Finally, tighten the nut on the upper panel bearing to lock the shaft in this position.

The capacitors, switch and other parts in the pi-network output section are mounted inside the plate circuit chassis. Parts locations and assembly details are shown in the end view on page 7.

Once all the holes in the panel and chassis have been drilled, the chassis should be temporarily assembled to the panel. Four 10-inch lengths of $\frac{3}{4}$ x $\frac{3}{4}$-inch soft aluminum angle (do-it-yourself type) should then be cut. Two of them are fastened to the panel, as shown in the detail photo below. The others are fastened between the upper and lower rear corners of the chassis with small angle brackets cut from the same material. Shields are then cut from perforated sheet aluminum (do-it-yourself type) to cover the top, bottom and rear openings between the chassis; also the open ends of the two chassis. Drill holes for No. 6-32 machine screws in the aluminum angle; and for self-tapping screws in the chassis, spaced not more than $1\frac{1}{2}$ inches, using the perforated shields as templates.

SMALL PARTS, such as angle brackets, should be facricated to fit the parts being mounted. Remove the aluminum base from C_3 and make two angle brackets to support it from the grid chassis deck. A frame for the plate tuning indicator to match the grid tuning MCN dial was made by tracing around the MCN frame onto a piece of sheet aluminum. This frame was cut out and painted black wrinkle.

The hub for the plate tuning dial pointer was made from a Lucite disc $1\frac{1}{2}$ inches in diameter. It also was finished in black wrinkle paint. The pointer is of clear plastic to match the MCN dial pointer, with an indicator line scratched on it, and filled with black paint. The pointer was cemented to the back side of the hub. The hub was fastened to the indicator shaft with a 4-40 machine screw driven into a hole tapped in the end of the shaft.

Two plastic pulleys about 2 inches in diameter — one on the shaft of C_1, and the other on the plate tuning indicator shaft inside the plate circuit chassis — drive the dial pointer. They can be adapted from table radio dial cord pulleys, or turned from sheet Lucite. Because the indicator rotates through only 180 degrees, the dial cord can be fastened at one point on each pulley to prevent slippage.

Modify the MB-150 tuner by removing the original link coil and substituting L_3 inside the low-frequency coil form. Make the leads on L_3 long enough to run out of the form, with one wire going to the r.f. input jack, J_1; and the other to L_4. Install L_4 between the two coils on the high-frequency coil form, as shown in the grid circuit view at the bottom of page 6.

FINAL ASSEMBLY of the parts on the two chassis may begin after the burrs are removed from all holes. All parts should be mounted and the wiring completed before fastening the grid chassis to the panel. Be sure to leave the shielded leads to the meters and 810 tube sockets long enough. Next, install the panel and meters, wiring

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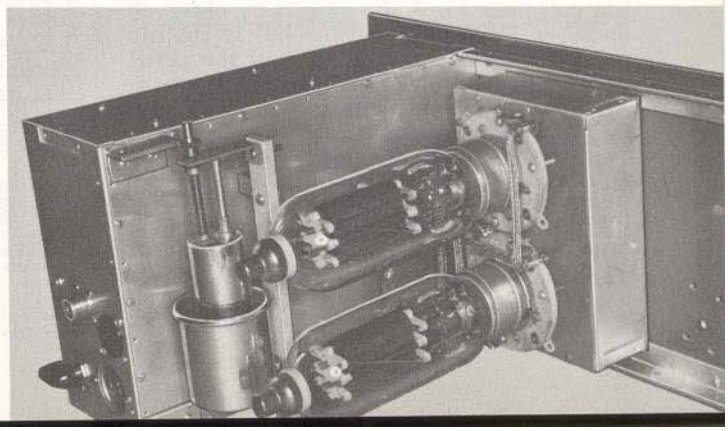
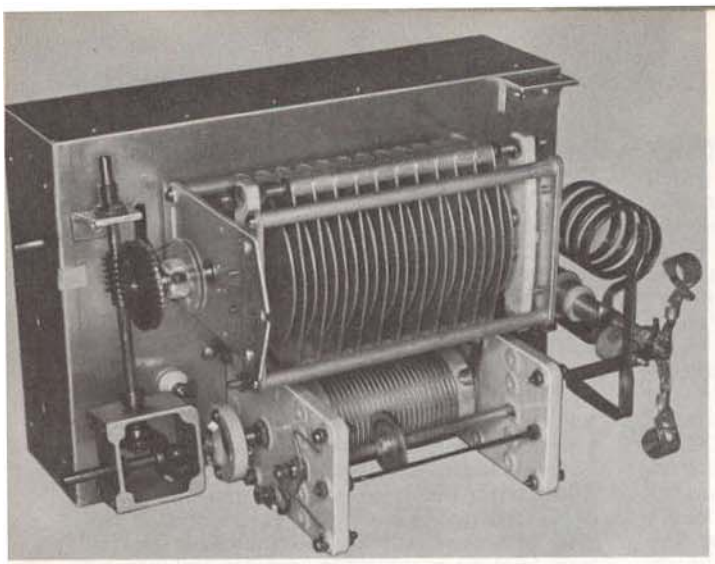


DETAIL VIEW showing the sockets for the 810 tubes positioned so that the plates lie in a vertical plane. This prevents possible grid-to-filament short circuits due to filament sag when filaments are hot. Details on grid chassis and meter shield boxes are given in the constructional details. Outside cup on C_3 connects to plates of 810 tubes; inside cup to MB-150 tuner through small feedthrough insulator.



DETAIL VIEW of the pi-network assembly and the gear drive between the shaft which turns L_2, and C_1. Shafts for the miter gears can be mounted on angle brackets, instead of the box-type housing shown. Note pulley for indicator dial with dial cord crossed for proper rotation of pointer. Insulated shaft coupling must be used on shaft of L_2. Feedthrough insulator behind gear box is for connection from L_2 to stator of C_2.

them before assembling their shield box. Mount the 810 sockets on the 5 x 7 shield cover and fasten it in place.

After the plate circuit chassis is in place, the $\frac{1}{16}$ x $\frac{1}{4}$-inch, copper strap leads between the plate circuit components may be fitted in place. Flexible copper strap or braid should be used for the 810 grid and plate leads. One end of L_1 fastens to the 0.001-mfd ceramic capacitor at the top of RFC_2; the other end is bolted to the strap connecting the stator of C_1 and the input end of L_2.

Forced ventilation of the table rack cabinet was accomplished by fastening a small fan — a phono motor with a 3-inch diameter fan — over a $3\frac{1}{8}$-inch diameter hole in the back of the cabinet, in line with the lower 810 tube. A short duct made from a 3-inch diameter can was fastened inside the cabinet, extending to within $\frac{1}{8}$ of an inch of the amplifier shielding.

PRELIMINARY TUNEUP should be completed without the shields in place. Turn the plate tuning control until L_2 is about $\frac{1}{2}$-turn from minimum inductance. Install the GL-810 tubes, turn C_2 to the half-meshed position, and set S_1 so that none of the fixed loading capacitors (C_4-C_7) are in the circuit. Obtain a grid dip meter covering the 30-megacycle range and hold its coil near L_1. A dip should be observed between 30 and 32 megacycles. If the dip is below 30 megacycles, spread the turns on L_1 and recheck. If necessary, decrease the diameter of L_1 slightly to shift the dip to above 30 megacycles.

Apply 115-volt AC power, bias voltage and about 50 to 75 watts of r.f. driving power at 14 or 21 megacycles through J_1. Do not connect plate voltage at this time. Tune the MB-150 to resonance, as indicated by maximum grid current on M_1. Leave C_2 and S_1 set as above and, while turning the plate tuning control with the roller on L_2 about 6 or 8 turns from minimum inductance, watch M_1 for a fluctuation in grid current. Starting with C_3 at maximum capacitance, turn it toward minimum capacitance while rocking the plate tuning back and forth until virtually no fluctuation in grid current is observed. The amplifier is now neutralized.

Shielding may now be installed and the neutralization adjustment rechecked. A small hole was cut in the top shield over C_3 for this purpose. Connect a suitable dummy load[2] to J_2 and apply about 1,000 volts to J_3. With the same r.f. drive used for neutralizing, tune the MB-150 for maximum grid current, then tune the plate circuit for a dip in the plate current reading on M_2. Turn C_2 toward minimum capacitance to increase the loading to about 200 milliamperes plate current, readjusting the plate tuning for a dip.

If the amplifier is operating properly, increase the plate voltage and current to the normal rating[3] for the class of service in which the amplifier will be operated. A fixed bias supply is recommended, especially for CW operation; and it is essential for class B linear operation.

Normal tuneup consists simply of adjusting the exciter to supply the required driving power, tuning the grid and plate circuits to resonance, and loading with the coarse and fine loading controls.

Type GL-8000 triodes, electrically and mechanically similar to the GL-810 except for amplification factor (mu), were tested in the amplifier and found to require somewhat less driving power.

[1]Other procedures for neutralization are given in the amateur radio handbooks.
[2]Four 150-watt lamps in series-parallel; or, see "Using Resistors as RF Loads," **G-E HAM NEWS**, January-February, 1951 (Vol. 6, No. 1), for other ideas.
[3]Complete technical information on the GL-810 and GL-8000 can be obtained by requesting publications ETX-150A and ETX-215, respectively, from: Technical Data Section, Power Tube Department, General Electric Company, Schenectady 5, New York.

G-E *HAM NEWS* SPECIAL MOBILE POWER SUPPLY

Scouting around the Company recently, I ran across a limited quantity of transistorized mobile power supplied at our Communication Products Department in Lynchburg, Va.

Sensing a chance to provide you with a real buy, I asked these G-E'ers to make these power supplies available to *G-E HAM NEWS* readers at a give-away price.

They are capable of delivering 170 watts of DC power at a 20-percent duty cycle with an operating efficiency of between 80 and 90 percent. The output voltages and currents are just about right to power most of the commercially built mobile amateur radio receivers and transmitters now on the market.

These supplies are fully transistorized – no vibrators, no rotating parts. They have been through extensive tests — hence we have to call them used — and are no longer a current model.

They are built to commercial specifications, with dual toroidal encapsulated high voltage transformers; eleven 400-volt, 500-milliampere silicon rectifiers (alone worth more than the total price); and a separate aluminum heat sink for the transistors.

The transistors are in a self-excited oscillator circuit, with a separate feedback winding on each of the two power transformers. The silicon rectifiers are in a tapped full-wave bridge circuit.

During tests on this power supply the washer which separates each transistor from the heat sink was found to be inadequate to fully insulate the transistor during periods of heavy shock and vibration. Improved type washers will be furnished with each power supply in case you wish to replace the old-style washers.

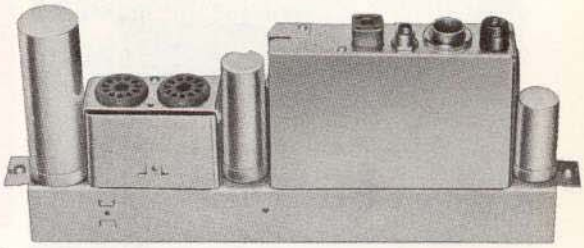
That's all you'll have to do to these power supplies before placing them in service. Each comes complete with cables, circuit diagram, and data for changing washers.

The price is $21.50, postpaid. Or, if you send $5.00, we will ship C.O.D. for the remainder and postage. Please make checks payable to the "General Electric Company." Of course, these power supplies carry a money-back guarantee.

Address orders for *HAM NEWS* Special Mobile Power Supplies to: Mr. William L. Young, General Electric Co., P.O. Box 4197, Lynchburg, Va.

First come, first served.

— Lighthouse Larry



SIDE VIEW of the mobile power supply. The over-all size is 13 inches long, 6 inches high and 1½ inches wide. They weigh only 3 lbs., 11 oz. The octal sockets at the left are for output voltages to transmitter and receiver. This compact unit will furnish nearly 170 watts of DC power.

FRONT VIEW of a complete transistor-powered G-E two-way mobile radio with the heat sink for the power transistors on the front panel (inside of circle). Both the power supply chassis and heat sink can be tucked under the dash of an automobile in a space where conventional cube-shaped power supplies would not fit.

SPECIFICATIONS — EP-14-B POWER SUPPLY

Nominal battery voltage.....12 volts DC
(positive or negative ground)

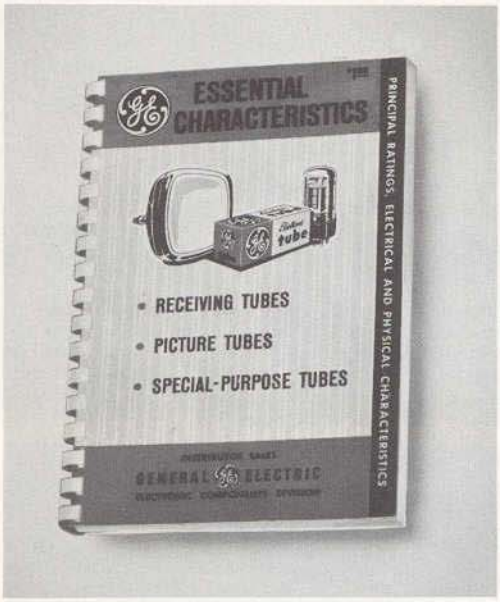
Duty cycle: receive 100%
transmit (1 min. on; 4 min. off) 20%

Ambient Temperature range....–30°C to –60°C

Battery drain: receive full load)....2.1 amperes
transmit (full load)..15 amperes

Output voltages—receive: (all simultaneously)
210 volts at up to.....100 milliamperes
— 25 volts at up to.....10 milliamperes

Output voltages—transmit: (all simultaneously)
425 volts at up to.....300 milliamperes
330 volts at up to.....110 milliamperes
200 volts at up to.....20 milliamperes
— 25 volts at up to.....10 milliamperes



New edition now available through General Electric Tube distributors

NEW TRI-COLOR cover, new data, new tubes! Now expanded from 228 to 260 pages, the latest edition of **ESSENTIAL CHARACTERISTICS,** designated ETR-15H, continues its popular comb binding. This permits the book to lie flat on desk or workbench without weighting it down.

ESSENTIAL CHARACTERISTICS

Radio amateurs will find several significant improvements in General Electric's newest edition of its *ESSENTIAL CHARACTERISTICS* receiving and television tube handbook.

A new section lists the domestic near-equivalents of 95 foreign tube types for ready reference. In another table, standard prototypes of high reliability Five-Star tubes now are indicated.

Tube characteristics and ratings listings now include screen watts. A total of 1392 receiving and special purpose tube types and 399 television picture tube types are listed with maximum ratings and typical operation data. Special type faces for tube numbers indicate at a glance whether a tube is metal, glass, miniature, or sub-miniature. Basing diagrams are printed on the same page as tube listings.

Added typical circuits — including a stereo pre-amplifier — and a revised introductory section, "Interpretation of Data," plus up-dated classification charts for quick reference to tube "families" (diodes, triodes, etc.) round out the new book's features.

Sounds good? Examine it at your local G-E Tube Distributor.

HAM NEWS

SEPTEMBER–OCTOBER, 1959
VOL. 14—NO. 5

BUILD-IT-YOURSELF IDEAS
from the 999 radio amateurs at
GENERAL ELECTRIC

published bi-monthly by
RECEIVING TUBE DEPARTMENT
Owensboro, Ky.

Available FREE from your G-E Tube Distributor

E. A. Neal, W4ITC — Editor