A NEW XMTR by FRANK C. JONES

RADIO NEWS

OCTOBER 25c

COMBINED WITH

All-Wave Radio

RADIO NEWS

VOX SYSTEM

•

MOTOR DRIVEN

ANTENNA

•

73 fm

BERING SEA

•

BENCH NOTES

•

Building a

Camper's Rcvr.

•

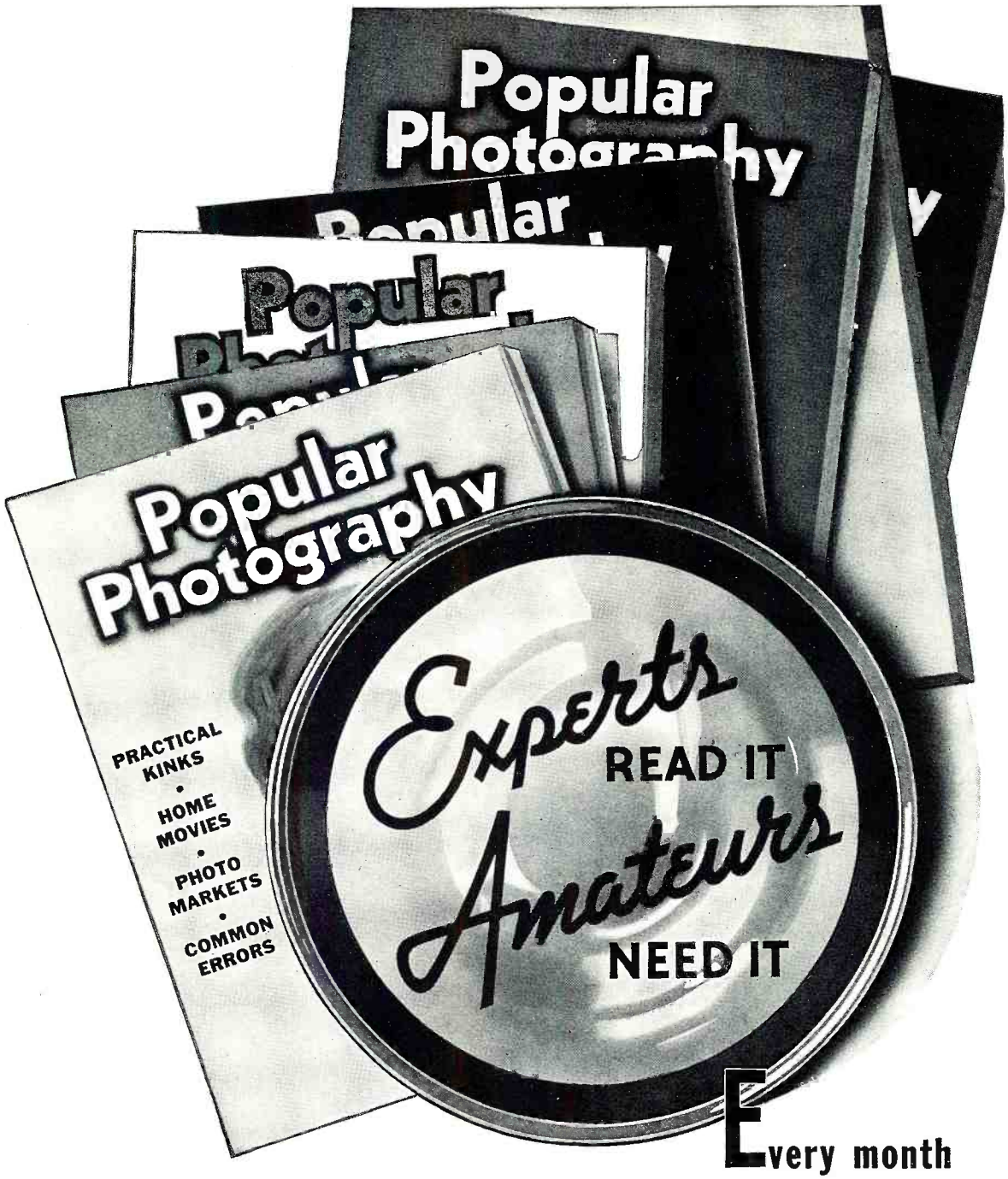
w. Portable

P. A. System

CHICAGO'S POLICE W9XZK

New 2-way System Blankets City

See Page 20



Every month **POPULAR PHOTOGRAPHY** is packed with brilliant features and unusual pictures by outstanding authorities. Articles too, on how-to-make-it and how-to-do-it

On Sale at your Newsstand or Camera Store

ANSWERS ALL QUESTIONS ABOUT PHOTOGRAPHY

I will send you a Lesson on Radio Servicing Tips FREE

TO SHOW HOW PRACTICAL IT IS TO TRAIN AT HOME FOR GOOD JOBS IN RADIO

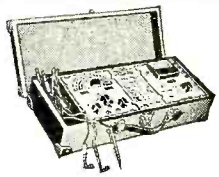
Do you want to make more money? I'm sure I can train you at home in your spare time for a good Radio Job and for opportunities coming in Television. I'll send you a sample lesson FREE. Examine it, read it, see for yourself how easy it is to understand even if you have no knowledge of Radio or electricity.

Many Radio Experts Make $30, $50, $75 a Week

Radio broadcasting stations employ engineers, operators, station managers and pay up to $5,000 a year. Fixing Radio sets in spare time pays as much as $200 to $500 a year. Full time Radio repair jobs pay as much as $30, $50, $75 a week. Many Radio Experts open their own full time or part time Radio sales and repair businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, paying up to $6,000 a year. Automobile, police, aviation, commercial Radio, and loud speaker systems offer good opportunities now and for the future. Television promises many good jobs soon. Men I trained have good jobs in these branches of Radio.

Many Make $5, $10, $15 a Week Extra in Spare Time While Learning

Almost every neighborhood needs a good spare time serviceman. The day you enroll I start sending you Extra Money Job Sheets. They show you how to do Radio repair jobs, how to cash in quickly. Throughout your training I send you plans and ideas that have made good spare time money—from $200 to $500 a year—for hundreds of fellows. I send you special Radio equipment, show you how to conduct experiments, build circuits illustrating important Radio principles. My training gives you practical Radio experience while learning.



I Also Give You This Professional Servicing Instrument

Here is the instrument every Radio expert needs and wants—an All-Wave, All-Purpose, Set Servicing Instrument. It contains everything necessary to measure A.C. and D.C. voltages and current; to test tubes, resistance; adjust and align any set, old or new. It satisfies your needs for professional servicing after you graduate—can help you make extra money fixing sets while training.

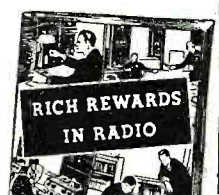
Get My Lesson and 64-Page Book FREE—Mail Coupon

In addition to my Sample Lesson, I will send you my 64-page Book, "Rich Rewards in Radio." Both are free to any fellow over 16 years old. My book points out Radio's spare time and full time opportunities and those coming in Television; tells about my Training in Radio and Television; shows my Money Back Agreement; shows you letters from men I trained, telling what they are doing, earning. Find out what Radio offers YOU! MAIL THE COUPON in an envelope, or paste it on a penny postcard—NOW!

J. E. Smith, Pres., National Radio Institute
Dept. 8KR, Washington, D. C.

J. E. SMITH
President
National Radio Institute
Established 1914

The man who has directed the home study training of more men for the Radio Industry than any other man in America.



J. E. SMITH, PRESIDENT, DEPT. 8KR
NATIONAL RADIO INSTITUTE, WASHINGTON, D. C.

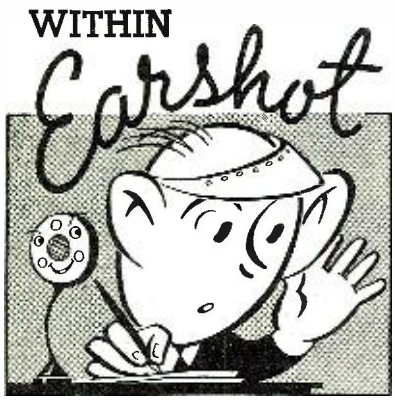
Dear Mr. Smith: Without obligation, send me a sample lesson and your free book which points out spare time and full time Radio opportunities, and shows how I can train for them at home in spare time—about the N.R.I. Set Servicing Instrument you give. (Please write plainly.)

Name ..... *Age* .....

Address .....

City ..... *State* .....

14x-1



OF THE EDITOR

WHILE the fight for further frequencies and greater consideration goes on among the amateurs, with some of them basing their claims on the service which the ham does to his or her community during times of disaster, the technical side of the ham's aid to radio has become less and less.

Were we to take our developments in the field of radio in the last year or so

(Right to Left) Dick Jurgens, ex-W6GH, and Hal Tate, show Gary Breckner, announcer what's what in RADIO NEWS.

as an example of what the ham can and will do, we would not be entitled to use even the ¼ meter band.

What brought this to mind was the reading of a recent copy of the *Proceedings of the Institute of Radio Engineers.* Whenever we have worked anyone on the air we have been impressed with the fact that very little experimentation was going on. This gave rise to a misguided notion that there was very little experimentation going on in the whole field of radio. Reading the magazine aforesaid dispelled that idea completely.

Few of us can believe that the ultimate has been reached in radio transmission equipment, and yet very few of us are doing anything about it. No so with the commercials. Several new and wholly different types of modulation have been developed including the development of high fidelity modulators dispensing with the usual transformers and resistors.

What the hams need if they are to stay "in business" is to get busy at their respective experimental tables and try to develop something new or different.

(*More Earshot on page* 50)

OCTOBER
1938

Vol. 20, No. 4

RADIO NEWS

INCLUDING All-Wave Radio

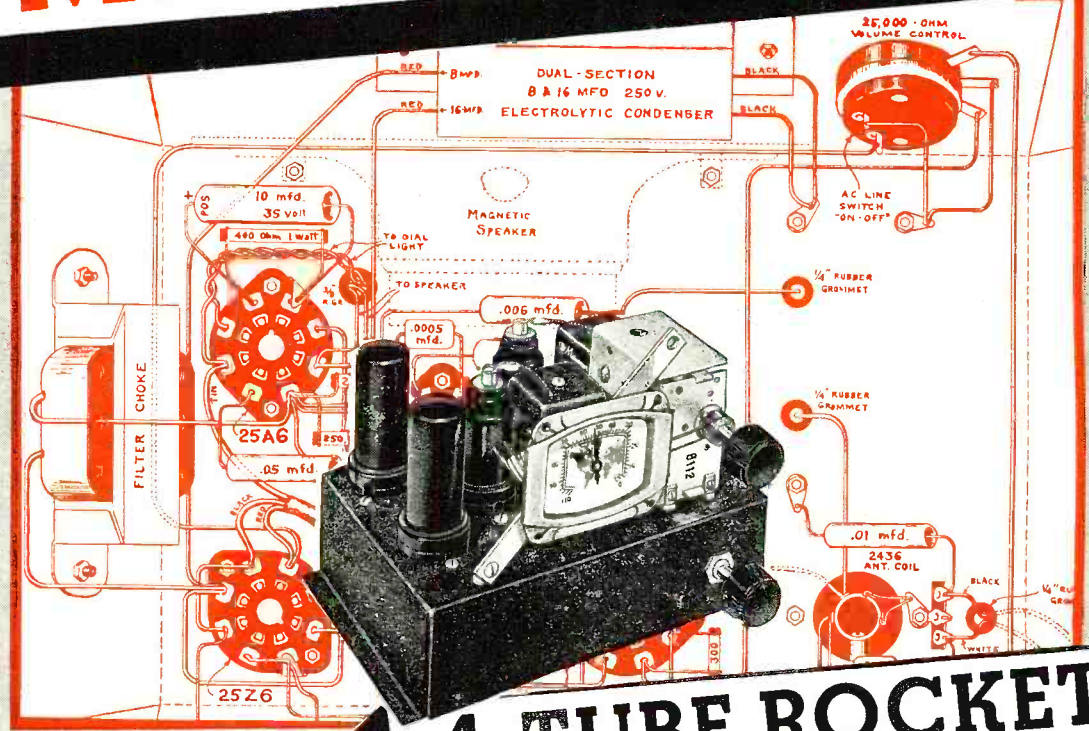
The Magazine for the radio amateur experimenter, serviceman & dealer

Contents

A 600 Watt Transmitter 6
Serviceman's Experiences 10
73 from the Bering Sea 11
Electricity Writes Its Own Story 12
The National QSO Page 14
Motor-Driven Antenna 18
W9XZK Protects Chicago 20
Coast Guard Ship Safety Service 22
Building a Camper's Broadcast Receiver 23
Technical Book and Bulletin Review 24
Radiopix 25
Radio Gadgets 26
Hamshack 27
A Ham Takes a Radio Vacation 28
World Short Wave Time Table 30
Short Wave Flashes 32
Radio News *VOX System* 33
Power Pack: Transformer Design 35
A Versatile 50 Watt Bandswitch Transmitter 36
Bench Notes 39
Letters to the Editor 40
Special Broadcast Programs for the DX Fan 40
An 8 Watt Portable P. A. System 41
What's New in Radio 42
Looking Ahead to Television Occupations 44
Questions and Answers 46
W9MWC Wins Paley Amateur Award 55
Radio Physics Course 57

RADIO NEWS is published monthly by the Ziff-Davis Publishing Company at 608 S. Dearborn St., Chicago, Ill. William B. Ziff, Publisher; B. G. Davis, Editor; A. F. Maple, Executive Assistant; Karl A. Kopetzky, W9QEA, Managing Editor; E. Stanton Brown, Associate Editor; Herman R. Bollin, Art Director; John H. Reardon, Circulation Director. New York Office, 381 Fourth Ave. Subscription $2.50 per year; single copies, 25 cents; foreign postage $1.00 per year additional, except Canada. Entered as second class matter, March 9, 1938, at the Post Office, Chicago, Illinois, under the Act of March 3, 1879. Contributors should retain a copy of contributions. All submitted material must contain return postage. Contributions will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Accepted material is subject to whatever revisions necessary to meet requirements. Payment will be made at our current rates upon acceptance and, unless otherwise specified by the contributor, all photographs and drawings will be considered as constituting a part of the manuscript in making payment.

IT'S *fun* TO BUILD A MEISSNER KIT!



4-TUBE ROCKET

FEATURES

- ★ 4-Metal Tube Kit
- ★ AC-DC Operation
- ★ Tunes 530 to 1600 kc.
- ★ 1—6K7, 1—6J7, 1—25AG, 1—25Z6
- ★ Illuminated Airplane Dial.

$7.35 NET

IT is a "performing fool"—and anybody can build it! A modern, up-to-the-minute, all-metal tube AC-DC receiver. *Everything* you need for "bread board" construction is furnished, except the tubes and speaker. Or we can even supply you with a heavy-gauge, already-punched, chassis base for $1.35 extra.

In two evenings you can have your "ROCKET" all assembled and playing! And Meissner *guarantees* that it will work to your satisfaction or we will fix it!

Ask your Parts Jobber for this Meissner Kit. Or, if he doesn't stock this particular model yet, write the factory and we will see that some jobber supplies you.

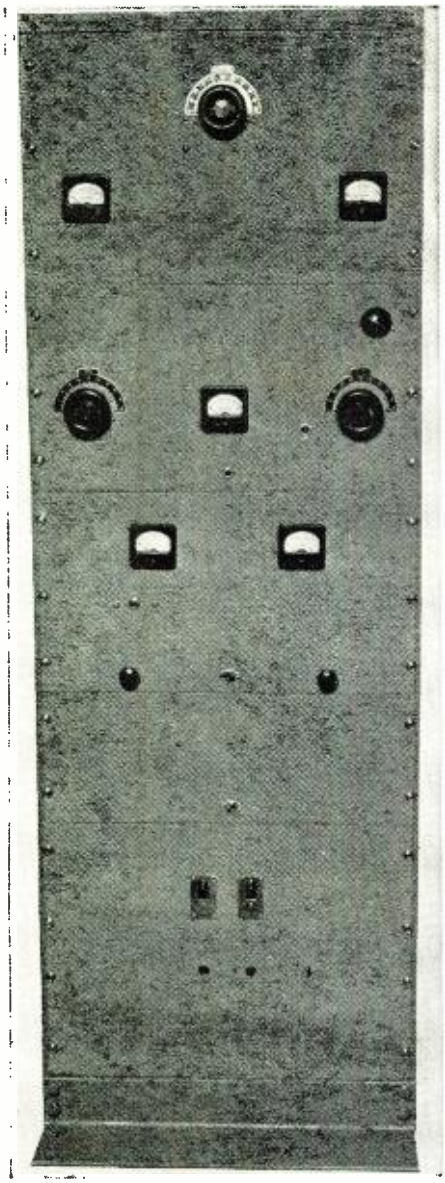
Meissner

MT. CARMEL, ILLINOIS

"A FAMOUS NAME FOR TWO DECADES"

MAIL THIS COUPON!

Meissner Manufacturing Co.
Mt. Carmel, Ill., Dept. RN-10
Please send me full details Meissner Kits.
Name.....
Street.....
City.....State.....



The front panel is symmetrically balanced.

A Novel 600

by FRANK C. JONES, W6AJF
Technical Editor, "Radio."

A novel crystal-buffer arrangement adapted to amateur transmitters from commercial practice is fully described by the well-known author in his first of a series of articles for RADIO NEWS. A 600 w. 'phone and 800 w. CW rig that should delight the high power men.

AS promised last issue, the Editors of RADIO NEWS take great pleasure in presenting the first of a series of articles by Frank C. Jones, W6AJF. Mr. Jones is the developer of the "Jones Oscillator," and well known to the hams for his "Handbook"

Mr. Jones will be a regular feature writer for us and the hams are urged not to miss any of his articles.

SOME of the requirements of present day transmitters are quick band changes, easy frequency shift within a band, high average level of modulation without overmodulation, and high efficiency over the whole r.f. frequency range. Ease of band change allows the operator to shift to several different amateur bands in order to use the best wavelength for the distance of transmission. Quick frequency change in a band often means ability to dodge heavy interference. Overmodulation should never be allowed in any transmitter and in order to prevent that condition, the average level may be around 30%. If that average level can be increased to 60% or so, without overmodulation on peaks, a transmitter with a 500 watt carrier is approximately equivalent to a 2KW set with 30% modulation. Audio automatic volume control provides a means of accomplishing this desirable feature and is incorporated into this transmitter.

R.F. Circuits

There are only two coils to change when shifting to any bands from 10 to 80 meters. A novel exciter furnishes equal output on either 20 or 80 meters from 80 meter crystals. The 80 meter output drives the 35T as a buffer on 80 meters or as a doubler to 40 meters. The same holds true for 20 meter exciter output, the 35T driving the final amplifier on either 10 or 20 meters. Several different crystals can be quickly selected by means of a front panel rotary switch. An ordinary toggle switch changes the exciter output from 80 to 20 meters by short-circuiting one coil.

The exciter consists of an untuned Pierce crystal oscillator using a 6C5G triode, a self-resonant 40 meter doubler with a 6V6G tetrode, and a tuned 6L6G buffer or doubler. The latter does not require any neutralization because the grid circuit is broadly resonant at 40 meters while the plate circuit is tuned to either 80 or 20 meters. There is enough 80 meter grid excitation, in spite of the 40 meter r.f. choke L_1, to drive the same grid current into the 35T as on 20 meters. This grid current is about 15 ma. under no load, and varies to about 5 ma. under full load.

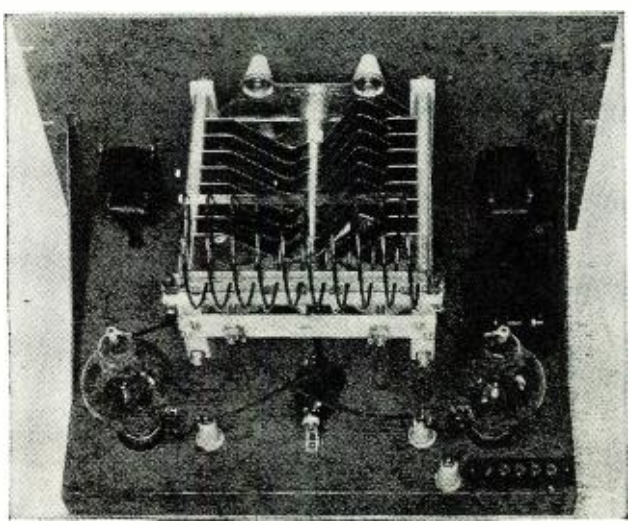
It was found desirable to bias the 35T extremely high in order to give good harmonic output as a doubler and to keep its plate current down to about half of its rated value. This type of operation provides good excitation to the final amplifier on all bands even with capacity coupling without appreciably exceeding the normal plate dissipation of the 35T tube.

Capacity coupling to the final amplifier was used in order to reduce the number of tuning controls and coils to change in comparison to link coupling. The 100th final amplifier tubes are high *mu* tubes having a normal plate dissipation rating of 100 watts each and have an amplification constant of between 30 and 40. This means that the grids can be tapped towards the center of the driver stage tank coil.

The r.f. voltage is comparatively low in the grid circuit and there is little strain on the ordinary pie-wound 125 ma. 2 mh. r.f. c. which connect to each grid. The only trouble that is sometimes had from this form of grid circuit, is the possibility of parasitic oscillations. A parasitic suppressor in one grid circuit consisting of a 100 ohm 2 watt carbon resistor shunted by 6 or 8 turns of No. 14 wire on a ½" diameter form will ordinarily stop this type of parasitic oscillation.

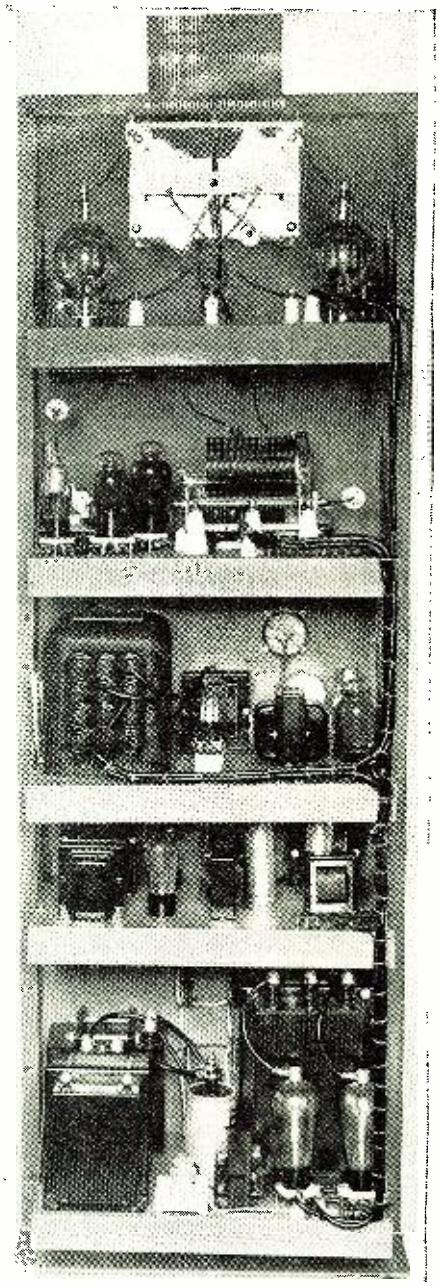
An oscillation of this kind will evidence itself by excessive final amplifier plate current, rough quality during modulation or low output to the antenna. Fortunately this trouble wasn't present in the set illustrated in the photographs.

The final tank circuit has a propellor type tuning condenser with built in neutralizing condensers. The "grid" plates have a screw driver adjustment which varies the spacing to the stators in the tuning condenser. This form of condenser is excellent for short r.f. leads in the plate and neutralizing circuits. The rotor is grounded through a 5000 v. mica condenser and a 1 meg. resistor connects from the rotor to + B in order to prevent flashover on modulation peaks. The mica condenser



The final is compact and ruggedly built.

Wa t Transmitter



The parts are arranged for easy access.

acts as a low impedance path to ground for harmonics in the split-stator tank circuit but prevents a d.c. arc from forming if the tuning condenser ever flashes across.

The resistor is sometimes necessary to equalize the leakage path and will sometimes reduce flashovers during modulation. The rotor to stator air-gap is ¼" which is ample with a 2000 v. d.c. power supply if the rotor is insulated from a direct ground connection. Even r.f. arcs across a tank condenser will often collapse the pie winding of an r.f. choke and may damage the power supply or final amplifier tubes in some transmitters.

Audio System

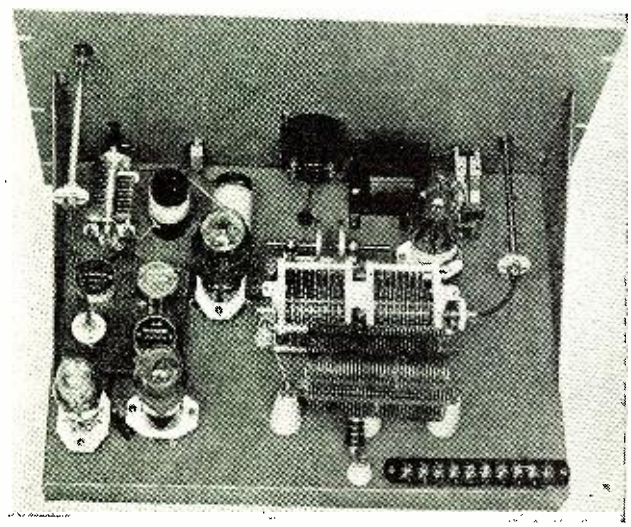
The audio channel must supply a peak power output of 600 watts in order to allow up to 100% modulation of the Class C final r.f. amplifier with 600 watts input. This is equivalent to 300 watts of average power output from the Class B modulator, and this amount can be easily obtained from a pair of 35T tubes. It would mean an overload with sine wave output but with speech, the 600 watts peak power output is easily obtained by using a rather low value of output plate to plate load impedance.

With sine wave output this would mean excessive 35T plate dissipation at high levels of modulation, but on speech this effect is not obtained. The modulation transformer has numerous taps for impedance matching and plate to plate impedance was simply decreased until enough output was obtained on speech to fully modulate the 600 watts input to the r.f. amplifier. Approx. 2 to 1 step-down seemed to be satisfactory. A prolonged whistle into the microphone (nearly sine wave input) will cause the 35T plates to become a very bright red but on speech the average is a normal red color. A tantalum plate tube can be operated in a Class B amplifier under these conditions more safely than a carbon plate tube unless the latter is very well evacuated.

The 35T Class B stage is driven by a single 6L6G beam power tetrode tube since the peak driving power is not over 10 watts. The 6L6G tube makes a very efficient driver either single-ended or in push-pull *provided the plate impedance is lowered by means of inverse feed-back.* Part of the driver output voltage is fed back to the grid circuit in order to reduce the plate circuit impedance to a fraction of its normal value as a straight tetrode amplifier. This feed-back reduces the amplification but greatly improves the quality and the 6L6G still has normal audio output available to drive 35T grid circuit. The inverse feed-back is obtained by connecting the 76 plate resistor to a voltage divider across the 6L6G plate circuit rather than to plus B. This form of feed-back is not at all critical and no trouble from in-phase voltage is had in the form of oscillations or howls at high audio frequencies. Many inverse feed-back circuits do not provide a pure 180° out of phase voltage over the whole audio range.

The 76 stage is driven by a 6C6 pentode speech amplifier which connects through a resistance r.f. filter to a crystal microphone. The suppressor grid of the 6C6 is connected through a two section resistance and condenser filter to the source of audio automatic volume control. The AVC is a 6H6 full wave diode which rectifies a small part of the audio voltage across the grids of the 35T tubes. This rectified voltage appears across R_{13} and is applied as a pure d.c. voltage to the suppressor grid of the 6C6 speech amplifier.

The amplitude of this negative d.c. voltage depends upon the amplitude of the audio voltage across the 35Ts and varies at a slow rate approximately as the envelope of the speech voltage. A peak which would cause overmodulation and sideband splatter, is automatically reduced because it reduces the gain of the 6C6 stage. The 6H6 tube cathode bias determines the point at which it begins to rectify a.f. voltage and feed-back d.c. amplification reducing voltage to the 6C6. A high bias will entirely prevent any AVC effect just as if the 6H6 tube was removed from the circuit. The desired amount of "delay" voltage is obtained by varying R_{21} (a front panel control) until no overmodulation takes place when talking into the microphone with full gain setting of R_{17}. *An oscilloscope or even a diode overmodulation indicator* (See Radio News, August, 1938, page 51) *should be used in this test procedure.*

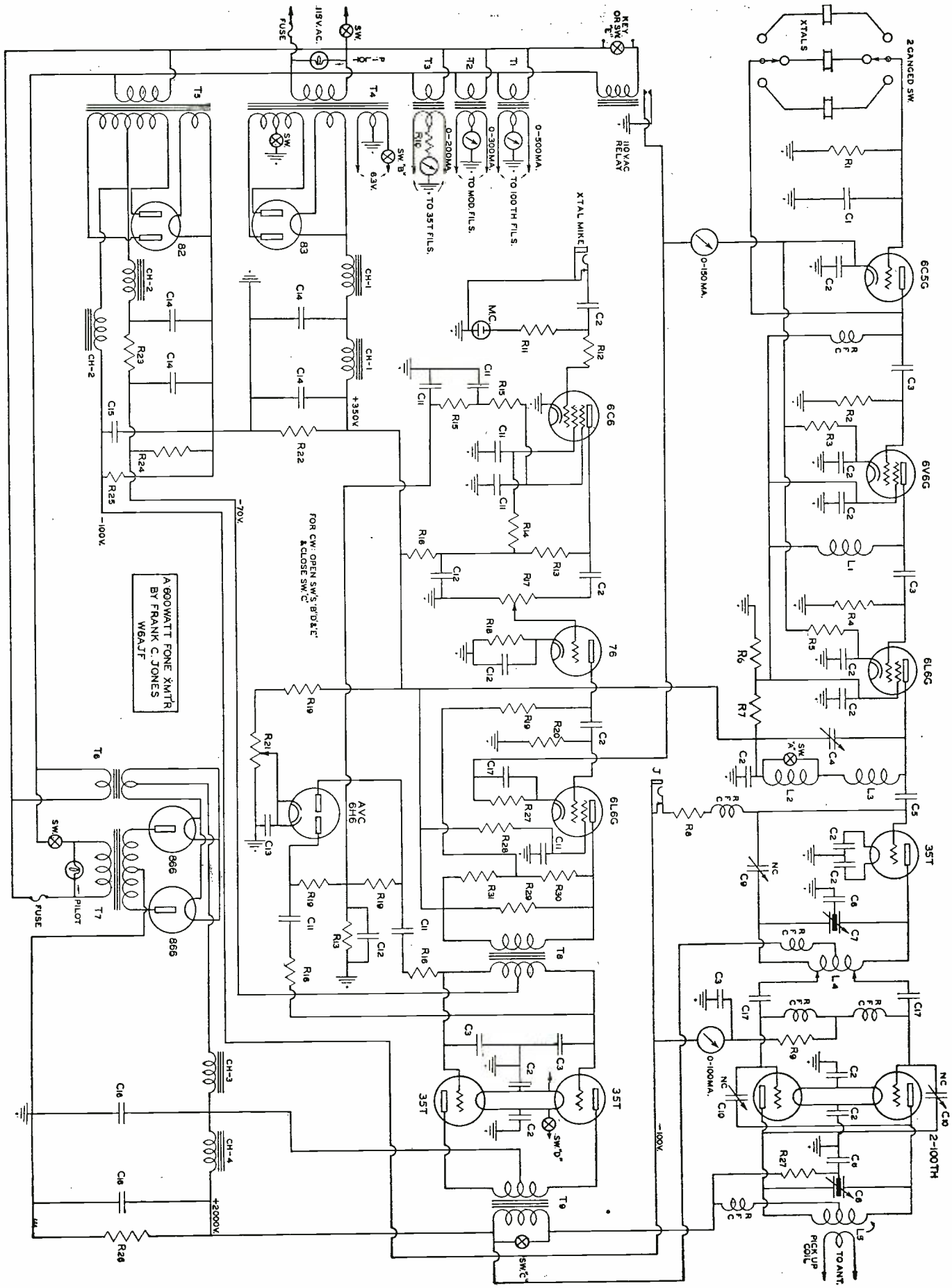


The crystal-buffer-doubler assembly.

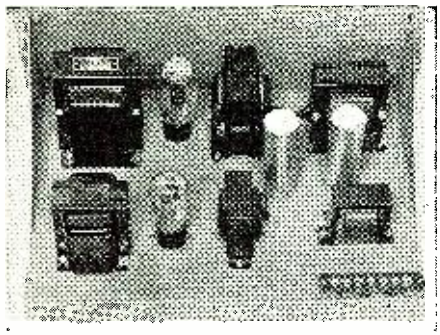
Once the value of R_{21} is properly chosen, it does not need readjustment as long as the d.c. plate current to the final amplifier is maintained at the same value in each band of operation. This AVC system allows a high average level of modulation without appreciable overmodulation and when properly used, will eliminate all traces of sideband splatter in nearby receivers. The 6H6 diodes are connected in push-pull in order to balance out audio voltages in the rectified output circuit. This means less RC filter and time delay in the AVC circuit. Any actual audio voltage fed back from the 35T stage to the 6C6 stage would cause a great reduction in gain or more likely, terrific audio oscillation.

Power Supplies

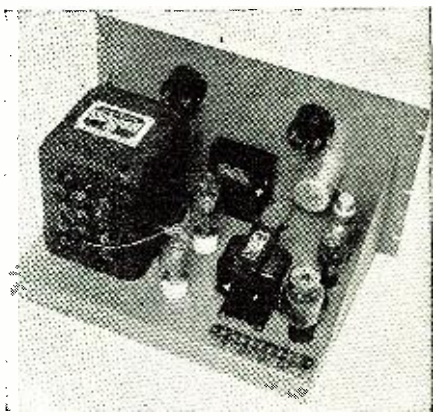
A 2000 v. d.c. 500 ma. supply furnishes



The power supply is so arranged that it can be easily serviced without trouble.



The speech chassis has its parts so placed that there is no chance for feed-back.



The drivers and modulators occupy one chassis. Modulator impedance is variable.

plate power to all high voltage stages. The buffer or doubler 35T stage requires from 60 to 80 ma., the final amplifier 300 ma. on phone and the remainder is available for the modulator and bleeder resistor R_{28}. On c. w., the modulator filaments are turned off and the plate current to the final amplifier can be increased to run the input up to about 800 watts. The milliammeter in the final cathode circuit reads the sum of grid and plate current so can be loaded up to at least 350 ma. on phone and 450 to 500 ma. on c. w.

A 350 v. d.c., 250 ma. supply furnishes power to the speech channel and r.f. exciter. The exciter (three tubes) draws a total of from 60 to 80 ma. depending upon the frequency and activity of the crystals. A relay in these cathode circuits serves as a break-in or c.w. keying device since fixed bias is connected to the 35T and 100TH grids.

One a.c. bias supply furnishes bias voltage to all high voltage stages through two separate filter and bleeder circuits. The common impedance of one filter system for both Class C and Class B amplifiers caused serious distortion under modulation. Separate filters and bleeders eliminated this distortion. The C bias power transformer should supply somewhat more than 110 volts each side of center of the secondary in order to obtain the bias voltages indicated. Minus 70 volts on the 35T modulator stage holds the no-signal d.c. plate current to a value of from 20 to 30 ma. 90 to 100 volts bias on the r.f. stages is sufficient to cut-off plate current entirely. Additional grid bias is obtained from grid leaks and from a cathode resistor in the 35T stage.

Separate filament transformers on each deck supply each 35T and 100TH stage. Choke coil input was used in all filter circuits in order to draw high plate current loads without having excessive peak rectifier load currents. The 866 tubes are somewhat overloaded on peaks of modulation but seem to be able to stand up for a good life operation period and are much cheaper than 872 rectifier tubes.

Constructional Data

The photographs illustrate nearly all of the data necessary for construction. A relay rack supports the 19" front panels which are finished in pearl grey wrinkle paint. The final amplifier panel is 12¼" wide. All chassis were made 12" x 17" x 1¾" with end brackets fastened to them and to the front panels. The exciter and speech channel panels are both 10½" wide. The 350 v. and C bias supplies are mounted behind a 7" panel while the high voltage supply and power switches required a 14" panel.

All wiring should be by the most direct "route" and square bends and the like avoided. The cables from one to the next chassis can be color-coded for easy identification, and they should be tied in in true "W.E." style. While this last is not absolutely necessary, it will improve the appearance of the rig, and will help to avoid incorrect connections and the resulting destruction of parts. Careful construction throughout is essential if "commercial" results and consistent QSO's are to be expected. There is no excuse for transmitter breakdown due to careless construction.

Coil data is listed in a chart to the left.

—30—

Exciter-Buffer Coils

L1—55 turns No. 24 d.c.c.—on ½" diam. ceramic or porcelain form—random wound to cover 1⅜" length.

L2—34 turns No. 22 d.c.c.—on form 1¼" diam.—winding length—1½"

L3— 9 turns No. 18 d.c.c.—on form 1¼" diam.—winding length—1"

Band in Meters	35T Coil (L4)	100 TH Coil (L5)
10	4 turns No. 12E C. T. 2½" Diameter 1 turn per inch Tapped at ¾ turn from each end.	6 turns No. 6 C. T. 2" Diameter 6" long.
20	10 turns No. 14 C. T. 2¾" Diameter 2 turns per inch Tapped 2½ turns from each end.	10 turns No. 10 C. T. 3" Diameter 6" long.
40	22 turns No. 14 C. T. 2¾" Diameter 5 turns per inch Tapped 6½ turns from each end.	20 turns No. 10 C. T. 3" Diameter 6" long.
80	34 turns No. 10 C. T. 2¾" Diameter 8 turns per inch Tapped 12½ turns from each end.	26 turns No. 10 C. T. 4" Diameter 5" long.

R_1—50,000, 1 w.
R_2—100,000, 2 w.
R_3—300, 10 w.
R_4—100,000, 2 w.
R_5—300, 10 w.
R_6—100,000, 2 w.
R_7—2,000, 10 w.
R_8—5,000, 10 w.
R_9—750, 50 w.
R_{10}—600, 10 w.
R_{11}—1 meg., ½ w.
R_{12}—25,000, ½ w.
R_{13}—¼ meg., 1 w.
R_{14}—2 meg., 1 w.
R_{15}—¼ meg., 1 w.
R_{16}—50,000, 1 w.
R_{17}—1 meg., pot.
R_{18}—3,000, ½ w.
R_{19}—100,000, 1 w.
R_{20}—½ meg., ½ w.
R_{21}—50,000, pot.
R_{22}—25,000, 10 w.
R_{23}—350, 10 w.
R_{24}—1,000, 50 w.
R_{25}—2,000, 50 w.
R_{26}—100,000, 100 w.
R_{27}—1 meg., 1 w.
R_{28}—10,000 ohm, 10 w.
R_{29}—10,000 ohm, 10 w.
R_{30}—100,000 ohm, 1 w.
R_{31}—10,000 ohm, 1 w.
Ch_1—200 ma., 12 h., filter ch.
Ch_2—85 ma., 15 h., 375 ohm filter ch.
Ch_3—500 ma., 5-20 h., sw. ch.
Ch_4—500 ma., 12 h., filter ch.
T_1—5 v., 13 amp. fila. trans.
T_2—5 v., 13 amp. fila. trans.
T_3—5 v., 4 amp. fila. trans.
T_4—870 v., CT, 250 ma. trans. with 6.3 v. fila. winding
T_5—220 v. CT, 160 ma. sec. with 2½ v. fila. winding
T_6—2½ v. 10 amp. 866 fila. trans.
T_7—4800 v. CT sec., 500 ma. power trans.
T_8—Class B, input trans.
T_9—300 w. multi match mod. trans.
C_1—50 mmfd., mica, 600 v.
C_2—.01 mfd. paper, 600 v.
C_3—.001 mfd. mica
C_4—50 mmfd. var.
C_5—50 mmfd. mica, 5000 v.
C_6—.002 mfd. mica, 5000 v.
C_7—100 mmfd. per section, 3000 v. split stator
C_8—120 mmfd. per section, ¼" spacing split stator (A & B "Propeller" Type)
C_9—neut. cond.
C_{10}—neut. cond. for 100 TH tubes built in to A & B condenser
C_{11}—.1 mfd. paper, 600 v.
C_{12}—½ mfd. paper, 400 w.
C_{13}—1 mfd. paper, 400 w.
C_{14}—8 mfd. elec., 450 wv.
C_{15}—16 mfd. elec. 450 wv.
C_{16}—2 mfd. 2000 v.
C_{17}—10 mfd. elec. 25 v.

Serviceman's Experiences

by LEE SHELDON
Chicago, Illinois

"To drink or not to drink," that is the question that faces many a serviceman when, having finished a particularly difficult job, the customer asks him to "have one." The author takes up this embarrassing situation and gives his answer.

THE set sounds fine since you fixed it," volunteered Mr. Ryan, after I had completed delivery. "Don't you think so, Ethel?"

"Yes, indeed," his wife replied. "It doesn't make that funny noise, or fade one bit." She turned to me: "At first, we thought your prices were high, but now we are satisfied you know your business."

I stood there, blushing, watching my left shoe as my right rubbed it. "Thank you," I said. "Salutary Sales & Service always tries to ring the bell, and I am sure my partner will be glad to know his work is appreciated."

"Good," said Ryan, rubbing his hands together as a friendly gesture. "And now, how about a little snifter?"

"Thanks," I replied, "but I never drink on the job. I find I can't do justice to my repair work if I fall by the wayside. Thanks just the same though."

The temperature dropped appreciably. I fumbled for Ryan's bill among some blanks, as if his wasn't the only job I'd delivered that day.

He paid me, and I drove back to the shop. Al was clearing up the workbench. He does that when business is bad, and no chassis are on hand. Says it helps him keep his mind off his business associates. He means me, of course, but I try to humor him, realizing his uncouth remarks are engendered by a subconscious cognizance of my superior business acumen.

"Smells like I laid my soldering iron across a roll of rubber tape," he remarked, as if to himself, as he heard me enter. Then, turning in mock surprise: "Oh, it's *you*, is it? How did Ryan like his set?"

"Great—both he and his wife said they were well satisfied. What did you do to get rid of the fading—replace the bypasses?"

"Nope."

"You didn't? Then what was the fifteen dollars for? We charged him for condensers," I said, excitedly.

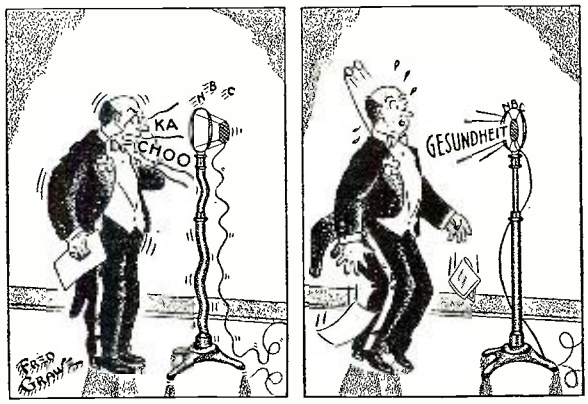
Al smiled and sat down. "I am reconciled to the fact that I must guide you tenderly, as you stubbornly refuse to learn your chosen profession," he said, pushing the 'phone away to make room for his feet.

"When you picked up the set, you were so confused at the prospect of getting work that you rendered yourself incapable of analyzing the job properly. You took it for granted the cause of the fading was bypasses because you remembered other sets of the same model had the same fault, and not because you bothered to inspect this one before you picked it up."

"I know, I know," I said, impatiently, "but what did you give them for their hard-earned, American fifteen dollars?"

"Don't get precocious, now—keep in mind it is no easy job to sponsor you during your technical adolescence, and that I suffer more from your growing pains than you.

"Although the immediate reason for the call was a loose grid clip, the set needed attention badly. The tubes, which you neglected to check because the smell of a successful contract rose in the wind, were on



their last prongs. I supplied new ones. As an afterthought, I blew out three ounces of 1933 dust, cleaned the speaker, and painted the filter block brown."

"Well, Ryan got his money's worth—why pick on me?" I asked, using martyred countenance No. 7.

"Because we gypped ourselves. The legitimate total came to $15.75, so we lost six bits. Next time, check the set properly before you pick it up."

We both smoked a while, loading up with mental ammunition. Al spoke first.

"I know the Ryan family pretty well. His wife doesn't let him drink outside the house, and inside only on occasion. Every time I visit him he uses the event as an excuse to mix a few drinks. Didn't he invite you into the kitchen?"

"Yes, but naturally, I refused. Business and pleasure—"

"You *what?*" Al jumped up and yelled. "Gimme the keys to the car!" He ran toward the door.

"Where are you going?" I asked.

With his hand on the knob, he relaxed long enough to say: "To the Ryan residence. I am going to ask both of them how they like the set. Then, after he asks me to drink with him, I will knock over a couple in an effort to regain some of the good will you lost by refusing."

"If Brown hears of this, he'll fire you. Your conscience must bother you, stopping work to go off and get drunk. Don't you ever toss in your sleep?"

Al let go of the door knob so that he could swing both arms while he spoke: "Listen, junior partner, right now one of our best customers is sitting in his living room, feeling we let him down by your mistake in thinking an invitation to drink concerns morals instead of sound business. I am going over there to regain some of his friendly feeling."

"What can I tell Brown if he asks for you?"

"Tell him where I am, and ask him to drop over for a 'ball. If he can't see I'm doing this for the good of the business, tell him I'll go down the street and sign up with Redoubtable Radio Repairs, Inc. If the 'phone rings, tear it up—we'd probably be better off if you were a silent partner."

He slammed the door and drove away. The idea of drinking to improve business! Still, the shop *did* look very empty, and I couldn't say we didn't need work. I remember the times we used to have so many chassis on the floor you could hardly walk from the workbench to the door without jumping. I was certain of one thing, though: prosperity would not return simply because I accepted every warm gin highball that was thrust at me.

One call came in while Al was out. Fellow named Risso, with an ailing Amrad. Promised to be there within an hour, and hoped Al would get back quickly.

To pass the time, I read a back issue of *Serviceman's Counseler & Guide,* and noticed with great satisfaction that item 4 (b) of their editorial platform advised those in the profession to "stay sober on the job, even if the drinks are free." I marked the paragraph with red pencil and left the book open so Al would be sure to see it.

When Al came back, he said: "Hello, there, Lee!" so pleasantly I knew he had been leaning against the Ryan refrigerator.

"Here's a call down on Van Alst Avenue," I said. "Let's have the keys to the car."

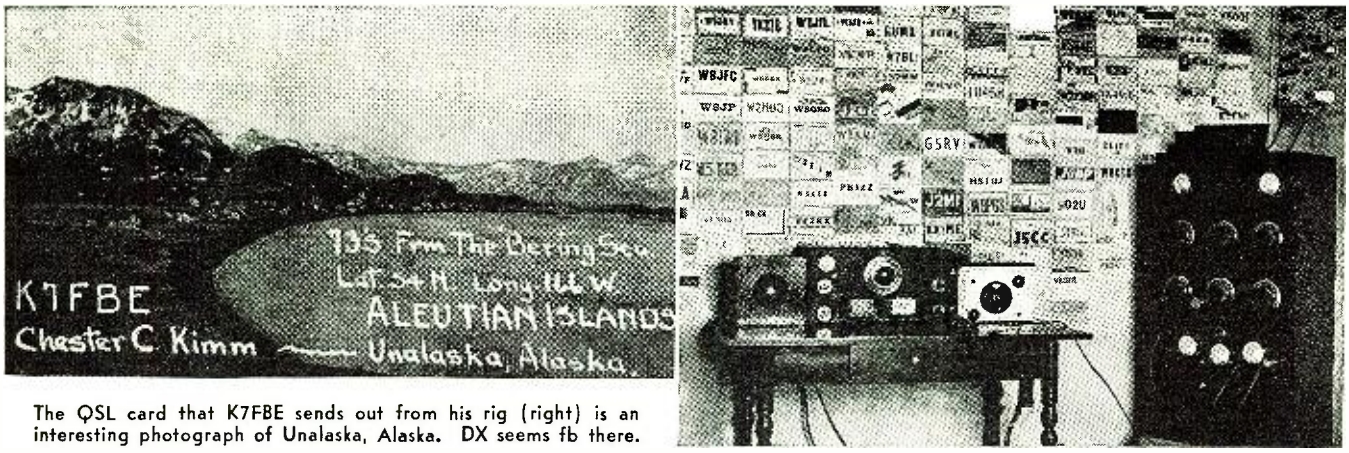
"You know that section is filled with a nationality that uses the juice of the grape as a business function, don't you?" He spoke very pleasantly, as if to a child.

"I do," I replied, and added, firmly: "But I will refuse to take the job at the expense of my morals."

"That's what I was afraid of," Al said. "You fail to realize alcohol is often the oil of commerce. *I* will answer that call. Go back and mother the 'phone again!"

I had dozed off when the 'phone rang. Al's voice, slow but cheerful, announced: "I will be detained far into the night with

(*Check to page* 56)



The QSL card that K7FBE sends out from his rig (right) is an interesting photograph of Unalaska, Alaska. DX seems fb there.

73 from the BERING SEA

by TED LEITZELL
Chicago, Illinois
Special Radio News' Writer now in Alaska

The last paradise of the U. S. Ham seems to be Unalaska where the huskies howl and the Borealis plays, but the DX sure does roll in. With only six Hams there, there is not much QRM.

IF you want DX paradise, pack up your rig and head for Unalaska. In case you don't know where it is, you'll find it on your map tucked away in the Aleutian Islands, so far west that it is closer to the eastern hemisphere than New York is to Chicago. It is even farther west than the Hawaiian Islands, but more than 3,600 miles further north, and after you pack your rig it will take you six weeks to get there if you make close connections.

When you get there you'll find a ham club with six members (out of a total white population of seventeen), and K7FBE, Chester L. Kimm, who works regularly with every continent on the globe. Gasoline is expensive and hard to get, so he uses only 75 watt input, but in the eleven months from June, 1937, to May, 1938, K7FBE had 991 contacts on twenty meter fone. Here is how they split up:

North America	762
South America	11
Asia	128
Oceana	33
Europe	45
Africa	12

He has so many QSL cards that it is hard to tell the pattern of his wall paper, and he has relayed literally hundreds of messages from continent to continent, ranging all the way from seventy-threes and merchandise orders to matters of life and death.

For power Kimm uses a rewound Dodge generator driven by a two horse Briggs and Stratton gas engine, coupled together with an old Ford clutch and parts from a washing machine. His receiver is a National HRO, and his transmitter is a conventional rig with the following tube line-up:

6A6 crystal oscillator, doubler, 2-6L6G (push-push) doublers, 2-T20's in a push-pull final, crystal mike, 6F5-6C5-6L6-210's Class B modulators. The input is 75 watts. That's all there is, but it reaches out.

Unalaska is six hundred miles south of the Arctic Circle, so it does not have the midnight sun. For practical purposes it might as well have, since summer months have only three or four hours of dim twilight to represent night. In summer daylight hours are the best—the twenty meter band shuts off like a switch when the sun finally sinks below the northern horizon. It comes on again as soon as the sun has risen fully, and stays good all day long.

In winter the nights are ok after the sun has set, but the aurora borealis plays hell with everything when it comes. Fortunately, they only get it two or three times each year, so it is not much of a problem.

A typical day from Kimm's log book shows him working W6LY, K7AOC, XU8RB, VK2HV, FB8AH, W9NLP, and W7ALS. He gets all over North America with little difficulty, and in Asia reaches more stations in Russia, Indo-China, the Philippines, China, and Japan than any other countries. Europe is next to Asia, and he has worked nearly every station there. Africa and South America are poorest.

In zones worked it is "Yes" on 1, 3, 4, 5, 6, 8, 10, 12, 13, 14, 24, 25, 26, 27, 28, 29, 30, 31, 32, 37, 38, and 39; "No" on 2, 7, 11, 15, 16, 17, 18, 19, 20, 21, 22, 23, 33, 34, 35, 36, and 40.

In April and May, 1938, he worked the following list of DX stations, all on twenty meter fone:

KA1KY, XE2AH, KA1RB, PK1VM, J2CR, YK4JU, J2NC, LU3EJ, XU8RB, VK3BW, G6GO, VK2ADF, F8UE, VK3ZZ, G3DO, LU9BV, VK3LA, T12HP, PK3LC, VK2ABG, VK4WU, KA2JV, KA1TZ, VK3AL, KA7EF, PK1JR, VK3KR, V36AB, KA1ME, VK5GF, VQ4KTB, KA1HS, HO2U, PK1ZZ, PK2WL, XU8HW, ZT2B, J2MI, VK27C.

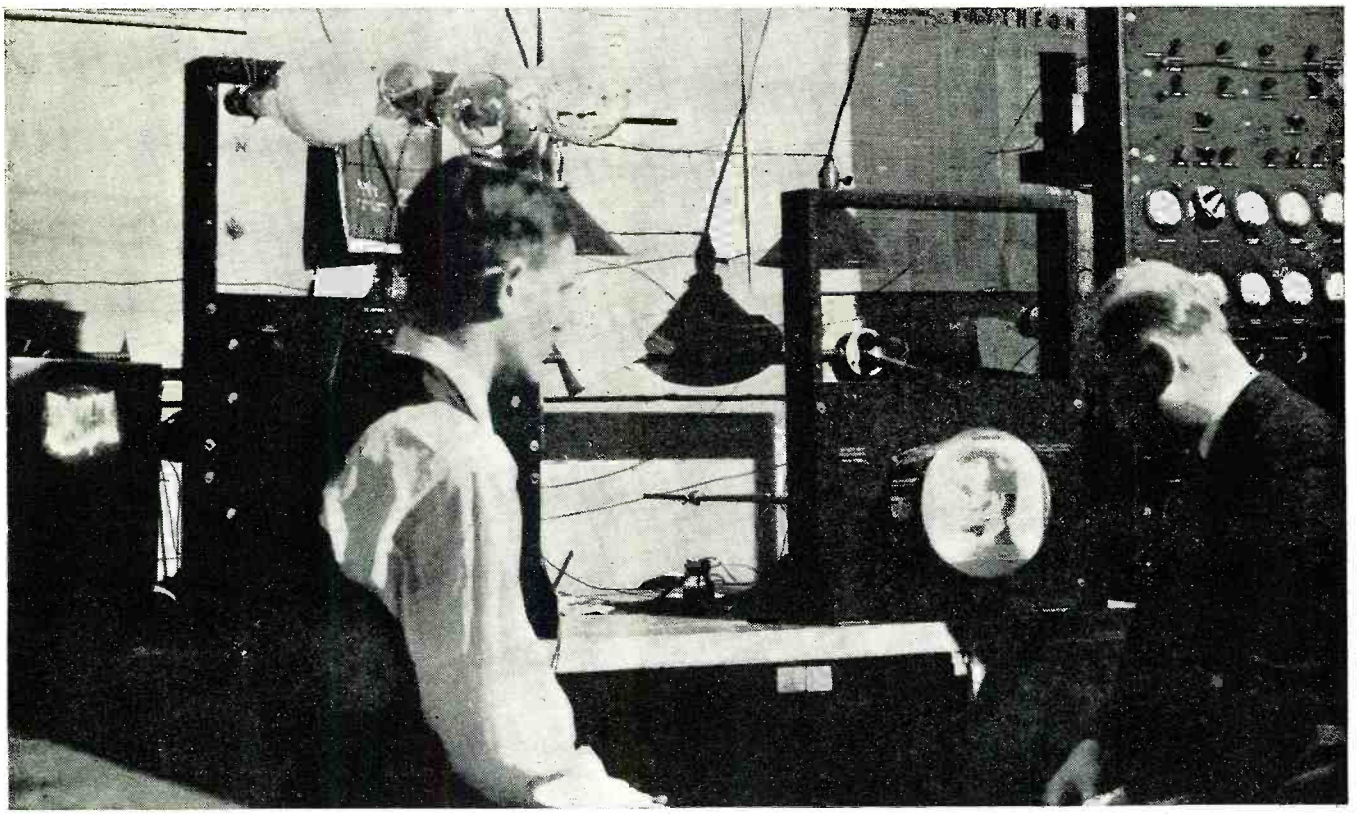
Left to right: John W. Fletcher, K7GTP; Harry Blankenship, K7FOY; Eloda B. Kimm, K7GDL; Chester C. Kimm, K7FBE; Rev. J. Dean King, K7GUD; and Dr. Leslie A. White, K7GCB. The white population of Unalaska numbers fourteen. Six of them, named above, are Hams.

PK1MX, VK6MU, PK4VR, G2PU, KA1MG, G5RV, K4SA, FB8AH, KA1MM, VK3ZB, LU1QA, HS1BJ, VK2VV, PA0BE, VS6AG, G6LK, VK6MW, KA1YL, LU4BH, KA1SL, KA1AP, F18AC, VS2AK, Z52AF, OA4AB, F8XT, OA4AI, G5XT, CE1AH, XU8SG, XE2FY, F8QD, H15X, G2AL, XE2FF, GM2DI, CO2WW, G8MX, VS1AI, and ON4AJ.

There are six licensed hams in Unalaska, but K7FBE has the only first class fone license, so Kimm does a lot of relaying for his friends. He handles a lot of trans-Pacific work: Shanghai to New York, Yokahoma to Los Angeles. Then there is the usual run of stuff between Alaska, Can-

(*Tune to page* 66)

Electricity WRITES



Allen B. DuMont, right, and his chief engineer, Dr. Goldsmith, study a Lincoln image received on a 9" 'scope in the former's laboratory.

by AUSTIN C. LESCABOURA
Croton-on-Hudson, N. Y.

The Cathode Ray Tube is not new, experiments on it being started by J. J. Thompson in 1897. The author describes the tremendous strides which have been made in the uses of this remarkable tube.

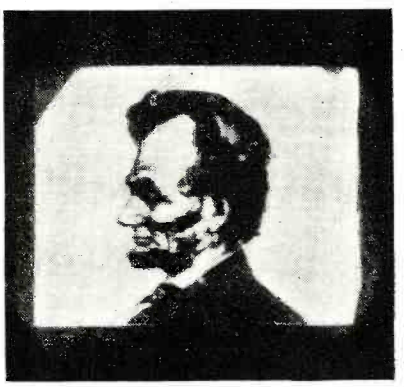
ALADDIN'S wonderful lamp, after some ten or twelve centuries of world-wide publicity, has lost much of its thrill. In the first place, we have in electricity a far more versatile *jinni* than that summoned by Aladdin when he rubbed his famous brass lamp; and secondly, any one of us can now own a wonderful lamp whereby to command electricity to do our bidding. It's no longer such an exclusive proposition, this matter of owning a wonderful lamp, but rather one of knowing how and where to apply electronic tubes of today.

Already commonplace are the wonders wrought by the vacuum tube especially in such fields as radio, public address systems and talking pictures. Industrial uses are somewhat removed from our everyday paths, yet the sorting of coffee beans by photo-electric eyes, the analyzing and comparing of colors and shades, the frisking of jail visitors by etherial hands that instantly sound an alarm if a concealed gun or other weapon is detected, the counting of item passing by a given point, the clocking of auto speeders unbeknownst to them—these and many more electronic jobs have long since lost their novelty. We have come to expect no end of accomplishments from the vacuum tube and its associated devices.

It is when electricity writes its own story, however, that we can still be startled. The Arabian Nights tales do not relate just how good a reporter that *jinni* was. But, working purely on an over-stretched memory going all the way back to childhood reading, it is our modest opinion that the *jinni* never wrote and probably didn't know how to write. Which is precisely where our present-day *jinni* comes in for further commendation; for, using an electronic beam for its pen and brush, and a fluorescent screen for its tablet or canvas, electricity writes, sketches and even paints the story of its activities or findings for its master.

All of which serves to introduce the cathode-ray tube, which has something to offer *every* man, woman and child by way of a better, fuller and more promising life, provided this remarkable device is more generally understood and thereby assigned to more and still more tasks.

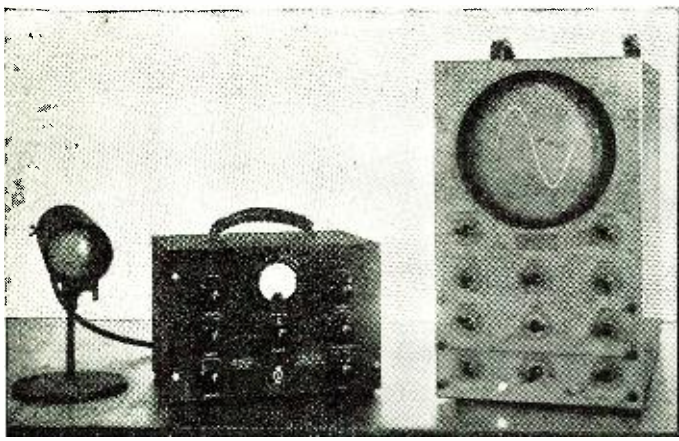
There is nothing intricate about the cathode-ray tube. It is simply an electrical means of sketching images. It converts electrical terms into visual ones. Or to put it another way, it enables us to "see" electricity or any action that can be translated into electrical terms.



Photograph of a Lincoln image actually being received by a cathode ray tube.

The usual cathode-ray tube is a funnel-shaped glass envelope, with a radio tube base at the end of its long neck, and a

T S OWN STORY



At left is a $250, two-piece C-R Tube offered over a dozen years ago. Compare it to the modern one costing the same.

The C-R resonoscope or "pitch standard and comparator" is of inestimable value to musicians in checking the musical pitch.

white screen at its flared end. There are some metal parts within the narrow-neck portion. Nearest the base is a cylinder with a small opening, which we are told is the "gun" that shoots a stream of invisible electrons against the screen of fluorescent salts at the far or flared end. Electrons, you know, are infinitesimal particles of electrically-charged matter, in this case a sort of vapor given off by the heated filament or cathode within the "gun," just as boiling water gives off steam. The electrons are simply jerked out of the "gun" and hurled at tremendous velocity against the screen. The fluorescent salts glow vividly when struck by the electronic stream. So far, then, we have a glowing spot of light appearing on the fluorescent screen, where the electronic stream strikes.

The next step is to control the size and sharpness of the "spot" on the screen. This is done by a second cylinder or focusing electrode. A third step is to shift that spot of light about the screen, in accordance with controlling influences, thereby obtaining a pattern or image for the graphic story. Two sets of metal plates positioned at right angles to each other, known as the deflecting plates, serve to control the shifting of the beam and consequently varying electrical charges which have an immediate effect on the highly responsive electronic beam, just as a stream of water from a hose might be deflected by introducing one's hand or other object in the stream. The deflector plates make use of the *electrostatic* method of deflection. Sometimes coils of wire are placed about the outside neck of the cathode-ray tube, also to deflect the electronic beam, in which event we have the *electromagnetic* deflection means.

That's about all there is to the basic idea. The electronic beam is shot at the screen and causes a spot of vivid light. Thanks to the sluggishnes of human sight, any rapid shifting of the spot gives rise to a streak or line, so that we have patterns instead of successive dots for any rapid gyrations of the electronic beam.

The fluorescent screen may have a fast or slow "decay" rate. In other words, its glow may disappear almost as soon as the electronic beam shifts to another position, thereby giving an instantaneous picture of the phenomenon being studied; or with a slow decay rate, the pattern may remain long after the electronic beam has swept over the screen. The quick decay screen is suitable for studying recurrent phenomena, whereby the pattern is traced over and over again, with slightest deviations made apparent. The slow decay screen comes in handy in studying transient phenomena, wherein, as quick as a flash, the electron beam registers the graphic story which remains for seconds and even a minute or more on the screen, slowly fading away. Meanwhile, of course, a photograph may be made of the screen pattern for further study.

The cathode-ray principle is an old story, dating back several decades, beginning with the experiments of J. J. Thompson in 1897 when he first discovered the true nature of the electron, aided by the efforts of Braun.

For years, the cathode-ray tube had been employed in a few favored laboratories for the study of electrical phenomena. The handful of tubes then in use were generally impractical, costly, and short-lived. The average life was under 25 hours; the cost, several hundred dollars. Yet the information made available through the use of a cathode-ray tube was so valuable that the better-equipped laboratories did not hesitate to use such equipment, quite regardless of cost and trouble.

Awe-inspiring as the cathode-ray tube may have been to its handful of early users, it was, in the eyes of a young radio engineer, simply a glorified vacuum tube capable of much the same mass-production methods and resultant price reduction which made radio entertainment a household institution. Allen B. DuMont was then in his late twenties. DuMont had already won outstanding fame in the radio-tube field. Following his graduation with a degree in electrical engineering, from Rensselear Polytechnic Institute, he had joined the Westinghouse Lamp Company first in the capacity of engineer in the development laboratory, and later in charge of production on various types of radio receiving tubes. While with the Westinghouse organization he applied for ten patents covering improvements on tubes and tube-production equipment. One of these patents on a high-speed automatic season-

(*Follow the ray to page* 65)

Various patterns drawn by a Cathode-Ray.

440 cycle or middle A tuning fork tone, devoid of harmonics.

392 cycle or middle G, sounded by a soft tone on a bugle. Minimum harmonics.

392 cycles, middle G, produced by single reed of an accordion. Note many harmonics.

329.6 cycles or middle E, produced by silver flute. Practically a pure wave form.

392.6 cycles or middle D, produced by the D violin string with first finger in position.

329.6 cycles as produced by a C melody saxophone. This instrument combines vibrating reed: tuned resonant chamber.

THE NATIONAL QSO PAGE

A WISE man once said, "There are none so blind as those who *will* not see." The truth of that proverb has already been demonstrated many times over since we started in to open the eyes of the amateurs to their plight, and the emasculation of their League.

One radio club succinctly informed us that they did not wish to offer RADIO NEWS subscriptions as prizes at their club meeting because our editorial policies were at variance with those of *QST* and the ARRL.

Whom were they punishing?

Us?

No, themselves! Did they think that by refusing to have their members receive a RADIO NEWS subscription as a prize (and only three per meeting in a club of over 200), that they would thereby change the situation one iota? Just because you refuse to read of the market crash in 1929, or that Franklin D. Roosevelt was elected by the greatest majority ever, does not alter the facts of these occurrences.

This same club prides itself on being "advanced" and "for the ham" and a member of the ARRL. Is it doing justice to any one of those three statements? Can it really say that it is advanced when it tries to censor the reading matter of its members to the extent of prohibiting the inclusion of RN among its prizes? What can be thought of a club that says it is "for the ham" if it refuses even to read or listen to the other fellow? How can such a body know that it has ALL the facts, or the entire situation in hand, unless it has BOTH sides?

We have received many letters, several hundreds in fact, and some of them are characterized by the same refrain. That is: "I won't read about your slurs against the ARRL."

"Fine," we say, "to have such loyalty to the League." But is that person doing the best he can for ham radio? Is he well informed on what goes on? We think not. Yet that is the very thing he should be.

We have it on excellent authority that

Joel Davis, 4 years old, who although not able to read or write, is an ARRL member.

QST, by order of the Directors will not publish any controversial matters in its pages. This means that not one word of criticism, not one word of rebuke, not one word of inquiry, not one word of answer will appear for the ham's edification.

Will this serve to *change* the ham situation?. Will this serve to help the U. S. Hams realize that the final "30" is about to be signed on his operations?

Carrying this sort of thing still further, and in a desperate attempt to keep the ham membership ignorant of what is going on, the HQ bunch have decreed that they will take no notice of the storm that is brewing . . . that they will try and squelch this *National QSO Page* with silence.

But is that the real truth? *Have they any answer to any of the accusations that have been laid at their door-step?* And it is refreshing to note, that in spite of the ARRL Edict, many of their own members have written and commended us on our fight, have written asking for information, have alleged that they want to help and want to fight to make the League a representative body.

There will always be a few serious thinking hams who, while skeptical, will want at least to hear both sides, will want to have the entire thing laid open. It is that type of ham that the revered Hiram Percy Maxim was. What has happened? Maxim must be turning over in his grave when he sees that his League is "taken for a ride" by the foreign powers, that it is run without giving the ham information on subjects vital to the very existence of his hobby.

The thing nowadays seems to be to get as much as you can and keep the people as ignorant of true conditions as you can. If someone tries to do something to dispel this type of cloak, then you simply ignore him, or else you order that he not be answered. In due time the opposition will wear itself out. and you will reign supreme again. There is hope in some quarters that this fight will go just that way. Don't you believe it! RADIO NEWS is in this to stay. And it is in it to keep up the fight until the ham's eyes are opened to the true situation and he tells the HQ bunch what he wants and gets action.

Have you had your irony today? Well, bunch, think this one over. How is it that the ARRL had a surplus of $109,000.00 in December, 1936, pays annual salaries to its officers and executives of over $51,600.00, and paid out $18,000.00 for a ham station which it is the privilege of a very, very few to operate, AND YET ONLY REPORTED PAYING OUT TEN DOLLARS FOR INFLUENCING LEGISLATION?

How does this stack up with a TAX-PAYING radio network which must pay taxes on over $12,000,000.00 in six months? There the ARRL is, with money in the bank, huge salaries being paid, erecting the most expensive type of ham station, and yet it spent less than what it costs us to buy a good second hand Class B transformer for the very thing that it should have spent the most on? Meanwhile others who are intent on stealing the bands away from the hams spend thousands to gain their ends at our expense. Who's asleep at the switch?

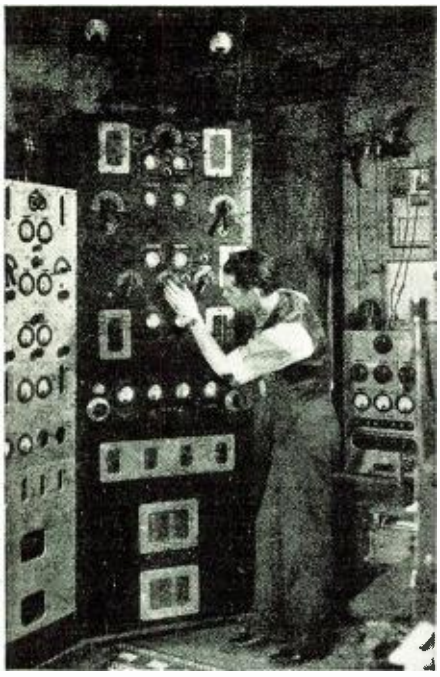
Naturally the ARRL position must be weak. They do not support our government with taxes, is it small wonder that it does not give them more than a passing glance. Meanwhile the commercials *do* pay taxes and heavy ones at that. Since taxes are what makes the wheels go round, doesn't it seem reasonable that they ought to do their share, and in return acquire the benefits from their being a tax payer?

In addition to that, who are licensed members of the League? How many can read and write? How many are *able* to understand what it is all about? And how many have been refused membership who *should* be in the ARRL? What league would have any power at all if it is unable to break down its membership and make it public, so that all and sundry may know *who* it is that is seeking the assistance of the Government?

And there you have it. Look at the picture of Master Joel Davis, aged 4, who can neither read nor write. He does not know a condenser from a ping-pong paddle. *Yet he is a full fledged member of the ARRL!*

True it is that Joe, aged 4, cannot vote in the League. But in going before the FCC he *is* counted as one of the members on whose behalf requests are made. Is it small wonder that the FCC and the foreign powers think so little of the League? Look at the other picture, it is that of Harry Harrison, W9LLX, a full fledged ham. W9LLX is an engineer of note, a serviceman, and an author. Yet he was refused membership in the ARRL because he did not want to receive *QST.* Joel, aged 4, who had no desire to join the ARRL, asked for no membership, finds an ARRL certificate and membership foisted on him, while Harry, W9LLX, is refused because he did *not* want *QST,* but DID want to become a member of the League. Something is vitally wrong with the picture somewhere.

And so it goes. From trying to keep those of its members in the dark as to what is the true status of the situation, to admitting kids aged 4 to membership in the ARRL; our League needs a cleaning up. There is machinery for just that sort of thing. It must be used by the members themselves. There is no need for a revolution in the ranks, no overthrow of the system, no amendment to the League Constitution. What is needed is the election of some real he-men Directors who will try and promote the interests of the ham, not for those who have a financial interest, but



W9LLX who was refused membership in ARRL because he did not want to take its QST.

for those who painstakingly pay their dues each and every year, and who for a number of years have received little other than a magazine for their money.

Once more we urge all who are not presently members, join the League. Once inside, get busy. Write your director and see how much of what goes on he knows; and what—if anything—he proposes to do about it. If he appears wishy-washy then throw him out—impeach him if you have to—but GET YOURSELF A REAL DIRECTOR WHO CAN, AND ABOVE ALL, WHO WILL, FIGHT!—The Editors.

CORRESPONDENCE

DEMANDS OUR PLATFORM

Dear Sirs:

Instead of flooding your subscribers with "parrot talk" coming from your inexperienced staff, why don't you "get off the dime" and go to work and outline your own program for protecting the amateur, or select prominent Amateur operators to form a board under your sponsorship? Open Forums can do no good unless there are leaders to advance ideas through the presentation of new material. We amateurs cannot afford to run around like chickens with their heads off; we must act sensibly and cooperate, *especially* with the regime now in command. Best 73.

(Sgd) STANLEY R. RADOM,
W6KBY-MXZ; WAC, ex-OBS & ORS.

Right you are, W6KBY! There are several reasons why we cannot do everything you suggest at this time. Firstly we have been unsuccessful in obtaining the services of any so-called prominent amateurs to form a board. Whether this is due to the fact that there are none with sufficient courage to "stick their necks out" or not we do not know. But we do know that for the most part the ham fraternity is so phlegmatic that it is nigh onto impossible to rouse them from their smug complacency. We DO need leaders, but the attitude seems to be, "Aw, who cares! Let George do it!" This attitude is what we have been fighting and must continue to fight.

On the other score we are afraid that you have not been following the magazine very carefully. The following *has been* advocated up to date.

(1) The establishment of the League on a tax paying basis, so that it will be in a position to
(2) Employ the services of the best possible "lobbyist" in Washington to keep the ham story before the houses of Congress and the FCC.
(3) The opening of the columns of QST to controversial matters pertaining to the League and its management, and the lifting of the presently imposed censorship by the Directors.
(4) The investigation of the possibility of obtaining more space in the frequency spectrum by conferences with the FCC and others, the former of which is only possible if the suggestion under (1) and (2) is accomplished.
(5) The election of new and better Directors where by their records the present ones have shown an inaptitude to accomplish anything, including the impeachment of the "weak sisters," where indicated by their respective records.
(6) The "cleaning house" in the HQ staff so that certain matters presently improperly being done, such as the payment of salary to an employee who has been absent over a year instead of having him covered by insurance, shall be rectified; and that the meetings of the Board shall be held in accordance with the Constitution and regularly recognized Parliamentary Procedure.
(7) The summary dismissal from the Board of all Directors not legally qualified to act under the League Constitution.
(8) The amendment to the Constitution permitting any licensed ham to join the League by the payment of small dues if he does NOT want to receive QST.
(9) The curbing of expenditures of the membership's money for those things which cannot possibly be enjoyed by the majority or a great part of that membership.
(10) That the amateur fraternity awake to the real situation which should be made public by the A.R.R.L., and with that awakening the greater interest be shown by the ham in his League and the preservation of his hobby.
(11) The restriction of membership in the League so that not any Tom, Dick or Harry can join.
(12) The publishing of the number of amateurs actually members of the League, so that when we do go to the FCC or Washington, and having acted favorably to suggestions (1), (2), (8), and (11), we will have sufficient power to accomplish something for the expansion and preservation of the ham's hobby.

We hope, W6KBY, that you will agree that this is an ambitious program. Certainly it is not a selfish one from our standpoint. We invite not only your comments on the platform (which will be expanded from month to month), but the suggestions of anyone else. We would be pleased to have any amateurs who are desirous of acting on a Board of Suggestion, to communicate with us.—The Editors.

WHAT AN ENGLISHMAN THINKS OF U. S. HAMS

. . . For example the loss of general message transmission of third party messages to Countries outside the Americas is lamented by a contributor in the August *National QSO Page*. Now any reasonable minded person will agree that the handling of third party messages must be open to many abuses and encourage the spread of sham amateurs (*i. e.* Semi-professionals competing with Professional Cable Services, etc.) and as a rule messages can be handled faster and more efficiently by the Cable & Wireless Companies. Therefore the loss of this privilege could only be expected, especially in view of the fact that *outside America most of the big powers have vested all communications services in the hands of the Post Office or other Government Department.*

The Ham's right to occupy his present frequencies in America is based on (1) Assistance in emergencies, (2) A reserve of potential operators in the event of War, (3) For serious experimenting. Now outside America item one cannot usually be undertaken by an amateur, and few hams have the apparatus, time, or knowledge for serious experimenting. It is small wonder that other essential services wish to expand into the ham bands. The best thing that can be done for the hams everywhere is to endeavor to retain as much of the present bands as possible and *be prepared to have to compromise.* Expansion of the present bands *is extremely unlikely and must inevitably be a waste of effort.* After all, why should the bands be enlarged just to enable this sort of things to go on, "Your sig R9 plus here am using a super XYZ receiver, etc. please QSL 73's."

Many other services can make out a better case such as additional space for air lines. Therefore the best way to obtain more room is to go down still further and obtain general permission to use 2½, 1¼ and ¾ meter bands. . . . (We already have it. Ed.)

This I consider essential if the ham is to keep up with radio and not be left behind in the general advancement. Don't think that I am anti-ham because I am all for it, but it always seems to me that in the States the ham seems to think that there is no other side to the question and *to exaggerate his own usefulness.* I have therefore tried to point out how other people look at them.

Judging from the recent report in *QST* on the Cairo Conference, I think the ARRL did the best they could under the circumstances. (All italics ours. Ed.)

(sgd.) K. N. Oliver, Guilford, England.

There, gentlemen of the ham fraternity, you have it! It would seem that we will really have to fight the War of Independence all over again—at least in behalf of the U. S. hams! What we need is a George Washington . . . and quickly too! So we think in our smug self-satisfied way that they don't mean business over there? They want the ham frequencies for air lines! Air lines, indeed. For propaganda. That's what they want 'em for . . . for un-American propaganda! Are we going to take this sort of thing lying down? Is there not one red blooded American ham who will "go to town" on this?

Once more RADIO NEWS takes the pains to point out to the American ham that he stands alone—all alone—in the

furthering of his hobby! We are about to lose it! Unless we get busy and force the League to "get going," Mr. Warner's prophesy (Radio News, Aug. 1938, p. 36) will come true and after 1942 there will be nothing for us below 30MC!

Let us analyze the letter of Mr. Oliver. Piece by piece it has the stigma of the person who is opposed to the American way of doing things. He bewails that the European ham has neither the time nor the apparatus to do "serious" experimenting. Therefore the U. S. Ham, *who has the time and instruments,* should be shoved off the air. That is the attitude of our European friends for whom *we* were the pioneers in pointing out the benefits of the game of ham radio. Surely that is the snake biting the hand that fed it!

Mr. Oliver mentions a "semi-professional" and a "sham amateur." What are these? We don't know. But if the foreigners think that we have "Semi-professional and "sham Hams," then our League—the mouthpiece of the American Fraternity—has indeed done a poor job of putting them wise to our term of "Radio Amateur." We believe that we know what Mr. Oliver means. That is this. In England, power of 1 kw is not permitted, but many of their *professional* stations have that power. Therefore any U. S. Ham with a power input of 1 kw is a "semi-professional." Nothing could be further from the truth.

Why should we compromise with the non-American countries? They only want our frequencies for the disseminating of propaganda, the expanding of their revolutionary ideas and 'isms, and the cutting down of the military efficiency of our great and glorious country. They figure—and we have it on excellent authority—that by shoving the U. S. Ham above 30mc (below 10 meters) that the development of radio in the 160, 80, 40, and 20 meter bands will be halted and therefore the military value of these bands will be impaired for our Army and Navy. This is based on their theory that the hams have consistently done more in the developing of a band than any commercial agency. They believe that: it was the hams who discovered the skip effect—at least how to make practical use of it; it is the hams who are devising the use of directional antennae, etc. They theorize further that if the use of the bands is denied, the development of the radio in those bands will be halted. That is the theory of the foreigner. In addition they are thoroughly familar with the fact that we so jam the bands that they cannot hope to put any kind of broadcast (propaganda) signal through. That annoys them also.

What it all boils down to is this. We cannot expect any further help from any foreign country in the "Fight for the Ham Bands of 1942." We must stand alone in the demands for our frequencies.

Unless the ARRL immediately puts itself into a position of force with respect to pushing the demands of the Hams at Washington, the *Powers That Be* at the seat of our government will not feel obligated in any respect to further our demands at the coming conference. Much less will they feel that we deserve any consideration at all if we do not fight here, at home, for that which we want them to fight for us abroad.

To help that fight, join the League! Elect fighting directors! **AND ABOVE ALL SEE TO IT THAT YOU GET ACTION.**—The Editors.

A RADIOSTRICH WRITES

Dear Sirs:

Your recently very obvious editorial policy in regard to the ARRL is the greatest collection of rotten, cheap, punk, low-down slurs I have ever had the misfortune to read.

. . . You should keep your prying nose out of what is none of your business.

I used to like Radio News. Now I hate it. It smells.

(Sgd.) Arthur F. Schoenfun,
Arr's Island, Maine.

Tsk, tsk, tsk! Do watch your blood pressure, Mr. Schoenfun! Hi!

Seriously, though, are you a licensed ham? Are you a member of the ARRL? Or are you a "Radiostrich"?

A *Radiostrich* is a person who either is or is not a member of the ARRL and who professes a real interest in ham radio, but buries his head in the sand and says, "I can't see anything wrong with anything about the hams!" And a "Radiostrich" never votes for a director, never inquires into what is being done for him nor against him, does not know what is going on anywhere, much less in his own League.

We deem it our very important business to open the ham's eyes to what the powers, foreign and otherwise, are trying to do in the way of taking from him his frequencies. We think it is very much our business to stir up the hams into demanding and getting action from their ARRL. We surely cannot see that there is anything wrong, prying, or rotten in getting those hams who are members of the ARRL to vote for a good director, an active director. We would be most happy if the hams will just go and vote no matter for whom . . . so long as they go to their respective polls and vote in great numbers. Above all, we think that it is every ham's business to see that he retains his hobby.

It is the very type of energy that inspires Mr. Schoenfun to write his vituperative letter that we are trying to corral into DOING something constructive *for* the ham. Surely it were better to devote the same time it takes to write us this type of letter to writing us a constructive thought for the preservation and expansion of our ham bands which are being so avidly sought by the Non-Amateur Powers.—The Editors.

ANOTHER LEAGUE?

Dear Sirs:

I want to say that if anyone will lead the way to get our frequencies back, I'm right behind him and I know I won't be alone. All that is needed is a leader and the hams, I am sure, will back him up. If our dear old ARRL which is now supposed to be our leader can't do the job, then let's get someone who can. I know many hams that would welcome another organization that would represent them.

What I am driving at is this. The hams do want an organization that is *for* ham radio . . . Either let the ARRL change its ways or else let's get someone who can do things the way we want them done.

(Sgd.) Arthur F. Eichorn, Sr.,
W6LBB (ex-K6LBB).

At present there is not any need for another league for the ham. If the membership will take its elective franchise seriously, and place only the best *men* in as Directors (and not their best friends, Hi!) then the League will become the logical leader. What we need is more members in the League, as long as they are fighting members, and they will demand ACTION as well as an accounting from their Directors.—The Editors.

HE IS FOR BETTER DIRECTORS

Dear Sirs:

The League is neither wholly right nor wholly wrong. It, however, is our League and whatever is wrong with it we hams have it in our power to correct. My personal observation of a Board meeting indicated what is more wrong than anything else. In order to demonstrate clearly what I mean I will describe what took place.

At the Board meeting in 1935 owing to pressure by some of the Western Directors, Warner and Segal were severely criticized and were told that their services would not be needed at Cairo. At the 1936 meeting, when the time came to nominate representatives to Cairo there was read a list of names, which included the names of several employees of the F.C.C. and the names of a number of men connected with the large commercial radio interests very few of whom were hams. Neither Warner nor Segal were included. By a short discussion the names which had been suggested were soon eliminated.

At this point Mr. Segal arose and addressed the meeting for slightly over forty-five minutes. His subject was K. B. Warner. His words were direct and to the point. Every word was well considered and no ham had he been there would have misunderstood Mr. Segal. What he said, briefly was that the League could find no one else so well qualified for the Cairo job as K. B. Warner. And Gentlemen! That still is a fact. No one knows more about our problem or could have done a better job for us at Cairo. After Mr. Segal sat down what happened? Only a year before there had been serious objection to Mr. Warner. If there had been any foundation of fact upon which the objection had been based, one year could not have changed the facts. However, when the proposal was put to a vote after Mr. Segal sat down there was no discussion by any director present. K. B. Warner was nominated for Cairo and a few minutes later Segal was nominated as counsel to assist Warner.

Gentlemen, if anything was wrong at that meeting it could only have been your directors. Such an important decision made without discussion, especially when the previous year's action had been exactly opposite, seems almost impossible.

And if your directors are wrong who sends the wrong men? You are responsible, but you say, you did not vote for your present director. If you didn't vote for him why didn't you vote against him? Records show that in many divisions only one-fourth the members of the League vote in a Director election.

The non-voters who are League members and the non-members of the League are the ones who cry loud and long that the hams have lost everything and blame Warner and Segal. *Wake up,*

fellows, do your part, get your fellow hams in the League and vote for directors when there is an election. (Italics ours. Ed.) Make the League what you want it to be. No new organization of hams could possibly gain the prestige the League has between now and the Rome convention.

Petitions to the F.C.C. and Congress are wasted effort. *(They have proved otherwise.*—Ed.) Your Congressman and mine has too many other things of far greater importance on his mind to permit him to spend much of his time or his thought on a petition signed by 20, 70, 150, or even 1,000 of his constituents. Even the unemployed in his district outnumber these figures. Most of them have to deal with tens of thousands of people and millions of dollars.

In addition petitions have a decidedly bad effect. It indicates an unwillingness on the part of the hams to cooperate for the common good. Petitions during the last few years have been unsuccessful and have brought no gain to the petitioners unless it was their wish to destroy the hard earned position which the League had attained.

Reference has been made to our losses at Cairo. We lost the exclusive use of some frequencies but no frequencies. Ham radio would have taken a far greater licking than it did, had it not been for the support of the entire American Delegation and especially that of Lt. E. K. Jett, Chief Engineer of the F.C.C. Could an act of our Congress have given us more support? Who earned this support for us? Warner and Segal? Yes, to some degree! But the most of our support came from a recognition of our past performances during storms, floods.

Too many of our hams fail to recognize that we have to justify our use of the ham bands. Radio frequencies are a part of the public domain. The discoverer of a new continent usually gets a substantial grant of the new land. We hams too got a grant of the frequencies a few of our number discovered. The one who gets a grant of the puhlic domain has to pay taxes on his part when the country is developed. We too must pay "taxes" on our frequencies by rendering service whenever opportunity presents itself. How many hams are prepared so to serve? How many put forth a little extra effort in order to have a radio station that will not fail under such adverse conditions as are present during emergencies? Our service to the public from now until the Rome convention will determine whether we get the continued support of the American Delegation or whether we fight our battle alone.

Even with the support of the American Delegation we may lose more frequencies at Rome. Should we lose an entire band, consider how much less will be our loss than the loss of liberties which have been the lot of the millions of Europeans in the Dictator countries. It is fortunate for us indeed that the influence of the dictators can only reach us through our hobby. By this statement I do not infer that we should willingly give up frequencies, but what I do mean is that when we are forced to lose frequencies, having had the entire American Delegation behind us, let us not be such big fools as to believe or say that had we had a different man on the job at Cairo we would have done any better. Let's begin now to make ourselves so important to our fellow citizens that the entire American Delegation will again be our representatives at Rome.

(Sgd.) Roy C. Corderman,
W3ZD-WLMD, ARRL Emergency
Coordinator, Wash., D. C. Area.

For the most part, W3ZD is right. He recognizes that only by electing the proper type of director, can the League function with any strength. That is what the Editors have been saying all along.

One thing we fail to understand. How is it that the counsel, who should only be heard on legal policies of the League, or to explain some legal point in the discussion, can take up 45 minutes in a personal bombast for a personal friend? Why didn't the Directors call for a "point of order" and show that the venerable counsel was "out of order"? Perhaps the counsel figures that he has the same voice as that of an elected Director. If that is so, then it is up to the membership through their duly *elected* Directors to see that this sort of thing is stopped. At least the League should be managed by elected Directors, not appointed persons.—The Editors.

FAVORS ARRL HOUSECLEANING

Dear Sirs:

Aside from appearing as the private corporation of K. B. W., QST seems to use the ARRL as a source of revenue and as a circulation builder to gain more revenue.

The ARRL is operating under cover of QST which is an amateur radio publication. The League is an organization of amateurs. Amateur radio to my way of thinking is made up only of persons interested in the transmission and reception of signals of other amateurs. Only radio amateurs are interested in amateur radio and therefore the ARRL should be made up only of such persons . . . licensed amateurs. A license indicates interest. Such persons are the only ones fully acquainted with their problems and possible solutions. Since it is an organization it can readily have this qualification without being considered discriminatory. If other than those amateur radio operators desire to purchase the magazine for what technical articles it may contain that is their privilege and the League's benefit.

The officers of the League should be radio amateurs before they are elected to office, and not take out a license afterward . . . to ease their conscience or that of the person hiring them. This rule should apply to all personnel working for the League, unless such person need be such a specialist that he cannot be found in the ranks of hamdom. When a new job is open it should be advertised in QST. Why not give benefit to those who make the League possible? The little fellow who subscribes and pays his $2.50 a year is not given all the attention due him. Yet he, and all his brother hams, are the ones who make possible the good jobs for the chosen few (How have they been chosen?); because, by the large circulation of the magazine among the fraternity, advertising is made easier, more abundant and more profitable.

No doubt in its early days the location of the League HQ. was a good one. Now the scene is changed. Hams are all over the country. HQ. should be centrally located to serve and to cut down operating expenses. Closer contact could be kept with all and radio could be made the means. It would not be a difficult job to cover the United States from a central location. Also in the Middle West the hired-hands could be drawn from all sections. The infusion of new blood would put pep into the organization which is continuously losing ground for the amateur . . . his ground . . . Kcs . . . though perhaps gaining in circulation and other commercial ways but that, to no benefit of the amateur of the ranks. The self-satisfaction which is impressed upon the radio amateur of the ranks by the editorials of QST is proving more disastrous each time the League represents amateurs at a world conference.

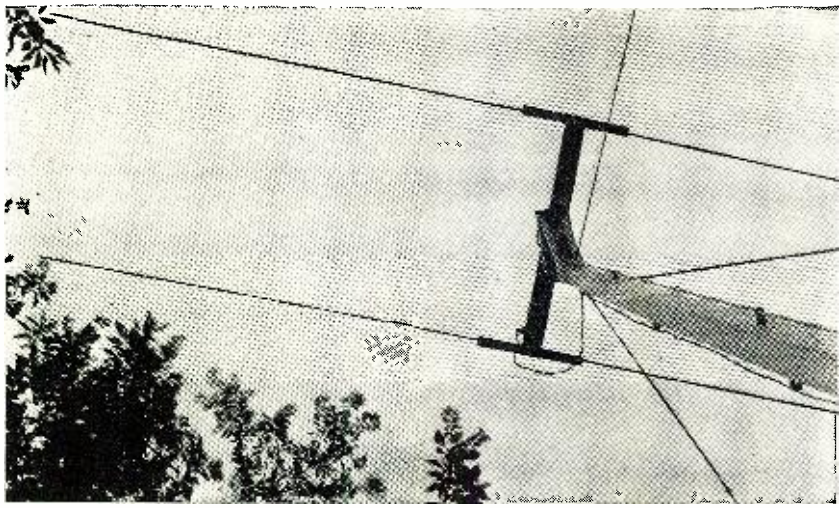
Recently it came to light that the League is a tax exempt unit. This indubitably takes away from the League much more than it can hope to gain in a financial way. Can this be a reason for our losing Kcs.? The counsel employed by the League was at the time and for a portion of the time of the Cairo Conference under suspension by the F.C.C. Yet he attended the conference and this conference was attended by representatives of the F.C.C. Does this promote confidence in our organization? It surely wouldn't were I a member of the F.C.C. (Dates can be checked in Broadcasting . . . Dec. Jan.—note.)

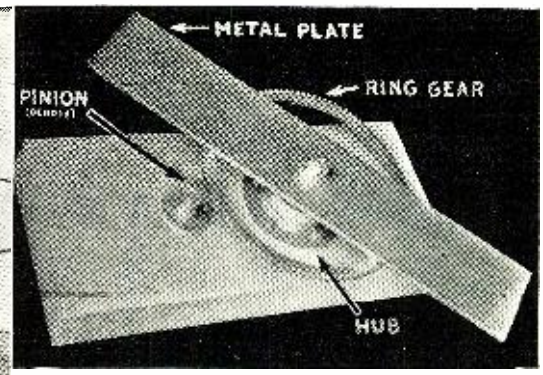
Frequencies are important to the amateur. Yet when we lose them there are no real explanations forthcoming. A sort of indifference is thrown our way, perhaps a shoulder shrug with the words, "We've done it before . . . pull in your transmitters, boys." It amounts to a dictator telling the populace to pull in their belts if they are hungry. You can be sure he's not and you can be sure all amateurs cannot have the benefit of the latest technical equipment to get them through all the QRM created by a lack of the necessary Kcs. I never got the benefit of operation in the days of the wide bands . . . but I remember listening on them and to the lack of QRM. DX and anything else could have been worked with enjoyment. But what I can't understand is why with all the "empty-holes" in the realm of the Kcs. they pick on the ham. Allowing Europe to use some of our 7000 kc. band, means that much less. What ham can work over or under one of those plenty-K. W. outfits beamed this way . . . it can't be done. You know what it's like on twenty when under some ham phone . . . it'll be worse on forty. And if we keep pulling in the edges of the bands each year it won't be long and we'll be pulled off completely . . . by r e q u e s t . . . and very soon.

(Sgd.) Arnold King, Jr., W2JJC.

Thank you for the letter, W2JJC. What we need most of all is ACTION on the part of the ham fraternity if the League and the ham frequencies are to survive. When your Director comes up for re-election, weigh his ACTIONS at the Board meetings, and if he did not come up to scratch, then do NOT return him. Pick a wide awake, keen, understanding and ambitious man for your director. Especially, pick one who will follow the dictates of his constituents and clean up the situation and push the hams' fight at Washington. —The Editors.

(*Continue the fight on page* 64)





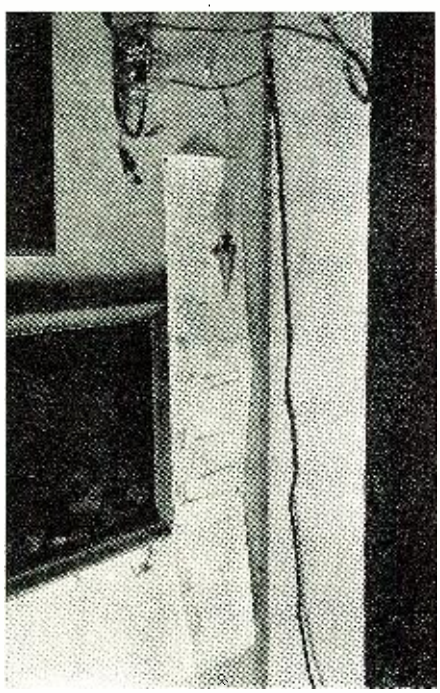
An old auto flywheel ring gear engaged by a Bendix starter gear turns the antenna.

The motor-driven array proved itself more useful in receiving than in transmitting.

Motor-Driven Antenna

by ROWLAND J. LONG, W9NLP
as told to Tom Gooteé, NBC Field Engineer, Chicago, Ill.

The amateurs are finally awakening to the fact that most of the signal power comes from a proper antenna. With a director system described here a power gain of 4 may be expected.



A plumb-bob indicates the direction of the beam. The gadget is absolutely fool-proof.

MANY hams are located in large cities and in congested districts where a very limited space is available for the erection of antennas. The development of the close-spaced array greatly simplified the problems of these hams, since antennas of the reflector radiator type are often too bulky for some locations. I had been operating in a QRA of limited space, using the doublet type of antenna, when I decided to experiment with a rotary beam antenna using a close-spaced array. My chief problem was to develop an efficient method of rotating the antenna, and to cut down the heavy cost of similar special factory-made equipment. I designed this rotating equipment for my own particular need, but the entire assembly can be used for mounting close-spaced antennas of either the director-radiator doublet type or the 8-JK beam type. I have been using this rotating beam antenna for some time, and find it to be very practical and efficient. It has an extreme degree of selectivity making it very adaptable for receiving purposes.

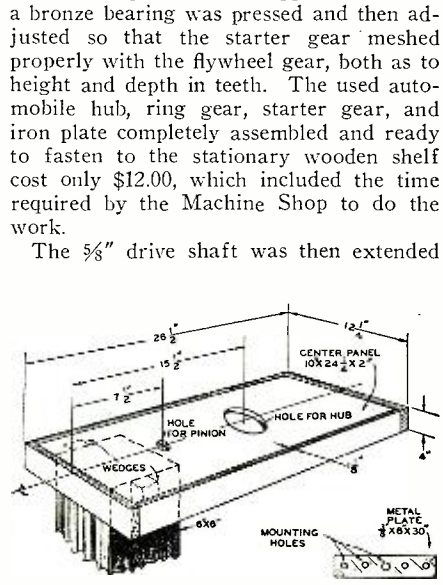
The rotating equipment consists of two principal parts, the fixed main pole and the top movable "header" on which the antenna rods are mounted. The "header" revolves on the wooden shelf plate mounted at the top of the main pole, and is driven by a motor and gear assembly located in the radio shack. The main pole and the "header" can be constructed separately, making the assembly of small parts comparatively simple. The entire antenna and rotating equipment should be completely assembled on the ground before permanently mounting.

For the main pole I used a forty foot 6" x 6". This pole was later mounted five feet in the ground, placing the antenna array rods the usual one-half wave above ground. The wooden support shelf 10" x 24½" x 2" was permanently mounted at the top of the main pole. The hub of a front automobile wheel (the wooden spoke type) was then set in the top center of the shelf. I decided on this type of hub rotator because of the two roller bearings which are spaced approximately six inches apart resulting in a strong rotating support for the movable top element.

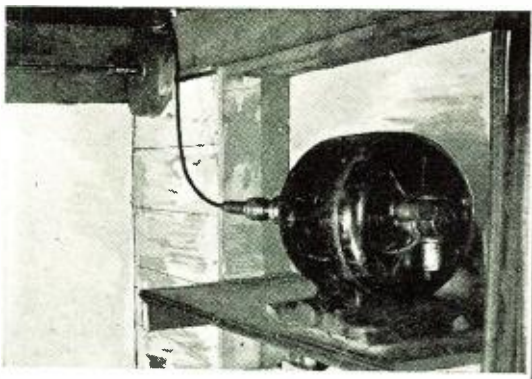
The surface of the axle (at the point where the "king pin" fastens to the shaft) was milled off, and to this an iron plate ⅜" x 6" x 31" was securely fastened. A 14 inch gear flywheel replacement ring was then bolted to the iron plate. It was quite a tedious job to find the exact center before drilling. This gear ring was also attached to the steel plate above it for aligning the gear teeth.

A ⅝" drive shaft is used to turn a small gear which meshes with the large 14 inch flywheel gear. This drive shaft goes through the stationary wooden plate, and a Bendix starter gear was attached to this drive shaft by setting in a support bearing. This bearing support consisted of a 1" pipe flange and close nipple into which a bronze bearing was pressed and then adjusted so that the starter gear meshed properly with the flywheel gear, both as to height and depth in teeth. The used automobile hub, ring gear, starter gear, and iron plate completely assembled and ready to fasten to the stationary wooden shelf cost only $12.00, which included the time required by the Machine Shop to do the work.

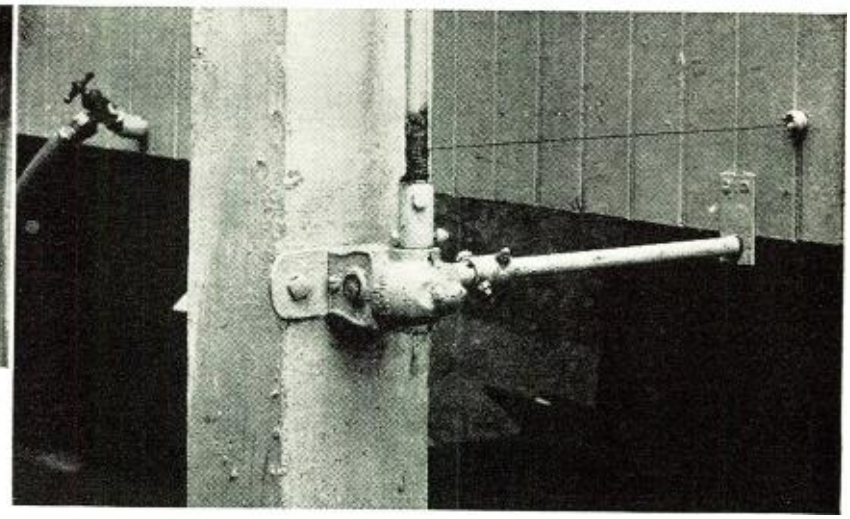
The ⅝" drive shaft was then extended



Constructional details of the header.

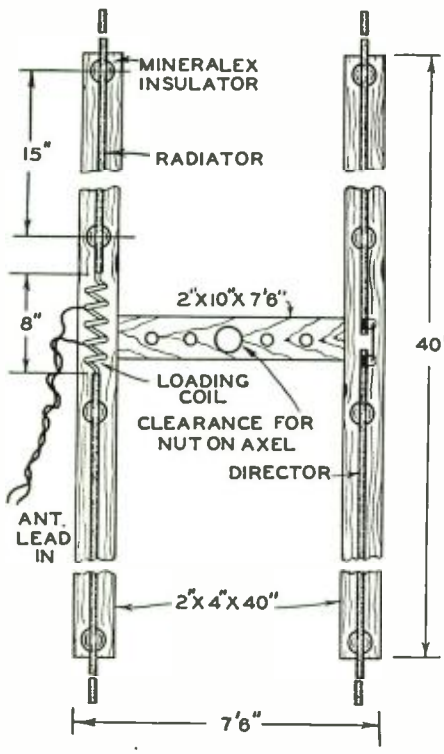


The motor turns the array by means of a flexible coupling to a gear box. One-half HP is sufficient.



Ordinary awning gear boxes are used to turn the corner and to give the proper driving turn ratio.

down one side of the main pole, supported about 1½" away from the pole by means of small angle iron brackets. At about three feet above the ground surface the drive shaft changes direction and enters the shack. To make this turn I used an awning right-angle gear box which had a ratio of about ten to one. The drive shaft then continued horizontally for about ten feet, and was terminated with another 10 to 1 gear box in the shack. The drive motor was attached directly to this gear box. For my purpose I used an old-style player-piano motor, having a speed of about 800 r.p.m. and approximately 0.6 hp.; these motors have starting leads brought out so that they can be easily reversed. Almost any other similar type of reversible motor could be used to drive the turning shaft. The gear ratio is 12 to 1 at the top of the "header," 10 to 1 at the first gear box, and 10 to 1 at the second gear box, making the "header" travel one revolution per minute.



Construction details of the beam supports.

The actual antenna array and mounting supports were constructed separately and then mounted on the large movable iron plate. I used a wooden piece 2" x 8" x 7'6" in length which I bolted over the iron plate; it was necessary to bore a large hole in the center of this mounting board to allow the axle and mounting nut to protrude from above the iron plate. Two holes were drilled on each side of the center axle mounting for bolting the iron plate to the wooden mounting piece. The actual antenna mounting support pieces are next attached to each end of the wooden center cross-piece. For my purpose I used two forty inch 2" x 4" pieces, one bolted to each end of the 7'6" cross-piece.

The antenna rods were mounted on these 2" x 4" mounting pieces. I used steel tubing prepared for my use at a local machine shop. Two 16'1" rods (tapered out: ⅛" to ¼") were mounted on the 2" x 4" pieces, and were connected together by means of a loading coil at the center. These two rods formed the radiator. I used two mineralex insulator clamps, spaced 15 inches apart, on each half of the radiator. The loading coil was about 8 inches in length, 2½" in diameter, and consisted of 10 turns of ⅛" copper tubing spaced ⅛" apart. When finally completed the radiator side of the directive array measured exactly 32'10". The rods extended well out over the end of the 2" x 4"'s.

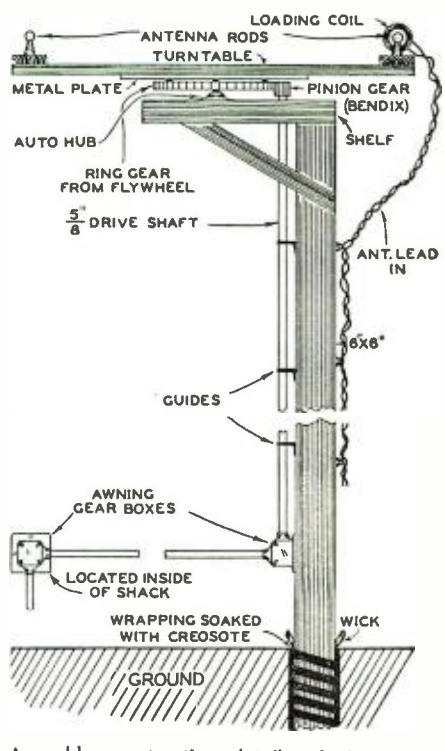
The antenna director rods were mounted on the other side in the same manner as for the radiator rods, except that the director rods are cut longer—the total combined length of the director being 33'6". There is no loading coil in the director. The same type of steel tubing was used for the directive rods.

There are several other types of tubing which can be used for the radiating elements. Shelby steel tubing, thin wall conduit, even bamboo and No. 10 copper wire in bridge form can be employed. The choice will depend largely upon the amount of money to be spent on the actual radiating elements.

I used EO-1 cable as a feeder for this antenna array, but other types, such as Bassett cable, could also be used. I mounted the feeder cable on the side of the 6" x 6" main pole opposite the drive shaft by means of glass stand-off insulators. Before the entire assembly was permanently mounted the radiating and director rods were properly tuned. The proper points for tapping on each of the rods to the loading coil can be easily determined by means of a field strength meter. The feeder was not securely attached to the antenna until the entire assembly was permanently mounted in an upright position.

The wooden shelf is attached directly to the main pole, and two wooden supports (about 2" x 2" x 1'6") were used to brace the shelf against the main pole, as shown in illustration. The automobile hub should be filled with water pump grease, and the hub screwed on the bottom side, to give permanent lubrication. I used aluminum paint applied over red lead as a protection for the exposed metal pieces on my rotating array. Ordinary outside paint was

(*Follow the beam to page* 58)

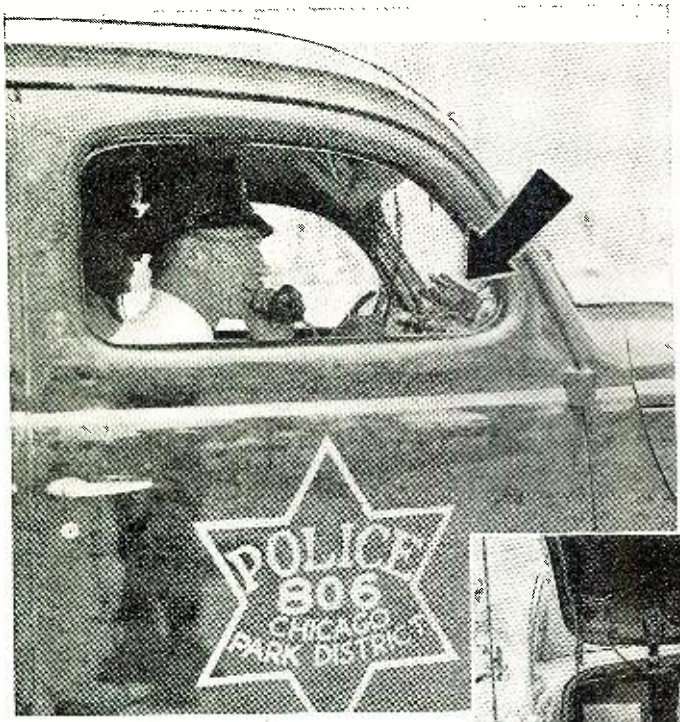


Assembly construction details of the array.

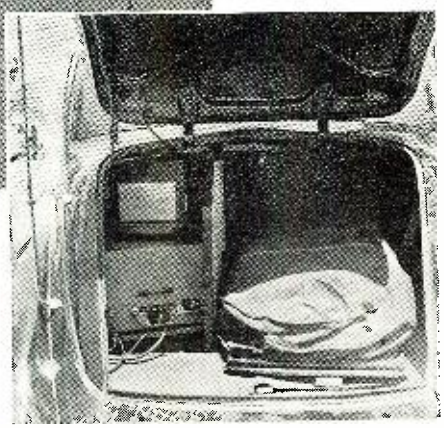
W9XZK

Using the bands originally developed by the amateur, the Chicago Park District Police covers a great city with "prowl" cars which are equipped with 15 w. transmitters, and a remotely controlled 100 w. station located a half mile away from the "Radio Control."

As told by SGT. JAMES FLAVIN
Chicago Park District Police



A "squad" installation, showing (arrow) cradle which carries the 'phone handset.



The transmitter and receiver are installed in the rear; alongside them is a stretcher.

"CAR 806 come in, please."

"806, clear!"

"806, go to Michigan Boulevard and 33rd Street and investigate an accident. Report the situation. W9XZK."

"OK. 806, clear."

This type of transmission has become rather common throughout the United States, for almost every short wave listener is familiar with the police signals in his immediate location. The second largest city in the United States, Chicago, is covered by means of three separate and distinct radio systems. The main police system operating on 1712 Kilocycles is a one-way system, and the Chicago Park District Police radio system, which is a two-way system, one on the cars or "squads" as they are called, the other at the main station, a "Radio Control" presently operating on a frequency of 33,100 Kilocycles. W9XZK, a 100 watt transmitter, completely blankets the entire city of Chicago, which in itself is a feat, considering the tall buildings and the great amount of steel in the Loop.

Radio cruising cars each have a 15 watt transmitter installed in them and are able to contact the main station from any part of the city at will.

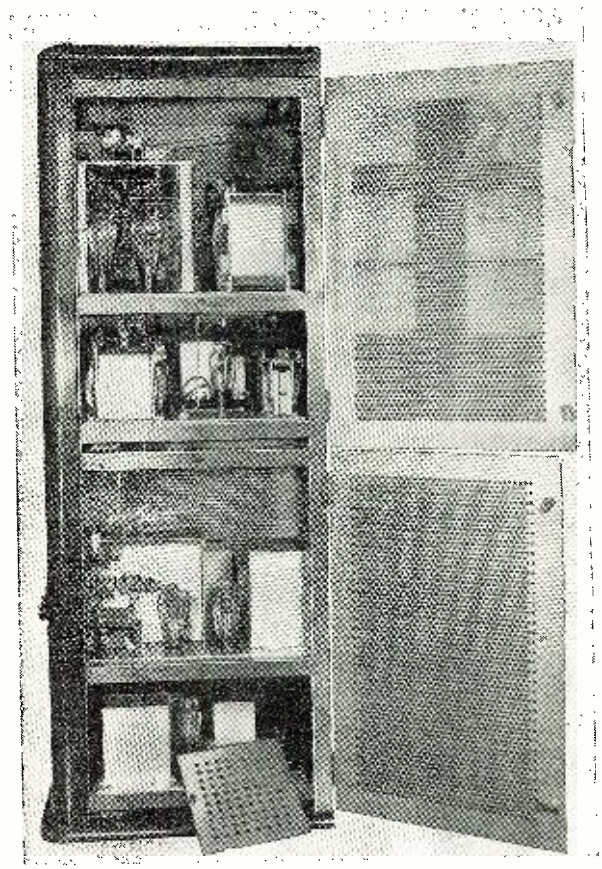
The main transmitter is located in the tower of the Field Building on West Adams Street in the Loop of Chicago. But the receiving and transmitting position of the Chicago Park District Police is in the Administration Building in Grant Park, a scant half a mile away. The control is by means of relays over a leased land wire.

The cover picture of this issue of RADIO NEWS shows the receiving and transmitting position in the Administration Building. To the right of Officer Glenn, who kindly offered to pose for the picture, are the transmitting controls consisting of two switches. The first switch throws a tone of 1,000 cycles on the carrier, warning all police cars that a transmission is about to take place, and the second switch throws the transmitter on. Returning the switches to normal, automatically cuts in the receiver which also is located in the Field Building, and connected to a loud speaker to the left of the desk by means of the same leased land lines.

The 100 watt transmitter is an RCA Type ET-5017 Exciter, with a type AA-5018 Amplifier. It is a standard police, rack and panel job, fully enclosed. The tube line-up is as follows:

A 210 crystal oscillator followed by a 210 first buffer-doubler, a 210 second buffer-doubler, 800 third buffer-doubler, an 800 intermediary power amplifier, and four 800's push-pull power amplifier. The power for the r.f. stages is furnished by a pair of 83's for the exciter buffer stages, and a pair of 866A's for the 4 RCA 800's. Bias voltage for the 800's is supplied by a single RCA 83 tube and power supply. The speech components consist of a crystal mike and RCA 56 first speech tube, resistance coupled to an RCA 56 second speech tube, a pair of RCA 2A3 drivers in Class A and a pair of RCA 203A modulators in Class B. Voltage for the speech components is furnished by a single RCA 83 and power supply, while the two 866A's aforementioned, furnish the high voltage for the modulators. The antenna is simplified vertical J antenna and situated directly on the roof of the Field Building, one of the highest points in the city of Chicago.

Interior of the 100 w. RCA Standard Police Transmitter which covers the whole city.



PROTECTS CHICAGO

The receiver is a crystal controlled superheterodyne operating solely on a frequency of 33,100 kilocycles. The audio gain controls are located at the "Radio Control."

The mobile transmitters each have an output of 15 watts and are run by the 6 volt car storage battery, which in turn drives a dynamotor unit furnishing the voltage for the transmitter. A separate dynamotor unit is used to furnish power for the receiver, which is a crystal controlled superheterodyne non-tunable type.

The tube lineup of the mobile job is as follows: a 1610 crystal oscillator, followed by a second 1610 buffer-doubler, followed by a 1608 intermediary power amplifier, followed by a 1608 final power amplifier. Modulation is by means of two 46's in Class B. The 46's are driven by a single 46 in Class A, which in turn is directly coupled to a high gain carbon microphone.

Transmission is by means of an ordinary telephone hand set, located in a cradle directly in front of the car and on the dashboard. Taking the hand set from the cradle automatically turns on the filaments of the transmitter, which are otherwise dead. Pressing the button beneath the receiver end puts the carrier on the air. When the hand set is returned to the cradle the filaments and the power of the transmitter are automatically shut off. The receiver is put out of operation during transmissions. Two separate antennas, one of the vertical type and the other a regular horizontal roof type, are mounted on the rear frame and roof of the car respectively and are used for receiving and transmitting.

Other radio equipment at the Administration Building consists of an RCA Police Receiver to receive 1712 kc. signals of the City Police and a Hallicrafter Sky-Champion all-wave job for emergency contact with each of the various police departments all over, as well as amateurs, short wave transmitters, coast guards, etc.

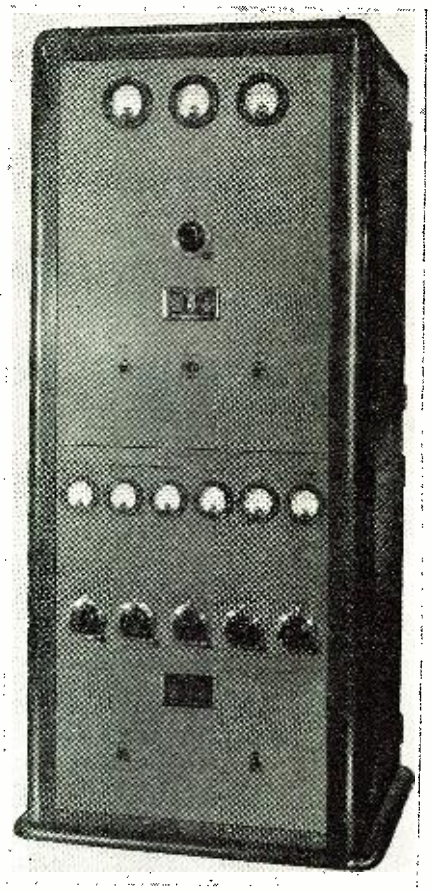
Although the transmitter of the Chicago Park District has only a 100 watt output, it has been reported R9 in California and also in Philadelphia, as well as laying down a healthy signal in Wyoming and in Texas, depending upon weather conditions. Contact with the cars is maintained on a 24 hour schedule and no difficulty is had in receiving police cars above the noise schedule.

The Chicago Park District is a member of the Association of Police Communication in the Chicago area, which includes the following villages and cities: Hammond, Ind.; Waukegan, Ill.; Elgin, Ill.; Aurora, Ill.; Joliet, Ill.; Evanston, Ill.; Page Co., Ill.; Elmhurst, Ill.; Gary, Ind.; Racine, Wis.; Kenosha, Wis.; Walworth Co., Wis.; Lake Forest, Ill.; Forest Park, Ill.; Chicago Heights, Ill.; Cicero, Ill.; Highland Park, Ill.; Glencoe, Ill.; Winnetka, Ill.; Kenilworth, Ill.; Niles Center, Ill.; Whiting, Ind.; Park Ridge, Ill.; Melrose Park, Ill.; River Forest, Ill.; Wheaton, Ill.; Oak Park, Ill.; Waukesha, Wis.; and Lake Co., Ill. All of these police departments have banded together in an Association and have presented their communication problems to the F.C.C. together. As a result of which they have a unique intercommunications systems net which enables each and every one of these police departments to communicate with the other. The respective areas overlap so that constant police watch is maintainable at all times.

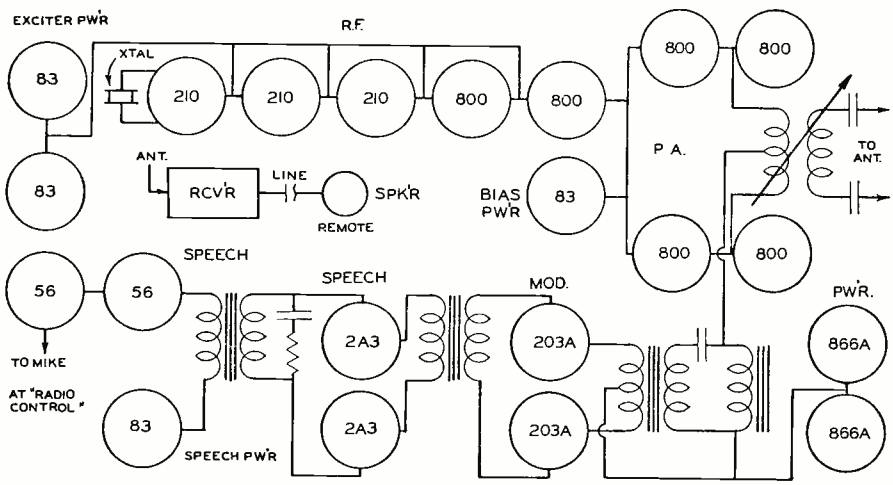
New frequencies have been assigned which will go into effect soon.

All of the operators of the Chicago Park District have taken a license test and all are licensed third class operators, or better.

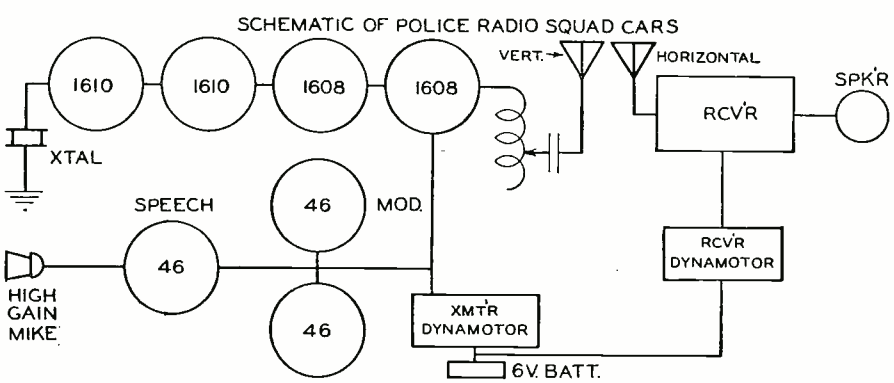
In closing it would not be amiss to mention that there are a great number of cases in which the Chicago Park District Police Radio System has saved lives of people and protected property.



The RCA 100 w. transmitter stands a half mile away from the remote control point.



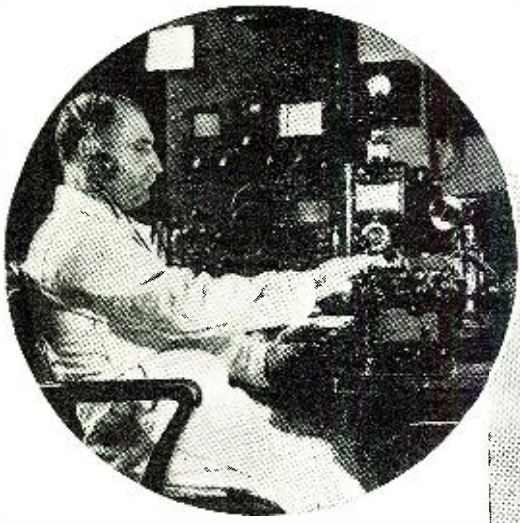
A block diagram of the 100 w. transmitter is shown above, while that of the 15 w. mobile automobile installation is shown below.



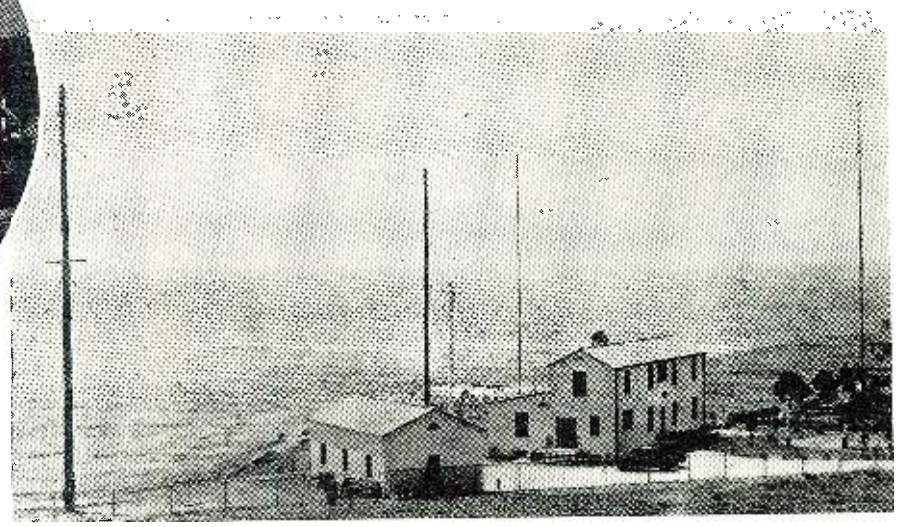
-30-

COAST GUARD

SHIP SAFETY SERVICE



Coast Guard radio station NOJ situated at Pt. Vincente, Cal., from which weather and other information is sent to ships. Above is a Coast Guard operator on duty.



THE United States Coast Guard, in cooperation with the U. S. Weather Bureau, U. S. Lighthouse Service, and Hydrographic Office, U. S. Navy, on April 1, 1938, enlarged the radiotelephone weather broadcasts heretofore made by Coast Guard Radio Stations at Boston, New York, and Norfolk, and increased the number of stations transmitting to include the Gulf Coast, Pacific Coast, and at a later date, the Great Lakes. These broadcasts are classified as *Marine Information Broadcasts.*

In addition to the forecasts of the U. S. Weather Bureau, this extended service includes the latest local reports of changes in aids to Navigation, such as are later published in *Notices to Mariners,* Department of Commerce, and last minute reports of obstructions to navigation in nearby waters as received from the Hydrographic Office of the Navy Department and local sources. The complete broadcast is first made at 30 words per minute to permit copying, and then repeated at normal speed of conversation, or 100 words per minute. The transmissions last approximately five minutes.

Weather

The weather information, which is furnished by the U. S. Weather Bureau, includes a forecast for *Nearby Coastal Waters,* and the forecasts for the sections of the Coast normally covered by the radio station which is broadcasting. Thus, Coast Guard Radio, at Rockaway Point, New York, New York, broadcasts forecasts for *Nearby Coastal Waters, Eastport to Sandy Hook,* and *Sandy Hook to Hatteras,* in the order named.

Storm Information

When advisory storm warnings have been issued, the Coast Guard or Lighthouse Service radio stations in the area concerned, broadcasts the storm warnings and repeats these warnings plus such additional information as may be released by the Weather Bureau, each two hours after the usual time of broadcasting, until the storm signals are down.

Several stations include in these special two hourly broadcasts weather observations from important locations of interest to smaller vessels. Thus, Coast Guard Radio, New York, includes last minute weather observations taken at Coast Guard Stations at Ditch Plains (Montauk Point), Rockaway Point (entrance to New York), and Cape May, N. J. These stations are not provided with Weather Bureau equipment, and the observations do not have the accuracy of standard Weather Bureau reports.

Vessels having radio transmitters may communicate with the Coast Guard on the Coast Guard frequency of 2670 kilocycles for the transmission of distress messages, or other information relative to safety of life at sea. These messages may include requests for assistance, reporting vessels in distress, requests for medical advice, or, during bad weather, for information as to storm conditions or bar conditions.

It is of utmost importance that the information transmitted to the Coast Guard be explicit and to the point. If medical services are asked for, all the symptoms should be given, whether the sick can be moved, facilities which are available, and all pertinent information.

The condition of the seas in the ship's location for guidance of aircraft, if one is requested, should always be given, also.

MESSAGES PERTAINING TO PERSONAL BUSINESS, NO MATTER HOW URGENT, CANNOT BE ACCEPTED BY COAST GUARD UNITS.

-30-

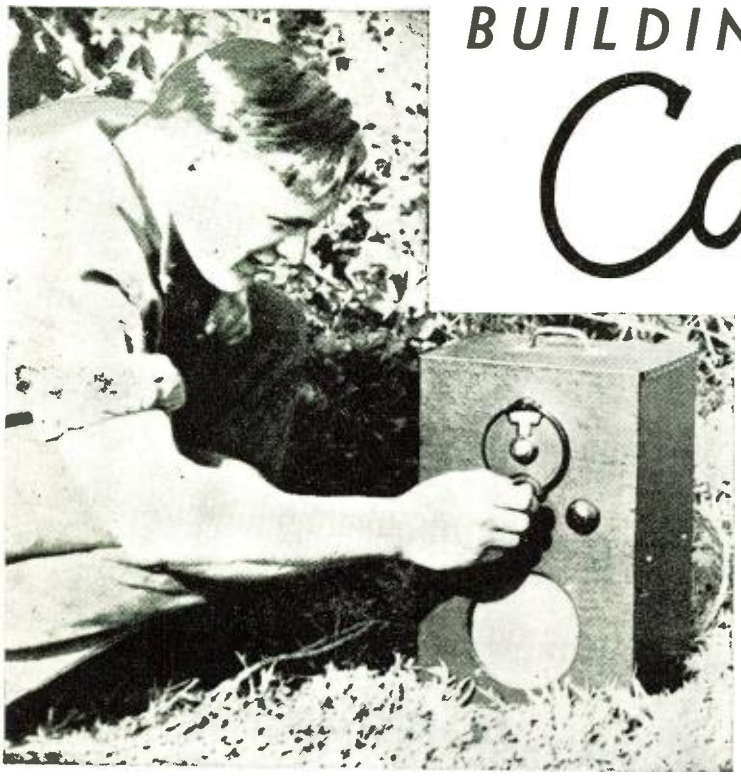
Schedule of Broadcasts

Frequency

2662 kilocycles (112.6 meters) on the Atlantic, Gulf, and Pacific Coasts.

Station and Times

LOCATION	TIME (Eastern Standard Time)	STATION BROADCASTING
Atlantic Coast		
Boston, Mass.	11:00 a.m. & p.m.	Coast Guard Radio (NMF), Winthrop, Mass.
New York, N. Y.	11:30 a.m. & p.m.	Coast Guard Radio (NMY), Rockaway Point, N. Y.
Norfolk, Va.	10:50 a.m. & p.m.	Coast Guard Radio (NMN), Princess Anne, Va.
Charleston, S. C.	10:40 a.m. & p.m. (Not yet in commission)	Coast Guard Air Station, Charleston, S. C.
Key West, Fla.	11:10 a.m. & p.m.	Lighthouse Service Radio Station WWZ
Jacksonville, Fla.	10:20 a.m. & p.m.	Coast Guard Radio (NMV), Jacksonville, Fla.
Gulf Coast (Central Standard Time)		
Mobile, Ala.	10:20 a.m. & p.m.	Coast Guard Radio (NMG), Mobile, Ala.
New Orleans, La.	10:40 a.m. & p.m.	Lighthouse Service Radio Station, New Orleans, La.
Galveston, Tex.	10:50 a.m. & p.m.	Coast Guard Radio (NOY), Galveston, Tex.
Pacific Coast (Pacific Standard Time)		
Port Angeles, Wash.	9:40 a.m. & 7:40 p.m.	Coast Guard Radio (NOW), Port Angeles, Wash.
Grays Harbor, Wash.	9:30 a.m. & 7:30 p.m.	Coast Guard Radio (NMW), Grays Harbor, Wash.
Pt. Adams, Ore.	9:50 a.m. & 7:50 p.m.	Coast Guard Radio (NREH), Pt. Adams, Ore.
San Francisco, Calif.	7:20 a.m. & p.m.	Coast Guard Radio (NMC), San Francisco, Calif.
Pt. Vincente, Calif.	8:00 a.m. & p.m.	Coast Guard Radio (NOJ), Pt. Vincente, Calif.



BUILDING A Camper's Broadcast Receiver

by HOWARD T. BURGESS, W9TGU
Elliott, Iowa

With the fall hunting season fast upon us, this little broadcast receiver should afford many evenings' pleasure, as well as contact with the world of civilization.

The author told us to be sure and say that this is not his picture. It is the receiver in actual operation, however.

WITH late summer and fall come vacations, fish stories, static and portable radios. Portables are not to be out done by the season though, hunting season following close on the heels of the last fishing trip. One can never really appreciate good wholesome static until he is about three days journey from the nearest radio. When he suddenly finds that some one has portable radio, even the hiccoughing and sputterings of mother nature sound like music to an old timer.

Construction is simplicity itself. Wiring is also very easy.

The layout permits plenty of finger-room for repairs.

To get down to earth, a need was felt for a set that could be used on a.c., batteries, or a car battery. One that could be carried around with the least amount of trouble and most of all one that could take the hard knocks which such a set is sure to get. Being amateur operators here we realized our great weakness and made it very strictly a one band affair. Nothing bores a picnic quite so much as to have some fiend cut in on a nice juicy program to check little Willie's signal out in Frog Holler.

The first attempt brought forth a tuned radio frequency job that filled the bill for size and ruggedness but true to form it lacked selectivity and the sensitivity was not all that could be asked for. After definitely discarding the TRF, a second huddle resulted in a five tube superhet not counting the rectifier.

The final model is housed in a leather covered plywood case which measures 16"x10"x8¼". The case is divided in two sections, the radio in the upper section and the power supply and speaker in the lower. The speaker is a permanent magnet dynamic which eliminates the field supply. Two power supplies are used. One for a.c. and one for six volts d.c.

The radio section is built on a cadmium plated steel chassis. This chassis measures 9½"x7½"x3" and gives plenty of working room for assembling. Starting at the front on the right hand side and going counterclockwise around the chassis, is the following tube line up. First a 78 tuned r.f., a 6A7 first detector-oscillator, a 78 i.f. stage, a 75 diode detector AVC and first audio and ends up in a 41 audio stage.

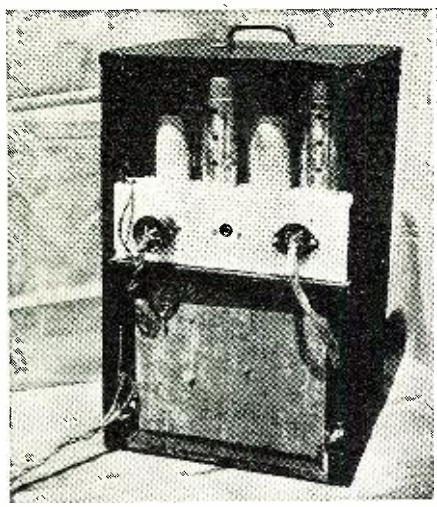
The two i.f. coils are mounted above the chassis and the two r.f. coils and the oscillator coils are mounted below. On the right hand side is the volume control and the tone control is on the left. For rough usage, a tuning dial that will stay tuned even with bumping and jolting should be used. The circuit is straight forward and should give no trouble. The only difficulty encountered was a slight case of oscillation which was cleared up by shielding the grid leads in the i.f. and r.f. sections.

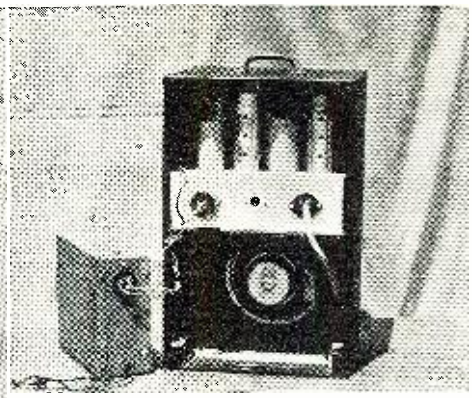
Lining up the i.f. and r.f. section is carried out as for any superhet. All battery leads and leads to the switch are brought out to a six prong socket mounted on the back of the chassis and connection is made to the power supplies by means of a cable with a six prong tube base on each end. To prevent noise pickup from the power supply the wires from the power supply to the switch should be shielded, but it is not a necessity.

The a.c. power supply is the same as for any receiver. Any power transformer that can supply 150 to 300 volts d.c. from the filter is satisfactory. Output connections on the socket should be made to correspond with the socket connection on the set.

The six volt power supply is a little more difficult than the a.c. unit, but it should not cause any serious trouble. All parts should be well shielded and all shields should be well grounded to the chassis. RFCs I are made by winding about 120 turns of No. 14 wire on a ¼" form in three layers and the whole is doped with shellac and covered with tape. RFC 2 is an ordinary r.f. choke. The vibrator and power transformer may be any of the many makes listed on the supply catalogues, but for best results a reliable make should be used. The set can be run on B batteries if it is necessary and will run on as low as one B battery and give low room volume.

A combination power supply for use on either a.c. or d.c. could be made, but it is





The power supply is connected by a cable and is removable to give ease for servicing. It fits up against the speaker.

more practical for the average builder to make both units separate and plug in the supply needed.

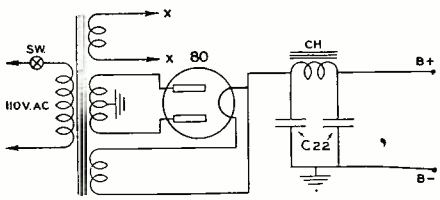
The entire combination is housed in a box made of ¼" three ply fir. The top and bottom are made of ¾" wood to stand the added strain on these parts. The weather-proof leather is put on with glue and the edges turned inside of the case and tacked with ¼" tacks. A handle on the top makes for easier carrying.

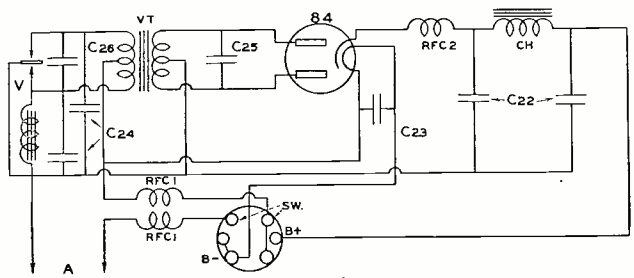
Almost any type of antenna can be used with the high impedance antenna coil used. A piece of thin copper 9"x8" is tacked on the bottom and can be used as an antenna when it is necessary.

However, the little set is sensitive enough for all common uses.

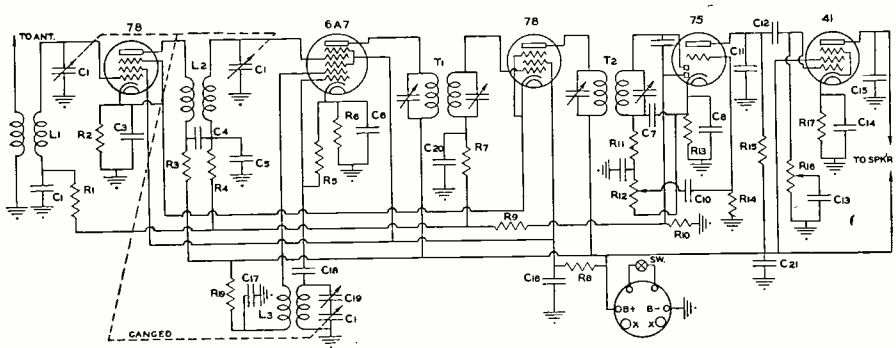
A word of warning in closing. Music hath charms to sooth the savage beast and YLs are no exception. Combined with a little moonlight, this set can work wonders and the writer assumes no responsibility for experimenters making scientific investigations along these lines. Hi!

—30—





Circuit diagrams of the power supplies.



Circuit diagram of the camper's receiver.

C_1—.000365 Three gang
C_2, C_4, C_6—.002 mfd.
C_3, C_8, C_{17}, C_{24}, C_{26}—.1 mfd.
C_7, C_{18}—.0001 mfd.
C_8, C_{14}—4 mfd.
C_9—.0005 mfd.
C_{10}, C_{12}—.05 mfd.
C_{11}—.001 mfd.
C_{13}—.02 mfd.
C_{15}—.004 mfd.
C_{16}—.25
C_{20}—.01 mfd.
C_{21}, C_{22}—10 mfd.
C_{23}—.5 mfd.
C_{19}—350 mmfd. padder
C_{25}—.02 mfd., 1000 v.
R_1, R_4, R_{11}, R_{14}—100,000 ohm
R_2—200 ohm
R_3, R_{16}, R_{13}—5,000 ohm
R_5, R_7—50,000 ohm
R_6—300 ohm
R_8—25,000 ohm
R_9, R_{10}—1 meg.
R_{12}, R_{18}—500,000 ohm
R_{15}—250,000 ohm
R_{17}—500 ohm
L_1—High Imp. Antenna coil
L_2—R.F. Coil
L_3—456 KC oscillator coil
Tr—1 456 KC IF transformer (input)
Tr—2 456 KC IF transformer (output)
T—power transformer with 6.3 v., 5 v., 400 v.
Ch—30 henry choke
VT—Vibrator transformer (such as Philco 32-7315)
V—Vibrator (as Philco 38-5036)

TECHNICAL BOOK & BULLETIN REVIEW

RCA Victor Service Notes for 1937, Eighth Edition, 384 pages, Price $1.25. Published by RCA Manufacturing Company, Camden, New Jersey.

This eighth volume of the RCA Service Notes contains chassis-layout diagrams, illustrations, and complete technical data for all the 1937 RCA home receivers, auto models, amateur sets, and test equipment. In addition, technical data is included for the electric tuning mechanism and the armchair control model. This new volume contains a wealth of data for every serviceman and radio dealer. A special section is devoted to receiver alignment with oscillograph and associated equipment. A chart is included with characteristics for all Radiotron tubes.

Indiana Technical College, 221 East Washington Street, Fort Wayne, Indiana.

This institution has just brought out a new 1938-39 descriptive catalog with complete information on their specialized courses in radio, aeronautical, chemical, civil, electrical, and mechanical engineering. Subjects under radio and television engineering, include code, measurements, communication, and laboratory work. Free copies are available to interested readers, by writing to the college at the address shown.

Meissner Manufacturing Company, Mt. Carmel, Illinois.

The latest 1938 Meissner catalog contains 44 pages with descriptions on their new 14 tube-five band communication superheterodyne kit, a battery operated model and other kits equipped with automatic push-button control. The catalog also lists their full line of i.f. and plug-in coils, condensers, chassis, and panels, and many other products. This book is free to experimenters, amateurs and servicemen.

Ohmite Manufacturing Company, 4835 W. Flournoy Street, Chicago, Illinois.

The new enlarged catalog No. 17 lists rheostats and resistance units for the industrial, radio and electronic fields. Included are the Ohmite vitreous enameled rheostats, tap switchs, chokes, etc. There are tables of ratings and a large number of values to make selection an easy matter. Free copies for the asking.

Bliley Electric Company, Erie, Pennsylvania.

Announces a new engineering bulletin E-5 telling how to build a simple 5-meter crystal controlled transmitter. Complete constructional details are given with circuit diagrams. Amateurs writing for this bulletin are requested to give their call.

RCA Review, Volume III, No. 1, July 1938. RCA Institutes Technical Press, 75 Varick Street, New York City.

In this quarterly journal of radio progress there is an interesting article by David Sarnoff on the American system of broad-

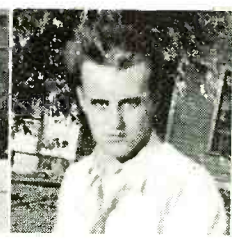
(*Review more on page* 61)

RADIOPIX

A page devoted entirely to timely pictures of radio in all its phases.

"Tubby" M. Edwards, W9VGH

Rev. "Dan" Thistle W5FPC

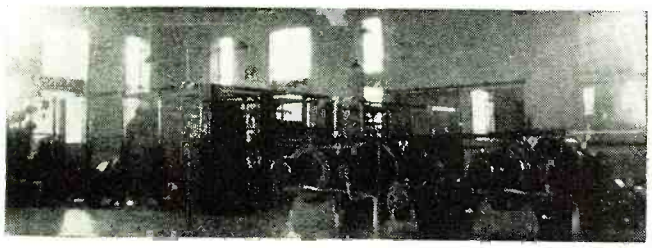


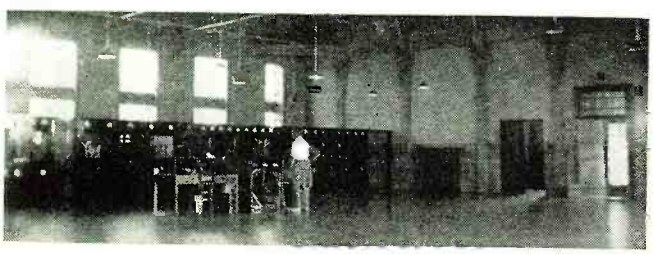
Eugene E. Tuel W9VWW

D. "Reg" Tibbetts W6ITH-W6XT-W6JSS

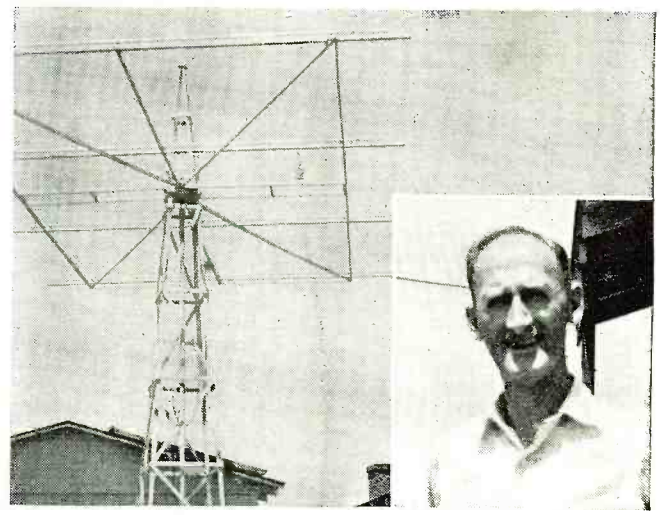
Richard L. Miller W9QPK

Ulmer Turner W9UG



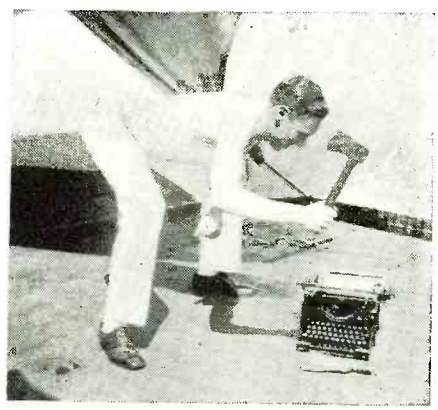


The transmitter of 2YA in New Zealand. The upper picture shows the power supplies, the lower the transmitter itself.



Howard K. Breedlove, W6JRM and his rotary beam antenna. Operating on ten meters it has a radiator, two directors and 2 reflectors.

The beautiful layout of W2ECR of Brooklyn, N. Y. Bill Kessler is owner.



Lee Scupper, writer of marine op articles for R.N. quits writing to go back to sea.

Left to right: Mrs. (W9LLX) Harrison, Cliff E. Boardman (W6ASK) and his pretty XYL.

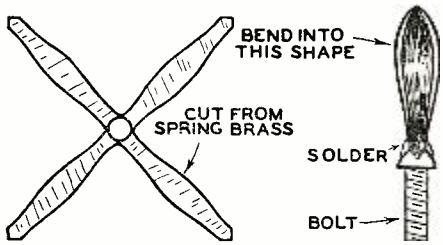
Running farm machinery by ham radio is a stunt engaged in by Fred Fulker, W9JBO of Mayfield, Kan. He won't miss the lunch call this way, no sir! →

"RADIO Gadgets"

Homemade Banana Plugs

Interstage coils and large transmitter tank coils are usually plugged into position by the use of banana plugs and sockets. In the event a banana plug is needed but is not available, one can be made as follows.

Cut a suitably size square of thin spring brass. The distance from the center to each corner should be slightly greater than the length of the intended plug. Spot the center and draw a line to each corner. Then



draw in the legs approximately the shape suggested. Cut out the cross with a pair of tin shears.

Bend up each arm of the cross so they resemble the petals of a flower, just opening. Then pull the ends in and temporarily tie them. Drill a large hole in the end of a brass machine screw into which the ends can be set soldered into place.

Magnifying Meter Reading

It is sometimes desirable to detect minute fluctuations in the movement of a meter pointer to check surges in a circuit. It is also necessary at times, to obtain meter readings with the instrument placed at a position remote from the observer. To meet these requirements obtain a folding type magnifying mirror of the 25 and 50-cent store variety. The mirror faces are over five inches in diameter and when placed in the back of the meter the image of the meter is greatly magnified.

Cushioning Radio Equipment

Ordinary sponge rubber, such as kneeling pads which can be purchased for twenty cents in the "five-and-dime" stores, finds many applications around radio equipment. Microphone trouble in regenerative and other receivers can oftentimes be eliminated by placing the receiver on strips of this material, for instance. Microphonism in preamplifiers can usually be cured in the same way as can hum pick-up resulting from using preamplifiers around amateur transmitters where they are subject to mechanical vibrators from vibrating power transformers, chokes, etc.

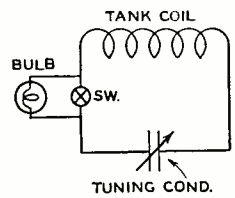
Possibly the greatest utility of this idea, however, is found in fastening small pads, one or two inches square, on the bottoms of oscillators, meters, oscillographs and other instruments to keep them from scratching receiver cabinets, table tops or other surfaces upon which they may be placed. Quite frequently desks with polished tops are used as "operating tables" in ham shacks. If equipment which normally belongs on the operating table is so protected, as well as other instruments which are occasionally placed on the table, much time and grief will be saved.

A good plan is to cut small squares from a kneeling pad and attach them to the corners of the bottoms of small instruments. For large or heavy units larger squares or strips of the rubber will be needed. Coil dope or DuPont's cement will fasten them securely. Neat squares are cut by using a safety razor blade with a steel-edge rule to guide it.

Neutralizing Kink

MOPA types of transmitters usually have one or more stages which require neutralizing. Lacking a millammeter for inserting in the grid circuit the amateur must resort to neon tubes, etc., to read neutralization. Even this method has its faults, but by employing a common flashlight lamp as shown in the sketch, quite precise adjustment can be obtained.

Open the "hot" end of the amplifier tank coil between it and the tuning condenser. Insert a miniature socket and a switch for shunting out the lamp when not in use. Use one of the smallest flashlight lamps obtainable. Open the switch and proceed with the neutralizing. Make adjustment of the neutralizing condenser until absolutely no indication of illumination is evident at any setting of the tuning condenser. This gives a very precise point of neutralization. Be sure to close the switch before connecting the high power to the plate of this stage tube.



Future adjustments can be quickly made by removing the high power temporarily, opening the lamp switch, making the change and then proceeding as usual.

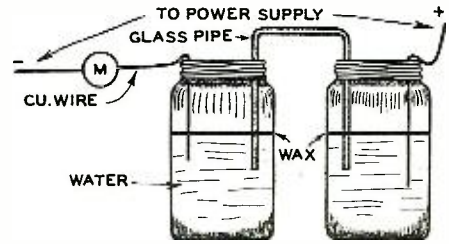
An Emergency Power Pack Bleeder

If your power pack bleeder has burned out, or, if you want one for temporary use, here is a good stunt that can be used with assured success.

Make a suitable base or receptacle that will hold two pint size screw-top fruit jars side by side. Fill them three-quarters full of clear water. In each jar, at the outside edge, hang a heavy bare copper wire as shown by making a double hook in the wires. Connect these to the rectified and filtered output in place of the usual bleeder.

Then bend a piece of glass tubing in an inverted U shape by holding the tube in a Bunsen or alcohol flame. Make the bends while hot. Fill this tube with water and, holding a finger over each end to prevent escape of the water, invert the ends in the jars and remove the fingers. This gives a complete water connection between jars. Place a milliammeter in the negative side of the line.

Turn on the power and watch the meter. With clear water the current passage will be nearly nil. Turn on the transmitter and note the total current drain of all tubes. Then place a pinch of salt in each jar, adding a bit at a time to each until the temporary milliammeter shows a current reading of not over 25% of that consumed by the transmitter tubes. When this point is reached, cease adding salt and cover the



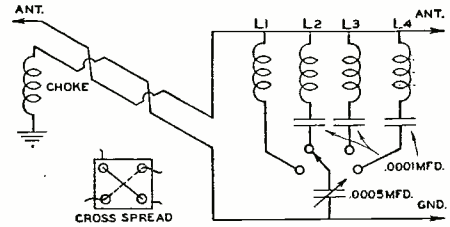
water in the jars with ⅛" of paraffin or mineral oil. This will prevent evaporation and the bleeder will continue to function for months without attention. By leaving the meter in the circuit a check can be kept on the bleeder current and salt or water added as necessary to keep the drain normal.

All-Wave Tuned Antenna

In many places it is impossible to properly erect the doublet type antenna with a center lead-in. Also, this type is not satisfactory on the 200-500 meter band, without prohibitive length or complicated transformers.

The old reliable inverted "L" antenna, which can be erected almost anywhere, is excellent on the broadcast band and very good on short-waves. However, the end connection makes it voltage-operated on short-waves; hence an electrostatic shield between primary and secondary of the receiver transformer would cause great loss.

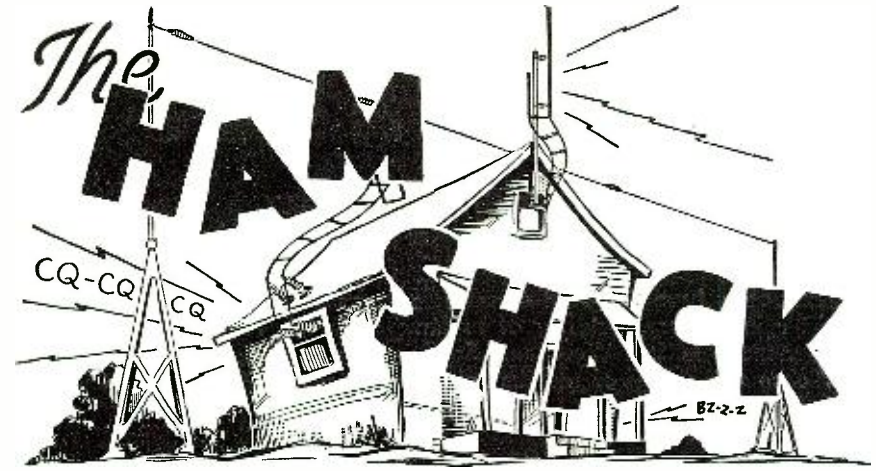
The circuit illustrated herewith relies more upon boosting the desired signal than suppressing lead-in pickup. This is accomplished by tuning the antenna circuit to the desired wave-length. No impedance-matching transformers are needed. The



antenna proper may be anything from 25 to 75 feet long. The lead-in, doubled upon itself, is made practically non-inductive, and its capacity minimized, by the spacing, 1½ inches. Transpose every four feet with 2 inch square spacers, which can be threaded on and worked along to position.

The antenna is a quarter-wave, or Marconi, for broadcast, and a Zeppelin for

(*More gadgets on page* 54)



THIS MONTH:

For the serviceman who wants an inexpensive, small public address system, this unit, called "the Scotchman's Special," is the unqualifiedly correct answer.

by H. VON JENEF, W9NWJ
Chicago, Ill.

AN economical, fool-proof amplifier which is capable of practically distortionless reproduction that can be built by any one is this "Scotchmen's Special."

Many articles have been written on high fidelity amplifiers that, when built according to the designer's specifications, were supposed to give crystal-clear reproduction. The main disadvantages of most of them are the great deal of parts required for construction and an array of instruments suitable for their final testing and adjusting.

When resistors and condensers are used in plate and grid circuits, in common amplifiers, their frequency and characteristics become evident and equalizing net works, bass boosters, etc., are necessary to make up for these shortcomings. The amplifier herein described has a flat frequency characteristic, within the essential audio frequency spectrum and boasts a maximum of a total harmonic distortion of 8%, measured out of the practical amplifier from 40 to 9,000 cycles.

A word might be mentioned about this type of circuit, as it will look unfamiliar to most readers at a first glance, but it is the latest development of the old direct dynamic coupled amplifier. The dynamic coupled amplifier was characterized in the past by its instability and complicated voltage divider arrangement to provide correct potentials for the various elements, but it had the ability to give the most perfect reproduction.

The advent of television has brought this particular circuit back into popularity as frequencies above 30,000 cycles per second are common in such applications. The power output of this particular circuit is 9.5 watts, absolutely undistorted and the latest report shows that tubes which will have up to 40 watts output per pair are in the last stages of experimentation. The new 6AC5G has all of the advantages and none of the disadvantages of the older types, and the simple construction which can be followed in making amplifiers with it, plus the excellent results obtained, are certain to bring it into widespread popularity.

The type 6F8 dual triode is used as a driver and also supplies bias for the 6AC5 push-pull output tubes. This tube was originally designed for use with the 76 as a driver, but the 6F8 has the same characteristics as the 76, only an added advantage is gained by having both the tubes in the same envelope.

The grids of the 6F8 have to be fed with an out-of-phase signal for correct push-pull operation so the simplest method was chosen—a push-pull inter-stage transformer. For phonograph operation or from a radio tuner output, a 6C5 as shown in the diagram is plenty to overdrive the amplifier. But if microphone operation is desired, the 6F5 will provide sufficient gain when used with the types of microphones that have an output of minus 50 decibels or so.

The type of power supply isn't very critical, no voltage divider is necessary and only a double eight microfarad filter condenser is needed due to the inherent characteristics of triodes and their low power sensitivity. Placement of the parts isn't critical as practically all of the connections between tubes are merely wires. The power supply should be able to deliver a maximum of 90 milliamperes at 250 volts as the 6AC5's draw 32 milliamperes each and the 6F8 draws a total of 18 milliamperes, the 6C5 draws 8 milliamperes.

The filament supply should be able to deliver 2.0 amperes maximum.

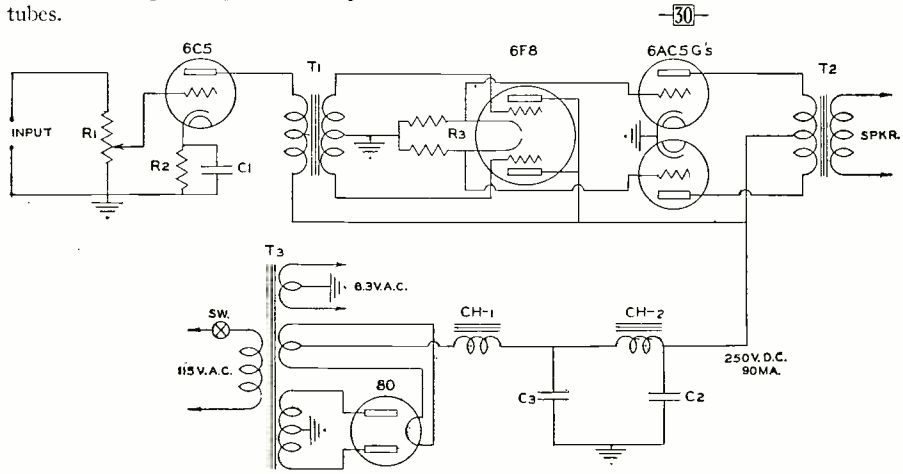
No shielding is required on any of the tubes.

All in all, the "scotchmen's special" will provide the home constructor with an amplifier that is capable of reproducing faithfully the whole audio frequency spectrum at the minimum of cost for parts. It can be built in the minimum construction time. It is trouble-free from the standpoint of replacement of parts, such as resistors and condensers, and is ideally suited for work with the experimenter in trying out new microphone circuits, mixers, tone compensators, etc., where it is necessary to know that the output stage is positively high-fidelity.

Its bell-like output should make itself very popular with servicemen that make amplifiers for use in musical instrument applications, churches, funeral homes, etc., where quality reigns supreme.

For the amateur seeking a small modulator for that 20 watt rig, this unit will fill the bill completely. It will be necessary to change the output transformer to one which is adaptable for modulation purposes.

In the event that the transmitter has greater power than 20 watts, then the unit will make a fine speech amplifier-driver for the modulators. For this, a 500 ohm output transformer or one suitable to match the modulators must be used.



The circuit diagram of the "Scotchman's Special" P.A. System.

R_1—500,000 ohm pot.
R_2—2000 ohm 2 w.
R_3—25000 ohm 2 w.
C_1—25 mfd 10 v. electro.
C_2—8 mfd 450 v. electro.
C_3—Same as C_2.

T_1—Single plate to p.p. grids.
T_2—10000 ohms p.p. plates to v.c.
T_3—Power trans. to deliver 250 v. d.c. from filter.
CH_1, CH_2—Up to 30 hy. filter chokes. (15 hy. min.)

The start of the trip with the portable 50 watt transmitter installed in the "V8."

A HAM TAKES A

by HARRY HARRISON, W9LLX
Chicago, Ill.

Many of us have promised ourselves a vacation with the radio transmitter in the car, but few of us have done it. Harry tells of his experiences in the West and Southwest, where his ham rig was at once the means of meeting other hams and having a fine time.

MOST of us have often wished it possible to take a whole month's vacation to go wherever we pleased. I put in long hours for eleven months of the year so I make a point of realizing such an ambition every year. I leave everything behind except my ham radio. That also goes for a vacation.

A radio vacation should be of interest to hams in general, as well as to almost everyone interested in radio. Consequently I'm setting down here, at the request of the Editor of RADIO NEWS, a day-by-day account of my experiences on a radio trip that took me from Chicago to the West Coast and return.

July 1st, 1938—Worked very hard preparing the radio receiver for the car. Installed rebuilt Hallicrafter Sky Champion to make it adaptable for installation under the cowling where the glove compartment is situated in a Ford V8. The receiver also has a 5 meter transceiver built in the space where the AC power pack and speaker was placed.

July 2nd—Made final tests with W9QEA on all-wave receiver and 5 and 10 meter receiver. Worked o.k. except motor noise was very high, even with suppressors on the plug.

July 3rd—Worked on car most of the day installing condenser and shielding, also grounding and bonding sections of the motor in the car. Worked on the 20 meter portable transmitter to be used when I arrived in Texas. Worked most of Sunday night on the 20 meter rig.

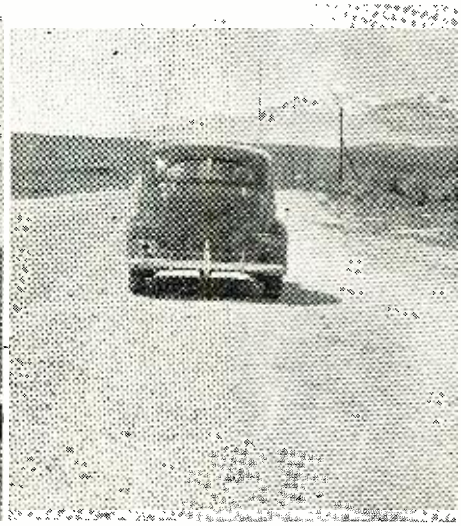
July 4th—completed another 20 meter rig. Collected all radio gear and other baggage for trip, being selected and packed for Helen, the XYL. Took some much needed sleep until about 1:00 p.m. Packed the car and took start-of-trip pictures. Then Helen, our three children, and myself were off, heading for San Francisco, about 1:45 p.m., July 4th.

Took highway No. 66 to Springfield and on the way down, near Pontiac, Illinois, a fellow passed us driving a Ford roadster. As he pulled up ahead of us he held up a mike hand set, and then one hand indicating "can you work 5 meters?" I held up my mike and turned on the 5 meter rig. I found it was W9VWW of Kansas City, Missouri. Were in contact for a few minutes and bid him 73's. A few miles south of Bloomington 9VWW again appeared in the rear-view mirror. So again a 5 meter contact was made.

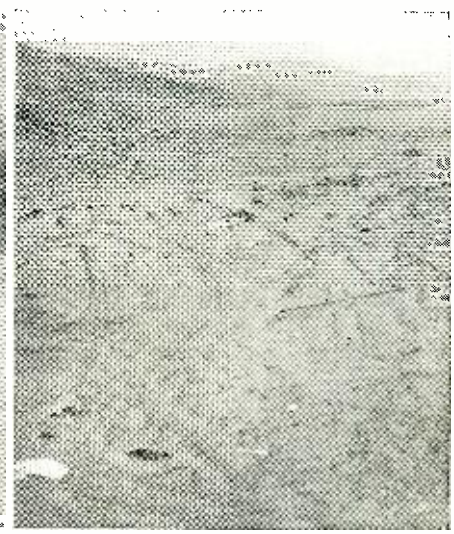
I asked him if he would mind stopping at the next filling station or roadside place so we might meet him and make a picture or so of him. Found that W9DWW was Eugene Tool of Kansas City, and I also found that he was a very fine business O.M. Received the news of the Kansas City gang from him and after taking a picture of 9DWW, he was on his way again—head-

We crossed the Continental Divide at an elevation of 11,305 ft. at Berthoud Pass.

On the top of Pike's Peak where we had a beautiful view and several fb QSO's.



Leaving Carson City, Nev., the Sierra Nevada Mts. seemed to bar our way to the West.



In the center of the California Desert, east of El Centro, Cal. Temperature 122°.

Radio Vacation

ing for Kansas City, and us stopping at Springfield, Illinois. Arrived at Springfield about 6:30 p.m. After having dinner, headed for Hannibal, Missouri, which we made about 9:30 that evening, and took a cabin for the night. Checked the 10 meter band but found no signals coming through.

July 5th—About 9:30 in the morning we left Hannibal, Missouri, for whatever distance we could make that day. Passed through Missouri into Kansas. From Topeka, Kansas, we drove straight through to Manhattan, Kansas, and encountered a very severe dust storm—one of the Kansas type—close to Manhattan, which fogged the wind shield and got in our hair and lungs. You probably have heard about the extent of Kansas dust storms. Sometimes you cannot see ten feet ahead of the car. After we went through that we were glad to stop at Manhattan, where we stayed over night.

July 6th—We headed for Colorado, going through Salina, Kansas, and stopping at Russell, Kansas, about noon for gas at a Texaco filling station on highway U. S. 40. I turned on the 10 meter receiver and heard W9QPK calling W4CYV at Bessemer, Alabama. Turned on the 10 meter rig and called him. He came back to us and was very much surprised to find that a mobile transmitter was in town. After gassing up, we made our way to W9QPK. Upon arriving at W9QPK's QRA on the edge of Russell, Kansas, we found a very fine business of 10 meter transmitter and rotary beam in operation. Our visit was unique, in that we used our 10 meter mobile transmitter to find our way to his QRA. He gave us directions as we came through town. After visiting with W9QPK and his XYL we went downtown for lunch.

After having lunch we made contact with W9QPK (Dick) again and worked him some few miles out of the city on our way on U. S. 40. Bidding 73's to Dick we were on our way, getting settled down to the good old heat of western Kansas. Leaving U. S. 40 we took U. S. 83 to Halper. From Halper we took U. S. 24 straight through to Burlington, Colorado, where we spent the night. I checked the 10 meter band at Burlington and called a number of CQ's and also a number of stations, but no luck.

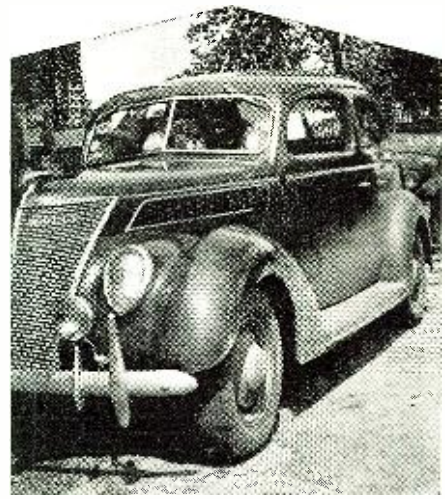
We could hear W9TLQ in Park Ridge, Illinois, very well but we were unable to make a contact. We heard a number of stations farther East in the 8 District coming through.

Leaving Burlington the next morning we headed for Colorado Springs and got there around noon. We found Colorado Springs a very beautiful town, but our main interest, of course, was in Pike's Peak.

We went out the highway to Pike's Peak and started our climb. On the way up I passed tanks which apparently held water. We found out later that these tanks were for the benefit of the travelers for refilling the radiator. After passing a second tank I decided it was time to check the car and found it was very much in need of water.

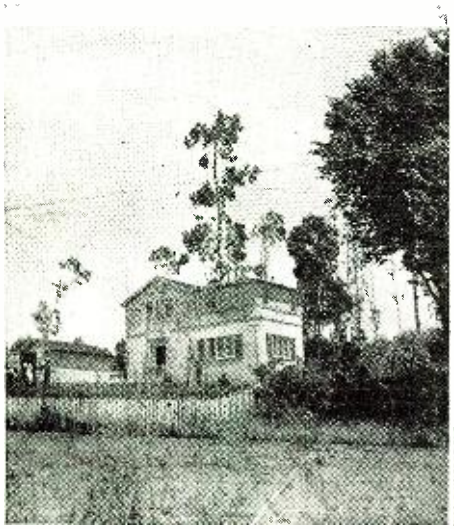
Things went well and we stopped on the 11,000-foot level to let the motor cool. I turned on and checked the 10 meter band. Found W9HZQ in River Forest, Illinois, calling "CQ." W9HZQ is a very good friend of mine and it was quite thrilling for us to hear him calling. Called him very frantically for a few seconds and stood by. He came back and you can hardly feature the thrill I experienced, being 11,000 feet up Pike's Peak 'way out in the wide open space of Colorado, to hear him back in my section of the country, calling. The contact was not 100% because of the fade-out of the 10 meter band. However, we had the thrill of say-

(*Follow the route to page* 59)

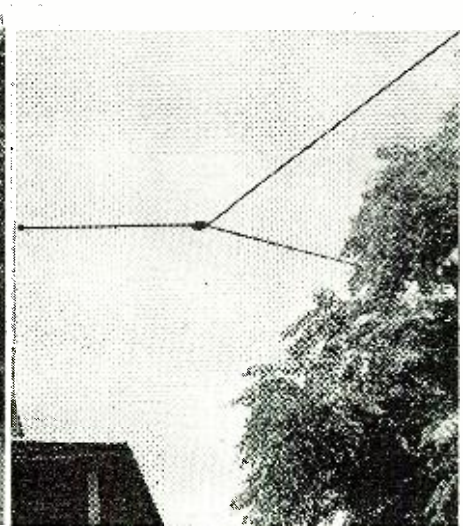


The finish of the trip with the trusty old "V8" parked in front of the home QRA.

Traveling Cowboy Bird Band which we heard in the streets of our old Texas home town.

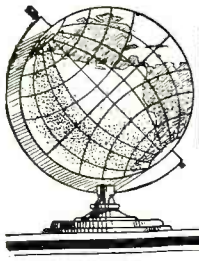


The laboratory-home of W6ITH. The radio lab is the lower part. W6ITH lives above.



The antenna at our Texas home QRA. The antenna has been drawn in for clarity.

Parked beside a solid wall of sulphur in the largest mine of its kind in the U. S. A.



WORLD SHORT WAVE TIME-TABLE

Compiled by the Editors of RADIO NEWS

Hours of transmission for the World's Short Wave Broadcast Stations

HOURS OF TRANSMISSION

8 9 10 11 M 1 2 3 4 5 6 7

EASTERN STANDARD TIME

Wave-length Meters	Call Letters	Frequency Kc.	City Country
13.93	W8XK	21540	Pittsburgh, Pa.
13.93	GSJ	21530	Daventry, England
13.94	W2XE	21520	New York, N. Y.
13.95	W2XAD	21500	Schenectady, N. Y.
13.97	GSH	21470	Daventry, England
13.99	DJS	21450	Zeesen, Germany
15.77	HS8PJ	19020	Bangkok, Siam
16.86	GSG	17790	Daventry, England
16.87	W3XAL	17780	Bound Brook, N. J.
16.88	PHI2	17770	Huizen, Holland
16.89	DJE	17760	Zeesen, Germany
19.56	DJR	15340	Zeesen, Germany
19.57	W2XAD	15330	Schenectady, N. Y.
19.60	GSP	15310	Daventry, England
19.62	LRU	15290	Buenos Aires, Arg.
19.63	DJQ	15280	Zeesen, Germany
19.65	W2XE	15270	New York, N. Y.
19.66	GSI	15260	Daventry, England
19.68	TPA2	15243	Pontoise, France
19.71	PCJ2	15220	Huizen, Holland
19.72	W8XK	15210	Pittsburgh, Pa.
19.74	DJB	15200	Zeesen, Germany
19.76	GSO	15180	Daventry, England
19.79	JZK	15160	Nazaki, Japan
19.82	GSF	15140	Daventry, England
19.84	HVJ	15121	Vatican City
19.85	DJL	15110	Zeesen, Germany
19.88	RKI	15090	Moscow, U.S.S.R.
20.04	LZA	14970	Sofia, Bulgaria
20.64	HBJ	14535	Geneva, Switzerland
22.00	SPW	13635	Warsaw, Poland
24.52	TFJ	12235	Reykjavik, Iceland
25.00	RNE	12000	Moscow, U.S.S.R.
25.24	TPA3	11885	Pontoise, France
25.27	W8XK	11870	Pittsburgh, Pa.
25.29	GSE	11860	Daventry, England
25.31	DJP	11855	Zeesen, Germany
25.34	OLR4A	11840	Podebrady, Czech.
25.36	W9XAA	11830	Chicago, Ill.
25.36	W2XE	11830	New York, N. Y.
25.42	JZJ	11800	Nazaki, Japan
25.45	W1XAL	11790	Boston, Mass.
25.49	DJD	11770	Zeesen, Germany
25.51	OLR4B	11760	Podebrady, Czech.
25.53	GSD	11750	Daventry, England
25.58	CJRX	11720	Winnipeg, Canada
25.60	TPA4	11718	Pontoise, France
25.60	CR7BH	11718	Lourenzo, Marques
25.62	HJ4ABA	11710	Medellin, Colombia
25.63	SBP	11705	Motala, Sweden
25.64	HP5A	11700	Panama, Pana.
26.01	SPD	11535	Warsaw, Poland
26.24	COCX	11435	Havana, Cuba
26.31	HBO	11402	Geneva, Switzerland
26.60	HIN	11280	Trujillo, D. R.
27.17	CSW	11040	Lisbon, Portugal
29.04	ORK	10330	Ruysselede, Belgium
29.35	PSH	10220	Rio de Janeiro, Brazil
30.43	EAQ	9860	Madrid, Spain
30.52	IRF	9830	Rome, Italy
30.81	CSW	9737	Lisbon, Portugal
31.06	LRX	9660	Buenos Aires, Argentina
31.09	YNLF	9650	Managua, Nicaragua
31.09	CS2WA	9650	Lisbon, Portugal
31.10	HH3W	9645	Port-au-Prince, Haiti
31.14	12RO3	9635	Rome, Italy
31.20	HJ1ABP	9616	Cartagena, Colombia
31.25	RAN	9600	Moscow, U.S.S.R.
31.28	VK6ME	9590	Perth, Australia
31.28	W3XAU	9590	Philadelphia, Pa.
31.28	VK2ME	9590	Sydney, Australia
31.28	PCJ	9590	Huizen, Holland
31.28	HP5J	9590	Panama City, Pana.
31.32	GSC	9580	Daventry, England
31.32	VK3LR	9580	Lyndhurst, Australia
31.33	HJ2ABC	9575	Cucuta, Colombia
31.35	W1XK	9570	Millis, Mass.
31.38	DJA	9560	Zeesen, Germany
31.40	TIPG	9559	San Jose, C. R.
31.41	W2XAD	9550	Schenectady, N. Y.
31.42	OLR3A	9550	Podebrady, Czech.
31.42	XEFT	9550	Veracruz, Mexico
31.45	DJN	9540	Zeesen, Germany
31.48	W2XAF	9530	Schenectady, N. Y.
31.48	LKC	9530	Jeloy, Norway
31.49	ZBW3	9525	Hong Kong, China
31.55	GSB	9510	Daventry, England
31.55	HJU	9510	Buenaventura, Colom.
31.55	VK3ME	9510	Melbourne, Australia
31.58	PRF5	9500	Rio de Janeiro, Brazil
31.82	COCH	9428	Havana, Cuba
32.12	OAX4J	9330	Lima, Peru
33.32	COBZ	9030	Havana, Cuba
34.62	COJK	8665	Camaguey, Cuba

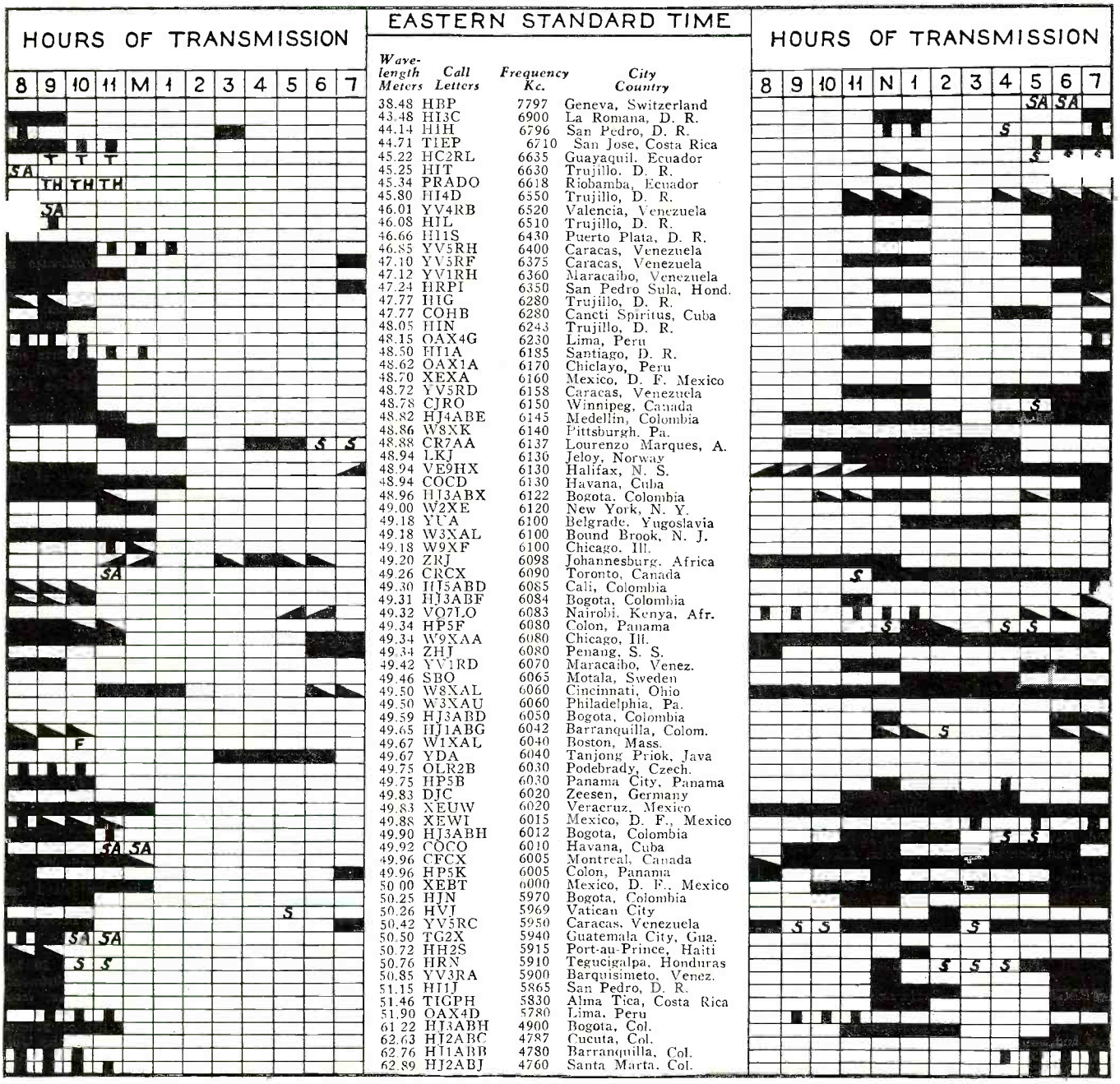
HOURS OF TRANSMISSION

8 9 10 11 N 1 2 3 4 5 6 7

WORLD SHORT WAVE TIME-TABLE

Compiled by the Editors of RADIO NEWS

Hours of transmission for the World's Short Wave Broadcast Stations



Wave-length Meters	Call Letters	Frequency Kc.	City Country
38.48	HBP	7797	Geneva, Switzerland
43.48	HI3C	6900	La Romana, D. R.
44.14	HIH	6796	San Pedro, D. R.
44.71	TIEP	6710	San Jose, Costa Rica
45.22	HC2RL	6635	Guayaquil, Ecuador
45.25	HIT	6630	Trujillo, D. R.
45.34	PRADO	6618	Riobamba, Ecuador
45.80	HI4D	6550	Trujillo, D. R.
46.01	YV4RB	6520	Valencia, Venezuela
46.08	HIL	6510	Trujillo, D. R.
46.66	HI1S	6430	Puerto Plata, D. R.
46.85	YV5RH	6400	Caracas, Venezuela
47.10	YV5RF	6375	Caracas, Venezuela
47.12	YV1RH	6360	Maracaibo, Venezuela
47.24	HRPI	6350	San Pedro Sula, Hond.
47.77	HIG	6280	Trujillo, D. R.
47.77	COHB	6280	Cancti Spiritus, Cuba
48.05	HIN	6243	Trujillo, D. R.
48.15	OAX4G	6230	Lima, Peru
48.50	HI1A	6185	Santiago, D. R.
48.62	OAX1A	6170	Chiclayo, Peru
48.70	XEXA	6160	Mexico, D. F. Mexico
48.72	YV5RD	6158	Caracas, Venezuela
48.78	CJRO	6150	Winnipeg, Canada
48.82	HJ4ABE	6145	Medellin, Colombia
48.86	W8XK	6140	Pittsburgh, Pa.
48.88	CR7AA	6137	Lourenzo Marques, A.
48.94	LKJ	6136	Jeloy, Norway
48.94	VE9HX	6130	Halifax, N. S.
48.94	COCD	6130	Havana, Cuba
48.96	HJ3ABX	6122	Bogota, Colombia
49.00	W2XE	6120	New York, N. Y.
49.18	YUA	6100	Belgrade, Yugoslavia
49.18	W3XAL	6100	Bound Brook, N. J.
49.18	W9XF	6100	Chicago, Ill.
49.20	ZRJ	6098	Johannesburg, Africa
49.26	CRCX	6090	Toronto, Canada
49.30	HJ5ABD	6085	Cali, Colombia
49.31	HJ3ABF	6084	Bogota, Colombia
49.32	VQ7LO	6083	Nairobi, Kenya, Afr.
49.34	HP5F	6080	Colon, Panama
49.34	W9XAA	6080	Chicago, Ill.
49.34	ZHJ	6080	Penang, S. S.
49.42	YV1RD	6070	Maracaibo, Venez.
49.46	SBO	6065	Motala, Sweden
49.50	W8XAL	6060	Cincinnati, Ohio
49.50	W3XAU	6060	Philadelphia, Pa.
49.59	HJ3ABD	6050	Bogota, Colombia
49.65	HJ1ABG	6042	Barranquilla, Colom.
49.67	W1XAL	6040	Boston, Mass.
49.67	YDA	6040	Tanjong Priok, Java
49.75	OLR2B	6030	Podebrady, Czech.
49.75	HP5B	6030	Panama City, Panama
49.83	DJC	6020	Zeesen, Germany
49.83	XEUW	6020	Veracruz, Mexico
49.88	XEWI	6015	Mexico, D. F., Mexico
49.90	HJ3ABH	6012	Bogota, Colombia
49.92	COCO	6010	Havana, Cuba
49.96	CFCX	6005	Montreal, Canada
49.96	HP5K	6005	Colon, Panama
50.00	XEBT	6000	Mexico, D. F., Mexico
50.25	HJN	5970	Bogota, Colombia
50.26	HVJ	5969	Vatican City
50.42	YV5RC	5950	Caracas, Venezuela
50.50	TG2X	5940	Guatemala City, Gua.
50.72	HH2S	5915	Port-au-Prince, Haiti
50.76	HRN	5910	Tegucigalpa, Honduras
50.85	YV3RA	5900	Barquisimeto, Venez.
51.15	HI1J	5865	San Pedro, D. R.
51.46	TIGPH	5830	Alma Tica, Costa Rica
51.90	OAX4D	5780	Lima, Peru
61.22	HJ3ABH	4900	Bogota, Col.
62.63	HJ2ABC	4787	Cucuta, Col.
62.76	HI1ABB	4780	Barranquilla, Col.
62.89	HJ2ABJ	4760	Santa Marta, Col.

LIST OF SYMBOLS

S—Sunday

M—Monday

T—Tuesday

W—Wednesday

Th—Thursday

F—Friday

SA—Saturday

SS—Saturday, Sunday

—Daily

—Irregular

—Daily Except Sunday

—Daily Except Saturday, Sunday

SHORT WAVE FLASHES

BY CHARLES A. MORRISON

and JOHN D. CLARK

IN order to give complete and useful information, two authorities on short wave conduct this column. Charles A. Morrison supplies information of interest to readers everywhere in his section entitled *Short Wave Flashes—General.* All frequencies in Mr. Morrison's column are in *megacycles* and all time is *Eastern Standard Time.*

John D. Clark conducts his column specifically for short wave listeners residing on the Pacific Coast, where reception differs considerably from the rest of the United States east of the Rockies. Mr. Clark's data is based on reports from listeners in all parts of the Pacific Coast area. In this section of *Short Wave Flashes* entitled *Short Waves for West Coast DX'ers,* all frequencies are also given in *megacycles* but all time is *Pacific Standard Time,* for the West Coast short wave listeners.

SHORT WAVE FLASHES—GENERAL

by CHARLES A. MORRISON

(All Times are EASTERN STANDARD)

Short Wave International Friendship Programs

Saturday. September 24th. from 9:00 to 10:00 p.m., over HP5A (9.604), *Panama City, Panama.*

Saturday, December 4th, from 9:00 to 10:00 p.m., over HJ7ABD (9.63), *Bucaramanga, Colombia.*

Return Postage Bureau

Dx'er J. L. Steele, has organized a Return Postage Bureau, as a non-profit service to provide short-wave listeners with foreign stamps of postal card rate for prepaying return postage on any SWL cards, QSL cards, or verifications in card form. This service saves much expense over the conventional international reply coupon and is much less trouble to all concerned. The initial price list of stamps available is as follows: 2 for 5c. Canada, Cuba, D.R.; 3c each, England and Mexico; 4c each, Chile, Peru, Belgium and Switzerland; 2 for 9c, Newfoundland, Labrador, Egypt; 5c each, Antigua, Barbados, British Honduras, Jamaica, Wales, Trinidad, Uruguay, Scotland, North Ireland, Dutch East Indies; 6c each, India and Netherlands; 6 for 26c, Australia (5c each).

Many other countries are to be added to the above list soon. Postage paid on orders of 50c or over. Address all communications to Return Postage Bureau, P. O. Box 733, Denville, New Jersey.

New Short-Wave Stations

(On the Air)

BELGIAN CONGO—Radio Leo (6.14), owned by two Jesuit priests, Fathers Comeliau and Mols, at 7 Avenue Lippens, *Leopoldville,* operates Sundays and holidays from 5:35 to 7:00 a.m. with a power of 25 watts.

CHINA—A *Shanghai* commercial phone on 15.46, probably controlled by the Japanese, works JVE, Nazaki, Japan, daily from 4:00 to 6:00 a.m.

COSTA RICA—TIEMT (10.08), "Radio El Mundo," P. O. Box 1049, *San Jose,* relays TIEM daily from 4:30 p.m. to midnight or later. Announcements in English are made frequently. Identifying signals include chimes, bugle calls, the starting of a train and a clock striking the hours.

GOLD COAST—Experimental short-wave transmissions are being conducted at *Acora* to determine the feasibility of establishing a powerful station there.

GUATEMALA—TGWB (6.04), power 1 kw, is now relaying broadcast station TGW weekdays from 7:40 to 8:40 a.m., 12:45 to 3:30, and 7:00 p.m. to 12:30 a.m.; Sundays from 10:30 a.m. to 4:00 a.m., and from 7:00 p.m. to 12:15 a.m.

INDIA—VUM (4.85), *Madras,* is now on the air and broadcasts news in English, daily at 10:45 a.m. EST.

IRAQ—A 500 watt transmitter at *Baghdad,* owned by King Ghazi, is operating about four nights a week, on a frequency of 7.11.

ITALIAN SOMALILAND—"Radio Mogadisjoe" (8.875), is being heard with excellent signals, Sundays from 8:30 to 9:30 a.m., according to J. H. A. Hardeman of Balikpapan, Borneo.

PAPUA—Ashley Walcott of San Francisco, reports VHPM of *Port Moresby,* testing from 5:30 to 6:30 a.m. on frequencies of 6.54 and 8.08.

SIAM—A new station at *Saladeng, Bangkok,* operating on a frequency of 6.11, broadcasts all Siamese programs each Wednesday from 6:30 to 9:30 a.m. The interval signal is a series of six chimes.

SUMATRA—YDX, new 500 watt station of the N1ROM at *Medan,* is now rebroadcasting the programs of PMN or YDC, on frequencies of 8.09 and 5.175, the latter one being in use daily from 8:30 to 10:30 a.m.

TRIPOLI—IQN (9.46), a new 5 kw transmitter at *Tripoli,* is rebroadcasting programs of the Italian network irregularly.

TURKEY—C. Hartzell of Jeanette, Pennsylvania, reports hearing the new *Ankara* station on 15.195, daily after 1:30 p.m., with best reception from 3:45 to 4:15 p.m.

U. S. S. R.—The mysterious station on 15.18, that had so many listeners guessing, has now been definitely identified as a *Moscow* transmitter. Hours of operation are daily from 3:00 to 4:00 p.m. A clock strikes the hour of midnight at 4:00 p.m., after which the "Internationale" is played as a signature selection. The station relays RKI irregularly.

(Under Construction)

CHILE—The Society "La Cooperative Vitalicia" of *Valparaiso,* is building a 1000 watt short-wave station which will operate on 15.1, under the call CB1510.

CHINA—The government is building a powerful 35,000 watt short-wave station at a secret location.

ETHIOPIA—The Italian government is installing a 10 kw short-wave transmitter at *Addis Ababa,* and proposes to raise the power of IQN in *Tripoli* to 50.000 watts.

GUATEMALA—"TACA" (Transportes Aereos Centro Americanos, Ltd.) is constructing a short-wave station to operate on 5.61, with the call TGT5, at its airport at *Flores.*

INDIA—VUD4, a second 5 kw short-wave transmitter, now being installed by All-India Radio at *Delhi,* will soon be inaugurated. During daylight hours the station will operate on 15.29, and at night on 9.55.

IRELAND—The new short-wave station under construction at *Athlone* will operate on the following frequencies when completed. 17.84, 15.12, 11.74, 9.595 and 6.19 mc's.

MOZAMBIQUE—The Radio Club de Mozambique, at *Laurenco Marques,* will soon put a new 600 watt transmitter into operation on 3.49, or 6.137.

Notes of Interest

ARGENTINA—Harold Amers of Pomona, Calif., states that a verification from LRU, "Radio El Mundo," *Buenos Aires,* gives the frequency of the station as 15.28, rather than 15.29 as it is shown in most lists.

BULGARIA—The transmissions of LZA (8.465), *Sofia,* have been suspended, since this transmitter is to be used hereafter for commercial radio-telegraphy purposes only. However, a 20 kw government short-wave transmitter now under construction will inaugurate a regular broadcasting service early in 1939.

COSTA RICA—Your columnist has been honored by radio pioneer Amando Cespedes Marin of TI4NRH, *Heredia,* in that he has been made a "Caballero" of the NRH Fraternal Order and in recognition of this fact has received a handsome silver medal engraved in gold and suspended from the red, white, and blue ribbon of Costa Rica. Senor Marin received over 4,000 reports from all parts of the world during the course of his 10th Anniversary celebrations for TI4NRH during May.

CUBA—Manuel Andrew, Jr., announcer of COCO (6.01), set a new world's record for radio announcing when he talked continuously for 107 hours, commencing on May 21.

CURACAO—PJC2 (9.09) now operates daily from 6:36 to 8:36 p.m. Reports should be sent to J. P. Curiel, Mondo Nobo 143, *Willemstad, Curacao, N.W.I.*

ETHIOPIA—The power of "Radio Addis Ababa" (9.6) of *Addis Ababa,* may soon be increased to 10 kw, at which time the station will also be assigned an additional frequency in the 25 meter band.

HAWAII—A 20 watt short-wave transmitter has been installed aboard Pan American Airway Company's launch "Panair," which is moored at *Pearl City, Oahu,* to serve approaching and departing clipper ships. A frequency of 2.986 will be utilized.

HONG KONG—Harry Honda of Los Angeles, Calif., reports hearing ZBW4 (15.18), *Hong Kong,* signing off at 1:30 a.m.

JAPAN—JVH (14.6) *Nazaki,* broadcasts irregularly until midnight or after.

MARTINIQUE—The greatly improved signal strength on transmissions from "Radio Martinique" (9.7), Fort-de-France, would seem to indicate a boost in power for this station.

PANAMA—All correct reception reports sent direct to HP5A (11.7) of *Panama City,* will now be promptly verified according to advice from that station.

PERU—OAX4G (6.298) of *Lima,* is now on the air again.

PORTUGAL—CSW4 (15.1), a new frequency for the government station at *Lisbon,* is being heard irregularly mornings. The power of this station may soon be boosted to 50 kw.

STRAITS SETTLEMENT—ZHP, *Singapore,* is being heard daily to 9:40 a.m. on a new frequency of 9.69 megs.

SOUTH AFRICA—ZRH (9.523), *Roberts Heights,* is again broadcasting setting-up exercises nightly from 11:45 p.m. to 12:45 a.m.

SWITZERLAND—HBL (9.345), is reported to be broadcasting Sundays from 8:00 to 8:45 p.m.

SWEDEN—SBP (11.705), *Motala,* is being heard Sundays as late as 4:15 p.m.

UNITED STATES—Louis Ambrosius of Louisville, Kentucky, writes that WAY (2.52), Public Coastal Station at *Lake Bluff, Ill.,* can be heard evenings contacting the Yacht Mizpah. KFZT (2.118 or 2.738); the yacht Mako, WOGK (same frequencies) and other lake steamers as a relay station for telephone contacts.

The only communication between *Isle Royale* in Lake Superior and the mainland is furnished by a short-wave link between National Park Service transmitters, WSHB (50 watts) at *Houghton, Michigan,* and WSHC (30 watts) on *Mott Island.* Small supplementary transmitters are also installed aboard the two 72 foot Coast Guard Cutters which furnish transportation between island and shore. All stations in the network work on 3.235 and regular schedules are kept at 8:30, 11:00 a.m., 3:00, 5:00 and 8:00 p.m., and irregularly as emergencies arise.

Construction has started on the new 20 kw General Electric short-wave station at *Belmont, California,* and preliminary transmitter tests should begin early in 1939.

W4XAD, owned by the University of Florida at *Gainesville,* and W8XNR, owned by the University of Michigan, may be heard testing irregularly on 12.86.

Transmissions of Interest

Sundays—12:00 to 12:30 a.m., "Voice of Hawaii," over KHE (17.95) or KQH (14.92), of *Kahuku, Hawaii;* 6:00 to 6:30 p.m., "Hawaii Calls," over KQH (14.92) of *Kahuku, Hawaii.*

Mondays—8:00 to 8:30 p.m., "Brazil on the Air," over PSH (10.22) of *Rio de Janeiro, Brazil.*

Wednesdays and Saturdays—8:00 to 9:00 p.m., special program for Swedish nationals in North America, over SBP (11.705) of *Motala, Sweden.*

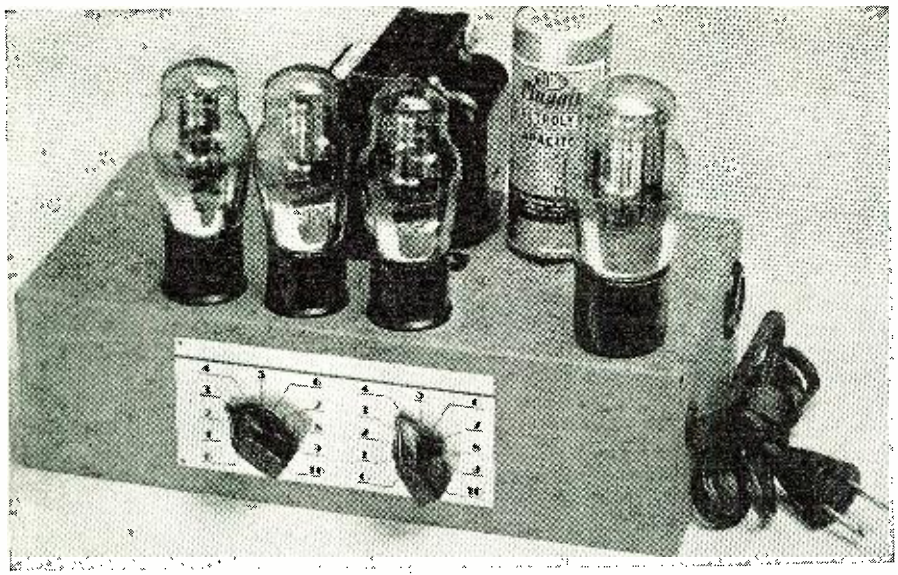
Revised Schedules

ENGLAND—GSE (11.86), daily 1:00 to 3:15 a.m.

(*Tune in on page* 47)

LICK THAT *QRM* WITH THE RADIO NEWS VOX System

by LOUIS J. GAMACHE, W9RGL
Chicago, Ill.



The *VOX System* is simplicity itself. While the laboratory model is mounted on a separate chassis, there is no reason why this unit cannot be built into the xmtr.

The answer to the ham's prayer for a duplex QSO without tieing up the band. We foretell that the *VOX System* will become very popular in the near future.

WITH the advent of more QRM in the ham bands plus the skip and fading that has been more than usually present these last few months, quick "breakin" for 'phone or even CW use has become almost a necessity. Many ham installations are so equipped, but then there has always been a mess of switches to throw and the ability of getting at them quickly. In a rapid breakin QSO the switches "smoked" with their continuous "on-and-off," and the average ham soon got to the point that he did not care to use that type of contact. I became determined to find a way out of the difficulties of throwing switches and evolve—if I could—a system that would permit "lazy-man" operation and yet be fool proof and sure-acting.

Looking over some old manuals and magazines, I came across a voice controlled relay which with modifications became what I have chosen to call a *VOX System.* The word *VOX* stands for "Voice Operated Xmtr" and is also the Latin word for "voice." After building a few of the circuits I finally designed the one here presented which does and will work.

One of the features is that the one relay in the *VOX* system will be all that will be needed to operate the transmitter and the receiver. Formerly one had to be careful not to have the transmitter Class B audio power go on before the final load, but experimentation with this rig proved that the whole transmitter can be shut off or turned on at will without anything in it being changed except the 866 rectifiers, if you happen to use them.

The 866 tube will not stand the gaff of being turned on and off as rapidly with the voice on a kilowatt rig, as will a pair of 866A's or any rectifiers with shielded filaments. For lower powered transmitters, the only concern that the amateur must have is for the rectifiers, and it will soon become apparent whether or not those in the rig will "take it."

There are many ship's owners that are having ship-to-shore systems installed in their boats to whom this little gadget offers a solution towards conducting a real telephone conversation with the other fellow. And for those hams who like "duplex," the gadget makes this possible without tieing up two spots in the band with a continuous carrier. One has merely to talk and listen whenever one wants the other person to transmit. Recently I had a QSO with another ham using this type of system, and the results were similar to a duplex and far more interesting.

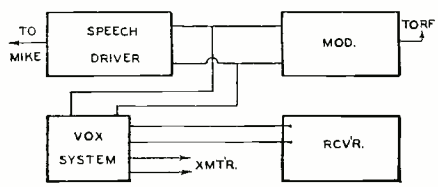
The unit employs a 37 tube as an amplifier and isolator, coupled to an 885 gas discharge tube which, in turn, controls the bias on the 37 tube to operate the relay. Approximately ½ volt of energy is required across the input terminals. The unit may be coupled with a condenser to one of the speech amplifier tubes.

If 37 tubes are not available, 76's or even 56's may be used without much change in the circuit, excepting that the 56's will re- 2.5 v. a.c. for the filaments. I found that the 37 tubes had just the right amount of gain and stability to operate perfectly and hence my choice of them.

The circuit is a simple one and the input may be connected across the 500 ohm output line of the speech amplifier where it goes to the modulators, or else the input may be connected in series with the plates of any one of the speech tubes. Of course, for operation it will be necessary for the speech always to be on with means to remove the power from the modulators and r.f. section of the transmitter. Most hams prefer to cut the power in the a.c. primary circuit, although it can be done in the B— side of the power supply. In this latter case it would be well to use a separate relay to prevent the high voltage, which might be lethal, from being present in the *VOX System* housing. I am sure that there must be as many ways of connecting this little system as there are different types of rigs.

Lay out a bent chassis similar to the one used in the model I built, or a standard chassis 5" x 10" x 3" may be purchased. In experimentation, it was found advisable to isolate the power 80 tube and its associated circuits from the rest of the *VOX System* in order not to pick up too much hum which itself might throw the transmitter on. This was done by locating that tube and its power transformer to the extreme right of the chassis while the other three tubes are located on the left-hand side.

Punch out holes for the tube sockets following the photograph, and also punch out the hole for a socket for the Pluggin condenser and transformer. A Pluggin condenser was used in the filter circuit because of the wide variation in amount of ripple which is present in different transformers and hook-ups. I first used only 8 mfd. but found that 16 mfd. would be necessary. It was a simple matter to pull



Block diagram of the *VOX System.*

the 8 mfd. and install the 16 mfd. (made up of two 8 mfd.) condenser.

Once the holes are drilled and punched out, the filament leads should be wired in, being sure to use or make twisted wires so as to have the hum cancel out. After the filament leads are wired in, the power circuit should be wired in complete. It should then be tested and if the voltage rises above 300 volts d.c., provision for a bleeder (R_{14}) and tapping of that bleeder should be arranged for. The *VOX System* operates on exactly 250 v. d.c. under full load, and more than that will make for unstable operation of the 885 gaseous discharge tube.

Once the power has been assembled and tested, the entire plate circuit should be wired in. Care should be taken to see that there is suitable and good insulation on this wire at all places and it should not be laid up against the chassis without making certain that the insulation is sufficient not to break down at the high potential which might appear there, should the relay short over to the chassis. The use of good insulation in this circuit will be the saving of many a shock and perhaps the ruination of the equipment.

The two audio transformers should next be located "below deck". They should be placed at right angles to each other and in such a position that there is a minimum of magnetic feedback between them at all times. Remember that any audio howl will serve to throw the transmitter on and interrupt a QSO.

After completing the placement of the transformers, the audio circuit should be wired in.

Care should be taken to see that the respective input and output circuits of the audio end be kept carefully separated in order to reduce feedback.

If the circuit has been carefully wired in, the *VOX System* is now ready for a test. Do not connect into the transmitter-receiver circuit yet. Connect power input to electric light lines, and replace the relay with a 0-100 ma. meter in series with a 10,000 ohm resistor. Turn on unit. The meter should read between 20 and 25 ma. with the input to the first 37 set for the minimum gain or "ground" setting.

Open up the *VOX System* gain to a point about 60% of full. The meter needle should remain stationary. Should it oscillate either slowly or fast then the cathode resistor in the 885 will have to be varied until the needle stays at its original reading. The value I used was 5,000 ohms, however, checks showed that wide variations may be expected in the cathode 885 resistor, and values between 3,000 and 10,000 ohms are not unusual. All voltages should be checked with a voltmeter to the plates of the three tubes. In no case should it exceed 250 v. d.c. In the event that the voltage does exceed that figure, then the bleeder mentioned above must be made use of, tapping down from the positive end until the proper voltage is found.

Assuming that everything is now O.K., the input should be connected to the input to the modulators. If that input is 500 ohms, the input of the *VOX System* can be connected across the line; if the input is a coupling transformer, experiments should be made to determine whether the audio output is lowered by connecting it in series with the modulator input transformer *primary*, or across that input transformer *primary*. Which ever way gives the lowest loss in audio is the proper one.

Having found that position, a test should be made by speaking into the microphone with the speech turned on, but the rest of the transmitter turned off, and the meter and resistor still in the plate circuit of the final *VOX System* 37 tube. If everything is functioning properly, the meter should drop immediately to 0 ma. when the microphone is activated. Some of the values which will also work, are up to 7 ma. When speech is stopped, the meter should gradually rise to its original value again. By varying the resistance in the grid circuit of the 37 with the six point switch, the mount of lag present in the time before the transmitter is put on the air can be effected. Time delay can be made from instantaneous to over 20 seconds with the resistors mentioned in the circuit diagram. If more delay is wanted, the final resistor of 10 megohms can be increased to 20 or 30 megohms with a corresponding increase in time delay.

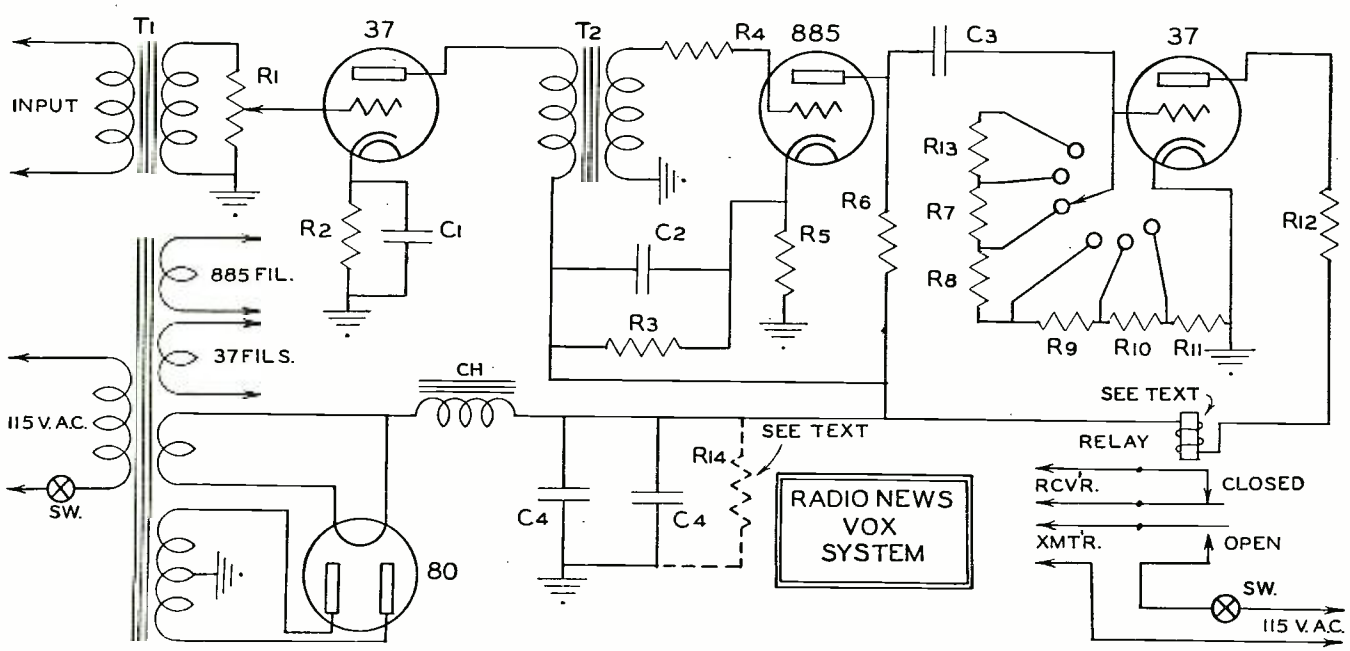
If everything checks O.K., the meter may be removed and the relay inserted into the circuit and tested. It should, if the directions are followed herein, function perfectly.

The *VOX System* can now be connected into the receiver and transmitter circuit. Two conditions generally prevail at the average ham's station. He either uses the same antenna for transmitting and receiving, or a separate antenna for receiving. In the former case a separate relay will be needed to throw the antenna from receive to transmit. This can be actuated by the heavy side of the *VOX System* relay so that when the transmitter is thrown on the air the antenna relay throws to transmit position. No trouble with the receiver in this case will be experienced. It is when a separate antenna is used that some trouble might develop. The receiver may howl,

(*Listen in on page* 52)

Component parts for the *VOX System*.

R_1—250,000 ohms pot.
R_2—3000 ohms ½ w.
R_3—0.5 megohms ½ w.
R_4—0.5 megohms ½ w.
R_5—5000 ohms 1 w.
R_6—30,000 ohms 1 w.
R_7—2 megohms ¼ w.
R_8—2 megohms ¼ w.
R_9—2 megohms ¼ w.
R_{10}—2 megohms ¼ w.
R_{11}—2 megohms ¼ w.
R_{12}—10,000 ohms 2 w.
R_{13}—10 megohms, ¼ w.
R_{14}—25,000 ohms 10 w. adj.
C_1—10 mfd. 25v. electro.
C_2—1 mfd. 450v. paper
C_3—0.1 mfd. 450v. electro.
C_4—8-8 mfd. 450v. electro. (Tobe 'Pluggin')
CH—30 hy choke (Stancor C-1706)
RY—D.P.D.T. Relay: To make one and to break one. (Pull in at 15ma, drop out at 10ma.) (Guardian Type 15-1000 A2-B3)
T_1—Audio 3:1 (3000 ohm primary). (Stancor A-53)
T_2—Same as T_1
T_3—6.3v. AC, 2.5v. AC, 5v. AC, 250v. DC from filter. (Stancor P-4045)
SW—Ac switch on R_1



Power Pack: Transformer Design

by L. J. GAMACHE & H. H. KREFFT
Engineers, Standard Transformer Corp., Chicago, Ill.

The authors discuss the necessities of transformer design and how a good unit is engineered. There are still a great number of amateurs and servicemen who wind their own to whom this article will be of value.

THE main elements in a power pack are the transformer, the rectifier, the filter, and the voltage divider. This article deals with the power transformer of the power supply.

It might be well at this time to explain the action of a power transformer. It is a device containing a primary, one or more secondaries, and an iron core. The design of a power transformer having high efficiency requires elaborate calculations and takes into account the d.c. flowing in a transformer secondary, when the full wave or half-wave rectifier is used. However, in a bridge rectifier, the d.c. does not flow in the secondary of the transformer.

The transformers used in power packs range in three sizes; small, medium, and large. The small and medium are by far the most popular because of the greater number of applications for these types. In the design of transformers, economy is secured when the windings are enclosed in a magnetic core area, with a minimum of wire and the shortest possible magnetic path.

The core form used in these transformers with the greatest overall economy is one which employs lamination which is called "wasteless," i.e., the opening of the "E" pieces are equal to the "I" pieces. In this way, two "E" pieces and two "I" pieces are stamped in one operation, utilizing the greatest percentage of metal and wasting very little steel (Figure 1). After the stamping, or blanking as it might be called, the iron is annealed. This is a complicated procedure and cannot be described fully at this time. During this process, each lamination is coated with a metallic oxide which acts to insulate it electrically. When this iron is stacked in the core, each lamination acts as a separate piece of iron and reduces the mass in a unit. Should this insulation between laminations be broken by stamping or otherwise, this would cause the unit to generate a great amount of heat, resulting in a burn-out. From this, will be seen that insulation of laminations plays a vital part in transformer design.

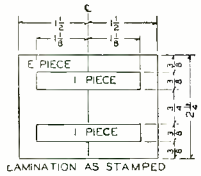


Fig. 1

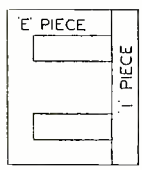


Fig. 2

Lamination steel may be obtained under the following commercial names: Dynamo; Super-Dynamo; Armature Steel; Radio Transformer (RT); Allegheny, A, B, and C; Electric grade; Dynamo special; Audio transformer, A, B, and C; Allegheny 88; Allegheny metal 44, 33, 65, 55; and Ohmaloy. The characteristics of these steels are contained in a chart supplied by the various manufacturers of steel.

Permeability is the ratio between the magnetic induction and the field strength. In air this ratio is unity. In Paramagnetic material, the Permeability is greater than unity. In Ferromagnetic material, it may have a value of several thousand, and in Diamagnetic material, it is a value of less than unity.

The unit of magnetic pole strength is a magnetic pole of such a value that when placed one centimeter from a like pole, a force of repulsion of 1 dyne will exist between them. The magnetic pole strength of any pole is measured in terms of this unit, the dyne.

The following steps are used in designing a power transformer:

(1) Determine the voltage and amperes in each secondary.

(a) To find the total wattage of all of the secondary windings, multiply the load voltage by the load current of each of the windings and add the results.

(b) Assuming that the small transformer will have approximately 90% efficiency, divide the wattage found in A by .9, which will give the approximate primary wattage.

(c) To find the primary current:

$$I_p \text{ equals } \frac{W_p}{E_p \times 0.9} \text{ equals } \frac{W_s}{9.81\,E_p}$$

Whereas: I_p equals Primary current. W_p equals Primary watts. E_p equals Primary Voltage. W_s equals Watts per second.

(2) The current of the windings being known from our previous calculations, and using a current density of 1 ampere for 1000 cir. mils., the copper wire is determined (d^2). One mil equals 0.001.

Therefore, the following are typical examples:

No. 20 wire has a diameter of .0319 inches. This value squared will give 1022 cir. mils. Another example: No. 30 wire has a diameter of .01003 and has 100.5 cir. mils. Using No. 10 wire, it is found that the diameter is .1019 inches. This squared is 10,380 cir. mils. These values are for bare wire at a temperature of 68° F. or 20° C. This is the temperature to which all measurements are converted.

With this information, it is possible to determine the current carrying capacity of windings on a transformer where the specifications have been lost or misplaced. However, in the design of a new transformer, it is easier to obtain this information from a wire chart.

An example of using a current density of 1 ampere for 1000 cir. mils. is No. 20 wire, which has a diameter of .03196 inches, and 1022 c.m. The closest wire size to this is either 1288 c.m. for No. 19, or 810 c.m. for No. 21.

(3) Iron or Core Consideration.

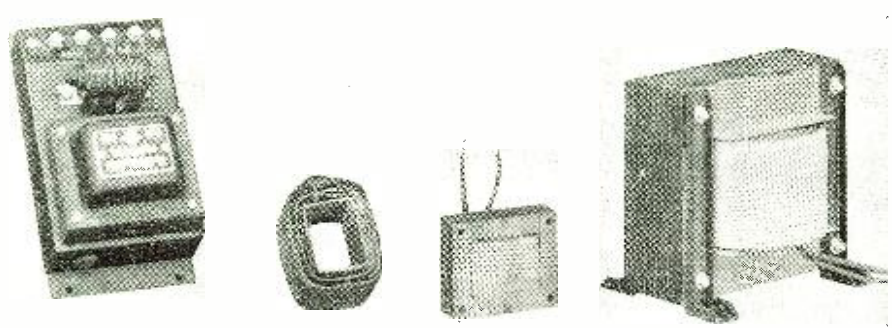
The following may be used as an example. For No. 26 RT iron, 40 watts should have 1 square inch of core area; 70 watts 1½ square inches, and 120 watts 2 square inches. The core area is determined by the size of the center leg of the "E" piece multiplied by the stack of this iron. Assuming the center leg of the "E" piece to be 1", this stacked 1" would give a square area of 1". The same stacked 1½" would give a square core area of 1½".

The above is gross core area which must be multiplied by .9 because there is a loss of approximately 10% in the net area from gross stacking area. This core area is needed before the turns per volt may be determined. See Chart.

(4) Induction and Core Losses.

Assuming 65,000 lines to be the flux density used with No. 26 (RT) gauge Armco radio grade lamination, it is found, by referring to the chart, that the core loss in approximately .6 watts per pound of iron.

(*Design further on page* 56)

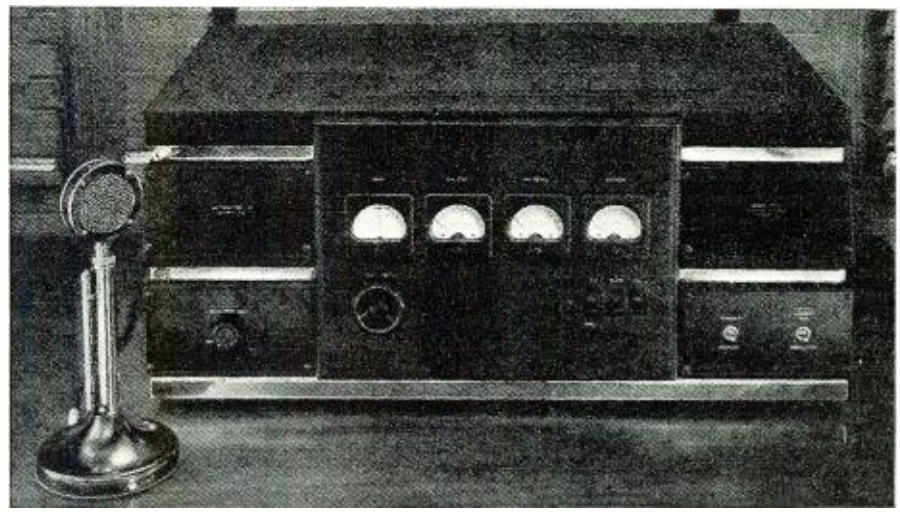


Illustrating the various steps from the coil to the finished transformer. A d.c. power pack which uses one of this type of transformers is shown to the far left.

A Versatile 50 w. Bandswitch Transmitter

by R. E. SAMUELSON and R. J. HIGGINS, W9AIO
Engineering Dept., The Hallicrafters, Inc., Chicago, Ill.

While many amateurs are able to build complex transmitters, there are those who feel that the manufactured product will serve them better. The authors describe the engineering principles underlying the design of such a unit.



Commercial in appearance, the bandswitching transmitter is easy to operate.

THERE was a time when most amateurs built their own receivers—in fact some of them still do. But with the ever increasing complexity of circuits, the amateur has concluded that it's cheaper in the long run to buy his receiver instead of building it. A transmitter should fall into the same category.

If the "service area" requirements for amateur transmitters were as standardized as those applying to broadcast transmitter installations, the problem of choosing a tube complement to deliver a certain signal at a given point would be easy to solve.

"Service Area" for an amateur transmitter must take into account considerations almost opposite to those imposed in broadcast practice. True — the amateur user, especially in operating the unit on the lower frequencies, likes to make a big noise locally, but in every instance he would sacrifice local signal strength if he could lay an R9 signal into some remote corner of the globe.

Field strength measurements then, for the amateur, are of no further interest than a determination of his radiation pattern in hopes of analysis for making the most of the direction in which the lobes occur.

Taking into consideration all of the normal requirements for satisfactory amateur coverage, a 50 watt fone carrier and 100 watts of c. w. are estimated as being capable of really going places.

After having satisfactorily settled the performance characteristics of the transmitter, the actual design of the unit can be undertaken. Numerous combinations of circuits and tubes are capable of giving the desired results, but at this point it is apparent that "engineering" means more than merely drawing a circuit diagram.

Initial tube cost should be kept low in view of maintenance cost over a period of years. Tubes should be run within the manufacturer's ratings to assure satisfactory tube life and performance stability. Operating all components at, or lower than their ratings saves both the operator and the manufacturer considerable grief over a period of time.

In the transmitter being described, an RK47 was chosen as the output tube. The RK47 can be operated at high frequencies without being neutralized—extremely good stability is obtained on 10 meters with the final stage operating as a straight amplifier.

Concerning that decision we might review the manufacturers ratings. The tube is rated at 50 watts output at 900 volts on the plate. Higher output can be safely obtained for telegraphy by raising the plate voltage to 1,250. The grid driving power requirement is very low—approximately 1 watt is all that is necessary for full output. Herein lies the greatest advantage because it will permit the use of low power tubes in both the oscillator and driver stages. Meeting the power supply requirements for low power tubes is both convenient as well as economical. Compact layout and reduction of band switching difficulties are two factors that should be given both of the above considerations.

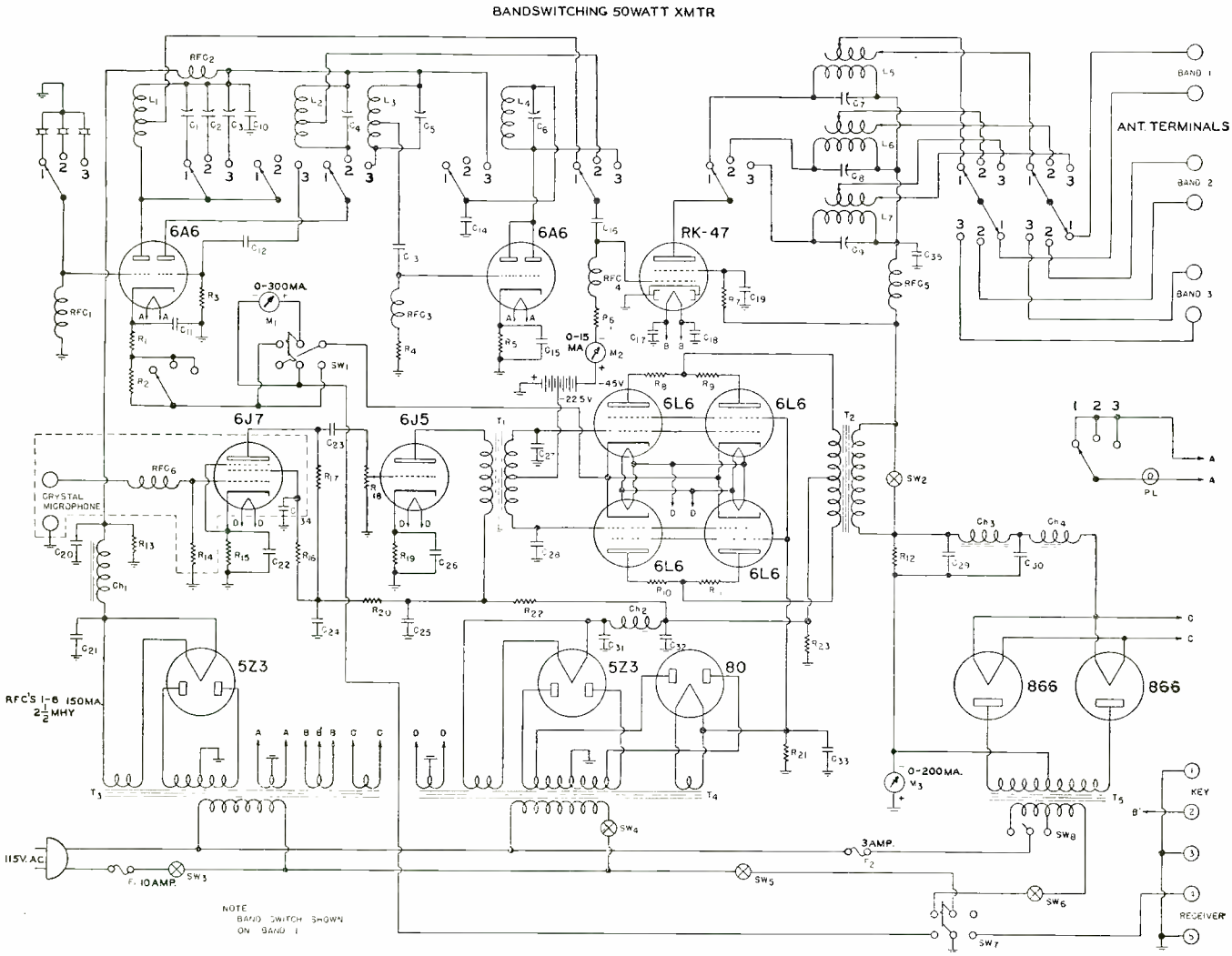
Over a period of years the 6A6 tube has demonstrated its reliability as a crystal oscillator. Crystal current is kept at a minimum. Considering the fact that the second triode section can be used as a doubler and still have these two functions performed by one tube recommends it as being a logical choice. For 10 meter operation another 6A6 tube is used with the grids and plates of both triode sections tied together.

From the point of economical tube replacement it was decided to utilize receiving tubes wherever it was possible. With the exception of the 866 high-voltage rectifier tubes and the Raytheon RK47 final amplifier, all tubes are of the receiving type.

The four 6L6 tubes in the modulator are operated class AB1. Operating the tubes in that class of service reduces the driving requirements to where the output of a 6J5 tube is ample to swing the modulator to full output. Two 6L6's running Class AB1 are rated at 32 to 34 watts output before they start to draw grid current. This output for two tubes, by the way, is that obtained under ideal conditions—zero regulations power supplies and no loss in the output transformer. Four 6L6's are used in this transmitter so that the necessary 50 watts of audio can be secured with ample power left in reserve. From zero to full signal the screen current of four tubes swings from 9 mills to about 35 ma. Obviously, any attempt to secure screen voltage by means of a dropping resistor would mean a loss in power output. Even if a heavy bleeder is used, and the screen voltage obtained from a tap, the screen voltage will drop 50 volts or more on full signal output. As a result the maximum obtainable signal would be below 35 watts. Any attempt to use a high initial screen voltage and allow it to drop to normal voltage under full signal will mean that the plate current and dissipation will be too high. A simple solution is shown in the schematic. A separate 80 rectifier is used for supplying 6L6 screen voltage. Voltage is secured by tapping the 5Z3 plate transformer. Because of the low current drain a single 8 mfd. condenser suffices for filtering.

Push pull parallel operation of tubes is usually fraught with difficulty in the form of oscillation. A small resistor in each plate lead and a small mica condenser across each half of the input transformer completely stabilizes the operation of the modulator and effects a balance so that each tube is taking its share of the load. The result is that the modulator delivers 50 watts of distortionless audio—enough

(*Please QSY to page* 38)



Circuit Diagram of the Versatile Bandswitching 50w. Transmitter.

R_1—*400 ohms, 10 w.*
R_2—*1,500 ohms, 10 w.*
R_3—*20,000 ohms, 2 w.*
R_4—*10,000 ohms, 2 w.*
R_5—*400 ohms, 10 w.*
R_6—*10,000 ohms, 10 w.*
R_7—*20,000 ohms, 50 w.—adjustable*
R_8—*50 ohms, ½ w.*
R_9—*50 ohms, ½ w.*
R_{10}—*50 ohms, ½ w.*
R_{11}—*50 ohms, ½ w.*
R_{12}—*40,000 ohms, 100 w.*
R_{13}—*40,000 ohms, 20 w.*
R_{14}—*5 meg. ohms, ¼ w.*
R_{15}—*1,000 ohms, ½ w.*
R_{16}—*1 meg., 1 w.*
R_{17}—*250,000 ohms, 1 w.*
R_{18}—*500,000 ohms potentiometer—25-031*
R_{19}—*1,000 ohms, ½ w.*
R_{20}—*50,000 ohms, 2 w.*
R_{21}—*75,000 ohms, 2 w.*
R_{22}—*20,000 ohms, 2 w.*
R_{23}—*40,000 ohms, 20 w.*
C_1—*100 mmf.*
C_2—*100 mmf.*
C_3—*100 mmf.*
C_4—*100 mmf.*
C_5—*100 mmf.*
C_6—*35 mmf.*
C_7—*50 mmf.*
C_8—*50 mmf.*
C_9—*50 mmf.*
C_{10}—*.002 mf., 900 v. mica*
C_{11}—*.002 mf., 900 v. mica*
C_{12}—*.00005 mf., 900 v. mica*
C_{13}—*.0002 mf., 900 v. mica*
C_{14}—*.002 mfd., 1,000 v. mica*
C_{15}—*.002 mfd., 1,000 v. mica*
C_{16}—*.0002 mfd., 1,000 v. mica*
C_{17}—*.006 mfd., 1,000 v. mica*
C_{18}—*.006 mfd., 1,000 v. mica*
C_{19}—*.002 mfd., 2,500 v. mica*
C_{20}—*.8 mfd., 600 v. electro.*
C_{21}—*8 mfd., 600 v. electro.*
C_{22}—*10 mfd., 25 v. electro.*
C_{23}—*.05 mfd., 600 v. electro.*
C_{24}—*4 mfd., 475 v. electro.*
C_{25}—*4 mfd., 475 v. electro.*
C_{26}—*10 mfd., 25 v. electro.*
C_{27}—*.001, 600 v. mica*
C_{28}—*.001, 600 v. mica*
C_{29}—*4 mfd., 1,500 v. mica*
C_{30}—*2 mfd., 1,500 v. mica*
C_{31}—*8 mfd., 600 v. mica*
C_{32}—*8 mfd., 600 v. mica*
C_{33}—*8 mfd., 475 v. mica*
C_{34}—*.1 mfd., 600 v. mica*
C_{35}—*.002 mfd., 2,500 v. mica*
L_1—*40 meter osc. coil, Hallicrafters 51-130*
L_2—*20 meter doubler coil, Hallicrafters 51-131*
L_3—*20 meter doubler coil, Hallicrafters 41-132*
L_4—*10 meter doubler coil, Hallicrafters 51-133*
L_5—*40 meter output coil*
L_6—*20 meter output coil*
L_7—*10 meter output coil*
T_1—*Interstage transformer*
T_2—*Modulation transformer*
T_3—*Exciter power transformer*
T_4—*Modulator power transformer*
T_5—*Plate transformer*
Ch_1 to Ch_4—*15 henry choke*
SW_1—*Meter switch*
SW_2—*Phone—CW switch*
SW_3—*Filament switch*
SW_4—*Modulator switch (on R18)*
SW_5—*Plate power switch*
SW_6—*Plate power interlock*
SW_7—*Standby switch*
SW_8—*High-low power switch*

Current and Voltage Readings for Checking Operation.

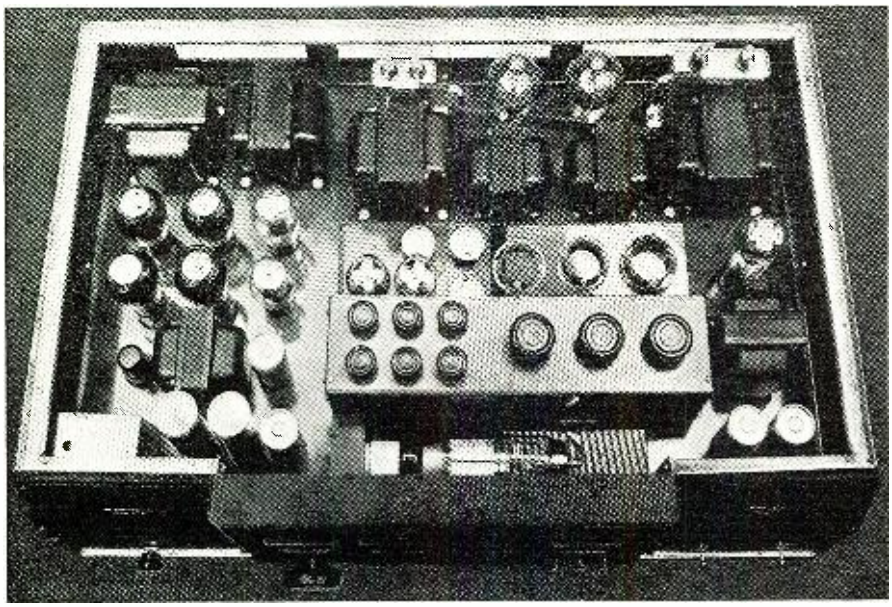
Representative Current Readings

Cathode 6A6 (40 meters)—35 ma.
Cathode 6A6 (20 and 10 meters)—80 ma.
Grid (plate on-full load)—6½ to 7½ ma.
Grid (plate off)—12 ma.
Plate and screen (phone)—125 ma.
Plate and screen (c. w.-Max)—150 ma.
Mod. cathode (normal)—180 to 220 ma.
(Swings up to 25 to 40 ma. on voice peaks)

Voltage Readings for Service Checks

Exciter plate supply (measured to ground)
40 meters—420 v. d.c.
20 meters—383 v. d.c.
10 meters—350 v. d.c.
Cathode voltage 6A6 No. 1.
40 meters—68 v. d.c.
20 meters—20 v. d.c.
10 meters—22.5 v. d.c.
Cathode voltage—No. 6A7, No. 2.
10 meters—24 v. d.c.
Grid bias RK47.
Not oscillating—45 v. d.c.
7 ma. grid current—120 v. d.c.
Screen RK47—phone reception fully loaded—250 v. d.c.
Plate RK47—phone—900 v. d.c.
Plate RK—c. w. (high power)—1,250 v. d.c.

6L6G—plate to cathode—400 v. d.c.
6L6G—screen to cathode—290 v. d.c.
6L6G—grid bias—23 v. d.c.
6J5—plate to cathode—225 v. d.c.
6J5—cathode to ground 8 v. d.c.
6J7—plate to cathode—30 v. d.c.
6J7—screen to cathode—40 v. d.c.
6J7—cathode to ground—1 v. d.c.



Interior view shows how carefully the commercial engineer lays out the component parts of a transmitter. Plenty of ventilation is provided for, and also finger-room.

power to completely modulate the output of the RK47 final r.f. stage.

While band switching is not new in a broad sense, ganged band switching of all tuned circuits such as is used is normally found only on commercial units of most recent design. It is only the amateur with years of experience and a knowledge of the problems of band switching who would care to attempt their solution.

This transmitter was to band-switch all circuits. Every tank coil was to be changed in order to really term the transmitter as band-switching throughout. One control changes all tanks simultaneously. Separate tank circuits are used on the final so that tapped coil losses would be eliminated. The separate tank tuning condensers allows pretuning for any given frequency by virtue of the separate control for each tank condenser—being accessible through the protective perforated cover.

When the individual tanks are switched the excitation to the following stage is also transferred. The proper point at which the excitation tap should be taken off the preceding plate tank had been determined by test. In subsequent frequency changes from one band to another it's a pleasure to know that each tube is being driven by its required amount. One other function performed by the switching mechanism is that of changing the antenna pickup coils. Six terminals appear on the rear of the transmitter to which can be connected either three separate antennas or a matching network to feed a variety of antennae, by connecting the terminals in parallel.

Speaking of the protection afforded by the perforated cover, it was unanimously decided the transmitter should be so arranged that it would be well nigh impossible to get shocked. When the cover is in place the only controls that can be reached are those which pre-tune the various tank circuits. When the cover and bottom plate are removed the chance for getting across the high voltage is improved, but by virtue of a plate interlock switch operates by removing the cover the operator will have to intentionally crawl into the transmitter "to commit suicide."

When the top and bottom are removed you can see the reason for the unit weighing so much. A point worth remembering is that dependable performance goes hand in hand with conservatively rated components. All transformers, chokes, condensers, resistors, etc., are run well below their rating which gives us the satisfaction of knowing the transmitter will be operating after units not so conservatively rated have long since gone into the "spare part" classification.

Mechanical Layout

The various features of the mechanical arrangement can be seen by referring to the photographs of the transmitter. Looking at the top view it will be noticed that the entire r.f. portion is assembled as a single unit in the front center of the chassis. The enclosed metal box in the center of the assembly houses the band switch, the excitor tuning coils, and all of the r.f. tuning condensers. The six knobs to the left control the excitation adjustments and the three knobs to the right control the output plate tuning. At the front of the tuning assembly is suspended the output tube which is placed horizontally to provide short leads for both grid and plate circuits. At the rear of the unit is suspended a small deck which carries the two 6A6 excitation tubes and sockets for three crystals. Underneath this deck are located the smaller components necessary for the r.f. circuits. To the right are located the three output tank coils. The entire r.f. assembly is fastened to the chassis by means of four bolts and the connections to the unit are made underneath the chassis by means of jumpered leads between terminal strips.

Observing the chassis proper at the right front corner is located the rectifier and filter for the excitation stages and immediately behind them the filament and low voltage plate transformer for this same power supply. At the rear center of the chassis are the high voltage plate transformer, the 866 rectifier tubes and the filter chokes and condensers. The entire modulator with its power supply is situated in the left section of the cabinet. In the front corner and mounted in a metal shield is the 6J7 input stage behind which is first the 6J5 speech amplifier, then the four 6L6 modulators, and then the modulation transformer. To the right of the modulation transformer is a modulator power transformer and in front of it the 5Z3 and 80 rectifiers. Ahead of them are located the necessary filter components for the audio section. The only parts mounted beneath the chassis in addition to the wiring are a few small resistors and condensers thus leaving an open type of construction which in addition to being mechanically and electrically sound and allows for quick inspection and servicing.

The center section of the front panel carries the three meters, plate and filament switches, the "c. w.-phone" switch, and knob and indicator scale for the band switch. Provision is made on the indicator scale for writing in the exact frequency used at each setting of the band switch. On the lower left hand panel is mounted the modulator gain control and modulator off-on switch controlled by a single knob and on the lower gith hand panel are mounted a stand-by switch and a switch for selecting the circuit used by the cathode current meter.

On the rear of the transmitter are located three recessed terminal boxes, the center of which contains six terminals for connection to three antennas. On the left hand side as viewed from the rear are located the power lead, the two fuses and the "high-low" power switch. On the right hand side is located a five terminal strip for making connection to a telegraph key and to a receiver stand-by connection.

Tuning Procedure

The tuning procedure of this transmitter is simplicity in itself. Looking at the r.f. assembly from the top you will notice that there are six knobs—to the left of the three larger knobs which are placed to the right of the shield can which houses the coils for the low powered stages.

Let's line up the transmitter for c. w. operation. The modulator gain control knob should be in the "off" position. The cathode current switch should be placed in the "up" position, which will give you 6A6 cathode current readings. Set the band switch to band 1 or 40 meters. Now turn the filament switch on, making sure that the switch which controls the primary of the plate circuit is in the "off" position. After the filaments have warmed up for about 15 seconds you will notice that there will be a reading of approximately 10 mills on the cathode current meter. The balance of the tuning is wholly conventional.

Coupling the antenna to a coupling coil and properly loading the final to the amount of plate current recommended will give you 40 meter output. Adjusting the transmitter for 20 meter operation requires the band switch to be put in the No. 2 position, etc.

Grid current for any one of the three bands without plate power applied to the final amplifier should be in the neighbor-

(*Please QSY further to page* 54)

BENCH NOTES

by LEE WARD

Expert Serviceman, San Francisco, California

WITH this issue RADIO NEWS brings to its serviceman reader the finest service page in any popular magazine. Mr. Lee Ward, for many years a prominent serviceman and presently employed by an outstanding radio corporation, will conduct this department. Mr. Ward will welcome any questions, suggestions or pictures from the servicemen, and those of general interest will be published in these columns. Photographs will not be returned unless accompanied by return postage.—The Editors.

Tribute to the Majestic 70

If the servicing gentry held an election to determine which set was the most important in terms of business income, the winning model would probably be the Majestic *70*. At the time of the *70* series' appearance a decade ago, it had few competitors in its price range; it was widely advertised; and it came just after Orthophonic Victrolas passed out, and thereby took advantage of the common public conviction that anything with a low tone was high quality machinery.

The natural result was that an astonishing number of cash customers laid out about $200 a copy for the various shapes in which the chassis appeared.

Since then, the *70* has composed a large proportion of the national servicing income. Many of us can truthfully say that we would not have lasted through the depression if no filter block failures had occurred in its 7BP6 power pack. Although the corresponding pack on the *90* series helped during the past exigency, it is safe to say the *70*, more than any other set, supplied us, during the hungry days, with a greater number of crucial ham sandwiches. It is understood within the profession that it was the quantity of these sets—not their quality—which brought so many of them into the repair shops.

Even today there are many still in use; and the set owner, remembering its long years of service, its distinctive low pitch, and the high price (compared to the present price range), reconciles himself to payment of a fair repair charge before the serviceman quotes the amount.

I salute the *70*! Long familiarity with its parts has not bred contempt, and I have come to regard it as a staunch friend. Good replacements are available, and the customers are favorably impressed by their size and visibility after the set is installed. Income and customer satisfaction over a long period—what set has given us more?

Could You Qualify?

Some five years ago I applied for a serviceman's job in a Long Island radio store. The owner, not knowing enough theory to test the applicants' technical qualifications, let each one work on a Majestic *72* to replace its drive cable. If it wasn't in after ten minutes, using your own tools, you were out of the running. He had fired the last man the day before, he explained, because he wasted too much time on that very tricky mechanical job.

There were seven other applicants. While we all realized the qualifying method was unfair, we knew it was not the time to argue. All seven men ahead of me failed; perhaps they could have succeeded in more familiar surroundings, or if the task was not so important. They all got buck fever and failed, while the audience—the remaining applicants—wished, in a fraternal sort of way, that each performer would be stricken with paralysis.

I got the job without taking the test. Seeing I was last in line, the owner knew he would either have to hire me or advertise again. He asked me a few questions, to see if I was sober, and took me on.

When I reported for work the next morning, the first shop job was to replace that drive cable. I didn't clock myself, but I remember I had to use one of my own replacement cables—the one the boss had supplied was three inches short!

Furnished Apartment

A Brunswick chassis contained one of the most unusual faults I have ever come across. It was brought in last week with the customer's complaint described as "intermittent operation" on the job ticket. When it was picked up, the serviceman decided the fault was fading, and asked for permission to make shop examination before a price was quoted for the repairs.

Inspection showed all the exposed wiring had been stripped of insulation—except those with red covering. At the points where the wiring was cabled, only the outside edges were exposed; the set played until speaker vibration had shifted one lead so that it shorted to the frame. The set could be turned on and off by mechanical shock.

The reason was obvious—mice had made a nest in the chassis. Upon reaching adolescence, the litter chewed off the insulation for gnawing practice before leaving their electrically-heated home. There was something about the red insulation which was anti-cheese.

Our bid was acceptable to the customer. I rewired the set, removed the evidences of occupancy, and sent it back. As it is not our policy to mention any animal life we come across to the set owner, for fear of embarrassment, he did not learn what had happened. The customer's cat, however, followed our man from the front door to the console. *She* knew.

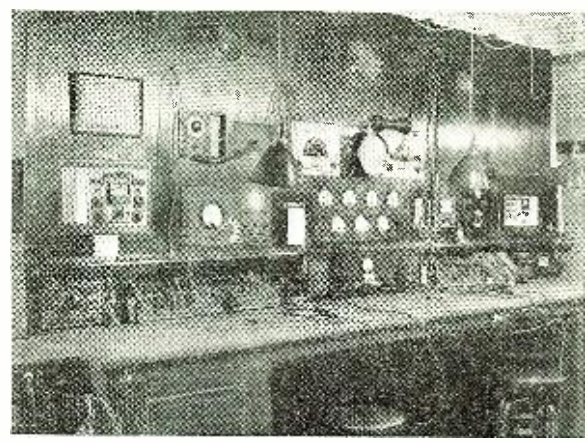
Is Honesty Safe?

In the early days, while working in the warehouse repair shop of a large chain of radio stores, I noticed the crack repairmen usually analyzed chassis troubles with the switch *on*, and took rapid voltmeter readings at significant circuit points.

This was not the ohmmeter method I was used to, checking point-to-point with the switch *off*. When I inquired about it, I was told that "an honest repairman always works with the juice on". This was an adage among the staff which meant that, if a man did not know what he was testing, he would burn out his meter; and hence, if he caused no casualty, he knew his business. The "dead" resistance tests, among the employees, was considered effeminate, and the "live" method was taken as proof of proficiency. The boss did not care which system was followed, because each of us used our own tools and meters.

Sets came in by the truckload, and were piled along the walls. We were often open for three 8-hour shifts, and had to work overtime about once a week. Imagine how from ten to thirty speakers sound while tuning dials are run over the broadcast band, with the volume controls wide open. Then add two or three sets to which voltage is being applied and taken off, and you have an idea what the big room was like. Once a day or so, it would happen that only

(*Check output on page* 44)



The service bench of Russel S. Morton of Salem N. J. Careful arrangement of all units is really excellent.

NEEDS ONLY SOME STATES

DEAR SIR:

I only need the states of Utah, Idaho, Nevada, Louisiana, Wyoming and N. Dakota for my W.A.S. certificate. I am mostly heard on 7010KC. I will give a new issue of the Radio Amateur Call Book to hams in the abovementioned states who first make QSO and QSL's with me. I am using 53 xtal, RK47, and pair of HF300. Please put this in your column.

(Sgd) Roy R. Neira, W2EVA,
Long Island City, N. Y.

Always glad to oblige. But why not give a subscription to RADIO NEWS? Hi!—Ed.

LIKES SHORTWAVE WESTERN SECTION

Dear Sir:

Your shortwave section for the west, edited by John D. Clark, is swell. If you intend to continue it permamently, I think that I shall have to subscribe to RADIO NEWS as no other magazine has such a complete shortwave section for us fans out here.

Sincerely,
(Sgd) E. J. Kimball,
Fortuna, Calif.

Thank you, Mr. Kimball. Rest assured that Mr. Clark's section will be continued.—Ed.

MORE ABOUT SUBMARINE RADIO

Dear Ed:

First thing I want to say is that you have a darn good mag and all that sort of soft soap.

Now the reason that I am writing this letter is to complain about the picture that you have at the bottom of page 20 in the August issue, and here are my complaints: First, the fellow pictured has never done duty aboard a sub, next the picture was not taken aboard the submersible as you state but aboard the U.S.S. Arizona and when they submerse her I would like to be there as she is a good old battleship. Third, that is not a sonic sounder at all, and those things in the background are not periscopes —although they are turret periscopes.

The fellow pictured is Melvin Orton and I know the above things to be true as I served with him about three years. The man in the picture is an aviation radioman and that is quite the opposite of submarine duty.

(Sgd) I. M. Coleman,
Operator in charge at Fort Peck Dam.

Oh me, oh my! Is our face red? Well, Mr. Coleman, it's this way. We had a swell article on submarine radio and contacted the Navy Dept. for pictures of submarine radiomen and some submarine radios. Your friend's picture was one sent to us from the Navy Dept. in response to our request. The Navy Dept. caption on the picture was, "A Navy Radioman." Not being too "salty," we did not know what the answer was and guessed at the rest—apparently very badly, too. To you and the whole Navy, including Mr. Orton, RADIO NEWS offers its abject apologies! We will ask CINCUS next time we want any dope.—Ed.

A CIVIL ENGINEER SPEAKS

Dear Sir:

RADIO NEWS is a very worthy reading magazine for the ham and everybody else.

(Sgd) V. Elhohn Wollesen,
Civil Engineer M af F.,
Copenhagen, Denmark.

Thank you, Engineer Wollesen. We are pleased to learn that one of the engineering profession thinks well of our product. We will try and keep your interest and that of all hams who are interested in a free-from-censorship magazine.—Ed.

BLAST AT THE ARRL

Dear Sir:

The ARRL promised us some television stuff, but it petered out. They promised us advance notice on what was going to happen at the board meetings but we haven't seen any.

My hat is off to R.N. Not because I agree with all that it says about the League, but because it *does* print both and all sides of a question without any censorship.

(Sgd) K. A. Runkel,
West Hartford, Conn.

We invite all our readers to write and present their views. But please append your proof, if you have any.—Ed.

WANTS ANOTHER LEAGUE

Dear Sir:

Why in H—l don't you stop knocking the ARRL. If you don't like it, why don't you form one of your own? No 73.

(Sgd) Alex C. Crousie,
Washington, D. C.

At present there is neither need for, nor any indication that a second league should be formed.—Ed.

SPECIAL BROADCAST PROGRAMS FOR THE DX FAN

LISTED below are the special DX broadcast programs dedicated to RADIO NEWS. Tune in on these special broadcasts and do not fail to send in your report to the station. Give them complete information, reporting the station's signal strength, quality, fading, etc. Practically all of the stations listed will be pleased to verify reports. The schedule is shown in *Eastern Standard Time* and all hours are *A.M.* unless otherwise indicated.

RADIO NEWS invites all broadcast band DX fans, clubs, and all those having to do with special dedication programs, special DX tips, and frequency checks to send in the information to help make these schedules as complete as possible. Anyone submitting such information please bear in mind that RADIO NEWS goes to press approximately thirty days before it makes its appearance on newsstands, which means that notice of programs for a given month should be in our hands by the first of the preceding month.

SEPTEMBER

Day	Hour	Call	State	Kc.	Kw.
9	4:20-4:35	WRAK	Pa.	1370	.1
9	5:30-5:45	KWYO	Wyo.	1370	.1
10	4:05-4:20	WJBO	La.	1120	.5
10	3:50-4:05	WGAR	Ohio	1450	.5
13	5:35-5:50	KGMB	T. H.	1320	1.

OCTOBER

Day	Hour	Call	State	Kc.	Kw.
8	4:05-4:20	WJBO	La.	1120	.5
8	3:50-4:05	WGAR	Ohio	1450	.5
11	5:35-5:50	KGMB	T. H.	1320	1.
14	5:30-5:45	KWYO	Wyo.	1370	.1
14	4:20-4:35	WRAK	Pa.	1370	.1

PERIODIC PROGRAMS
Frequency Checks and Dedications to DX Clubs and RADIO NEWS

Mondays—

9:15-9:30 p.m., 690 kc., CJCJ, Calgary, Alta., Canada, .1 kw. (tips).

Wednesdays—

12:30 a.m., 1390 kc., KOY, Phoenix, Ariz., 1 kw. (tips).

1:45-2:00 p.m., 780 kc., WTAR, Norfolk, Va., 1 kw. (URDXC) (tips).

4:35-4:50 a.m., 1500 kc., KDAL, Duluth, Minn., .1 kw. (IDA).

Saturdays—

10:30 a.m., 830 kc., WEEU, Reading, Pa., 1 kw. (tips).

2:45-4:00 a.m., 780 kc., CHWK, Chilliwack, B. C., .1 kw. (URDXC).

Sundays—

12:45-1:00 a.m., 1280 kc., KLS, Oakland, Calif., .25 kw. (URDXC) (tips).

2:45-3:00 a.m., 1010 kc., CKWX, Vancouver, B. C., Canada, .1 kw.

3:00-3:30 a.m., 1410 kc., CKMO, Vancouver, B. C., Canada, .1 kw.

3:30-3:45 a.m., 570 kc., KMTR, Los Angeles, Calif., 1 kw. (tips).

Monthly—

1st day of each month, 3:00-4:00 a.m., 1260 kc., WTOC, Savannah, Ga., 1 kw.

1st Sunday of each month, 4:00-4:30 a.m., 1340 kc., KGDY, Huron, S. Dak., 25 kw.

2nd Monday of each month, 5:20-5:40 a.m., 1250 kc., WAIR, Winston-Salem, N. C., .1 kw. 4:20-4:35 a.m., 1310 kc., KVOX, Moorehead, Minn., .1 kw.

2nd Tuesday of each month, 5:00-5:30 a.m., 1370 kc., KRMC, Jamestown, N. Dak., 1 kw. 5:00-5:20 a.m., 1210 kc., WSAY, Rochester, N. Y., .1 kw. (NNRC).

2nd Wednesday of each month, 3:40-4:00 a.m., 1310 kc., KAND, Corsicana, Texas, .1 kw. (NNRC).

2nd Thursday of each month, 4:00-4:20 a.m., 1330 kc., KRIS, Corpus Christi, Texas, .5 kw. (NNRC).

2nd Friday of each month, 4:00-4:20 a.m., 1370 kc., WBTM, Danville, Va., .1 kw.

2nd Saturday of each month, 4:35-4:50 a.m., 1310 kc., KTSM, El Paso, Texas, .1 kw. (FC).

5th day of each month, 3:00-3:30 a.m., 1370 kc., KTEM, Temple, Texas. (FC).

New Stations and Revisions

United States

Call	Kc.	Location	Power
KWJB	1210	Globe, Ariz.	100 W.
WDAN	1500	Danville, Ill.	250 W.
WHLS	1370	Port Huron, Mich.	250 W.
KGLU	1420	Safford, Ariz.	100 W.

Australia

7ZR	1160	Hobart
5AU	1400	Port Augusta

Cuba

CMKL	990	Bayamo

Station Data

H. O. Collett, Chief Engineer of the South African Broadcasting Corporation, Johannesburg, sends in the following information on their station schedule. We are grateful to Mr. Collett for this data.

		Kc.	Power
ZTJ	Johannesburg	645.00	10 Kw.
ZTD	Durban	749.60	1 Kw.
ZTX	Pietermaritzburg	697.70	10 Kw.
ZTU	Grahamstown	560.00	10 Kw.
ZTC	Capetown	600.00	10 Kw.
ZTE	Bloemfontein	808.60	750 W.
ZTP	Pretoria	952.38	50 W.

—30—

An 8 Watt Portable P.A. System

The completed unit is very compact, but hum-free and efficient.

by HARRY PARO
Sound Engineer, Wholesale Radio Service Co., Inc.,
New York City, N. Y.

There are places when a compact small P.A. System is highly advisable. Any serviceman can build the unit herein described.

VERSATILITY of operation, convenience of installation and economy in operation are qualifications difficult to find in a single public address system; yet it has been accomplished in the compact sound system about to be described.

The amplifier, a four-tube unit of advanced design, features high-gain and low-gain channels, low hum level, 5 to 8 watts output, high sensitivity, provision for any type of microphone, provision for phono pickup and radio tuner, built-in power supply for a modern double button carbon mike, fader volume control and variable tone control. An eight-inch permanent magnet dynamic speaker handles the full power output at high efficiency.

Portable equipment of any kind is unavoidably subject to hard knocks and abuse, consequently in this system, ruggedness of construction and light weight have been combined to a degree which gives full protection to all the units which are enclosed in a carrying case. The power consumption of the complete system is only 50 watts and this remarkable economy of operation should find favor with those users who require trouble-free performance for several hours at a time. Of course, the fact that there are only four modern tubes of low-current drain and no required field supply, helps considerably in keeping the current consumption low.

The Circuit

As can be seen from the schematic circuit, a 6N6 direct coupled triode is used in the output stage. In single ended operation and under operating voltages as obtained in this amplifier, a peak power output of 8 watts can be had from this tube. Under these conditions, however, the harmonic content exceeds 6 percent. With the tube working into a 7,000 ohm plate load at a level of 5 watts or less, the harmonic content is held down below this figure. The hum level of the amplifier is — 55 db below the rated output. This low hum level is due in part to adequate filtering and mainly to the use of resistance-capacity coupling in the pre-amplifier and voltage amplifier stages.

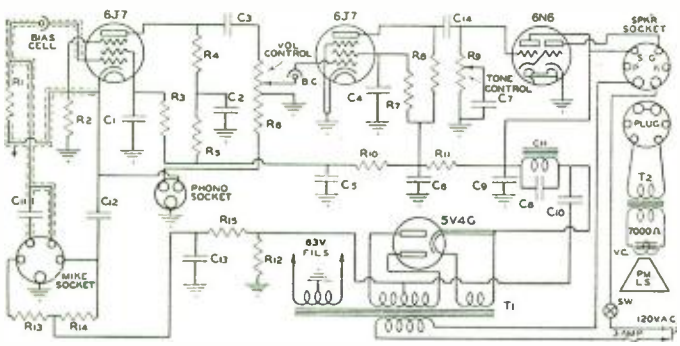
Variation of tone is accomplished by means of the potentiometer and condenser in the input grid circuit of the 6N6. The voltage gain between the control grid of the 6J7 voltage amplifier and 6N6 input grid is well over 120 under operating conditions, thus establishing a good approach to the theoretical maximum gain of 140. While the pre-amplifier circuit constants are almost identical with those of the voltage amplifier stage, it should be noted that a quarter megohm resistor has been interposed in the B plus lead between the two stages. This resistor serves the double function of decoupling filter and voltage-dropping feeder. Thus, the pre-amplifier stage gain is 85 as compared with 120 for the voltage amplifier.

Fading from microphone to phonograph, or using either half as a straight volume and gain control, is the function of the 1 megohm center-tapped potentiometer, which is wired into the control grid of the voltage amplifier.

A bias cell is inserted in the control grid lead of each 6J7 tube to provide a fixed bias of the correct value and to avoid the degenerative effect of a resistor in the cathode circuit. In addition to the bias cell, a further increase in bias is provided for the pre-amplifier tube when a carbon mike is used. This additional bias is removed when crystal, dynamic, or velocity microphones are used instead of the carbon mike.

In the wiring of the 2 plug receptacles, the power supply B minus lead has a 150 ohm resistor inserted between it and chassis ground—which makes the chassis 6 to 8 volts positive with respect to the junction between the 4,000 and 5,000 ohm current limiting resistors, across the 5 pin receptacle socket. Together with a .25 mfd. con-

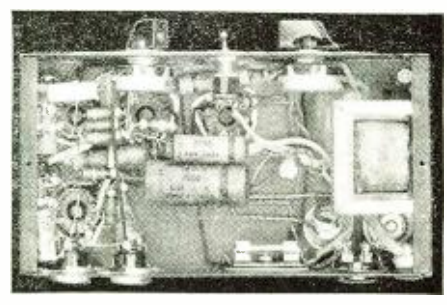
(*Fade in on page* 53)



Circuit diagram of the 8 w. portable P.A. System.

R_1—0.5 megohms ¼ w.
R_2—20,000 ohms 1 w.
R_3—1 megohms ½ w.
R_4—¼ megohms ½ w.
R_5—0.1 megohms ½ w.
R_6—1 megohms dual pot.
R_7—1 megohms ½ w.
R_8—¼ megohms ½ w.
R_9—½ megohms pot.
R_{10}—¼ megohms 2 w.
R_{11}—0.1 megohms 2 w.
R_{12}—150 ohms 5 w.
R_{13}—4000 ohms 2 w.
R_{14}—5000 ohms 2 w.
R_{15}—20,000 ohms 2 w.
C_1—0.1 mfd. paper
C_2—0.5 mfd. paper
C_3—0.05 mfd. paper
C_4—0.1 mfd. paper
C_5—0.1 mfd. 450v. electro.
C_6—Same as C_5
C_7—.01 mfd. paper
C_8—0.05 mfd. paper
C_9—8 mfd. 450v. electro.
C_{10}—16 mfd. 450v. electro.
C_{11}—0.006 mfd. mica
C_{12}—0.5 mfd. paper
C_{13}—0.25 mfd. paper
C_{14}—0.05 mfd. paper
T_1—Combination power transformer
T_2—Output transformer: 6N6 pl. to 7000 ohms

Ch—30 hy choke
SW—Switch on volume control
BC—Bias Cell

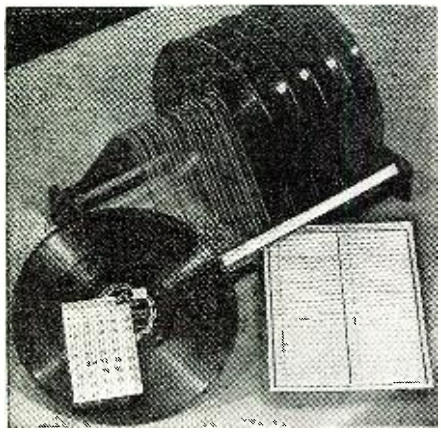


Underside view of the chassis.

What's NEW in Radio

American Phenolic Corp., 1250 W. Van Buren St., Chicago, announces a new low-loss insulating material with a loss factor of only .00053. The material is known as Amphenol, and is particularly suited to high frequency apparatus and photoelectric cell apparatus.

Owners of combination radio-phonographs will be interested in the record library now available through Haynes Griffin, 373 Madison Ave., New York City. The rack has 50 numbered compartments and a matching numbered chart for titles.



Allied Radio Corp., Chicago, has just issued its new 1939 radio catalog. A 180-page book, the catalog features many new developments in receivers, service instruments, amateur-experimenter equipment, PA equipment, and radio parts.

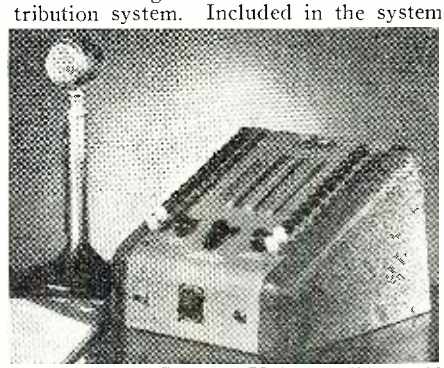
Standard Transformer Corp., Chicago, is now marketing an amplifier kit known as the Hi Fi 11 AC-DC Amplifier Kit. It is compact in size yet delivers 4 watts of power at 89 DB with excellent tone quality. Output impedances are 4, 8, 15 and 500 ohms.

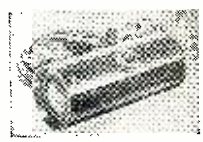
RCA Victor is planning a complete line of battery receivers designed particularly for use on farms. There will be two series of instruments. One will comprise a number of models employing a 1½-volt tube for long battery life, while the other will be a line of 6-volt instruments ranging from 4 to 8 tubes.

Hermetically sealed in round aluminum containers, the Type TLA new Cornell-Dubilier capacitors are impregnated and filled with fire-proof Dykanol, the same high dielectric impregnant used in the TJ-U transmitting capacitors. The staple characteristics of Dykanol permits the operation of these capacitors at 10 per cent above rating without injury to the unit. Complete details in new catalog 161, free on request at main office, South Plainfield, N. J.

Several new types have been added to tube line of the Raytheon Production Corp. The new tubes are as follows: RK-56 is a beam type similar to the RK-39 but with lower ratings; RK-57 and RK-58 are triodes which may both be used in zero bias Class B audio circuits; RK-59 is a type suitable for portable high frequency equipment; RK-60 is a new rectifier capable of supplying 600 v. d.c. at 200 milliamperes.

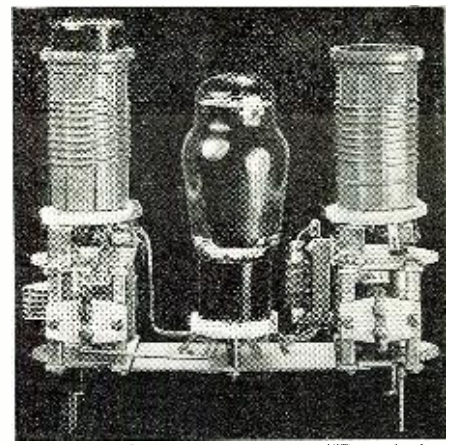
Operadio Mfg. Co., St. Charles, Ill., is now marketing a 10 schoolroom sound distribution system. Included in the system are: Master Control, Unit amplifiers, 10 speaker cabinets, microphone and stand. Each room may be talked to singly or all simultaneously.





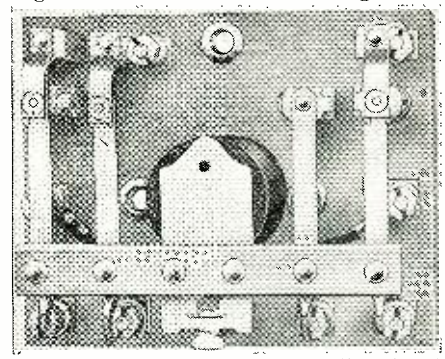
Universal Microphone Co., Inglewood, Calif., is now distributing a neon trigger light for increasing ease, visibility, and accuracy in observing the stroboscope while in rotation. It connects to any a.c. plug and is fitted with a push button switch.

RCA Manufacturing Co. announces a completely new 8 watt ultra high frequency police transmitter. The new transmitter, designated MI-7814, is wholly self-contained and requires no external power supply. There is but one unit encased in wrinkle-finish steel, to mount in the automobile. It is crystal controlled and equipped with a class "A" high level modulator, and works from car battery.



A new Oscillator Doubler "Foundation Unit" has been announced by the Hammarlund Mfg. Co., New York City. The unit is known as the "OD-10" crystal oscillator doubler. While this unit is intended to be used with Hammarlund's other foundation units, it is also an excellent beginner's rig. The circuit is standard with amateurs and uses any suitable pentode or tetrode, depending on the power output desired.

Ward Leonard Electric Co., Mt. Vernon, N. Y., announces a new Break-In or Push-to-Talk Relay. The relays have four poles: two poles, double throw, for switching the antenna from transmitting to receiving; a single pole, normally closed, for disconnecting the receiver plates circuit while transmitting a single pole, normally open, for switching the oscillator plate primary.



A 75 watt power rheostat-potentiometer is now made available by the Ohmite Mfg. Co. of Chicago. The physical dimensions and rating of the new Ohmite Model "G" falls between the Model "J" 50 watt and the Model "K" 100 watt. It has a diameter of 2¾" and a mounting depth of 1¾".

A model radio service shop, designed along modern lines, has been constructed at the Emporium, Penna., plant of the Hygrade Sylvania Radio Tube Corp. It contains the latest radio service equipment and is laid out to create a neat, cheerful atmosphere. The company has announced a Service Shop Modernization contest for all servicemen. A prize of $100 will be paid to the three servicemen who best adapt the Sylvania shop plans to their requirements and build a modern service shop.

Looking Ahead To TELEVISION OCCUPATIONS

by ALFRED N. GOLDSMITH

A STUDY of occupational possibilities in the field of television before that interesting art has made its commercial debut is possibly premature and certainly hazardous. It savors slightly of planning the Panama Canal shortly before the discovery of America. At best, any vocational analysis of the television of the future must be read with several provisos in mind. In the first place, a *normal* engineering development of television is assumed. That is, it is taken for granted that technical knowledge of television will increase apace, enabling the practical solution of the remaining engineering problems of television within a reasonable time. If any apparently insuperable obstacles should prevent the engineers from designing equipment meeting the reasonable needs and desires of the future television equipment purchasers, this might upset all calculations. We are all familiar with arts where normal progress has been retarded by dangers or limitations which the engineers have not as yet been able to overcome. There is a slight but nevertheless existent chance that such obstacles might put off the commercial advent and general acceptance of television for some time.

In the second place, a *normal* economic development of television must be regarded as probable in any analysis of its occupational possibilities. Television transmitting and receiving equipment is elaborate and relatively costly. Television program construction will be more complex and expensive than radio program construction of today. The television art is a comparatively luxurious one. Manifestly, such an art can hardly be introduced rapidly on a large scale in times of marked economic depression nor can it be expected to win public favor under such circumstances. The television programs will be paid for, under our present system of broadcasting operation, by advertising sponsors in the main. The sponsors will in this way purchase a portion of the purchasing power and general good will of the looking and listening public. But the size of the audience, its purchasing power, and its mood will all influence the extent to which the advertiser can justifiably support television broadcasting. Accordingly, there is an action and reaction between economic conditions and television success. If times are bad, the programs must be restricted which, in turn, affects the public response that justifies the broadcasting of the programs. Only in reasonably good times can this circle of effects be broken advantageously. Accordingly, those contemplating television as a career will watch closely for times of general economic recovery since it is in such times that arts like television can be expected to flourish and to afford opportunities for a multitude of new workers.

Assuming that television comes into its own in the next five or ten years, probably the best way to outline the various occupational opportunities which it will offer, and the requirements of each position, will be to describe the activities of the field in some detail (with the various prospective openings italicized).

Opportunities in Manufacturing

Let us start at the factory where the necessary equipment for television transmission and reception originates. Here are needed *apparatus engineers* who are capable of doing research, development, and design work in that complicated field. These men must be technically trained and well-qualified along conventional radio lines in order to meet the more difficult problems of television. These radio engineers are, in fact, electrical engineers with specialized training in the particular field of communications. In the factory there are also needed *tube engineers* who will handle the similar problems of vacuum-tube and cathoderay-tube production which are an integral part of the television transmitters and receivers. Some of these men may be university-trained physicists who are prepared to enter the equally complex but more commercial fields of tube research and design. The usual factory personnel will be required for television equipment construction, including *test men, supervisors, production and manufacturing engineers*, and the like. The qualifications here are similar to those for positions of the same type in other fields except that the manufacturing and test problems are probably more difficult and more rapidly changing than in most other fields, thus demanding a flexible, responsive, and original mind as well as great native energy and determination.

Transmitting Station Jobs

Once the television transmitter has been built and shipped, it must be installed in the television transmitting station and thereafter maintained. At this point, an entirely new series of openings will exist. Television *station engineers* will include *field-survey engineers* who will determine the best location for the station and its antenna system and who will study the strength and acceptability of the signals throughout the service range of the station. These men will also furnish the data which will satisfy the governmental authorities that the station is covering its territory with an adequate service in the physical sense. The equipment must be maintained in good condition at all times, and emergencies must be met, and this is the job of the *maintenance staff* of the station. Men of great reliability and prompt resourcefulness are required for this type of work.

The television-station studios will require a staff of their own of considerable size and of wide diversity of tasks. Considering the technical men only for the moment, there will be *lighting experts* who will arrange and control the powerful illumination which floods the sets (scenery) in the

(*Continued on page 62*)

Bench Notes

(*Continued from page 39*)

one or two sets would be running for a brief interval, and the place would seem like a tomb.

It might have been unpleasantly loud, but those surroundings, with their haste, noise, and distractions, trained some corking good servicemen for that type of work. Some of the boys became artists in analysis —they were fast, experienced, and adept. They had a way of skipping unnecessary routine to get at the cause of the trouble which was puzzling to an inexperienced spectator. About 75% of the replacements were on five or six models the retailer happened to be pushing at the time, and so the work was mostly routine; however, there were enough exceptions to make a good practical background essential.

One worker stated in all honestly that he could identify four manufacturers' burned out power transformers *by odor*. I believed him, after watching his quick work; he didn't *test* for a faulty part—he *ferreted* it. Although I didn't burn out power transformers to put him to test, I am sure he learned many remarkable tricks by repeated repairs on the same models. He owns his own store now, and spends about one-tenth of his total time in his quiet—often too quiet—store. He admitted to me that, in private practise, where only two models in ten jobs were alike, it was sometimes better that a man be alone with his soul during unfamiliar trouble-shooting.

Late at night we were often amused to spot a sleepy serviceman at work over a "hot" set. Seated on a high stool, his body would tilt forward over the bench as his muscles relaxed. The rest of the staff would stand by hopefully, knowing that high voltage was kicking around under his hands. When the lightning struck, he would usually jump, fall off the stool, and often the chassis would come down on the floor. We all thought it was funny.

I got bit once, too, after a spirit of bravado moved me to test with the juice on. My forehead was the point of contact after I fell asleep; when I woke up I felt like a street-car had hit me. I could count my heartbeat for two days afterward by the throbbing around the fillings of my teeth.

Light Overhead

The next time you are ready to discard one of those 10" x 12" slant-sided tin illuminated signs the manufacturers supply, remove the glass, turn it face downward, and screw it to the top of your meter panel. It serves as an ideal bench light, as it casts light over the panel and bench while it shades your eyes. The bulb, socket, reflector, switch and cord need not be changed.

Then to prevent hand shadows from obstructing the work on the bench, slip a piece of ground glass into the frame.

—30—

Send in pictures of Your Service Bench or Store to Mr. Lee Ward, c/o RADIO NEWS. The best will be published.—*The Editors.*

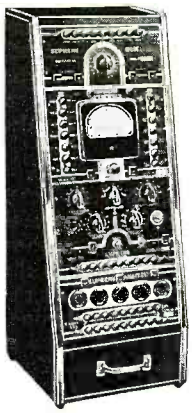
THE BIGGEST LITTLE INSTRUMENT in your shop!

HERE IS THE BIGGEST VALUE IN THE SMALLEST
COMPLETE MULTI-METER
ON THE MARKET!

EVERYTHING YOU'D EXPECT IN A $30 INSTRUMENT!

Here is a complete pocket lab for only **$16.30**

or it may be purchased on the easy installment terms of $4.73 cash and 3 payments @ $4.73.



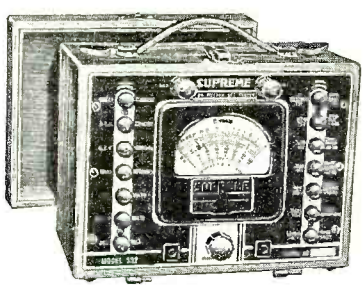
SUPREME SERVICE LABRACK

This service laboratory occupies less than one square foot of space on your bench! It contains *all four* of the new SUPREME *Speed* INSTRUMENTS listed below.

MODEL 596 SUBSTITUTION BOX by means of nine push-buttons allows rapid, accurate, temporary replacement from 1 ohm to 50M, 100M, 250M, 500M, 1 meg.; also capacitors 0.1, 0.5, and 8 mfd. Speeds up your replacement work 100%.

MODEL 594 TUBE TESTER with a new, modern tube testing circuit which utilizes the Model 592 *set-tester's* meter, and its GOOD-?-BAD scale. TOMORROW'S TUBE TESTER!

MODEL 593 ANALYZER designed to be used with any multimeter or set tester. Just connect your multimeter to the 593's two pin jacks, put the analyzer plug in the set's socket, the set's tube in the 593 and make voltage or resistance measurements!



MODEL 592 SET TESTER gives you a total of *47 ranges* and functions with *two* D.C. volts sensitivity—both 1000 ohms per volt *and* 25,000 ohms per volt—in the same instrument! Completely self-contained. Push-button operated.

A REGULAR little pocket laboratory with a case only 3" x 5¾" x 2" in size, weighing but 23 ounces—*24 ranges*—just as accurate and even more convenient than you would expect to find in an instrument twice its price.

At your finger tips are 4 D.C. mil ranges (with first scale division 5 microamperes) of 0/0.3/6/30/150; 4 D.C. volt ranges (with first scale division 0.1 volt) of 0/6/150/300/1500; 4 ohms ranges (with 1 ohm first scale division and 25 ohms center scale) of 0/2,000/20,000/200,000/2 meg.; 4 A.C. volt ranges (with first scale division 0.1 volt) of 0/6/30/150/600; 4 output ranges of 0/6/30/150/600; 4 decibel ranges of −6/+10, +8/+24, +22/+38, +34/+50.

The Model 542 is not a toy—it uses a full size 3" square meter with a rugged, accurate 200 microampere movement and a knife edged pointer. This movement has a sensitivity of *5000 ohms per volt!* All ohmmeter ranges, including the megohm range, are operated by batteries furnished with the instrument and contained within its durable black moulded bakelite case. A uni-control takes care of all voltage, current, and D.B. ranges in addition to zero ohms adjustment. The attractive metal panel is finished in silver and black to match the case, meter and other parts.

Because of its convenience and ease of operation it will soon become one of your favorite instruments—just slip it in your coat pocket and you are equipped to make all A.C. and D.C. voltage, Direct Current, Resistance, Output voltage and D.B. measurements!

Your own parts jobber now has the 542 Multi-Meter in stock—order yours TODAY.

MAIL COUPON TODAY!

SUPREME INSTRUMENTS CORP., GREENWOOD, MISS., U. S. A.
Export Dept., Associated Exporters Co., 145 W. 45th St., New York City
Cable Address: LOPREH, New York

SUPREME INSTRUMENTS CORP.,
Dept RN-10, Greenwood, Mississippi

Please send me literature on your new *Speed* instruments.

NAME.....

ADDRESS.....

CITY..... STATE.....

QUESTIONS and ANSWERS

E. W. D., New York City, N. Y.: Sometime ago RADIO NEWS printed a series of azimuthal maps, used for reckoning distances from a center point to any other location in the world. Please advise the back issue containing the map which was centered on New York. I have complete files of Radio News as far back as 1930.

Answer: The globe scale map or chart centered on the east continent coast for New York was published in the July 1934 issue. The short-wave fans on the Pacific Coast will be interested in knowing that the azimuthal map centered on San Francisco was printed in the August 1934 number. The New York map is obtainable from the U. S. Navy, Hydrographic Office, Washington, D. C.

P. E. T., San Francisco, Cal.: Please advise on what frequency and at what time, in the morning, I can tune for news from China. My short-wave set covers to 15,000 kilocycles.

Answer: Listen for station ZBW3 on 9.53 mc., Hongkong. News bulletins are transmitted around 3:00 a.m. PST. This is a powerful and reliable station and the western listeners receive ZBW3 programs from 3:00 to 7:00 a.m., PST. Complete schedules on the China stations are contained in the August issue page 67. Station XGJ on 11.68 mc., Hankow, sends out news reports in several languages, including English, daily from 4:00 to 4:30 a.m., PST.

C. A., Cleveland, Ohio: I am a nut on DXing both long and short-waves. I am about to move and the new location must be good for dx or no sale. How can I check on this?

Answer: This is an interesting question. Briefly, you could be advised to locate on the nearest mountain top or highest point in your location, but in actual practice the highest point doesn't always prove to be the ideal spot for dx. The idea has been advanced (and it seems practical), to survey a locality with an automobile receiver and the location that pulls in the best dx reception, should be the answer to your problem.

J. W., New York City, N. Y.: I have a 1934 superheterodyne and would like to bring it up-to-date with push-button tuning, is this practical?

Answer: It is practical. There are several compact tuning units on the market that can be attached to your set to provide automatic push-button tuning. Consult the large radio stores, they will explain the types and installation connections.

W. T. T., Fredericksburg, Va.: I would like to add automatic-volume-control to my Airline 7-tube set which employs twin speakers. Also, can I increase the tuning range of this set to 5 meters? At present it only goes down to 15 meters.

Answer: Checking the servicing manuals, it would appear that your set is equipped with automatic-volume control. It is possible that the a. v. c. circuit in your set is not operating correctly. With reference to your second question, it is not practical to attempt revisions for 5 meter operation. A receiver designed for the ultra high-frequencies is the best answer for reception on 5 and 10 meters.

S. C. D., Long Island City, N. Y.: I have an uncle who is hard-of-hearing and have been considering building a small amplifier for him to connect to the telephone. He transacts much of his business by 'phone but recently has found his progressive loss of hearing a serious handicap in this respect. Is there any law which prohibits the plan I propose?

Answer: None that I know of. Many telephone companies have a fixed rule, however, which prohibits connecting or attaching anything to a telephone instrument. If, in the course of their inspections they find an amplifier or other device connected to the 'phone they will demand that it be removed or will threaten to suspend service. You could play safe by building a unit containing both an amplifier and a microphone, so arranged that it is only necessary to hold the telephone earpiece against this microphone, your uncle wearing an ordinary headphone connected to the output of the amplifier. The telephone companies would have no objection to this as there would be no wire connections to their instrument.

F. L. J., Quincy, Ill.: I have seen circuits of noise suppressors of the "limiter" type, used in the detector or audio circuits of receivers. My friend tells me that they are no good because when adjusted to take out noise they will also take out the speech or other program. Is this so? If not, will you explain?

Answer: Your friend is wrong because a well designed noise limiter circuit is highly effective in removing many types of noise, including ignition noise. These noises are made up of impulses and become troublesome only when the voltage of these impulses is much higher than that of the speech. If a signal, with bad noise interference, is looked at on an oscilloscope these noise peaks will be several times higher than the signal pattern. All a noise limiter does is to chop off these peaks by blocking the audio system instantaneously when a peak above a certain level (determined by the adjustment of the noise limiter control) arrives. What is left of the chopped off noise impulses is almost completely masked by the signal. Obviously this will not hold true for noises other than the impulse type or of ignition noise is caused by many cars at the same time, their impulses combine to form a continuous mass of sound instead of a series of

(*Continued on page 63*)

Short Wave Flashes

(*Continued from page 32*)

PORTUGAL—Daily, over CSW3 (9.74), *Lisbon,* noon to 2:00 p.m. for Mozambique and Portuguese India; 5:00 to 6:00 p.m. for Europe; and 6:00 to 8:00 p.m. for North, and South America; over CSW2 (11.04), 2:15 to 4:15 p.m. for Angola, Portuguese Guinea, and Cape Verde Islands.

Frequency Changes

COSTA RICA—T12RS. "Radio Athenea." *San Jose,* to 7.45. T14XRH, *Heredia,* has shifted slightly to 9.695.

CUBA—COBZ, *Havana,* variable, near 9.005 to 9.012; COCM, *Havana,* has shifted slightly to 9.855.

MEXICO—XEWW, *Mexico City,* has shifted slightly to 9.503.

SPANISH MOROCCO—EA9AH, *Tetuan,* is variable between 13.992 and 13.999.

VENEZUELA—YV2RA, San Cristobal, to 5.745; YV5RC, *Caracas,* to 5.97.

Data

ARGENTINA—LRA (9.69), Radio del Estado, Direccion General de Correos y Telegrafos, relays LRA, Mondays to Saturdays 10:30 a.m. to 1:00 p.m., Sundays 10:30 a.m. to noon, Mondays to Thursdays 6:00 to 9:00 p.m., Fridays 4:00 to 9:00 p.m. and Saturdays and Sundays 7:00 to 9:00 p.m.

ANGOLA—J. C. Kneeland of Worcester, Mass., writes that CR6AA of *Lobito,* is now broadcasting simultaneously on 7.177 and 13 mc's, Wednesdays and Saturdays from 2:45 to 4:30 p.m. and on 9.66 irregularly.

BRITISH GUIANA—George Whitney of Demarara, British Guiana, informs me that former *Georgetown* stations VP3BG and VP3MR have been amalgamated. The sole present station VP3BG (6.14), which is under the control of the British Guiana United Broadcasting Company, with studios in the Fogarty Building, broadcasts programs weekdays from 9:00 to 10:00 a.m., 2:15 to 6:30 p.m. and Sundays from 5:30 to 11:30 a.m. and from 3:00 to 5:00 p.m.

CHINA—Ashley Walcott of San Francisco, California, writes that the short-wave relay for XGOW in *Hankow,* which broadcasts daily from 5:00 to 10:00 a.m., or later, on a frequency varying from 9 to 9.25, is XGX. The *Hankow* station mentioned in last issue as XGJ (11.68), is according to corrected information XTJ (11.691). This station broadcasts daily from 7:00 to 7:30 a.m. and from midnight to 12:30 a.m. This same transmitter is used as a commercial telephone station to contact XTZ/XRB (9.485), *Canton;* XTR (9.4) or XTS (11.44), *Swatow,* or *Chungking* on 11.44, early mornings.

DOMINICAN REPUBLIC—According to Gustave Magnuson of Providence, Rhode Island, HIG (6.28 and 9.3), "Radio La Opinion," Santiago Rodriguez No. 12, *Trujillo City,* power 150 watts, operates daily from 6:40 to 8:40 a.m., 11:40 a.m. to 2:10 p.m. and from 3:40 to 9:40 p.m.

ECUADOR—HCJB, *Quito,* is now operating on a new frequency of 12.46, daily except Mondays from 8:00 to 10:30 p.m.

ETHIOPIA—Guy Bigbee of Fort Benning, Georgia, reports that "Radio Addis Ababa" (9.523), *Addis Ababa,* broadcasts a news bulletin and musical program daily from 1:00 to 2:00 p.m.

FINLAND—The 1 kw station in *Lahti,* operates as follows: Daily over OFE (11.78), from 2:10 a.m. to 1:05 p.m. and over OFD (9.5), from 1:15 to 6:00 p.m. A 200 watt station in *Helsinki,* operating on 6.12, also relays the above programs. A new 1 kw station to operate on 15.19 and 17.8, under construction at *Lahti,* will be completed soon. The power of the *Lahti* transmitters will be increased to 10 kw each by the end of the year and an antenna beamed on North America will be put into use.

HONDURAS—Harold Amers of Pomona, Calif., reports he finally received a verification from HRN (5.875), *Tegucigalpa,* after having sent half a dozen reports over a period of two years. This 500 watt station operates daily from 7:00 to 10:00 p.m.

INDIA—VUD2 (9.59), *Delhi,* is being heard in California, from 7:30 a.m. to 12:30 p.m. Reception is best near 8:30 a.m. VUC (6.11), *Calcutta,* is operating daily from 2:06 to 4:36 and from 6:36 to 11:36 a.m.

ITALY—2RO5 (15.3), operates daily 12:10 to 2:00 p.m., with news in English given at 1:36 p.m. This transmitter and 2RO6 (17.82), power

2 kw each, are being used experimentally until the completion of the new Italian Short-Wave Center late this year.

JAPAN—The latest schedule of overseas broadcasts is as follows: Daily, 12:30 to 1:30 a.m. for Pacific Coast of N.A. over JZK (15.16); 7:00 to 7:30 a.m. for Eastern N.A. over JZL (17.785); 8:00 to 9:30 a.m. for Australasia, over JZK (15.16); 2:30 to 4:00 p.m. for Europe, over JZJ (11.8) and JZK; 4:30 to 5:30 p.m. for S.A., over JZJ and JZK. and from 6:00 to 6:30 p.m. for Eastern N.A., over JZL.

JAVA—YDO3 (3.29), operated by the Radio Electric Trading Company, Ltd. of 147 Kaliasin, *Soerabaja,* power 50 watts, operates on Sundays, Tuesdays and Thursdays from 7:30 to 9:30 a.m.

MADEIRA—The only station in *Madeira* is owned and operated by Gabriel Ornelas of *Funchal.* Using the call CT3AQ (4), it operates Mondays, Wednesdays and Fridays from 2:00 to 4:30 p.m.

NEW ZEALAND—ZLER (2.77), *Invercargill,* and ZLES (2.97), *South Hillend,* both astronomical stations, are on the air almost daily from 1:45 to 5:45 a.m. according to Alan Breen of Dunedin, New Zealand.

NICARAGUA—Roger Legge of Philadelphia, Penna., states that YNLG (6.61), *Managua,* power 1 kw, verifies with a large card having black call letters.

PANAMA—HP5B (6.033), Emisora Miramar, relays HP5C daily from 10:30 a.m. to 2:00 p.m. and from 6:00 to 10:00 p.m. The programs of this 1 kw station open with the selection "Panama" and close with Ted Lewis' recording "Good Night."

PORTUGAL—Earl Roberts of Indianapolis, Indiana, writes that CS2WA (9.65), *Lisbon,* verifies with an attractive CT1AA card in blue, red and green, with the new call in the corner.

SPANISH MOROCCO—James Pratt of London. Ont., Canada, reports that EA9AH (13.992), *Tetuan,* operates daily from 4:00 to 8:00 p.m., with news in English at 4:20 and 5:30 p.m. The station relays "Radio Nacional" at *Salamanca* from 4:45 to 7:00 p.m.

SWEDEN—The schedule of operation for SBP (11.705), Motala, is weekdays 1:20 to 2:00 a.m.; weekdays except Saturdays 6:00 to 9:00 a.m., weekdays except Saturdays 11:00 a.m. to 4:15 p.m., Saturdays 6:00 a.m. to 4:15 p.m. Sundays 3:00 a.m. to 4:15 p.m. and on Wednesdays and Saturdays 8:00 to 9:00 p.m.

URUGUAY—CXA2 (6), owned by R. Caissiols, Cia. de Radiopublicidad Continental, Juan Carloo Gomez 1431, *Montevideo,* verifies with a blue card showing map of South America in maroon.

VATICAN CITY—Charles Guilbert of Paris, France, writes that HVJ is now operating as follows: Weekdays, on 15.12, from 10:30 to 10:45 a.m.. on 6.03, from 2:00 to 2:15 p.m. and on Sundays, on 9.55, from 5:00 to 5:30 a.m.

Amateur

Latest messages report that the McGregor Arctic Expedition is having a difficut time aboard the ice-bound schooner *General Greely.* Listen for amateur station W1OXAB (14.368).

BELGIAN CONGO—Be on the look-out for OQ5ZZ (14), with the 10th Gatti African Expedition, which is operating from a portable light plant in the explorer's elaborate jungle cruiser.

DUTCH NEW GUINEA—PK6XX (14.02), base-camp station of the Archbold Expedition of the American Museum of Natural History at Hollandia, is still being heard early mornings in contact with U. S. amateurs. PK6XX contacts W6NNR Saturday mornings at 2:00 a.m. and W2IWT, Mondays near 7:00 a.m. The explorers in the interior contact PK6XX by means of the aircraft transmitter aboard their flying boat *Guba,* which operates on 6.425 and 11.355. Reception reports should be sent to PK6XX or W2BVB, Harold Ramm, in care of the A.R.R.L., Hartford, Conn.

EGYPT—David Hutchinson of Manchester, Conn.. is justly proud of his verification from SU1AM (14.208), which is owned by Prince Abdul Moneim, cousin of King Farouk. The card includes drawings of lotus flowers—the sacred flower of Egypt; Thoth, the god of sciences, and the winged Isis, symbolizing Egypt.

PHILIPPINES—KA1BII sends a very attractive QSL card, picturing a colored map of the Philippines with native pictures sketched in.

SUDAN—Be on the look out for ST2CM operating on 14.32.

Last Minute Notes

Earl Roberts of Indianapolis. Indiana, has received the following information concerning the stations in *Bolivia:* CP1 (9.892), "Radio Chuquisaca. *Sucre,* power 400 watts, operates daily from 11:00 a.m. to noon and from 7:00 to 10:00 p.m.

CP12 (6.15), "Radio Tanari," *Cochabamba,* power 200 watts, is under construction.

The English news-bulletin in transmission IV, from *Daventry,* is now being given at the revised time of 1 p.m.

SHORT WAVES FOR DX'ers on the WEST COAST

by JOHN D. CLARK

All Times Are PACIFIC STANDARD

Straits Settlements

"This is Singapore calling." Flashing across more than 8,000 miles of ocean. these words are now being heard regularly by thousands of Pacific Coast listeners. A powerful new transmitter. located in *Singapore,* has commenced operations on 9.69 meg., and for the first time American short wave fans on the Pacific Coast are experiencing truly fine reception from Malaya.

First reports of this new broadcaster reach us just as we go to press, and the call-sign of the station has not yet been definitely ascertained. The announcement is only, "This is Singapore calling," and the transmitter is operated by British Malay Radio Corporation. It is possible that the call letters are ZHP, previously used by this same company on 9.53 meg.

Programs are released from 1:40 to 6:40 a.m., the last half-hour being devoted to dance music relayed from Singapore hotels. The news is relayed from London at 5:30 a.m.

ZGE of *Kuala Lumpur, Malaya,* now heterodynes "Radio Boy Landry" of *Saigon. Indo-China,* every Sunday, Tuesday, and Friday from 3:40 to 5:40 a.m. As a result neither station is clearly audible in this country.

ZHO of *Singapore* has been reported by several listeners during the last thirty days. Listen for ZHO on 6.01 meg. weekdays from 2:40 to 6:40 a.m., and Sunday from 2:40 to 4:30 a.m.

A station. ZGB. also located in *Singapore,* has been logged on 13.64 meg. near 4:45 a.m. It is used for phone work only, and usually contacts PLQ in Bandoeng, Java.

India

VUD2. *Delhi, India,* is being received on the west coast of North America with a greatly improved signal near 5:00 a.m. The 9.59 meg. frequency often holds up until after 7:00 a.m., providing Pacific Coast listeners with their best chance to log a broadcaster in far-off India.

A weak station, broadcasting native music, has been observed on 9.59 meg. from 10:30 p.m. to 12:30 a.m. regularly. This may be another transmission from VUD2.

VUD3, also located in *Delhi,* is working on 15.16 meg. every Monday, Wednesday. and Saturday, commencing at 5:30 p.m. VUD2 used to carry the Indian programs at this time of day. but the higher frequency is proving much more satisfactory.

VUM2. of *Madras, India,* operates on 6.06 meg., and is heard irregularly in the United States near 3:30 a.m. Do not confuse this with VUD. which employs a frequency of 6.08 meg., and is often on the air near the same hour.

Chinese Phones

A great many Chinese phone stations may be logged in all parts of the low-wave spectrum from time to time. Many have been heard only once or twice, but those listed below have been logged quite often by west coast dialers:

XTU, *Canton,* 12.07 meg.; usually heard near 6:00 a.m.

XTS, *Swatow,* 11.47 meg.; and XTR, *Swatow.* 9.36 meg.; both phone Shanghai near 11:45 p.m., and work irregularly between midnight and 6:00 a.m.

XTK, *Hankow,* 9.08 meg.; usually heard near 4:30 a.m.

XTU, *Canton,* authorized on both 9.30 and and 9.50 meg.; usually received between 3:00 and 6:30 a.m.

XTB, *Shanghai,* 11.42 meg.; usually heard near 5:00 a.m.

XTA, *Hankow,* 9.53 meg.; phones and sometimes broadcasts near 6:00 a.m.

Japan

The substitution of JZL (17.78 meg.) for JZJ (11.8 meg.) has materially improved reception in this country during the daily 3:00 to 3:30 p.m. transmission from *Tokyo.* However. extremely careful tuning is necessary to separate JZL from W3XAL, New York, which is on the air at the same time.

A Japanese station, reported several months ago on 6.17 meg. near 2:30 a.m., has again made its appearance on almost the same frequency, and at almost exactly the same time. The only

announcement is "Kochara wa Moji," or, in English, "This is Moji."

An unidentified Nipponese transmitter is reported with fair volume on 10.88 meg. near 5:00 a.m. irregularly.

JVN, *Tokyo,* has resumed its English news broadcasts at 1:55 a.m. daily on a frequency of 10.66 meg. The present schedule of JVN is 10:50 to 11:20 p.m. and 1:00 to 4:40 a.m. daily.

Unidentified

A new station, undoubtedly located in some British possession, because of the announcer's pronounced English accent, has been heard on approximately 9.87 meg. during the early morning hours. The program concludes abruptly near 5:00 a.m., and the transmitter goes off the air without any kind of a terminating announcement.

Another newcomer, announcing in English, but too weak to identify, is working on about 6.08 meg. near 6:00 a.m.

Stations on 11.70 meg. and 11.96 meg. (approximately), are on the air near 5:15 a.m. irregularly. Programs are evidently of Asiatic origin.

Miscellaneous

PK6XX, a new station in *Dutch New Guinea, Dutch East Indies,* is being received regularly on approximately 14.2 meg. between 3:00 and 5:00 a.m.

HS8PJ of *Bankok, Siam,* announces programs will be released on 15.23 meg. instead of on 19.02 meg. every other Monday from 5:00 to 7:00 a.m. The lower frequency reaches America with good volume, but has only been in use about once a month to date. It was heard once in July and once in August.

The "Hawaii Calls" program is released from Honolulu via KQH (14.96 meg.) every Sunday from 3:00 to 3:30 p.m. From time to time KHE (17.95 meg.) may be substituted.

The new station in *Lahti, Finland,* is reaching the Pacific Coast with surprisingly good volume on 11.78 or 15.19 meg. from 10:00 to 10:45 p.m. daily except Saturday. On Saturday the station commences operations at 10:45 p.m., and is received with fair volume until about 11:15, when the signal weakens and fades out.

ZLT of *Wellington, New Zealand,* phones Australia on 11.05 meg. at irregular intervals between 8:00 p.m. and 3:00 a.m. [Ed. Note: Australia has phone stations on 10.52 and 9.76 meg. When testing both frequencies use the call VK2ME; when working Java, they operate under the letters VLJ; when working England, they use VLK; and when working New Zealand, they are known as VLZ.]

PCJ of *Eindhoven, Holland,* is received with excellent volume in all parts of the western United States during a special weekly transmission to Australia, which is released on 15.22 meg. every Monday night between 9:30 and 10:45 p.m.

RKI, *Moscow* (15.08 meg.), is at last sending a good signal to the Pacific Coast during the daily English news broadcast at 5:45 p.m.

"Radio Philco," located in *Saigon, Indo-China,* is broadcasting daily on 6.20 meg. and 9.76 meg. between 3:00 and 6:30 a.m., but is so badly heterodyned on both frequencies that satisfactory reception is well-nigh impossible.

JIB, *Taihoku, Taiwan,* does not broadcast simultaneously with JFO (9.62 meg.) until 6:00 a.m., but it may be heard for several hours before that time conducting phone work on 10.53 meg.

Europe

The increasing efficiency of the lower wavebands, due to the approach of a sunspot maximum, has made possible some truly remarkable European reception throughout the Pacific States.

The 25, 19, and even 16 meter bands have been productive of extremely strong European signals, not only in mid-day, but after dark—even as late as 11:30 p.m. Strangely enough, experiment has proven that these transmissions between 9:00 and 11:30 p.m. reach the west coast of this country via the long route around the world—i.e., from the east. This is due to the fact that most European broadcasts are then directed to Asia and Australia. As a result, reception after 9:00 p.m. of German, British, Dutch, and other European stations is usually stronger on the Pacific Coast of America than it is on the east coast.

London's GSD (11.75 meg. and GSI (15.26 meg.) shake the antenna masts with extremely strong signals from 6:20 to 8:20 p.m., and from 9:00 to 11:15 p.m. nightly. Germany's DJL (15.11 meg.), DJB (15.2 meg.), and DJQ (15.28 meg.) are excellent after 9:10 p.m.

Holland's PCJ (15.22 meg.) has surprised more

than one listener with its fine volume on Monday evenings after 9:30 p.m.

The new *Finnish* transmitter on 15.19 meg. may be picked up without difficulty after 10:00 p.m.

Peculiarly enough, morning reception from Europe, which was quite good only a few months ago, has virtually disappeared. Signals from trans-Atlantic stations still reach a maximum near 7:00 a.m. for listeners in the western United States, but they rarely deserve better than a "fair" of "weak" rating. The 19, 16, and 13 meter bands produce the best signals available at this particular time of day.

Siberia

The excellent reception, which is now available from station RV15 in *Khabarovsk, U.S.S.R.*, has provided many listeners with practically eye-witness accounts of the Russo-Japanese conflicts on and near the Manchukuan border. Station RV15 is audible on 8.54 meg., as well as on the original frequency of 4.27 meg., from 1:00 to 6:30 a.m. daily.

Last Minute Flashes

MYSTERY STATION—Another new Asiatic broadcaster has just made its appearance on the abbreviated wavelengths. So far it has been impossible to determine the station's identity, the only clue being a clock which strikes ten at exactly 6:30 a.m., PST. According to our time charts, the only country with an exact 16½ hour time difference is Sarawak, on the north side of Borneo. Programs consist mostly of native music, and the frequency used is approximately 15.18 meg.

[Could this be RKI U.S.S.R.?—Ed.]

HOLLAND TIME CHANGE—An announcement has just been made from Holland's PCJ, indicating that on and after August 15th, the regular Monday transmissions to Australia (now being received from 9:30 to 11:00 p.m., PST) will be released one-half hour later on 15.22 meg. The first half of the broadcast should still reach America's Pacific Coast with excellent volume.

—30—

Earshot of the Editor

(*Continued from page* 4)

That is certainly a better recommendation for our existence than "How's my modulation, and what's the weather there, OM" which clutters the ham bands any evening.

* * *

WE recently had a chance to see how the amateur mind works. Speaking to Rex Munger, W9LIP, the other afternoon when the thermometer hovered in the vicinity of 100 in the shade—and darn little shade at that—we mentioned that perhaps we could swap the FCC greater supervision of the hams for increased frequencies. Rex's reply was that we should leave the FCC alone and leave out any suggestion of more supervision. This was opposite to the opinion of Al Cox, Jr., W9UAQ, and Bill Halligan, W9WZE, both of whom thought that there might be a number of frequencies that might become available to the hams were they properly supervised and controlled to a greater extent than now.

Our scheme was very simple and was this. Let us go to the FCC, we said, and ask them to encourage the same type of transmissions that they require of the police or broadcasters. This requirement to be along the lines of so much percentage of modulation, such-and-such frequency drift, etc., etc. Let us tell them to put in a stiff special examination and require that the hams who would use some of the "shared" frequencies be capable of operating on a fixed frequency with the same circumspection as the other persons who are assigned a fixed channel. Then let's ask for one of the "share-with-some-other-not-too-often used-service" frequency. This would open up a few more bands to the hams which would be heavily policed and in which the welter of woozieness found usually on 160 would be conspicuous by its absence.

We think that such a scheme could be sold to the FCC. Why? Well, for one thing it would give greater employment to the FCC who would have to have a greater staff to handle the hams, and secondly it would put us directly under the supervision—daily—of the FCC. If we were in that close contact with the government, and showed that we could make good use of our newly found bands, and really develop something which would have a purpose in radio, then the chances of our keeping our hobby would be increased ten fold. As it is now, we hardly, if ever, come in contact with the government except on "license renewal" day.

And anyone who thinks that we are indispensable for flood or emergency work has another think coming. Our Uncle Sam could and would raise an army of radiophone men at short notice with the daily increase of police, airplane, marine, and fireman radioists that are being trained. It would behoove us to put on our thinking caps and dream up an idea which would bring us closer to our government—even if it meant stern regimentation of the hams—if we want to keep our bands.

Yeah, hams should give this thought and not believe they can forever hold our gov-

ernment at arms' length, and still receive favors from it.

Another idea which suggested itself was to require an examination at the end of every license period. That license would cover a code test which would be "upped" by 5 words per minute for every renewal period until it reached 30 words per minute. The practical test would include an examination in the developments which had taken place in radio since the last test. The purpose of this would be to require the ham to keep up with his radio, not only the code (which is one of the few reasons for our existence) but also with the technical side of radio. Those who would flunk the examination would be granted three more chances to take the exam before their licenses would be cancelled. License renewal tests would start any time in the last 9 months of the existence of the license.

This is no mere pipe dream. We listened to Col. White of the Engineering Staff of the FCC a few evenings ago, when he was in Chicago to talk to the Association of Police Communications of Chicago, and he told us that that was exactly what was being contemplated for the professional operators. That is, all except the "upping" the code speed. If the commercial ops are going to justify their being able to keep their licenses by showing that they are up-to-the-minute on the latest developments in radio, can the hams *afford* not to take the attitude that what is good for the commercial op is not good for him also?

The handwriting is definitely on the wall that the matter of holding a license (either that of operator or station) is going to be made harder . . . and specially the renewal is going to be made harder.

A radio license is getting to mean something at last.

* * *

IN this issue we break a column called "Bench Notes" by Mr. Lee Ward, of San Francisco, California. The column will have hints for servicemen and the conductor of the page will be happy to print any pictures of servicemen's equipment that servicemen themselves send in. They may also send questions to RADIO NEWS, in care of Mr. Ward. If they are of sufficient public interest, he will answer them in his column. Otherwise, he will answer them personally, wherever possible. Please do not expect an answer within twenty-four hours, since with the extensive volume of mail this will be manifestly impossible.

* * *

WE received word from our writer, Ted Leitzell, the other day via ham radio from a station in Alaska. Ted has had a narrow escape from death in climbing Mt. McKinley. What happened is this. He pitched camp at the base of Mt. McKinley and turned in after a hard day's work. He and his guide awoke in the middle of the night to find their camp completely overrun by bears who were eating everything in sight.

Since they were out of food they decided it would be foolhardy to attempt to climb that tall mountain on an empty stomach. Accordingly, they lashed a few logs together and launched a raft down a local river, which eventually took them to civilization.

While Ted is not a ham, he has been so closely associated with the ham situation and with RADIO NEWS that the hams may

almost claim him, for one of their own. It is interesting to note that Ted has the real pioneer spirit in him, and even like the ham he is not dissuaded from success by local hindrances.

We expect to run a full story of Ted Leitzell's experiences in Alaska, including his experiences with ham radio, when he gets back. We hope that we will be able to publish the fact that he has conquered Mt. McKinley,—one of the few ever to do this stunt.

* * *

WE take this opportunity of urging all amateurs who possibly can make the grade, to join the Army Amateur Radio System, or the Navy Amateur Radio Reserve. If these bodies will increase in size, due to the inclusion of each and every amateur within the borders of the United States, the position of amateur radio will become much more certain, and the chances of foreign governments throwing us off the air or eliminating our 20-40 M bands will become that much more impossible.

Unless we show our appreciation to our Government by joining in its services and unselfishly rendering aid at times other than those of emergency or floods, we will find ourselves legislated out of existence.

* * *

ANOTHER letter has called us to account and says that the *National QSO Page* is five years behind its time and that we should have started our fight five years ago. May we call to the readers' attention the fact that RADIO NEWS has been under the present management only since the April issue, and that therefore could not have engaged in this fight five years ago, unless the former management would have undertaken it. We believe that it is better to start our fight late than not at all. And certainly if we are to succeed in keeping our bands after 1942, our fight should be started now, and the sooner that the Amateurs get into this fight and do something to retain their bands themselves, just that much sooner will we have some assurance that when we leave the conference at Rome in 1942, we will still be the possessors of 20 M and 40 M.

* * *

WE are attempting to make RADIO NEWS tops in amateur and servicemen articles. If there are any type of articles that anyone would like to see in R.N., please do not hesitate to write us. We will be most happy to accept and receive your suggestions. And so . . . until next month . . . we wish you the best of DX luck and 73—W9QEA.

—30—

VOX System

(*Continued from page 34*)

or not go "off" in time. The *VOX System* relay can be used to throw a 1 mfd. condenser across the antenna and ground post of the receiver when the transmitter is "on." This will usually correct this condition.

Should it fail, then the *VOX System* should be cut from the circuit by turning it off and resorting to "manual" control of the transmitter. With the transmitter running on the air, the receiver should be "deadened" by one means or another. Either the B— should be disconnected and the terminals brought out, the antenna and ground posts shorted and the terminals brought out, or the antenna and ground disconnected. In this latter case, sometimes the receiver picks up r.f. from the transmitter and it might burn out the coils, so extreme care should be taken to see that everything is "cokosetti" before attempting to use the *VOX System*. Once the problem of the receiver has been licked, the transmitter can be tackled.

Certain things must be made positive before the transmitter can be used with the *VOX System*. (1) The crystal MUST start every time if the Class B transformer is not to be ruined by use without a terminal load. This is most important, and in installations of over one-quarter kilowatt, an underload relay should be used as a safeguard against just this condition. It is better not to get the last ounce of power from the crystal and to have it idle along, than to take the chance that it won't start. (2) The power for the Class B and Class C r.f. must be instantly available. This is not as silly as it sounds since in many a ham's set the power gets to the Class C slowly because of lag in the various circuits. Test for this by seeing that the meters all "jump" to their final load setting. If this is true then no trouble will be experienced from operation with the *VOX System*. (3) The receiver must be completely disabled when the transmitter is on. This will prevent howls and other irregularities which will make the *VOX System* inoperative.

Last but not least, there is the problem of the loudspeaker. If you are accustomed to running the speaker very high, the system will not work. A directional mike is necessary although the *VOX System* can be made rather insensitive by running its gain at a low point. In the last analysis, headphones can be resorted to. However, no trouble will be experienced with the loudspeaker if it is run low enough, and that is the way that the author has run it during tests.

The author has grown so accustomed to the unit, which has given no trouble, that he doubts whether he will ever want to return to "manual" control.

—30—

CORRECTED DIAGRAM AVAILABLE, FREE.

A corrected diagram of the "Wired Wireless" described on page 49 of the September issue of RADIO NEWS is available, free, to all who write in for it. Address: Circuit Editor RADIO NEWS, 608 S. Dearborn Street, Chicago.

8 Watt P.A. System

(*Continued from page* 41)

denser and 20,000 ohm filter resistor, this arrangement constitutes a simple and effective means of supplying current to a double button carbon microphone.

The maximum usable gain of the amplifier is 112 db which is ample for any of the modern microphones such as the crystal, dynamic or velocity, while for a 500 ohm carbon mike the gain is reduced by means of the increased bias mentioned above, to 87 db.

The low-gain channel for phono pickup or radio tuber provides a maximum gain of 76 db using an input of 150,000 ohms.

Input Connections

The input connections are designed to be as flexible as good engineering practice will permit with all connections made at the rear of the amplifier. The shielded five-pin receptacle accommodates a low level input device, such as crystal, velocity, or double-button carbon microphone, while the shielded three-pin receptacle accommodates a high-level device, such as phono pickup or radio tuber. This receptacle also provides a means of shorting out the button supply when using a crystal, dynamic or velocity mike.

Input connections, and the connections for shorting the button current supply are shown in the diagram. The button current supply must always be shorted when a crystal or velocity microphone is in use. If this connection is not made, the hum level of the amplifier will be excessive. All input leads must be shielded and the shielding grounded to the large pin of the input plug.

The control-grid clip attached to the 6J7 tubes must never be permitted to come in contact with the chassis or any other metal portion of the amplifier, as this will result in shorting the bias cells.

The high (microphone) input, and the low-gain input may be left permanently connected, and either one brought into use by manipulating the "fader" volume-control knob. The volume level is regulated by adjustment to either side of the "off" position. This arrangement makes it possible to "fade" from the microphone channel to either phonograph or radio tuner. The amplifier will not operate if the speaker control knob should be left at the "off" position when neither device is in use. The plug is pulled out as the speaker socket is wired so that the AC line is opened until the speaker is inserted.

Minimizing Hum

The hum component of this amplifier is very low when operating correctly. In almost every instance where hum is encountered with high gain amplifiers the trouble can be traced either to the associated equipment or the manner in which it has been connected. The most common causes of hum with this type of amplifier are reversed input leads, or poor ground connections.

The three major sources of hum which may be encountered can be classified as *Inductive, Static* and *Tube* hum. Inductive hum will be present whenever low impedance input transformers are allowed to come within 3' of the amplifier. A separation of at least 6' is advisable when using high grade shielded transformers. With unshielded or low grade transformers the distance should be increased to ten feet or more.

Static hum is heard in the form of a high frequency buzz, and is usually eliminated by grounding the amplifier, microphone case, or phono pickup, together and to an earth ground. Tube hum may be caused by leaky cathodes or shorting between elements. Substituting a good tube in one socket at a time is the old standby for locating the bad tube.

All this discussion of hum is mentioned merely to emphasize the precautions applied to this amplifier in order to minimize hum.

Taken all in all, this versatile portable P. A. unit answers every practical need for a reliable 5 to 8 watt system.

—30—

Notice! Don't miss the November issue of RADIO NEWS. On sale at newsstands and leading radio stores on Oct. 7th.

Bandswitch Xmtr.

(*Continued from page 38*)

hood of 10-12 mills. With plate power applied with the tube properly loaded, grid current will be in the neighborhood of from 6 to 8 mills.

The adjustment for phone operation is similar to that for c. w. and the tuning procedure is identical. All that is necessary is that the "phone-c. w." switch should be placed in the "phone" position and that the "high-low" power switch is in the low power position. Place the transmit stand-by switch in the transmit position. When the filaments have warmed up normal grid and cathode currents should be observed. Turn the modulator gain control on to the right and place the cathode current meter switch in the modulator position. Normal modulator current will be in the neighborhood of 200 ma. Turn on the plate power switch and observe the plate current to see that it is normal. When you speak into the microphone, with all of these other adjustments having been made to your satisfaction, the modulator plate current should swing up by 30 to 40 ma. on voice peaks. This will give approximately 100% modulation of the 50 watt carrier.

Tested on the air, this transmitter gave an excellent account of itself in switching from one band to another, with the least amount of trouble.

—30—

Radio Gadgets

(*Continued from page 26*)

short waves, receiving the latter best from either *side*. Two inverted L's, at 90 degrees angle, converging on a common lead-in, will receive from all directions—but this calls for a highly selective receiver!

Some experimentation will be necessary to find proper size of coils. Old style sets with low-impedance input may require the variable condenser in series with the wire that goes to antenna post, and loading coil in wire to ground post of the receiver. (It is important that these two wires be marked for identification so that they will not be connected to the wrong posts.)

The secondary of an r.f. transformer, designed for a .00035 condenser, will be about right for the broadcast coil L1. Short-wave coils 2, 3, and 4 consist of 45, 25, and 15 turns respectively, wound on 1-inch tubes.

The fact that coil and tuning condenser are in parallel with the antenna coil in the receiver, may cause peculiarities of tuning, such as suppression followed by amplification, double-spot tuning, etc. However, these effects are confined to the antenna circuit, and with practice may be used to advantage. The remote ground wire, which extends up close to the antenna but does not connect to it should be shielded if in a zone of interference. The choke, at top of ground wire, consists of 50 turns of enameled wire, jumble-wound on an ordinary thread spool.

—30—

W9MWC Wins Paley Amateur Award

IN the brief period of its existence a considerable amount of prestige has been attached to the William S. Paley Amateur Radio Award. The trophy, presented each year by the president of CBS to the ham performing an outstanding feat, is to amateur radio what the Pulitzer Prizes are to literature.

Hence, it was quite fitting that the 1938 award to Robert T. Anderson, of Harrisburg, Illinois, who won the year's honors for valiant service rendered during the flood emergency in the Ohio River valley,

Robert T. Anderson, W9MWC, receives the award from W. S. Paley, President, CBS.

be presented in an impressive ceremony.

The thirty-two-year-old amateur, an employee of a Harrisburg Electric Company, was brought to New York for the presentation ceremonies at the Waldorf-Astoria. He was guest-of-honor at a presentation luncheon and participated in a coast-to-coast CBS broadcast, as well as in two-way talks with amateurs in all parts of the world. For the latter, a ham station, W2GOQ, was erected right in the hotel suite.

Besides Mr. Paley, who made the award personally, the participants included representatives of the United States Navy and Coast Guard, the American Radio Relay League, the board of judges, and radio editors of magazines and newspapers.

Following a reception, the guests assembled to witness a thrilling motion picture of the Ohio River valley floods of early 1937. The surging waters and dramatic rescues portrayed on the screen gave an idea of the immense task performed by Anderson in the emergency when he worked for four days with hardly any sleep to obtain relief for Shawneetown which was threatened with inundation by the raging river. He carried his ham transmitter, W9MWC, across three bodies of water and worked in freezing temperatures to get a means of evacuation for the 1,500 residents. He was the only link with the outside world. Not a life in the town was lost and he is accredited with making the rescues possible.

Amateurs in all parts of the world "came in" on the luncheon.

-30-

Power Pack

(*Continued from page* 35)

The flux density at which the core will be, determines the iron or core loss. The various grades of laminations have different losses per pound, which may be plotted against a flux density in kilolines per square inch. A value of 65 kilolines is used as an average value of induction per square inch of core material. However, with various grades of steel it is not uncommon to find flux densities ranging from 15 kilolines to 95 kilolines. This will be determined not only by the quality of the steel but also by the thickness of the laminations. The thicker laminations must necessarily be used with lower flux densities than the thinner laminations because of the greater loss set up by the mass in the thicker laminations. The formula for flux density is:

$$B \text{ equals } \frac{E\,10^8}{4.44\,ANf}$$

Whereas: B equals Flux density. 4.44 equals A factor also. E equals Primary voltage. A equals the gross area. 10^8 equals A factor. N equals the number of primary turns. F equals frequency.

(5) Induced voltage equation, turns per volt.

The definition that 10^8 magnetic lines cut per second will induce 1 volt pressure is the basis for the following equation:

$$E \text{ equals } \frac{BANf}{10^8} \times 4.44$$

Where E is the voltage, A the area of the core, B the flux density for A, f the frequency in the cycles per second, and N the number of turns it is found, by the substitution, that this formula may be changed to:

$$N \text{ equals } \frac{E\,10^8}{4.44\,ABf}$$

By working out this formula for 115 volts primary at 60 cycles, the following is a simplified formula.

$$N \text{ equals } \frac{4.84}{AB}$$

(6) Number of turns for each winding.

With a B of 65,000 lines, N equals 870 turns on the primary, therefore, the turns per volt will be 7.65. It is then a matter of obtaining the voltage ratios and multiplying this by the number of turns per volt to obtain the desired number of turns in the secondary winding.

(7) Winding space required.

From the total turns for each winding and the wire size, the total area of winding space is calculated. Most transformers used in power packs and radios employ enameled wire. By using a wire chart, the diameter of the wire is found. The steps in calculating the build of a transformer are as follows:

(a) The size of the tube or the winding form.

(b) The diameter of the wire for the primary, the number of turns which may be wound on one layer and the insulation between each layer. This, multiplied by the number of layers required for the primary is the area required for the primary. To this, add a winding insulation. Then proceed with the wire size of the secondary, number of turns, etc., as above.

If more than one secondary is used, repeat this until the primary steps and secondary steps have been totaled and then divide this by the window area.

It is impractical to wind a transformer with more than 85 or 90% build.

The photographs illustrate a complete pin game power pack, a coil for a transformer, a small transformer for a pack and a larger transformer used in a theatre power pack.

The next article will be on power packs for use to replace batteries on demonstrations of automobile radios and farm sets. These will incorporate filters, protective devices, and data on problems that vibration causes in the design of this type of a power pack.

—30—

Serviceman's Experiences

(*Continued from page* 10)

some business associates. Come over here, drive the car back, and close up."

I found him in an apartment with a very jolly group of men without neckties. Wine bottles were on the table; some were empty. Group singing was being contemplated. Al pulled me aside.

"For shame!" I cried. "And all for the sake of one job!"

"Drive home, Carrie Nation, before my jovial mood passes. Get out of here before someone offers you a friendly drink. Tomorrow I will probably be full of bum liquor and remorse, but tonight I am going to get stone drunk—curbstone drunk, in the name of good customer relations. Have you a little gutter-pillow in your pocket?"

I drove back in disgust. What a business partner! Before I closed the shop, I took the tools and meters out of the back seat of the car. An Amrad chassis was there—and a Bosch—*two* Bosch's—a Zenith —! Six repair jobs in all, and not a cluck midget in the carload.

I laid them on the floor in the shop. They made a heart-warming sight, all those speakers, power packs, and tuning chassis. I tore the page from *Counseler & Guide*, turned off the lights over the workbench, and could hardly walk to the door without jumping.

—30—

RADIO PHYSICS COURSE

by Alfred A. Ghirardi

(Continued from last month)

Energy can be transmitted from one place to another by only one of two general means; either by a *wave disturbance* travelling through a medium which does not itself move as a whole, or by the motion of corpuscles of matter from some source (as illustrated by the case of buckshot issuing from a shotgun). According to the *wave theory,* an electromagnetic disturbance travels in the former way, by a wave motion through the ether. According to the *emission* or *corpuscular* theory, electromagnetic disturbances are propagated by invisible rapidly moving particles whose size varies with the frequency. As it is impossible for most minds to think of waves without a medium to carry the wave motion, it has been supposed that a hypothetical ether exists in all space, this either serving as the medium to carry the wave motion. If the wave theory is upheld, then it must be assumed that all points on a surface through which an electromagnetic wave is passing, energy is uniformly and continuously distributed. If the corpuscular theory is upheld, it must be assumed that the energy is distributed discontinuously in isolated bundles or quanta, being concentrated at points. At the present time, many facts do not find an adequate explanation in the simple wave theory and the quantum theory does not satisfactorily explain all observed phenomena associated with all types of electromagnetic waves. It seems probable that a combination of parts of the two theories will explain the observed facts more satisfactorily. The *wave mechanics* theory, which attempts to reconcile the conflicting views of these two theories, is rapidly gaining popularity. In this, it is assumed that in every mechanical system electrons are accompanied by waves. In this book we will speak of electrical and radio waves and also of bundles of energy or quanta, when dealing with the propagation of electrical energy from the radio transmitting aerial to the receiving antenna.

The exact nature of the little bundles of energy is not yet positively known but it has been definitely established by a series of extremely delicate experiments performed by Professor R. A. Millikan, that a quantum shot off from an electron whose orbit lies close to the atomic nucleus is larger than a quantum that is radiated from an electron rotating in a larger orbit, further away from the nucleus. It is also known that the frequency of emission, that is, the number of groups or clouds of quanta shot off per second from electrons rotating in the inner orbits, is greater than the frequency of emission coming from electrons in the outer or larger orbits. The reason for this may be easily understood by remembering that the frequency depends entirely on how long it takes the electron to travel back and forth over its path. The shorter the path of the electron, the sooner it completes a round trip and is ready to start over again, and the more closely the outgoing streams of energy follow the preceding ones, i.e., the higher the frequency and the shorter the wavelength.

(Continue your study next month)

Motor-Driven Antenna

(*Continued from page* 19)

used on all the wooden surfaces. Stove-bolts and heavy wood screws were used for all of the construction. Lubricating oil can be used on the meshing gears at the top of the main pole, but if properly painted this may not be necessary.

Since the rotating array was to be a permanent part of my rig I had to give some thought to the preservation of that part of the main pole embedded in the ground. I wrapped upholsterers tape on the bottom of the pole as a preservative, forming a wick on all four sides extending from the bottom to about one foot above ground. The tape was folded over and tacked down, making sort of a tube duct. Before filling in the earth around the pole I soaked the tape in creosote, and after filling in I used a small "squirt-gun" to pump more creosote into the ducts to fill the wicks. The tape absorbs the creosote, and protection is thus afforded the pole. I plan to apply the creosote to the wicks about every six months.

I erected the main pole at the rear of my residence, as shown in the illustration, using the roof angle of the house as a means of bracing the main pole. Actually only about fifteen feet of the main pole is free to move with the wind. I used several guy wires to strengthen the main pole, but they are not absolutely necessary as the movable array is very well balanced. When it is not possible or convenient to mount the main pole against a part of the house or building I would suggest that the completed structure be very well guyed with heavy wire, preferably at about one-third and two-thirds of the main pole height above ground. This is necessary due to the weight of the entire top structure. The weight of the header is about 20 to 25 pounds.

After the main pole was erected and in place I used a temporary pulley to raise the "header" to the top of the pole. Two eye-bolts in the main pole (one 6″ from the top, the other 2'0″ from the top) were used to receive a three foot heavy rod. This rod was bent at the top in a V shape, and was inserted in the eye-bolts for the raising process. It was later removed when the "header" had been permanently mounted. The eye-bolts were left in for possible future use.

After the "header" had been attached I connected the lead-in wires to the antenna rods and loading coils. The feeder was left in a loose loop, and was connected to the main pole about three feet below the top of the main pole. Sufficient slack was thereby allowed to permit one full revolution of the antenna unit on the "header." After one full revolution it is necessary to stop, and reverse the motor to obtain other desired directions. Some type of indicating device was therefore needed to show the exact position of the directional array. Such a device should be located in the radio shack for convenience.

After quite a bit of experimentation I decided upon a mechanical indicating device. The vertical drive shaft on the main pole makes 12 revolutions for each complete revolution of the antenna "header." I attached one end of a piece of copper dial cable to this vertical drive shaft, and then brought the dial cable through copper tubing into the house and directly to my shack—a distance of about twelve feet. I fastened a plumb bob to the free end of the dial cable (in the shack) and then marked a position scale on the wall of the shack to correspond with various positions of the antenna "header." The exterior end of the dial cable was wound around the drive shaft. As the shaft turns the plumb bob on the other end of the dial cable travels up and down a distance of about three feet for the compass circle of 360 degrees. An illustration of this gadget is shown. All motor starting and reversing switches are located on a panel in the shack.

As to cost and obtaining parts, I think this type of directive array can be constructed very economically. The automobile hub, ring gear, starter gear and iron plate were obtained completely assembled for about $12.00. The cost of shafting, with all necessary couplers, amounted to $4.00. Used awning gear boxes were obtained for only $2.50. The 6″ x 6″ main pole cost approximately $12.00. A suitable driving motor can be obtained for $5 or less. The antenna radiating rods will be an additional cost, depending upon the type desired.

I have used this type of rotating device for some time now and have found it very practical and faultless in operation. Although I use it for transmitting I find its greatest use in receiving DX. By merely rotating the antenna I can get selectivity far greater than I could expect from any make of receiver.

My 800 watt rig has put out a good signal with this type of antenna. It uses 2 250T's in the output, driven by T55's; a 47rtal and 801 buffer-doubler complete the tube line-up.

This type of rotating device can also be used with any kind of close-spaced array antenna system, it being only necessary to alter the dimensions of the 2″ x 4″ mounting pieces which are attached to the movable "header." With reasonable care in construction I believe any ham can enjoy a *really selective* directional antenna array.

The most important work that the array accomplishes is to receive weak, badly QRM'd signals. The old adage, "You can't work 'em, if you can't hear 'em" still holds true. By swinging the array towards the incoming signal, the interfering signals drop down further and further and sometimes even completely out. Meanwhile the station you want to hear comes up out of the background noise until it seems that it is the only signal on the band. The advantages of this have been so marked that I have been able to work stations I have only had the luck to work when one or more of the interfering stations were off the air. It has increased my dx quota over a 1000% since its erection.

—30—

A Ham Takes a Radio Vacation

(*Continued from page 29*)

ing "Hello" to him and that we were on our way up to Pike's Peak. The rest of the trip was made without any mishaps or undue excitement, except for a snow storm which we encountered at the Half Way House. That, to us, was something—in the middle of July. On reaching the summit of the Peak, we found the temperature to be down around 28° and that we were above the clouds. Our descent was really more thrilling than the ascent due to the extreme caution necessary in going down.

Most of the time, in sections, low gear is used as well as the brake. We reached the base of the Peak around 5:00 o'clock in the afternoon. We went on to Denver that evening, where we spent the night. We found Denver to be a very beautiful city, living up to its well-earned name of one of the spots that Americans should see.

The next morning we left Denver and headed for Salt Lake City, as our goal, which we made that evening. One of the first passes of great interest is the summit of Lookout Mountain, at an elevation of over 7,700 feet. The next thrill we encountered was the summit of Berthoud Pass on the Continental Divide; elevation 11,305 feet. Our next pass was the summit of Rabbit Ear Pass at an elevation of 9,985 feet. There are a number of other passes of interest along the route to Salt Lake City which are anywhere from 6,000 to 9,000 feet high.

Leaving Salt Lake City the next morning on U. S. 40, we headed for the Great Salt Desert, which has the appearance of a vast spread of snow. The highway is perfect, and it took a very short time to make the town Windover, 134 miles from Salt Lake City. There we changed our route from U. S. 40 to U. S. 50, which we took to Carson City and spent the night there.

The next morning we left Carson City and were in view of the Sierra Nevada range, with snow capped peaks in the distance. We arrived at Sacramento, California, slightly after 12 o'clock. From Sacramento our trip to Oakland was made without any mishaps except the expense of 87 cents for crossing a small river. It only cost 50 cents to cross the Oakland Bay Bridge, which is many times longer.

Driving over to Berkeley, my first call was to W6ITH, whom I called by telephone, making arrangements to meet him that evening around 7:30 p.m. After settling the family in a comfortable cottage, W6ITH appeared and we went up to his QRA, which is one of the highest points around Berkeley. Reg's home is situated on a peak overlooking about everything in the Bay Country. We had heard much about Reg's layout on top of the mountain, as well as his extensive antenna system which amounts to around 15 acres of directive antennas, all terminated into the transmitting room and controlled from the operating desk by selectors, which select any one of the various rays at will.

Reg is a very interesting person and his equipment everything that we expected, and more. All of the equipment he uses at 6ITH he constructed himself. It is just about the most complete and most unique amateur station that I have ever had the pleasure of visiting.

On the morning of July 11, 1938, we again went up to 6ITH's QRA, taking pictures and visiting with the XYL. On leaving 6ITH's QRA we went through the University of California grounds. We were directed by radio through W6ITH's 20 meter transmitter. Using my 10 meter mobile transmitter in the car, we worked two-way radio throughout the grounds of the University of California, and had all of this section described to us by 6ITH. We were directed by the shortest route over the Oakland Bay Bridge, and San Francisco Bridge. Contact was maintained with 6ITH the entire trip over the bridge. Near the center of the bridge we had the pleasure of viewing the new man-made island for the 1939 World's Fair to be held in San Francisco next year. Some of the buildings are up and the Fair seems to be on its way to great success. We have hopes of seeing it next year. While finishing the trip over the bridge we were still in contact with W6ITH and were directed to U. S. 101, where we bid him 73's and thanked him for his courtesies and hoped that he would come to Chicago to see us during the convention.

Leaving San Francisco. On U. S. 101 we came through Santa Clara, then to San Jose. At San Jose we had the pleasure of a visit with W6SQI, Doc Farhney, and talked to him on the 10 meter band. Our visit with 6SQI was very short and very, very pleasant. After having talked over old times we went on our way to Paso Robles, where we spent the night.

Leaving Paso Robles on July 12th, we arrived in Santa Maria, California, and on driving around a section of the town we saw quite an antenna mast on which were affixed the call letters W6ASK. There we met Cliff and his XYL. W6ASK has a very nice transmitter and also a nice 10 meter mobile installation.

Leaving Santa Maria we were in contact with W6ASK for some miles outside the city with the 10 meter transmitter. We arrived in Santa Barbara, California, around noon, and visited with W6NCT and W6PIG, one and the same. W6NCT is an old-time friend of mine, having worked him many times.

From Santa Barbara we drove to Canoga Park on the outskirts of Hollywood. Visited W6CNE, but did not find him home. Had the pleasure of viewing his transmitter and his automobile, which held the 10 meter mobile unit. Roy's layout is exceptional, due to the fact that it is also located on one of the highest hills in that section of the country, having rotary beams and various antenna arrays at his command. He is located away from the conjested area, which makes for fine radio.

Leaving Canoga Park we went to Hollywood, viewing the various things that are often seen in the movies. We arrived in Los Angeles shortly after 5:30 p.m.

From Los Angeles we drove to South-

gate, California, where I visited with my aunt, Mrs. Bessie McGee, whom I had never had the pleasure of meeting. In Southgate, where we stayed, we made the following contacts: W6CRZ, W6MHY, W6CER, working those stations on 10 and on 5 meters.

The evening of July 13th we drove out to Long Beach, California, and called W6AM and made radio contacts from downtown Long Beach to Don's QRA, where again I had the pleasure of seeing one of the most extensive curtain antenna arrays ever used by anyone in an amateur station. In fact, I still have a crick in my neck from looking up in the sky at the antenna and meter wires running in most every direction. I believe that Don has had experience on most of the antennas that are of any value. In fact, he has an antenna array for just about every direction on the great circle. Saw his new transmitters that are under construction, and also the very nice lineup of RME69 receiver, DB20 and the 5-10 expander for it. Our visit with W6AM was very short but very interesting and we hope to see him again soon and have a longer stay. He had many interesting things to tell about the experiences he has had, particularly on the high frequencies.

We spent a very interesting evening with W6NTX in Los Angeles, and made one of our first Chicago contacts on 20 meters. We contacted W9CPD of Elmhurst, Illinois, and had about an hour and thirty minutes of 100% QSO.

Our visit in Los Angeles was only too short and we hope on our next trip out that we will be able to spend more time visiting many more of these fellows we contacted on the various bands previous to our trip to California. Our trip from Los Angeles to San Diego was made at what you might call very slow speed. We took in the sights along the beach and the highways which wind in and out along the Pacific Ocean to San Diego. In San Diego we had the pleasure of visiting W6MHL, W6LYY, and W6JRM at La Mesa, California.

All of these fellows have fine business transmitters and antenna systems. W6LYY has a rotary beam operation and maintains schedules with PK6XX, the New Guinea Expedition. W6JRM, at La Mesa, has a very excellent 10 meter rotary beam, with two generators and one reflector.

On leaving San Diego, our trip to El Centro was made without mishap. However, arriving at El Centro we found the temperature to be 112° at high noon. From El Centro we went through the Great Desert of California and the temperature was 122°. We kept the car cool with dry ice. The idea was conceived by a friend of mine who has traveled through the country before. He put dry ice in the front of the car, opened the ventilator slightly and lowered the rear windows a bit. This gives circulation of air over the dry ice and lowers the temperature in the car.

We obtained the dry ice in El Centro, California, from a service station in a garage where the ice is kept for tourist use. The dry ice is sawed with a regular wood saw. We used some 15 pounds of ice, which costs 12c a pound. However, the ice will last most of the day; in fact, it still was serviceable well up in the night.

We arrived in Yuma, Arizona, late in the afternoon and headed for Tucson, which we made around midnight after passing through a severe sand and rain storm. We continued driving for the rest of the night, and we arrived in Demming, New Mexico, around noon the next day. There we visited with W5FPC, Dan Thistle, whom we had worked on 10 meters many times. From Demming, New Mexico, our trip to El Paso was made by late afternoon.

From El Paso we drove to Van Horn, Texas, where we spent the night, and left there the next morning early—around 4:00. From Van Horn, Texas, we drove through to my home town of El Campo, some 670 miles, arriving home around 8:00 p.m. The old hometown of El Campo is located some 72 miles southwest of Houston on U. S. 96. The name "El Campo" is an old Spanish name meaning "The Camp," which was founded a number of years ago by a railroad company putting a line through that section of Texas.

On arriving home our 20 meter fone was found to be in good order where it was shipped previous to our trip to the West Coast. The rig was set up and put in working order. Our first antenna used at home was a long wire antenna around 550 feet in length. Later a "V" beam, 137 feet per leg, was put up, which worked very fine. This same antenna was used on a vacation last year. The second day of our operation on the portable 20 meter transmitter tough luck was experienced by the fact that both the high voltage transformers were burned badly in the secondary winding, so operations had to close down for some two days. During that time we used W5AHK's transmitter, whom you have probably heard many times on the 20 meter band. Our visit with W5AHK, Millard and Sally, was thoroughly enjoyed as well as the courtesy of using his transmitter.

One of our most interesting contacts

was with W9NLP, W9TIZ, W9QEA, W9WZE, and W9TLO. Our contacts lasted around one hour and a half, when we went round and round about the trip and found out all the news about the old Windy City. The 20 meter transmitter was repaired by taking the transformers apart and taking certain sections of the burned winding out and bringing out new leads, and we had some 375 v. of d.c. output out of each of the power supplies. This 20 meter transmitter worked with limited power at about 40 watts. The line-up, consisting of 6L6-RK49 pair of RK49 final, being modulated by VG73 microphone 6G5, 6F5, 6F6G and a pair of 42's in Class AB. The receiver was a Hallicrafter Skychampion. The following stations were contacted on 20 meter phone from El Campo: W9UAK, W9MVT, W9NLP, W9TIZ, W9SJX, XE1LK, W9RNV, W9BHO, W4FKL, VE3SM, W9UVW, W5AXP, W9JDO, W9BG, W9IPS, W8MGP, W4BPG, W9CGT.

Leaving radio for a short time we made a trip to the Texas Gulf Sulphur Company mine, located some 28 miles from home. The one thing in mining sulphur is the device with which the sulphur is brought out from under the ground. The mine looked much like an ordinary oil field, having derricks on the same order. A hole is drilled in the ground, the same as an oil well, and several cases are inserted, one beside the other. After the sulphur strata is reached, these casings are connected to super-heated steam pipes coming from a main central power plant. Super-heated steam is forced into the ground and the high pressure forces the melted sulphur up through the casing and pipe line to the separator, where the impurities are taken out —oil and elements other than sulphur— from which it goes to the vats, where the hot sulphur is cooled. These vats are on the order of large frame buildings, approximately 80 feet in height, some three blocks long by three blocks wide. It takes several days, and up to weeks, for sulphur to cool, which forms a very hard rock-like substance. At the time we visited the mines there was some six or eight of these blocks already formed. The sulphur is blasted and picked up by steam shovels, being loaded on gondola cars for shipment. Of course, sulphur has a number of uses in the manufacture of automobile cars, used in connection with the process, and manufacture of medical supplies, insulation, etc.

The Texas Gulf Sulphur mine is claimed to be the largest in the world. A number of fine pictures were taken of the sulphur deposits on top of the ground, the loading of it, as well as a number of samples being brought back for souvenirs. After spending nine pleasant days with the folks at home, we headed the old V8 north, coming through Houston, Texas, and heading for Texarkana. There we visited with W5BDB of signal squirter fame and W5AXP, whom we had worked from our portable station in El Campo, Texas. From Texarkana we drove to Hot Springs and, on driving down the main section of the city there, had quite a coincidence occur, seeing two of our old friends from Chicago, Mr. and Mrs. Fleming, walking down the street. After greetings, we located a very fine cottage and located the family. Mr. and Mrs. Fleming and myself went down to the Chamber of Commerce radio station, KTHS, and met an old friend of mine, W9MHZ, who is Doug Fleming, son of Mr. and Mrs. Fleming, announcer on KTHS. After a short stay in the studio we looked over the transmitter. After visiting the transmitter, we were on our way back to the studio and visited until the end of the day's program at midnight. The next day we looked up two of my uncles, who were living in Hot Springs, had lunch with them, and were on our way after saying "S.K.'s" and "73's," for the old Windy City. The trip was made without any unusual events, leaving the radio off most of the time outside of the broadcast band. Without the use of the radio in the car, the 10 and 5 meter transmitters, the trip would not have been the pleasure that it was, since many of the people which we had the pleasure of meeting would not have been contacted. So, I say, for a first class vacation, take your radio with you.

—30—

Technical Review

(*Continued from page* 24)

casting and its function in the preservation of democracy, also C. B. Jolliffe discusses the 1938 international telecommunication conferences of Cario. There are articles on television and amateur radio.

THE RADIO ANTENNA HANDBOOK, by the Technical Staff of Radio, 112 pages. Price $0.75 U. S. A., elsewhere $0.85. Size 6 x 9 inches. Published by Radio, Ltd., 7460 Beverly Blvd., Los Angeles, California.

This book has been prepared to cover the complete antenna problem for the amateur and others concerned with antenna installations for the high-frequencies. Many graphs and diagrams are included. Chapters are devoted to Directive Properties of Antennas, U.H.F. Antennas, and Directable Arrays.

THORDARSON ELECTRIC MANUFACTURING Co., 500 W. Huron Street, Chicago, Illinois.

A nicely prepared catalog which describes in detail the new line of Thordarson amplifiers. Models are listed from 8 to 60 watts output. Technical data accompanies the description for each sound system. Copies free to sound engineers, servicemen, and interested readers in P.A. equipment.

THE RADIO NOISE REDUCTION HANDBOOK, 44 pages. Price 35 cents, size 6 x 9. Published by Radio, Ltd., 7460 Beverly Blvd., Los Angeles, California.

Here is a practical compilation on radio noise suppression, types of interference, suppressing noise at its source and chapters on noise balancing systems, limiting circuits, and other information that will be appreciated by anyone interested in radio.

—30—

Looking Ahead to Television Occupations

(*Continued from page* 44)

studio and the actors. These men must be skilled electricians capable of handling, shifting, and controlling illumination in any desired fashion. There will be the *microphone* or *sound men* in the studio who will place and control the microphone supports or booms which hold the microphone close enough to the actors to pick up speech or music, while still keeping the microphone outside of the field of view of the camera. Here men with steady hands, quick responses, and a cool way of working effectively will be required (particularly in the stress of high-speed operations during the studio performance). In the control rooms of the studio, there will be *sound-control men* and *picture-control men* who will handle respectively the quality of the sound and the picture which is being transmitted. These men will be technically trained, probably as junior engineers, and they must have quick responses, good judgment, and manual skill in getting the picture and sound results which will best please the audience.

Sometimes, the television transmissions will be from sound-motion-picture film which has been previously made. For example, a film newsreel may be transmitted. This requires that there shall be *projectionists* who will handle and project the film on the television pick-up whereby it is sent to the audience. Here too there will be necessary *film-sound control men* and *film-picture control men* who will carefully monitor the transmissions.

Camera Men

The *television-camera men* will constitute a new profession as well. These men handle the television pick-up or "camera" which is trained on the action and carefully and continuously focussed. The reactions of these camera men must be instantaneous, they must work with perfect coordination in groups where several angle-shots of the same scene are to be transmitted, and they must be resourceful and artistic in their pictorial sense. It should be remembered that the television broadcast cannot be altered after it is transmitted. The *first* transmission to the audience is the *last* transmission, in general, and there is no opportunity to rectify errors or limitations by a succession of "takes" (as is commonly done in present-day motion-picture production). Accordingly, the job of television-camera men will be exacting and important.

The television-camera men in the studio will be a part of a larger group, for it is clear that the outdoor television pick-ups will require the services of men of similar qualifications and perhaps as great resourcefulness to meet the multitude of complicated, partly unforeseeable, and sometimes uncontrollable conditions to be encountered in outdoor jobs. The outdoor camera man will necessarily be of somewhat the same type as the present successful newsreel camera man who can meet an emergency promptly and effectively.

Since a fair portion of television programs may be, as stated above, from film, it will be necessary to film program material, recording both picture and sound in the same way as now done by the motion-picture studios and newsreel companies. This will lead to a demand for *film camera men, sound recordists, editors, cutters,* and other men of the types found in the motion-picture studios of today. The demand in these fields may develop fairly rapidly as the program "hunger" of television broadcasting rapidly increases after its commercial inception.

Television Service Men

Still considering work of primarily technical nature in the television field, it is clear that the television receivers of the future must be installed correctly and kept in good operating condition. This requires the existence of a good-sized group of television *service men.* Such men must be familiar with the circuits of television receivers, their operation, the testing of the receivers for faults, the location of the faults and their correction, and the best method of installing and maintaining the receiver in the home. The public response to television will depend in some measure on the skill, honesty, and diplomacy of these service men, particularly during what may be the more or less difficult early days of commercial exploitation of television.

Related Activities

Governmental regulation of radio broadcasting, as at present, will lead to the need for a number of *radio supervisors* in the various districts of the country charged with the inspection and supervision of the operation of the stations to determine that the Federal regulations are observed and to report on matters of service to the Federal Communications Commission. Further, the staff of the Commission will necessarily include *engineering* and *legal experts* in the new field of television. Those interested in entering the Government service may find openings of this sort congenial in the future.

There will necessarily be a considerable number of related or adjunct activities to those mentioned above in related fields. For example, once television broadcasting is carried out on a nation-wide scale, it will be necessary that the programs, in part at least, be syndicated or carried by wire or radio. If wire methods are used, the "coaxial cable" will likely find considerable application. The construction of such cables, their installation, their operation and maintenance will then form one of the fairly extensive activities of the Telephone Company with the creation of a corresponding *television-cable staff.* To the extent that radio-relay methods of syndicating network programs are used in the television field, there will have to be established a *radio-relay staff,* consisting of engineers, maintenance men and the like to keep the connecting links in perfect operating condition.

Opportunities for Writers

Leaving the field of technical television occupations, it is evident that there may exist a bewildering multiplicity of opportunities for persons of the necessary originality, energy, and application. Programs cannot be started until there are *authors.*

Since the television lookers may be practically insatiable in their demands for program material, it will tax the inventiveness and strength of the authors to the utmost to supply the steady flow of interesting and usable material for the television programs of the future. The material prepared by the authors will, in some instances, require revision or adaptation by *re-write men* or *script men* who will have to be high-speed literary lights of special ability to meet the instant and considerable demands of the program staff.

Directors, Actors, Musicians

The casting and production of the programs will require a number of persons, including, of course, *directors* who will know how to build up, rehearse, and present television programs. These men can be drawn partly from the legitimate or "little" stage and the motion-picture studios. In part, however, they will have to be trained at dramatic schools which may be established for the purpose.

At this point there is reached what may be the most serious television demand of all, namely, the demand for qualified *actors.* By "actors" are meant all those appearing before the television camera and microphone including *musicians, announcers, dramatic* and *comedy characters, commentators, vaudeville actors, lecturers, interviewers,* and the like. It must be remembered that we do not as yet know just what are the desirable qualifications for a television actor. The nature and psychology of the home audience, the limitations and opportunities of home presentations, the technical capabilities and restrictions of the television screen, and the general economic problems of television will all affect the suitability of a given person as a prospective television actor. Since only a minor fraction of the aspirants will please the radio public, it follows that a great number of applicants will be necessary to meet the situation. However, the career of a television actor will be appealing to many and, in spite of the long odds against the individual, it is likely that there will be intense competition from a horde of applicants for these openings. Probably those who have been adequately trained and have had successful experience in somewhat similar fields will stand the best chance of successfully entering this new field.

A considerable number of studio openings will necessarily exist in the television field, for example, jobs for *carpenters, scenic painters, set artists* or *designers, costume experts, wardrobe mistresses, make-up men, historical-research specialists* (who will see to it that no historical inconsistencies or inaccuracies are present in the performance) and the like. Such openings will increase only rather slowly in number as time goes on, since it is likely that the full development of the television field as a branch of the art of the stage will take a generation or more because of the many and novel problems which are involved.

Caution!

One final word may be in order in the form of advice to the person who is thinking of entering the field of television. Don't push and run—walk; and watch where you are going. Speed in rushing into the field will not be nearly so helpful as first knowing where your abilities lie, cultivating those abilities by training in fields similar to television, and then everlastingly sticking to the job of perfecting your talents and their application once you have entered the television field. Remember that television success will come rather as the result of a prolonged marathon of effort than from a brief gold-rush of enthusiasm.

[Reprinted by the courtesy of *Occupations, the Vocational Guidance Magazine* for April, 1938. (Copyright 1938.)]

—30—

Questions and Answers

(*Continued from page* 46)

impulses and the noise limiter therefore becomes less effective because, while it still limits the peaks, the remaining noise may equal or exceed the signal in the remaining pattern and will be heard accordingly.

R. F., Cleveland, Ohio: One or more companies have placed 10-meter crystals on the market. Are they as satisfactory as the lower frequency crystals for amateur transmitters?

Answer: Experience with these new crystals indicates that they have both advantages and disadvantages. Their primary advantage lies in the fact that they save one or more doubler stages and therefore permit extremely compact layout for low-power transmitters. In fact a single tube, with its grid on ten and its plate on five, may constitute the entire r.f. end of a small transmitter. Their disadvantage is found in their tendency to drift in frequency, and the difficulty sometimes encountered in making them oscillate. On the whole they are a boon to the 5-meter enthusiast who operates portable mobile, but for home rigs where small size is not an imperative factor the use of lower frequency crystals is recommended.

J. P. A., New London, Conn.: I have been hearing numerous rumors to the effect that the F. C. C. is going to ban modulated oscillators on the 5-meter band. Do you know whether this is so? I am planning to build a 5-meter transmitter of the modulated oscillator type but if crystal control is to be required I will change my plans accordingly.

Answer: Such rumors as you mention have been circulating for the past two years or more and, so far as we have been able to determine, such action has been considered by the F. C. C. but no definite decision reached. In no case will crystal control be demanded, nor is it demanded on the lower-frequency bands. The only requirement the Government sets up in this connection is that signals be *stable;* they do not specify how it is to be accomplished. Even without orders from the F. C. C. there is a strong trend away from modulated oscillators among the 5-meter hams and you will find that crystal control gives you many advantages over a modulated oscillator—advantages well worth the slightly higher cost.

—30—

Classified

Rate 15c per word. Minimum, 10 words.

CORRESPONDENCE COURSES

USED Correspondence Courses and Educational Books sold or rented. Inexpensive. Money-back guarantee. Write for Free Catalog listing 4000 bargains. (Courses Bought.) Lee Mountain, Pisgah, Alabama.

PATENT ATTORNEYS

INVENTORS . . Protect your rights before disclosing your invention to anyone. Form "Evidence of Conception"; "Schedule of Government and Attorneys' fees" and instructions sent free. Lancaster, Allwine & Rommel, 414 Bowen Building, Washington, D. C.

PATENTS—Advice and booklet free. Highest references. Best results. Promptness assured. Watson E. Coleman. Patent Lawyer, 724 9th Street. Washington, D. C.

WHAT to do with your invention? Free books tell all. Patent facts clearly explained. 63 years' experience at your immediate service on easy budget low payment plan. Write today for free copies of our booklets and "Certification of Invention" form. C. A. Snow & Co., 7105 Snow Building, Washington, D. C.

PATENTS AND INVENTIONS WANTED

INVENTIONS Commercialized. Patented or unpatented. Write Adam Fisher Company, 278 Enright. St. Louis, Missouri.

RADIO ENGINEERING

RADIO Engineering, broadcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Elm St., Valparaiso, Ind.

MISCELLANEOUS

ALL-WEATHER Coats: Special offer All-weather Reversible Topcoat $5.00. (Regularly retail $9.50.) Guaranteed. Mutual Coat Co., 487 Broadway, New York.

BE Your Own Boss! Operate used-new clothing business from store, home, auto. 200%-300% profit. Everything furnished. Catalog FREE! V. Portnoy, 566-F, Roosevelt, Chicago.

HAM STUFF

SELL or Trade: Thousand watt, 110 volt a.c. generator. Works on car. Harold Davis, West Jackson, Mississippi.

VIBAPLEXES $6. New Bugs $9. Lydeard, 14 Temple, Mattapan, Mass.

PERMANENT Magnets perfect for making velocity microphones, polarized relays as described in Radio News for May, 1938, and many other uses. J. L. McFarland, 507 South Washington Avenue, Royal Oak, Michigan.

C. T. S. Air Conditioning Course, $2.95. Wacker, 3727 West 13th, Chicago.

QSL's, SWL's, one color, 45c, two color, 60c hundred, postpaid. Samples. W1FTM, 268 Piedmont, Waterbury, Conn.

HI-FIDELITY public address 12" and 15" Magnavoxs, $5 to $20. Stamp brings list. W9UUN, 2610½ Bowser St., Fort Wayne, Ind.

SWL's, QSL's, attractive reply getting cards. Samples (Stamps). W-8-E-S-N, 1827 Cone, Toledo, Ohio.

SPECIAL RATES FOR READERS

A special classified rate is now offered for readers (non-commercial) who wish to buy, sell, or exchange radio sets, transmitters or parts; 10 words for 50c. Extra words, 15c. Payable in advance.

National QSO Page

(*Continued from page* 17)

ANOTHER RADIOSTRICH

Dear Sirs:

At this time, with the very existence of amateur radio threatened by the encroachments of commercials, we must all stick together in a fight to hold our frequencies, not argue and disorganize and lose our hobby just to provide a circulation-building feature for your magazine . . . C. Baker, W2KTF.

Well, W2KTF, that is a funny way to put it, but perhaps you may know of a way that all hams can stick together and save their bands without anyone like ourselves calling the rotten ham conditions to their attention. Certainly nothing has appeared in QST! It seems a little paradoxical that you should expect us to fight for the hams and their bands and not have them read our magazine. If they do read our magazine—and fight for the bands—then without anything being done on our part, we do have circulation. After all, only a blind man could not sense that the ARRL builds circulation for QST. It is sort of like asking that the President refrain from opening his mouth because things are so bad that every one must stick together and not argue, but fight for betterment. *And specially must the President not get any votes (circulation).*

The main trouble is that the League apparently is NOT giving the ham the action he has a right to expect from his organization; and the hams are more interested in sniping at us than in keeping their bands. What if our circulation is increased? At least we do not force you to buy a magazine to join in the fight for the preservation of the ham bands. Our proposition is the same as your voting at the polls. All we ask is that you fellows get hep to what's going on, and make your own fight from within the League so that *it* will carry out the semi-public trust it has incurred with you.

Everyone likes to snipe at the person who *seemingly* attacks what he has (for one reason or another) come to believe to be perfect, but sometimes when you sit back and consider, there have been cases where the "perfect one" has been wrong. We *might* be right, and at least you should present those facts wherein you think we are wrong. We do not know whether you care or not, but it might barely be possible that we had proof of our statements? A fair break to everyone is more American, isn't it?

—The Editors.

—30—

Hams!

This is your column! It is not censored and we do print controversial subjects. Write in your suggestions for the betterment of the League. Don't delay. You must fight for your bands.—The Editors.

Electricity Writes Its Own Story

(*Continued from page* 13)

ing and testing machine operating at the heretofore unheard-of rate of 5,000 tubes per hour, won for him the much coveted Westinghouse Engineering First Award for the outstanding accomplishment of any employee in the organization. DuMont again won the honor the following year for further outstanding achievements.

From 1928 until 1931, DuMont served as Chief Engineer and later as Vice-President in Charge of Engineering and Production for the DeForest Radio Company. He also directed the research and television broadcasting activities of sight-and-sound broadcasting. To his keenly practical mind, the mechanical technique then in vogue for television did not appeal to DuMont. He fully appreciated the limitations of the whirling scanning discs then in use for tearing the images to shreds, so to speak, at the transmitting studio, and then at the receiving end, weaving those shreds into a glowing replica of the original image. The fine pictorial detail required for enjoyable television images simply could not be attained by any such mechanical contraption. Something infinitely more delicate, more responsive, more speedy had to be found. And the quest, leading back to earlier electronic art, came to an end in the crude cathode-ray tubes occasionally found in well-financed laboratories.

Inventive, inquisitive, impatient, the nimble mind of DuMont found radio-tube production too prosaic, now that tubes were being produced at the rate of hundreds of thousands each day. The art had become too stereotyped. Quite naturally, therefore, the young engineer turned his back on standard radio tubes, resigned from DeForest, and plunged into the virgin territory of cathode-ray tubes and their possible applications.

In the basement of his home in Upper Montclair, N. J., DuMont began his specialization in the cathode-ray art. From purely experimental activities, he was soon obliged to move to the garage in the back yard, and to then take on skilled glass-blowers for small-scale production of cathode-ray tubes. His radio-tube production experience soon came into play. Many industrial as well as scientific applications suggested themselves if cathode-ray tubes could be made available at within-reach prices. Shortly, DuMont had tubes to sell at less than a hundred dollars, with smaller models for only a few dollars. The cathode-ray tube and its associated art were debunked at last.

From that point on the progress of the art was rapid. DuMont was obliged to establish a production plant and to hire dozens of engineers and skilled workers. The plant grew. Soon DuMont found it necessary to develop and produce the cathode-ray oscillograph, or complete test equipment built around the tube itself.

Today, thanks to the efforts of Allen B. DuMont who popularized the art, there are tens of thousands of cathode-ray tubes in use.

Among radio servicemen alone, the cathode-ray oscillograph is considered virtually indispensable in studying the intricate workings of radio sets. Indeed, the serviceman can learn more in five minutes with his oscillograph than he could in many days of critical measuring and checking, for each little wiggle, glowing on the fluorescent screen, tells an important story. The first DuMont oscillograph model in 1932 sold for $250.00. Today, a half dozen years later, a vastly improved model sells for a fifth that much, thanks to the savings of the assembly line.

Oscillographs are also used to study electrical phenomena of all kinds, and any other phenomena that can be translated into electrical terms. Fastidious automobile manufacturers, for instance, use delicate microphones to pick up squeaks and rattles during road tests, while the cathode-ray oscillograph screen writes the story of major and minor noises before attentive engineers.

A most interesting application of the cathode-ray tube is the resonoscope or standard of musical pitch. This device adds to the cathode-ray oscillograph a set of precision tuning forks covering a full octave of the chromatic scale. The resonoscope sounds any pitch within the octave. The tone is heard through a loud-speaker. It is seen as a characteristic wave form on the cathode-ray screen. Then by flipping a switch, the resonoscope is ready to pick up the same note either sung or played, and to compare it with the pure note of the tuning fork. If the superimposed wave form wanders to the left, the picked up note is flat with relation to the standard pitch. If to the right, it is sharp. If stationary, it is a perfect match. Meanwhile, the many little ripples or overtones appearing on the screen indicate the timber or distinguishing quality of the voice or musical instrument. Hundreds of resonoscopes are already in use, especially in musical instrument factories and in vocal training studios. Broadcasting studios find the resonoscope a great boon in tuning musical instruments so that the entire orchestra is on pitch when the musicians have taken their places, thereby eliminating the tuning-up raucous. Piano tuners and organ tuners use it to attain a pitch accuracy never before achieved. America is growing pitch conscious.

The cathode-ray oscillograph is an electronic finger-print specialist in the broadest sense. In other words, most objects have certain characteristic wave forms on the cathode-ray screen. These wave forms come in handy for comparative purposes. Such was certainly the case when a manufacturer was facing the serious dilemma of differentiating between two lots of alloys which had become mixed. Only a slight chemical difference existed between one lot and the other, yet from the application standpoint, the two lots simply had to be differentiated. Chemical analysis was out of the question. Fortunately, a simple circuit arrangement soon produced a characteristic screen pattern or "cycloram" for each lot. The difference was

sufficient to separate the two lots. The electronic fingerprint test had proved its practical worth, and it may well be the forerunner of delicate metallurgical and chemical differentiations in the future.

The gamble is being taken out of oil prospecting thanks largely to the cathode-ray oscillograph. A shot of dynamite is fired in a well drilled to a depth of 50 to 100 feet. This creates an artificial earthquake, and the vibrations generated are picked up by vibration detectors at the surface. The exact nature of the vibrations can best be studied by wave forms on the cathode-ray oscillograph, providing far more critical data than have heretofore been obtainable by other recording means.

Important therapeutic and diagnostic applications are opening up for the cathode-ray tube. Doctors and institutions are already employing this visual means of studying heart and nerve actions.

Even such jobs as checking watches and clocks against standard time signals are facilitated by the cathode-ray oscillograph. It now becomes possible to set a watch or other timepiece in a very short time as compared with days and weeks sometimes required to check with ordinary methods.

Because the cathode-ray tube can make no end of faces, as compared with the fixed faces or dials of the usual electrical meter, it is entirely feasible to make one such tube serve endless indicating means. In fact, the cluttered and terribly costly board of the airplane may soon be reduced to a single tube, with switches for posing the dozen and one questions regarding altitude, gas supply, drift, speed, engine revolutions, oil pressure, and so on. Likewise with simplifying the automobile dashboard.

And so it goes. Anything which can be converted into electrical terms can be flashed on the cathode-ray screen and studied as it occurs or, if photographed, at any time in the future.

Yet that is not all. The cathode-ray tube, with its delicate electronic beam to weave screen patterns, becomes the ideal means of television. An additional control regulates the intensity of the spot in accordance with the various tones of the pictorial image. So-called sweep circuits control the positioning of the spot so that it will weave the necessary pattern of parallel lines. At the transmitting end, the original image is focused by a suitable lens on to a sensitive mosaic surface which in turn is scanned or swept by the cathode-ray beam, the lights and shadows on each section of the mosaic being translated into electrical terms and transmitted to the remote receiver.

With the cathode-ray tube, television is entirely feasible. Fair entertainment value is already available in present-day equipment. Only serious economic considerations stand in the way of early commercialization. Meanwhile, television technique may soon find certain industrial and business uses, such as seeing as well as hearing the party at the other end of the inter-office communicating system, and bringing visual supervision of plant activities to the desk of the busy executive.

Guess that Aladdin's Lamp story was mighty tame, after all.

-30-

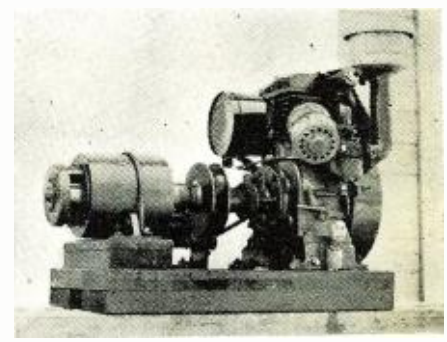
73 from the Bering Sea

(*Continued from page* 11)

ada, and stations in Asia or the States. He once served as the relay station between Europe and South Africa.

The most important single use of ham radio in the far north is ordering merchandise from the States. It takes six weeks to get a letter outside; six weeks more to get the order back. Imagine waiting three months for a new tooth brush or a new supply of gas to run the generator, when you can relay the order by radio and have it delivered pronto in six weeks! Teachers, doctors, and everybody else in the little white colony rely on K7FBE for quick service on supplies.

The woods are full of tales about doctors summoned to bedsides in the nick of



K7FBE constructed this gas-driven generator from old auto and washing machine parts.

time by hams. Well, those things do happen, particularly when the doctor can fly. But think of this one:

Unalaska is, at times, fog ridden for weeks. On one of these occasions a native woman had a child with unfortunate after effects. There was no doctor there, and no way to get one. So Kimm went on the air, got contact with a doctor, and relayed messages back and forth from the bedside. He described the symptoms as the resident nurse gave them to him, and gave her instructions for a highly technical piece of surgery as the doctor fired them back. The operation took over an hour, but it was successful, for the patient stopped bleeding. In a few weeks she was taking care of her brood of Aleuts (pronounced 'alley-oots") as if nothing had happened.

There have been other distress signals relayed by K7FBE. A trapper found that wolverines had robbed his caché and had new supplies brought to him by one of the commercial air lines which have revolutionized the pioneering life in Alaska. Similar emergencies are taken as routine occurrences in this land of sourdoughs.

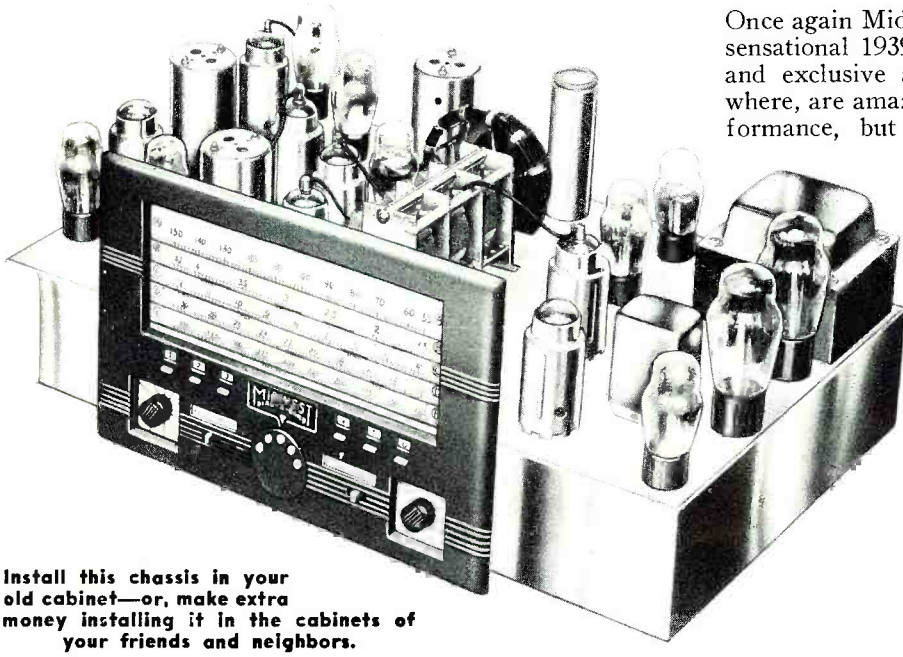
Many of the hams reading this have worked K7FBE at one time or another. Kimm is in Anchorage now, and won't be home for several months. So, why not call Mrs. Kimm (she is K7GDL) and say hello?

[Ted Lietzell has been traveling throughout Alaska during the summer months gathering together much interesting dope about our brother Hams in the Far North. You'll hear more about it later.—Ed.]

-30-

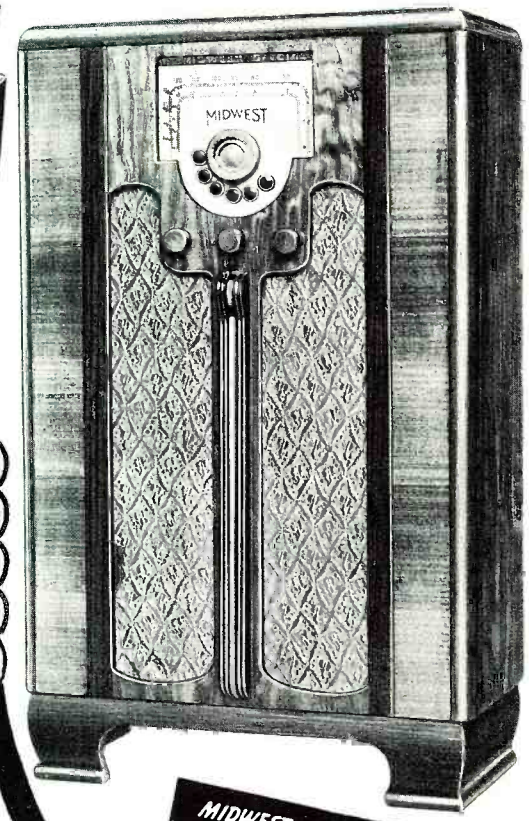
FACTORY-TO-YOU SAVES YOU 50%

GET A BIG SUPER POWERFUL TRUE-TONED LONG DISTANCE RADIO AT A SENSATIONALLY LOW PRICE!



Install this chassis in your old cabinet—or, make extra money installing it in the cabinets of your friends and neighbors.

Once again Midwest scoops the radio world with its new and sensational 1939 radios that just sparkle with new features and exclusive advancements. Merchandising men, everywhere, are amazed not only at their brilliant world-wide performance, but at their sensationally low factory-to-you prices, which make your radio dollar go twice as far. You buy at wholesale prices, just like a dealer.



17-TUBE WORLD-WIDE MIDWEST

WHILE the $39.95 Midwest "Special" represents one of the most amazing radio values offered today—the Super DeLuxe 5-band "17" and DeLuxe 5-band "12"-tube Midwest radios are even greater bargains. The new-design, 5-band, 17-active tube Midwest, whose chassis is shown above, is an outstanding example of Midwest's greater values. It gives you high priced performance for the cost of an ordinary 10 or 12-tube set. It will delight you with its tremendous 12,000-mile range on 5 bands, glorious new tone and brilliant overseas reception. Stations on the other side of the world come in like "locals." Only Midwest gives you a combination of features like Dial-A-Band Wave Changer, Acousti-Filter, Electric Touch-Button Split-Second Tuning and Fidel-A-Trol!

$30 Trade-In Allowance On Your Old Set!

Send for the new FREE 1939 catalog and feast your eyes on its history-making values. It pictures many new 1939 models—to suit every purse. The famous Midwest 30-day Trial Plan gives you 30 days to make up your mind. You be the sole judge! If you decide to keep it, you secure as much as $30.00 credit on your old set. Even higher trade-in allowances on some Midwest models.

MIDWEST FACTORY-TO-YOU PRICE... $69.95
TRADE-IN ALLOWANCE... $30.00
YOU PAY ONLY $39.95 ABSOLUTELY COMPLETE
SPECIAL 17-TUBE CONSOLE

30 DAYS FREE TRIAL

Special 15-Tube Midwest Chassis $29.95 with Tubes and Speaker.

PASTE COUPON ON 1¢ POSTCARD... OR

MIDWEST RADIO CORPORATION
Dept. 11-EE, Cincinnati, Oh
Send me your new FREE catalog, complete details of your liberal 30-day FREE trial offer, and factory-to-you wholesale prices.

Name .....
Address .....
Town ..... State.....

User-Agents Make Easy Extra Money. Check here ( ) for details.

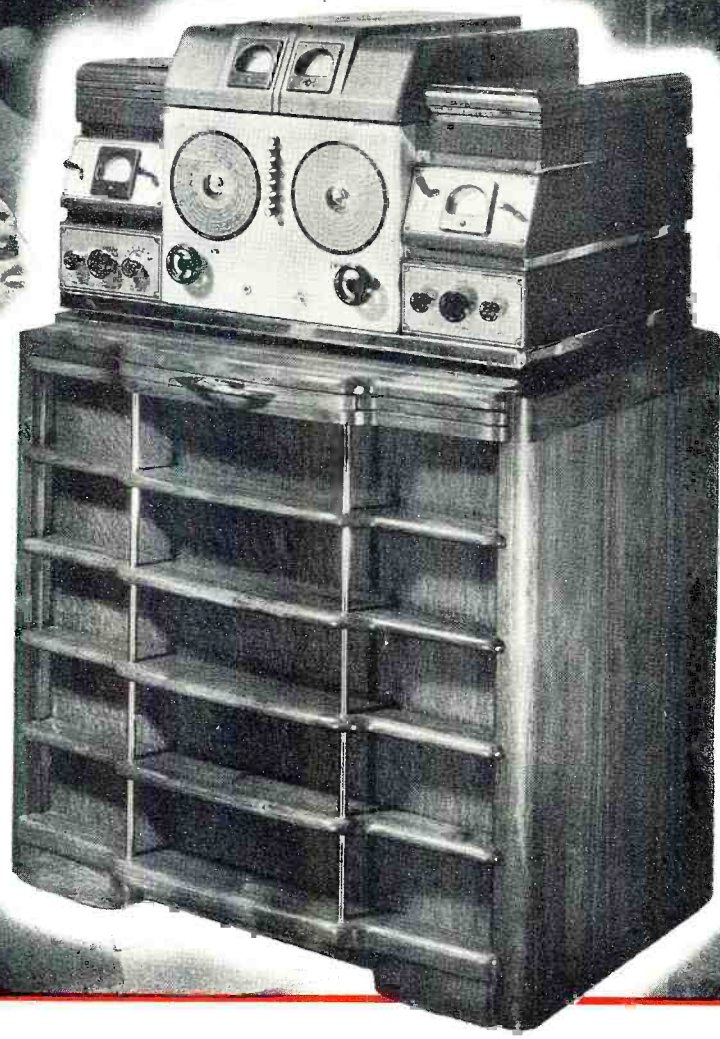
MIDWEST *factory-to-you* RADIOS

DEPT. 11-EE MIDWEST RADIO CORPORATION...CINCINNATI, OHIO, U.S.A.

Manufacturers of Quality Radios Since 1920

The "Inside" ON WORLD AFFAIRS

with the skyrider *Diversity*



The World is boiling, as dictators and premiers plan their strategic moves with the lives of millions at stake! Intrigue, plot and counterplot keep diplomatic corps and intelligence staffs in a fever heat. Newspapers, foreign government representatives, people whose vocations center around "behind the scenes" activities in world affairs, are turning more and more to the revolutionary SKYRIDER DIVERSITY to listen in on the greatest game of diplomacy ever played.

It has never been possible, before the development of the new SKYRIDER DIVERSITY, to listen in so closely, with such reliability, to the pulse of world affairs in your own home. Here is Diversity Reception, the same type of receiving system used in costly, especially built form by commercial stations and by intelligence staffs of different nations to receive secret messages. With fading reduced to a negligible factor, better signal-to-noise ratio and greater signal strength than can be obtained with any single receiver, the SKYRIDER DIVERSITY offers this, the most advanced type of radio reception, in easily operable form for your home. Not only the finest kind of reception, but tonal quality of unsurpassed fidelity—and smart cabinet beauty that blends perfectly with the finest surroundings.

With the SKYRIDER DIVERSITY, the entire radio world, near and far, is yours with the spin of a dial. See your Hallicrafters dealer or write today for complete description.

the hallicrafters inc.

2603 INDIANA AVE., CHICAGO, U. S. A. • CABLE ADDRESS: "HALLICRAFT," CHICAGO

world's largest builders of amateur communications receivers