november, 1938
25 cents

QST

devoted entirely to

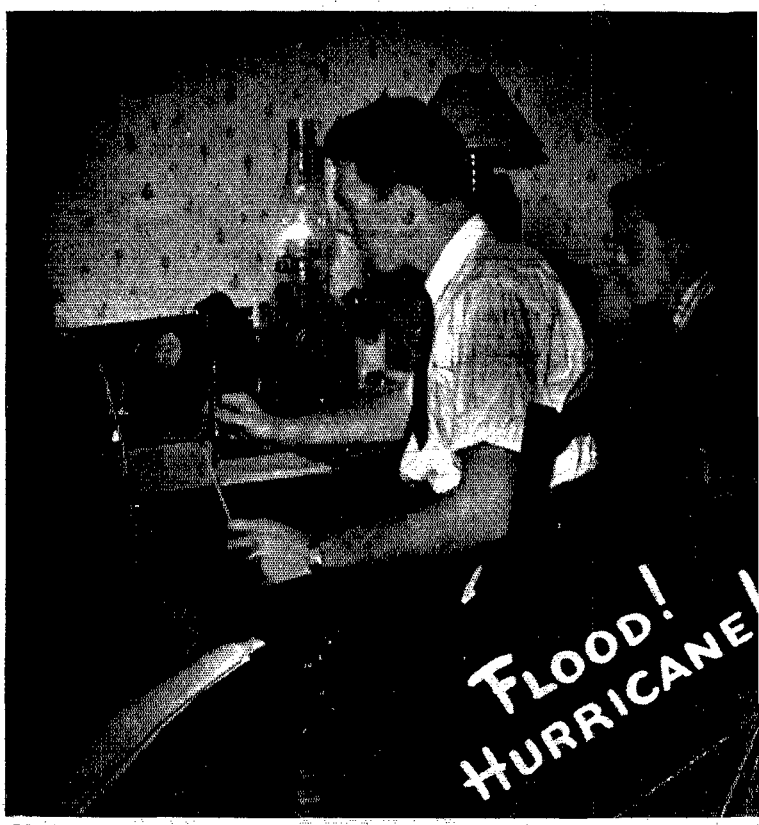
amateur radio

In this issue—

Amateurs Help in Emergency

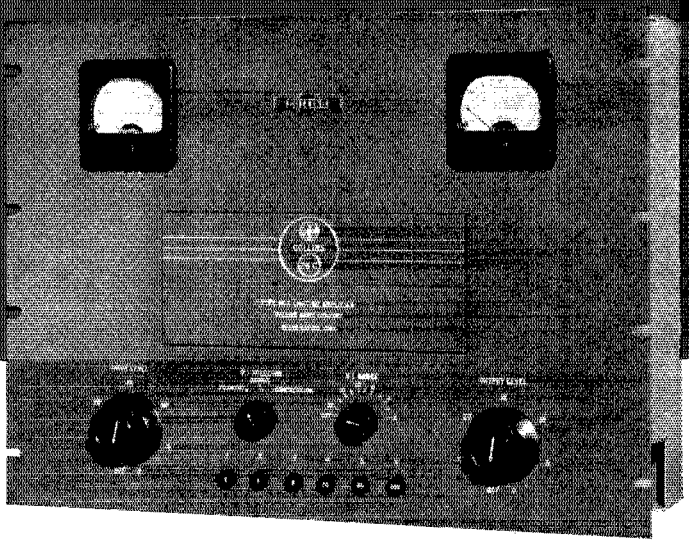
DX Contest Results

Antennas and Feed Systems



COLLINS 26C

LIMITIN
AMPLIFIE



A limiting amplifier or "compressor" can be used to even greater advantage in amateur and communications service than in broadcast service where these devices have already been adopted widely. In broadcast work the amount of compression must be restricted to about 3 db in order that the original "expression" or volume range will not be noticeably modified. But where voice only is transmitted and intelligibility is the primary consideration, a limiter may be used to control much greater changes in input level and the following advantages can be realized:

1 Substantially complete modulation can be maintained.
2 Adjacent channel interference due to accidental (or chronic) over-modulation is eliminated.
3 The need for frequent manual adjustment of gain controls is avoided.
4 Possibility of breakdown of transmitter circuits due to severe over-modulation peaks is prevented.

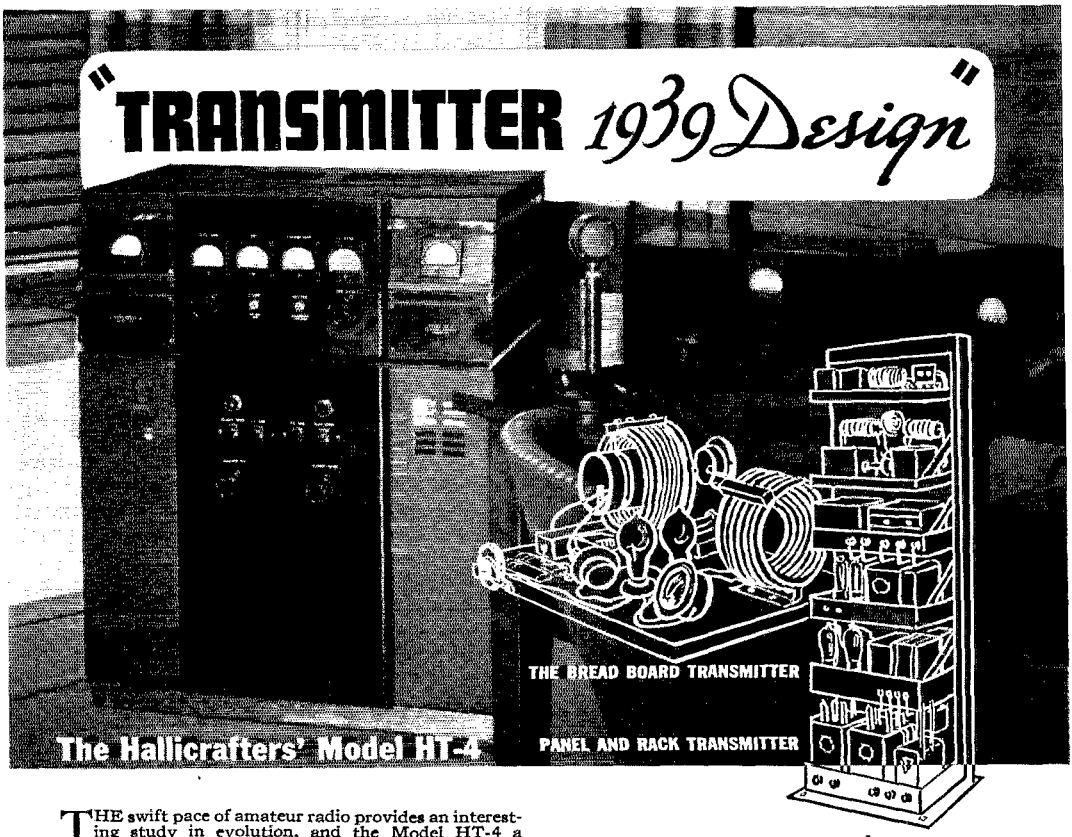
The bulletin describing the Collins 26C Limiting Amplifier contains a technical discussion of the special circuit developed to accomplish the rather difficult job of automatically adjusting gain in response to wide and rapid changes of signal input. A card will bring you a copy without obligation. You will find the bulletin of value if you are interested in the design considerations in limiting amplifiers for either broadcast or high frequency use.

We wish to announce, also, that the 30J and several other Collins Transmitters can now be supplied on special order with integral limiting circuits and that separate 76 Series Transmitter Speech Amplifiers are available with limiters.

COLLINS RADIO COMPANY

CEDAR RAPIDS, IOWA - NEW YORK, N. Y., 11 WEST 42 STREET

"TRANSMITTER 1939 Design"



THE swift pace of amateur radio provides an interesting study in evolution, and the Model HT-4 a striking example of the development in transmitter design.

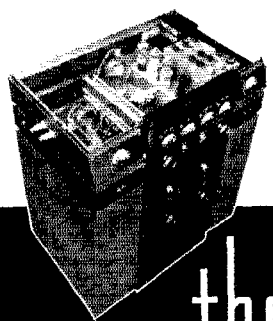
Old Timers remember the "bread board" era, when getting a transmitter to operate at all was the first consideration, and convenience and appearance received little thought — with "hay-wired" parts spread over an entire table top.

The next step in the evolution of the amateur transmitter was borrowed from the telephone exchange. To provide standardized unit construction that would permit the easy assembly of a big city exchange or a smaller rural unit, telephone engineers created the "rack and panel." Amateur radio borrowed it, and transmitter parts left the "bread-board."

As transmitter circuits have developed in efficiency, the advantages offered by the rack and panel are being nullified. Built to impractical and "clumsy" heights, it leaves much to be desired from the standpoint of appearance, not to mention operating convenience. The logical coordination of the transmitter components for the greatest efficiency is difficult if not impossible. Its open construction exposes many leads to accidental contact or short circuit.

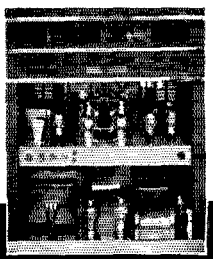
The Model HT-4, offers a new conception of transmitter design, a distinct departure from the traditional to the functional. Here is a logical coordination of parts, with the entire R. F. section on a single plane, permitting shorter leads and a reduction of losses that greatly increase overall efficiency. The operating controls are brought within easy reach. All its parts are entirely enclosed and protected, but with ample provision for ventilation. The whole presents a finished "engineered" and planned appearance that leaves an impression of efficiency and dependability.

We present the Model HT-4 as the first of a new trend in Amateur Radio Transmitters.



(left) Model HT-4 with cover removed showing complete Top View of R.F. Section.

(right) Rear View of Model HT-4 with back panel removed. Note orderly and logical placement of components.



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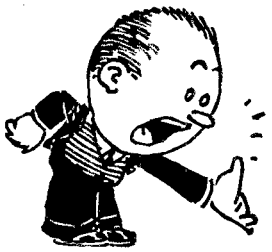
PUBLISHED, MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE, INC., AT WEST HARTFORD, CONN., U. S. A.; OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION



NOVEMBER
1938

Volume XXII
Number 11

★

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The Contents

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All appointments in the League's field organization are made by the proper S.C.M., elected by members in each Section listed. Mail your S.C.M. (on the 16th of each month) a postal covering your radio activities for the previous 30 days. Tell him your DX, plans for experimenting, results in 'phone and traffic. He is interested, whether you are an A.R.R.L. member or get your *QST* at the newsstands; he wants a report from every active ham. If interested and qualified for O.R.S., O.P.S. or other appointments he can tell you about them, too.

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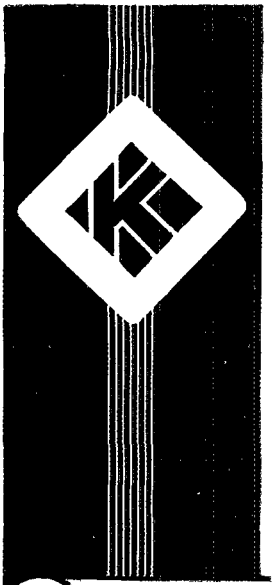

A Page From An Engineer's Notebook.

AUDIO TRANSFORMER SPECS.

1. INPUT TRANSFORMERS.
   - (A) Line or microphone to single or P.P. Grids (Class A).
     - I. Impedance of primary.
     - II. Step-up ratio.
     - III. Secondary load.
   - (B) Line to P.P. Grids (Class AB or Class B).
     - I. Impedance of primary.
     - II. Level and true impedance of line.
     - III. Tubes to be driven with complete operating conditions.
2. INTERSTAGE TRANSFORMERS.
   - (A) Type of tube working into primary.
   - (B) Type of tube into which secondary works.
   - (C) Single or Push-Pull type.
   - (D) Turns ratio.
3. DRIVER TRANSFORMERS.
   - (A) Driver Tubes.
     - I. Operating conditions - Plate voltage - bias - plate current.
   - (B) Tubes to be driven.
     - I. Operating conditions - Plate voltage - bias - Power output required.
4. OUTPUT TRANSFORMERS.
   - (A) Output Tubes.
     - I. Operating conditions - Plate voltage - bias - plate or plate to plate load - power output.
   - (B) Secondary Load.
     - I. If modulator - D.C. voltage and current.
     - II. If two secondaries - will both be loaded simultaneously?

Kandid Ken-O-Talk, No. 12

• AUDIO TRANSFORMER SPECIFICATIONS •

AUDIO transformers are almost endless in their variety. It is therefore important that specifications covering them be complete in every detail.

Input transformers are used to couple a low impedance source to a single class A grid, or to push-pull class A grids. It is important that the primary impedance be specified as well as the tube or tubes into which the secondary works. The latter is important because the tube input capacity is a value which must be taken into consideration in the design. If the secondary is loaded with a resistor, or volume control, this should be stated.

For input transformers to be used with a single or double button microphone it is important that the button current be known as it may have a direct bearing on the low frequency response.

It must be remembered that step up ratio determines, to a large extent, the size and cost of an input transformer. A ratio of 1:12 from a 500 ohm line is an average value. Any value materially higher than this involves difficulty in maintaining good frequency response.

Line to grid driver transformer construction is controlled not only by the impedance of the line from which it works, but also by the impedance and power capabilities of the tube or tubes feeding the line. A line fed by pentodes will necessarily have a different loading characteristic from one fed by triodes. Under most conditions pentodes would not be used as driver tubes, therefore a line fed by pentodes would not be suitable for use with a line to grid driver transformer.

Interstage transformers are governed by much the same considerations as input transformers, inasmuch as the only difference is the primary impedance.

Driver and output transformers are quite uniform in design. It is important however to know exactly what tubes and operating conditions exist in order to design a transformer to give the best possible service. An example of this is an output transformer which may be ordered for P.P. 6L6's class AB. The engineer designing this transformer looks up his ratings on the 6L6 and finds that it may be operated class AB_1, fixed bias, class AB_1, self bias, class AB_2, fixed bias, class AB_2, self bias. The plate to plate load may be any value from 3800 to 8400 ohms, and the power output may be anything from 20 to 60 watts.

Complete specifications may take a little longer to make out, but they insure a satisfactory transformer with a minimum waste of time for all concerned.

F. P. Kenyon

The American Radio Relay League

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is non-commercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite. Correspondence should be addressed to the Secretary.

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"It Seems to Us — —"

THE brilliant career of Ross A. Hull, editor of *QST* and *The Radio Amateur's Handbook*, was ended on the evening of September 13th, when he was accidentally electrocuted in his home in Vernon, Connecticut, near Hartford, while engaged in experiments on a television receiver.

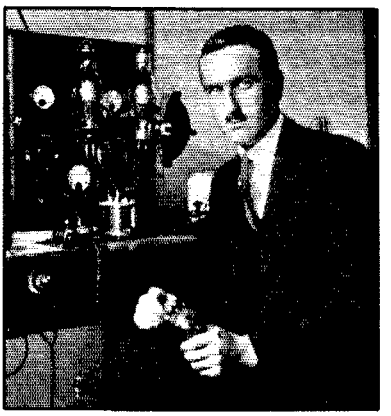
Thus was tragically closed the life of the man whom we consider the most brilliant and ingenious and indefatigable amateur we have ever known. Possessed of a restless, inquiring mind, a determination to out-do all others in everything he attempted, and never satisfied with the accomplishments either of himself or of others, Ross Hull poured an unbelievable number of hours and an astonishing enthusiasm into numberless projects, both in and out of amateur radio. He was interested in many technical fields, in which he habitually threw himself with the energy of ten men, always to emerge with remarkable results. A Simon-pure amateur, he had what we have always considered the perfect approach and attitude of the true amateur towards his hobbies. Where he found the time and energy to do all that he did was a constant marvel to his associates.

Most of our readers know him as a radio amateur who left a deep impress upon our field but, although amateur radio was his greatest love, he was proficient in many fields. He was a brilliant pianist, with a great love of music, and played for hours every day. He was an artist of considerable ability in oils, water colors and crayon. He was an expert amateur photographer, both as a pictorialist and in scientific work, and many of *QST*'s cover illustrations have been his work. He was interested in astronomy and had built several reflecting telescopes. Model aircraft was one of his passions from childhood. The last several years, he and W1ANA had been building model soaring planes of considerable span, large enough to carry radio apparatus for control in flight. Regular attendants at the Elmira soaring meet, they achieved encouraging success this summer with Hull's planes and were large with plans for a winter program. With it all, Hull found the time to read everything and the time to play: skiing in the winter, golf in the summer. With his radio gear, his piano, his cameras and his workshop he lived the life of the ideal amateur at his cottage in the Connecticut countryside. He was unmarried.

ROSS A. HULL
1902–1938

Ross Hull was born in Melbourne in 1902

and was schooled to become an architect. But he was also a radio amateur and by 1922 one of Australia's outstanding ones, being the first VK to hear American signals. When Fred Schnell was in Sydney with NRRL on the Australian cruise of the United States fleet, Hull determined to see America. In 1926, as oa3JU and secretary of the Wireless Institute of Australia, he visited us at headquarters on a study of American radio activity, particularly amateur radio. He was just in time to encounter a vacancy in the junior position in our editorial department, the technical information service. It was an admirable vantage point from which to see American amateur radio and he asked for and got the position. He extended his stay in America and was shortly an assistant technical editor. When, in 1928, our Board of Directors authorized a special technical development program at headquarters to devise new apparatus and methods to meet the trying conditions that would confront amateur radio in 1929 when the Washington convention took effect, Hull was the logical man to head the program and became its director. The brilliant success of that program is a matter well known to every old-time amateur. Much new gear of Hull's devising was introduced and it is not going too far to say that his studies over that period revolutionized our technique. He popularized "band-spread" for amateur receivers and was responsible for the first serious use of the superheterodyne in amateur circles as the logical receiver for 'phone stations. He produced the first practical apparatus employing the high-C circuit for self-excited oscillators, made the first presentations in amateur radio of 100%-modulation and the use of linear r.f. amplifiers, first introduced the signal monitor. This technical-development program was the beginning of real development work in the Headquarters laboratory and shop, thereafter carried on almost entirely under his direction. He himself had a flair for building unorthodox equipment. He popularized the practice of putting tubes upside down or at unusual angles to shorten leads and was largely responsible for the abandonment of bread-board construction in favor of bent metal chassis. The apparatus he built, although often put together under stress of time, was beautifully constructed, mechanically rigid, and with losses minimized to work at the greatest efficiency, whatever its purpose. He set the pace in apparatus design for many years back.



AUSTRALIAN 3JU
at his station in Melbourne, about 1924.

ROSS HULL AND HIS BROTHER
A. Galbraith Hull, the latter editor of the Australian journal, "Wireless Weekly," during a visit to A.R.R.L. Headquarters in 1936.

He returned to Australia in 1929 (see *QST* for May of that year, page 26) and became the technical editor of *Wireless Weekly*. But the American bug was in his veins and in a year and a half he was back on our staff, this time as associate editor. It is interesting to note that he was succeeded as technical editor of *Wireless Weekly* by his brother, A. Galbraith Hull, and that for the past year they were each the editors-in-chief of their respective publications. For Ross Hull became the mainspring of the *QST* editorial staff and has been the top man in our work for a year back. He had the ability to organize and direct; he could keep his eye on the ball and inspire others to do the same; and at the same time he worked like three ordinary men in the laboratory himself. This summer we celebrated his ten years of service to the League. Final papers in his application for American citizenship were pending in the courts at the time of his death.

Always possessed of an immense interest in the ultra-high-frequencies, he pioneered simple apparatus for this field and was directly responsible for most of the amateur accomplishments therein. One of his outstanding personal accomplishments was the popularizing of 56-Mc. work by showing amateurs the great enjoyment to be had with 5-meter local contacts; many well remember his article, "Fun on Five." He did a long-term piece of original research work of great value in recording received u.h.f. signals and correlating their transmission with weather observations, establishing for the first time the true cause for the bending of these waves in the lower atmosphere. For Hull, by means of high-gain antennas, was regularly communicating on five meters over distances in excess of a hundred miles, and there are yet to-day many five-meter amateurs who have never worked over fifteen miles except on the occasions when they talked to Hull. Over a period of several years he made regular recordings of distant u.h.f. signals, accumulating a vast quantity of data which required prodigious labor to correlate and analyze. He delivered several scientific papers on this work before technical societies. The Blue Hills Meterological Observatory is now kindly arranging to carry his studies in this field to completion.

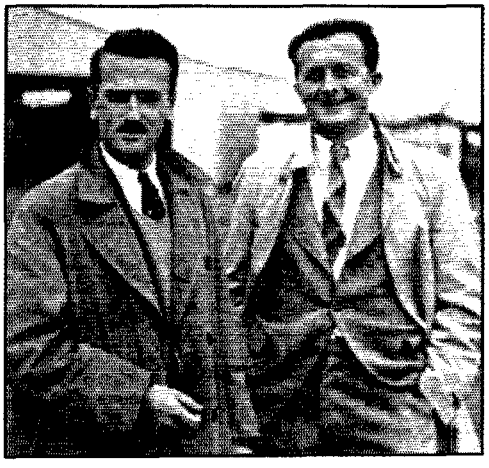
ADDRESSING THE NATIONAL CONVENTION
at Chicago on September 4th.
(Photo by W9UZ.)

Hull was also the editor of the *Handbook*. He joined Communications Manager Handy in the rewriting of the fourth edition. Shortly, of course, it became a family affair, the product of the entire staff, and all the successive editions have been under his editorship. At the time of his death he was engaged in a laboratory program for the new *Handbook* and had just completed the development of some very interesting new u.h.f. transmitters and had a promising new receiver in process.

He had just returned from the national convention at Chicago, where many American amateurs met him for the first time. He appeared on the program on several occasions, speaking on ultra-high-frequency work and television, rendering a simplified report of his researches on u.h.f. bending, as well as speaking as the editor of *QST* during the "A.R.R.L. meeting."

Hull was greatly interested in television, particularly in the ultimate opportunities for its employment in amateur radio. He had an elaborate experimental setup of his own devising at his home on a Connecticut hilltop, a thousand feet above sea level. With his remarkable ability to scoop up u.h.f. signals, he was succeeding, in his last few weeks, in receiving the N.B.C. experimental transmissions from New York, a hundred miles distant, about as well as they are received in New York City, much to the amazement of N.B.C. engineers. He had, in fact, built an experimental amateur television *transmitter* in our laboratory which was sufficiently promising to indicate that amateurs may soon expect low cost two-way television communication without occupying all of a band and without the need for precise standardization on number of lines and so on.

It was the power supply for his television receiver which caused his death. This receiver required a 6,000-volt plate supply for its large Kinescope. While only a few milliamperes were required, small transformers had caused trouble through surface leakage and he had replaced



ROSS HULL AND PETER RIEDEL
the German soaring ace, at the 1938 Elmira meet.
(Photo by WIANA.

HULL (R.) AND HIS MODEL SOARING PLANE
at the Elmira soaring meet this past summer. The plane is a gull-wing of 16-feet span, and had been equipped with radio control by Hull and Bourne, W1ANA, the latter acting as control operator in flight.

them by a husky 1½-kw. 4,400-volt pole transformer. The power supply was on a shelf under the table, and the mains outlet was on the wall behind and immediately above this apparatus. It was a dangerous setup. While wearing 'phones connected to the converter and receiver, and grounded on one side, he reached over the power supply to plug into the 120. Upon withdrawing his hand he came in contact with the high-tension lead to the rectifier plate, pulled it off, and fell so that the 4,400-volt lead was contacting his body, the 'phones providing the ground. He had as a dinner guest that evening a doctor who is an X-ray expert and familiar with high voltages. Sensing trouble from the next room within thirty seconds after Hull plugged in the power supply, the doctor ran to his aid, dragged him clear and applied artificial respiration. Two other doctors arrived in a short time, adrenalin was administered, a pulmotor was quickly got, and every effort was promptly made by experts. But to no avail: death had been instantaneous.

There is an awful lesson for all amateurs in Ross Hull's tragic end. He did not need to die. If the small transformer had still been in use instead of the brute with a powerhouse behind it . . . if the power supply had been covered . . . if the plug had been somewhere else . . . if the line had been lightly fused . . . if he had not had on the headphones. . . . Hull was himself the author of the warning against high voltages which appears in the *Handbook*. You all might well stop right now and pull your *Handbook* down from the shelf and look at page 324. But skillful experimenters are too often contemptuous of the dangers in which they work. Far too many amateur transmitters are potential lethal machines. When death comes to as clever and versatile an experimenter as Ross Hull, it must be a painful object lesson to the rest of us.

Oh, the unending pity of it all! In his passing, amateur radio has lost one of its most valuable minds. For over ten years his name has been representative of the best and newest that radio offered the amateur. Our loss is the world's loss, because not every generation produces a Ross Hull, and a man of his genius and drive was certain to make even greater contributions to the world's progress had he been spared. His memory and example must be constant inspirations to the amateurs of the years to come.

Of the most endearing personal qualities, Ross Hull leaves aching hearts in all who knew him. He was a grand guy. He will live forever in the thoughts of his friends.

AN ENTHUSIASTIC SKIER
of considerable ability, Hull made frequent week-end pilgrimages to the hills of upper New England. Snapped in New Hampshire last winter.

ROSS carried in his pocket at the time of his accident a memorandum to investigate the possibilities of a safety device wherein a beam of light, looked at by a photo-electric cell, would be reflected back and forth by mirrors to form an intangible barrier between the operator and the point of danger. On his desk was a recent exchange of correspondence with Mr. Howard A. Chinn of the engineering department of the Columbia Broadcasting System. It is so pertinent to this matter that, with the permission of Mr. Chinn, we reprint it:

Dear Ross:

The cover of your July 1938 issue of *QST* forcibly illustrates a matter which I have been wondering about for a long time. It is the question of safety of life in amateur transmitter installations.

As you are well aware, for the operation of commercial and experimental transmitting stations,

(*Continued on page 64*)

Amateur Radio Bests Triple Catastrophe

Long Island and New England Emergency Sees Hundreds of Stations Mobilized, Invaluable Service Performed

By Clinton B. DeSoto*

AMATEUR radio in southern New England pulled a Joe Louis during the fourth week of September. Dazed by three staggering body blows in rapid succession: hurricane, tidal wave and flood—overconfident and undertrained—ham radio generally reeled in its tracks for one ghastly round of twenty-four hours before pulling itself together.

But the glorious comeback far overshadowed the initial faltering. Providing the sole communications for several severely stricken communities, draining off the pressure and affording priority service for official, business and personal traffic in places where vestiges of wire service remained, amateur radio again performed public service of an order that elicited the warm praise of official Washington, local and state leaders, the press, and the public as a whole.

BAROMETRIC FREAK BRINGS CALAMITY

Each successive blow was unexpected, numbing. At first it was nothing more than a prolonged rain that had everyone grumbling. Up along the Connecticut a vague flood threat was still too remote for general suspense. But all unknown, offshore, there was a low-pressure center, moving north. Instead of moving eastward off into the North Atlantic, this "low"—so low that it induced lethargy like a climb to Pikes Peak—was blocked by an unusual high pressure area off Greenland, turned northwestward. Over Long Island swept the shrieking, churning vortex of high-speed air that accompanied it. Across the Sound to New London and up the middle of Connecticut the storm center sped, its cross-country velocity the swiftest ever recorded—averaging 45 miles per hour. In the storm, gusts of 90, 100, even 200 miles an hour demolished flimsy structures, lifted roofs and steeples, uprooted and snapped hundreds of thousands of trees.

In the path of the wind came tidal waves, rising to heights of 30 and 40 feet—rushing floods of water that swept away summer cottages, hurled shipping far inland all along the coast. Traffic was halted, and the country was in darkness—thousands were without lights or food or shelter.

And still it rained. As the hurricane dumped countless tons of rain on the already saturated New England countryside, the threat of flood turned into a certainty and the Connecticut River rose to levels exceeded only by the disastrous flood of 1936. The triple catastrophe was complete. A known death list exceeding 600 had been written. An estimated damage exceeding half a billion dollars had been done.

THE AMERICAN RED CROSS
National Headquarters
Washington, D. C.
October 5, 1938

American Radio Relay League
West Hartford
Connecticut

Gentlemen:

On behalf of the National Headquarters of the American Red Cross, I should like to express to you our sincere appreciation of the splendid coöperation received from the amateur radio operators in connection with the flood and hurricane in New England and Long Island.

Never before in our disaster history have we relied so heavily on the amateur radio operators and never before has the work been carried on so effectively. We were able to get reports through members of your League on disaster conditions at many points when normal communication services were disrupted, and this information was invaluable to us during the first twenty-four to thirty-six hours in making our plans here.

There is no doubt but that the experience during the past two weeks will give a great impetus to further coöperation between amateur radio operators and disaster committees of our local Red Cross Chapters. The work of the members of your League has definitely shown all of us here that their service is an essential part of the disaster preparedness work of our Chapters.

Sincerely yours,
Colin Herrle
Assistant National Director,
Disaster Relief

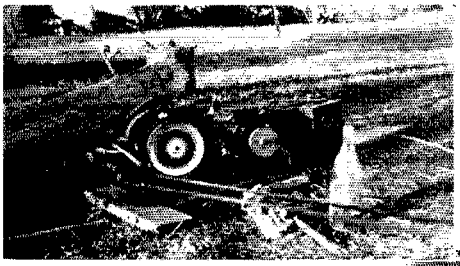
Long Island:

Long Island was sticking out like a sore thumb, and the hurricane stepped on it with all its fury. Sixty-two persons were known to be dead, sixty were missing, five million dollars property damage was done.

On September 21st when the disaster cut off all communication lines, only two stations are known to have come on the air. One was W2DXO at Glen Head. The other was W2BME WLNO. Located near Southampton, where Mackay's giant 190-foot tower was blown down, this station was on its Army frequency by 7:00 P.M. with emergency power. From then on rush traffic was handled to all points.

Just six days before, W2JZX had been appointed

* Assistant Secretary, A.R.R.L.

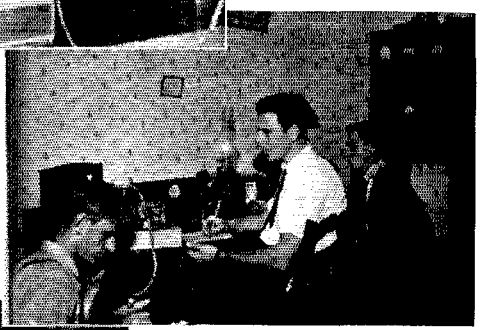


WHERE THE POWER POLE FELL DOWN, THIS GENERATOR TOOK OVER COMMANDEERED SUPPLY OF W1EBO

W1EBO—SOLE OUTLET FOR STRICKEN NORWICH, CONN. *W1DET, another of the crew, at right.*

Emergency Coördinator for Nassau County at a meeting attended by various officials including State Police. Her baptism of fire began when Section E.C. W2DBQ telephoned that the Coast Guard wanted a link from Bay Shore to Fire Island. An expedition comprising W2JZX, W2AHG, W2AZV, W2HYJ, W2JTP, W2KXC, W2LAH, and W2LJJ set out from Brooklyn for Bay Shore, equipped with several mobile units. Both 75- and 5-meter stations were installed at police barracks using the calls W2JZX and W2LAH. W2HYJ and W2KXC, meanwhile, were taken by a C.G. boat to Fire Island, with 5-meter gear. They set up, using the call W2HYJ, and began work with a detailed report on the island's devastation.

Meanwhile W2DXO at Glen Head was operating his own station with a borrowed motor generator, aided by W2DUA. On Friday he, too,



QRA NO. 1 FOR W1BDS *L. to r.: W1KRF, W1BDS, W1KRQ.*

W1FOF, MESSAGE CLEARING CENTER FOR SPRINGFIELD, MASS.

Besides owner-op. L. Eloise Cook, center, Sgt. C. L. Honiker, W1BCX and A. S. McLean, W1JQ, can be seen.

THE 160-METER CONTROL POSITION AT W1INF, WITH W1JEQ MIKING *Just visible behind him is W1LJI.*

went to Bayshore, carrying a 3497.5-kc. crystal and authority to use the call WLNS. Thereafter W2JZX tied also into the A.A.R.S. Net. The next day S.C.M. W2AZV arrived and took over operation on 75. W2LR went to Fire Island as relief. Operators coöperating in various ways, included W2GGV, W2JDJ, W2IRJ, W2OT, W2IRC, W2FSK, W2HWR, W2DMM, W2KNA, W2TKU.

The base station for this work was W2JDG at East Rockaway. He was assisted by W2HSO, W2KB, W2BKZ, W2OQ and W2OT.

W2AZM, regional E.C., is located at Rockaway Beach. Hearing the storm warning on the Coast Guard's frequency just before the hurricane hit, he drove about frantically for batteries, eventually got on the air with the aid of W2HLP and participated in organizational work.

Other stations got going as the hours passed—some when power was restored, others with battery supply. A 160-meter 'phone net sprang up, with W2JIO as net control. In various cities stations came on the air. W2HAP at Far Rockaway performed excellent work. W2IJU and W2JLQ were on there, too. W2AHG, Merrick; W2HSO, Baldwin; W2JUS, St. Albans; W2IXY, Springfield; W2OT, Oceanside; W2EC, West Hempstead; W2OB, Jamaica; W2JLF, Ozone Park, and W2OQ and W2JDP in Manhasset have all been reported active.

The New York City and Brooklyn area, although buffeted by wind and storm and without power for an hour, did not experience a genuine communications emergency. A number of amateurs rendered emergency service, however. These included: New York City; N2COI, W2FYP, W1HJV, W1IUQ, W2JIO (portable), W2JXJ, W2KMS, W2KQV and W2SC/WLN and in Brooklyn; W2AOM, W2BJR, W2BO, W2CLC, W2DBQ (section E.C.), W2DCV, W2DW, W2ECL, W2HGO, W2KCX, W2LEN and W2PF/WLNA.

Connecticut:

There is a new coastline for Connecticut, and a new skyline, too.

Its trees and some of its lesser buildings felled by hurricane, its coast eroded by tidal wave which dumped inland its load of millions of tons of sand, the "land of steady habits" stands shaken and bruised. Tree-lined avenues which set off stately colonial structures are now bare. Beaches and shore resorts where hundreds of thousands once lived carefree, casual summer lives are now tumbled, vacant fields strewn with matchwood.

But people live. And for all but one in a thousand life goes on in normal fashion, unremembering. Power lines are mended, telephone service restored, broken trees and wreckage hauled away. Amateur radio goes back to "CQ" and "73," to "that's the dope on that, old man" and "nil hr nw gld QSO cul 73."

There were four or five days when most of that was forgotten, though. First point along the Connecticut shore to receive serious damage from the blow was Bridgeport. Communications remained largely intact, the primary damage being from tidal wave rather than hurricane. Yet there was plenty of work for hams to do. W1APA, as E.C., assisted by W1IBH and W1JLN, manned the clubroom station of the Bridgeport Amateur Radio Association (W1JHT) and handled 171 messages. W1IM, released by station WICC from active duty for the purpose, operated 96 hours and built up a traffic total of 858. W1ANN, chief engineer of WICC, also put in shifts at his ham rig. W1KAB, on 160, handled traffic totalling 128. W1AMI, W1ASK, W1BGP and W1FYE were also reported active.

When New Haven lost power, all stations were out of commission except for 5-meter mobiles. On Thursday afternoon W1KFN got on the air, the first station to have power restored. His first contact was a QRR call from an isolated small village in Massachusetts; but after relaying this he went to work on his own emergency. Aided by W1KQY, over 250 messages were handled for all official agencies.

After trying vainly to reach New London with five-meter gear, W1JHM aided W1LHG in setting up an emergency station at a downtown radio store where power and telephone became available. Assisted by W1HHJ, W1DDP, W1JQK and W1IQC, approximately 200 messages were handled. W1LHG and W1KQY later handled a quantity of traffic at their personal stations, as well. Two stations were set up at the New Haven Amateur Radio Club and about 100 messages were handled. W1GRF and W1JQO were heard on, too.

To all the other dangers at New London there was added that of fire, when a capsized boat started a conflagration that threatened the entire city. The Navy and Coast Guard sent boats and men to meet this threat, and through these channels streamed most communications. Much amateur traffic from outside went through the Navy's NOA. New London amateurs, living mostly near the water front, were largely without facilities. W1HXL was active on 80-meter c.w. in the outskirts of New London, although handicapped by QRM and other troubles. Other stations are said to have been using 56 Mc. for local work. W1JHK was reported on at a later stage.

In Meriden, W1GYT set up at the South Meriden airport, then operated on both amateur and N.C.R. frequencies. On the operating crew with N1EFW, N1AEY, N1FEF, N1LCF, N1HVX and W1HVF. Part of the work consisted of contacting airplane NC18444 on its flight to Martha's Vineyard and return.

In Middletown W1AJB/WLGG held the fort alone at first, working into the A.A.R.S. as well as generally. Of 168 messages handled, 45 per cent were for the Red Cross. Later, W1BKO came on.

At Norwich, most severely hit inland town, amateur radio proved itself an indispensable adjunct to relief work. At 6 P.M., realizing that a major catastrophe was occurring, Norwich amateurs began to assemble equipment. To obtain emergency power it was necessary to commandeer a gas-driven 300-watt generator from its reluctant owner, with the combined aid of the mayor, National Guard and State Police.

With rare good sense, all Norwich amateurs coöperated in manning one station—W1EBO—high on its hilltop location. In the crew besides W1EBO were W1DET, W1ALW, W1LJX, W1KYV, W1CJN, W1LHF and John Dynon, all but the latter two and W1DET being N.C. Reservists. A 5-meter link using Army equipment relayed to City Hall. Without exception, all communications, official and otherwise, went through this station to W1BDI and W1AW for four days.

Hartford's dikes held this year, and the hurricane's greatest damage was in tossing thousands of uprooted trees on power and telephone lines. So the major communications need lay in coordinating state-wide emergency traffic in conjunction with state officialdom. There were three

major centers—at the State Police Barracks, Red Cross headquarters, and A.R.R.L. Hq. in West Hartford.

W1FOO was set up at the police barracks through personal coöperation by the State Police Commissioner, and served as their communications center to all isolated points. A comprehensive 160-meter network was set up. Traffic for other bands was routed through W1INF. W1DAV assisted as night operator in addition to handling 510 messages at his own station during the daytime. There he erected an emergency antenna during the height of the storm, lashing himself to the roof.

At Red Cross headquarters W1HJW set up his regular station. Assisted by W1KAW and W1DR, some 500 messages were originated and delivered. So valued was this station that Red Cross officials insisted on retaining the station for a two weeks' period for routine emergency work.

With W1AW's large transmitters without power for 36 hours, W1INF became the official headquarters station. Operation was on three bands simultaneously—160-meter 'phone, 80-meter c.w. and 5-meter 'phone. W1LJI, W1JEQ, W1DF, W1GS and W1JZB did the bulk of the operating. The Hq. office was, of course, besieged with telephone and personal callers seeking to file traffic; through Friday evening telephone calls averaged an estimated 75–80 per hour.

When W1AW resumed operation on Saturday, operators Bubb and Hart, assisted by W1JKL, turned to with a vengeance and piled up a total of 644 messages.

Many other stations were active in the Hartford area, too many for a detailed account of their activities. W1AFB delivered to all New England points. W1AOK, assisted by W1KZA, was a key station on five, handled 400 messages. W1AOX was aided by W1DR and W1IHP. W1ASD used 160-meter 'phone. George Hart and W1JKL aided in operating W1BDI until power was restored at W1AW. W1DJC was active on 56 Mc. W1DLN tied into the A.A.R.S. W1EEV was on 75-meter 'phone. W1ES was active chiefly in N.C.R. work. W1FE occupied a strategic position at the State Armory; assisted by W1GUC and W1BEI the traffic total was 677. W1IAR operated at W1AW in addition to his own station. W1KDK was instrumental in organizing a valuable net for the New Haven railroad, in addition to keying a 160-meter 'phone net; W1KXM assisted. W1LLL was very active on five, notably in DX work along the Connecticut River and into Massachusetts. W1SZ, spelled chiefly by W1JPE, carried a heavy load on 75-meter 'phone, including all traffic coming out of stricken Westerly, R. I., during the initial emergency period. Other operators were W1FTR, W1EWD, W1TS and W1EAO—1000 messages were handled.

Across the river in East Hartford, W1JAM substituted for telephone service with the aid of W1CSC, W1BAH and Boy Scout messengers. At the same location W1CSC handled about 200 messages on 40 c.w.

W1KKS was on in Manchester. In Glastonbury W1KOY, assisted by W1GTF, had plenty to do in the hardest hit locality in the Hartford area. W1KPM, New Britain, participated in the 160-meter net; W1LED, W1LJA/1 and W1HNF were also on there. W1BGJ and W1BTU stood by in Southington. In Plainville it was W1BWL. Bristol's 5-meter outlet was W1FLS; W1DHT and W1DOW were on there, too. W1JSO linked Windsor with Hartford.

Located in the Engineering Building, Connecticut State College, at Storrs, W1CAS was for a time the sole outlet into northeastern Connecticut. Most of the operating was done by W1IOW.

When Stafford Springs was isolated and the State Police needed a contact, W1BDI, W1UE and W1JTD were escorted there with portable gear from Headquarters. W1AW/1 was established at the Barracks by lantern light. This station operated until W1HWG was restored power when he took over.

In the northwest corner of the state three stations were active—W1AFG, Goodyear, W1ITX, Brooklyn, and W1IED, Danielson. This section was last to be heard from and longest isolated; traffic handled included police, public utilities and personals.

Elsewhere in the state still other amateurs were operating. Among those reported are W1FWH and W1FVO, Greenwich; W1EER, Noroton Heights; W1ERX, Darien; W1CTI and W1BCG, Norwalk; W1KUN, Milford; W1CPL, Devon; W1LGZ, Danbury; W1KSH, Wallingford; WZKRC, Naugatuck; W1GME, Middlebury; W1JXP, Old Lyme; W1AIY, W1FTM, W1HLB and W1KSJ, Waterbury; W1KKG, Watertown; W1BIH and W1JJL, Torrington; W1KAK, No. Windham; W1DUC, Willimantic.

W1HJW, TRANSPLANTED BODILY TO RED CROSS HEADQUARTERS IN HARTFORD

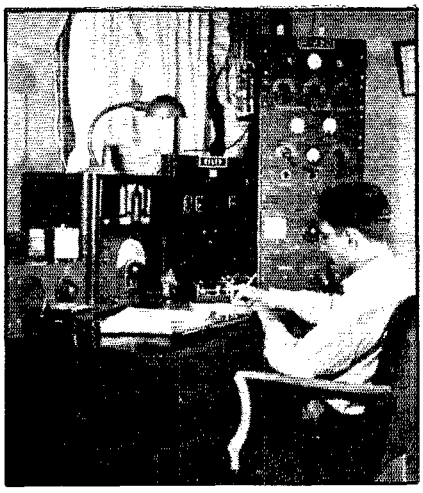
L. to r.: W1DR, Typist, W1KAW, W1HJW.

Cape Cod and Eastern Massachusetts:

The Cape is used to high winds, but

not to tidal waves. When surging waters rolled up along its coast to heights of 30 feet or more, the combination of wind and water obliterated wire communications throughout practically its entire extent.

At Provincetown, on the extreme tip of the Cape, W1KPW operated continuously for 60 hours on 160-meter 'phone and after four hours sleep returned for another stretch. W1KLC assisted. Traffic for the whole lower Cape went through this station via a telephone line to W1QJ at Hyannis. State Police used this circuit in preference to their own. Typical performance: A message delivered to Maine and reply returned, through two relays, in 3½ minutes elapsed time.



W1ASD, IMPORTANT HARTFORD 160-'PHONE LINK

Little is known yet of the activities of W1EVJ on Nantucket Island except that his weak battery signals pushed through an AP dispatch to Boston and then were not heard again.

At Harwich W1BBM, together with W1DJK, cleared a quantity of personals. An entire emergency rig was assembled in three hours, including winding of coils. W1AOM was on a bit later in Harwich, with W1ARC in West Harwich.

In addition to W1QJ at Hyannis, W1ADM returned to the air with the return of power and rendered valuable service to the State Police and others, working into an N.C.R. circuit.

At Buzzards Bay, W1KKP, well known on 20-meter 'phone, cleared a variety of police and personal traffic with the aid of the Barnstable County police network—one message experiencing 13 separate relays in transmit.

Down below, on Martha's Vineyard, W1JMJ did a job that had the residents heaping laurels on his head. The sole outlet for 32 hours, he handled the bulk of communications including Western Union files for seven days, totalling about 500 texts.

Other stations reported active on the Cape include W1JNB, Provincetown; W1RZ and W1KLC, Orleans; W1BMW, Osterville, and W1KJU and W1JQB, Fair Haven.

Fittingly enough, W1JJY, the local E.C., was the first station on in New Bedford. His principal job was Red Cross contact with Providence, having been detailed to that duty as a National Guard member. About 500 messages were handled, with the assistance of W1IKU, W1IZF and W1KHE. W1IZF handled personals on 75 over his own station. W1IKU and W1KHE also operated their home rigs.

W1ZE's towers—170 and 130 feet high—miraculously withstood the storm, and that station was on when power resumed. Since W1ZE is manager of WNBH, the b.c. tie-up brought much traffic. He handled 556 messages single-handed.

W1ME went on in New Bedford when informed of the emergency by the mayor's secretary. He relayed from W1JMJ at Martha's Vineyard. W1DOP was also active for a 20-hour period. N1EHJ is reported to have been working, as well.

At Swansea, Mass., W1BOO assembled emergency gear with the aid of W1LIK and W1LIE. Police had commandeered all storage batteries, let him have three. With these he stayed on for a week. He had resigned as E.C. of the Fall River area two weeks before, but it didn't seem to stick.

In Fall River, W1AWX and W1AHP were first on the air, with portable-mobile 5-meter rigs. They performed vital service in aid of the police, locating bodies, etc. Later W1AWZ set up an emergency 75-meter 'phone rig in his store and operated for two days. Others active in Fall River include W1CRN, W1DHX, W1IIC, W1JCD, W1LIE.

At Brockton W1HMM with W1HNY served the local police department as well as providing an outlet for W1KER and others. W1EZV and W1LJT were also on. W1CUY was reported on in Plymouth, as were W1EPE and W1EYY in North Easton.

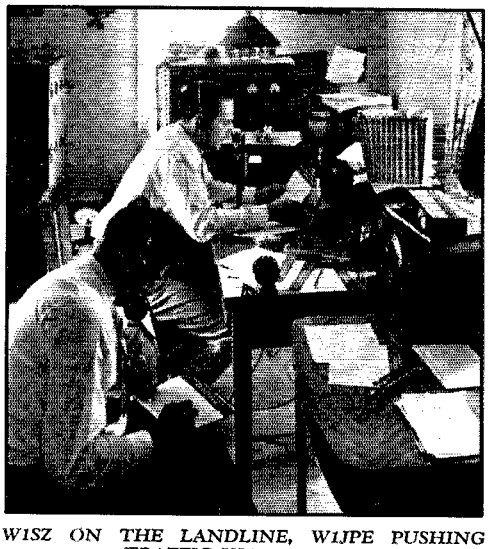
When the hurricane struck Haverhill most power, telephone, fire and police wires were destroyed. To add cause for alarm, however, the Merrimack River was threatening to flood. The mayor suggested establishment of a police prowl net with two-way u.h.f. rigs, so E.C. W1KBQ secured three mobile units with the aid of W1IWR. W1KQU set up the base station at City Hall. W1IUI, W1IYT, and W1KUA manned the mobile units for 16 hours. A 32-mile area was patrolled and contact was 100 per cent at all times; about 200 contacts were made. The mayor and city council praised the performance.

In nearby Newburyport W1QW was a participant in the emergency work.

A great many stations were active in Boston and vicinity, far too many to allow of individual mention of their activities in the space available here. The following are on the active list.

Arlington: W1SS (456 messages), W1GZ,

W1HOM, W1JSM, W1LOC; Belmont: W1AR, W1JBZ; Beverly: W1EAQ, W1EKN, W1KMQ, W1NF; Boston: W1AR, W1AWX, W1BGW; W1DMG, W1DXR, W1FH, W1IIM (assisting ops; W1HPB, W1GUF, W1IXL, W1AIZ, W1JDE, W1IF 307), W1IXL, W1JRN, W1KRL, W1KZD, W1LDU, W1PI (2763!), W1QA, W1SC; Brighton: W1JWT (W1KZT assisting), W1KZD; Brookline: W1KZT; Cambridge: W1FHY, W1FQV, W1ILB, W1IZL, W1MX (W1LKV, W1IIN, W1SS, W2INQ, W2KVV, W3BXC, W5GMX, W9FRU, W9HRX, operating; 356 messages handled); Chelmsford: W1JLI (mobile); Danvers: W1HWE, W1JFS; Dedham: W1JLI, W1JCT, W1KCT; Dorchester: W1HLW, W1IDU, W1IGA, W1JQH; Everett: KGH; Framingham: W1CTR, W1DDM; Lawrence: W1HXE; Lowell: W1AR (mobile), W1JJV; Lynn: W1AJL, W1GOR, W1ITY, W1JNF, WLGY (250); Malden: W1EL, W1HXK; Marshfield Hills: W1IWC (170), W1LBY; Medford: W1KYJ (300); Melrose: W1EMN; Natick: W1DEI; Orange: W1JOG (150) Quincy: W1JMS; Randolph: W1JDO (mobile); Reading: W1AHK, W1EGO, W1JZR; Revere: W1AO; Roxbury: W1BGW (150), W1JDO; Salem: W1AKS/WLGO (259), W1AMT, W1KZO; Scituate: W1FJN; South Boston: W1JCK, W1KRN, W1LEM; South Peabody: W1AGX; South Weymouth: W1JKR; Waltham: W1BOD; Watertown: W1IY; West Medford: W1GKA, W1HRE; West Roxbury: W1KTE; Weston: W1KY; Weymouth: W1KRL; Winthrop: W1BB (150), W1BDU; Woburn: W1KNQ; Wollaston: W1GOU. Undoubtedly there are omissions in the above list, but it can be seen that Boston vicinity was well covered.



W1SZ ON THE LANDLINE, W1JPE PUSHING TRAFFIC VIA 75, AT SZ

Rhode Island:

The greatest loss of life occurred in Rhode Island. Terrific though the wind was, it was the tidal wave that did most damage, sweeping up the beaches, reducing summer cottages and other shore property to a residue of scattered wreckage.

In Westerly, scene of the greatest havoc, amateur radio found its greatest opportunity for service. At the peak of the storm W1BDS, then downtown, foresaw the need for communications. Arriving home after several narrow escapes only to find his antennas and the garage that held them both gone, he set out with a coil of wire and a pair of pliers to erect a new antenna. As he rounded a corner of the house the wind whipped the pliers from his hand. Next morning they were found embedded in a tree, the handle driven deep into the trunk!

Nevertheless, the antenna went up. At 8 P.M. the first QRR went out, to be answered by W2CQD. But the latter had QRM trouble and other skeds so W1SZ took over and provided the outlet for W1BDS for the next four days. For 56 hours the station was Westerly's sole outlet; for a time it was the only signal emanating from Rhode Island. Early Saturday morning power was made available and the station transferred to the South County Power Company's office. But friction developed. The power company insisted that W1BDS handle only power traffic. So they moved to W1KRF's QRA, staying there through Sunday.

The crew that did the job included W1BDS, W1KRF, W1KRQ, W1KCG. They handled some 800 messages—every word that went in or out of the city for 56 hours, and most of it thereafter—and were lauded by such persons as Attorney-General Cummings, Harry Hopkins, Colin Herrle of the Red Cross in Washington, etc. The little 42 crystal oscillator, fed by "B" batteries, bore a heavy load of responsibility and bore it well.

After power was restored in Westerly two other stations found room for sterling performance. W1KTH, brought in by the Providence Radio Club, was set up in the Town Hall within an hour after power resumed. The crew consisted of W1KTH, W1CBS, W1KOG, W1JXQ, W1KZN and W1LDL. Of the 571 messages handled, about 250 were official—including 17 press dispatches.

W1AGJ, aided by W1KRQ, was the first Westerly station to work Providence. Red Cross workers erected an emergency antenna for him. Seven 45-volt "B's" powered the 42-6L6G exciter at 15 watts. The station provided valuable service to local officials, Red Cross, National Guard and the power company.

Near where Narragansett Bay opens into the sea, at Wakefield, W1CPI, A.R.R.L. E.C. for South County performed the Herculean task of manning his station 107 hours in six days. Over a thousand messages were handled for the 103rd

Field Artillery, Coast Guard, State Police, etc. Operating in the "Shore Limited Network," "Skipper" did a real coördinating job. W1IGB was also on in Wakefield.

W1KLR and W1BXZ turned in an excellent performance at nearby Wickford, operating a joint station at the local fire house. The transmitter was on 160, but there was much cross-band work, especially in providing a Providence-Westerly relay link. W1IQF was also reported on in Wickford.

At Peace Dale W1ALJ, assisted for a time by W1IGB, succeeded in borrowing a gas-driven alternator to get on by 11:00 A.M., Thursday. He was useful to the New England Power Company, among others.

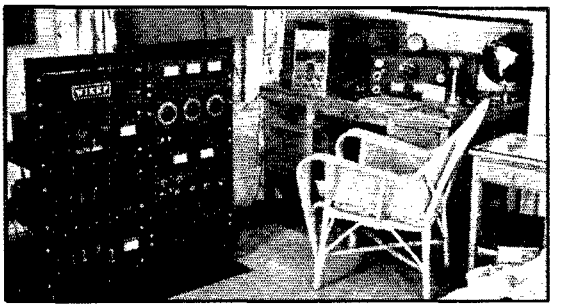
In the Providence area the A.R.R.L. Emergency Coördination plan was in successful operation. The annihilation of all means of transportation and communication led to a slow initial start, but when the Providence hams got going they turned in a job that commanded the respect of everyone.

W1JEZ, the E.C., started work at the governor's call on Wednesday evening. On Thursday afternoon the key station, W1INM (call of the Providence Radio Association), was set up at the State House next door to the governor's office. Perhaps 2000 messages were handled on behalf of various state agencies, largely in lieu of the state teletype system. The operators on duty included W1CPV, W1GOG, W1GTN, W1INT, W1INU, W1JCN, W1JEZ, W1JP, W1JRY, W1JUE, W1KCS, W1KYK, W1LAB, W1LCH, W1LDL, W1KWA, W1HCW.

For a period of six days W1INM maintained contact with W1KTH, the portable unit which was sent to Westerly. So successful was this station that an offer was made to provide another station and two operators to be flown to Block Island, reported devastated. When the Coast Guard reported conditions there not to be serious, this project was abandoned. Mobile units were sent into the Hope Valley region, and other points.

Another outstanding job was that of W1IPU. Active in Providence beginning 7:00 P.M., Thursday, when a special power line was installed, this station handled a total of a thousand messages, mostly on 75 'phone and 80 c.w. W1GVH, W1HEN, W1CAB, W1KUG, W1GYO, W1CLN and fifteen unlicensed persons provided efficient assistance. W1IPU had a tie-up with b.c. station WEAN.

W1BES got on 75-meter 'phone as soon after the emergency as power and antenna facilities could be restored. Traffic handled totalled 340. Before that he, along with W1GTN, had set up a group of Signal Corps transmitters at the Cavalry Armory, Central Station, State House and Dexter St. Armory, for local communication.



W1KKP AT BUZZARDS BAY, MASS., DELIVERED CAPE COD TRAFFIC THROUGH THE BARNSTABLE COUNTY POLICE NETWORK

W1BBA performed a useful purpose in clearing distant personals via 14 Mc., thus relieving the lower-frequency bands. He had a tie-up with WJAR, cleared for them as well as the other Providence stations. Over 500 messages were handled.

The club station of the Associated Radio Amateurs of Southern New England, W1AQ, was operated by W1CPV, W1BOY and W1JXL in downtown Pawtucket until 4 P.M., Friday, when the operators were called to relieve W1INM for an overnight trick.

Other Providence amateurs whose activity has been reported include W1ICE (commended for snappy c.w. break-in operating), W1IZO, W1JCR, W1KOG, W1KYK, W1LDL, W1LLC.

W1GPV, the A.R.R.L. E.C., got a station on the air at W1BGA's store in downtown Pawtucket and succeeded in handling 597 messages. W1BOY and W1KWA took operating shifts; W1JXL also took a watch. W1KSO was on for a time in Pawtucket, too, accepting R. I. traffic for delivery, as were W1BGO and W1JMT.

W1ISE and W1ITQ were on the job at Warren, first from the former's location and later, with an improvised a.c. line, from the latter's. For a time they were the sole outlet.

Newport stations displayed considerable activity after some degree of normalcy had been restored. The following were heard: W1AWG, W1DWO, W1HPE, W1JFF, W1JJM, W1JUC.

W1JUG of Howard still has a lot of people wondering. It seems he had a message to deliver to the Red Cross in New Bedford and no contact there. So he drove there, over roads that public works officials had declared impassable, handed the message to the doorman, and drove off before anyone could thank him.

Up at Woonsocket W1IHW, assisted for a time by W1JFK, operated during Wednesday evening. Answering a broadcast plea for amateur operators in Providence, he went there, only to be turned back by police. W1LCO was also on in Woonsocket, handling traffic, as did W1JFK later from his home station.

Elsewhere in the state activity has been re-

ported on the part of W1BLS, Middletown; W1KUF, Auburn; W1KXJ, Central Falls; and W1LJO, Jamestown.

Western Massachusetts:

Western Massachusetts amateurs, too, mindful of flood but unprepared for hurricane, were caught off guard briefly. But not for long.

Just above the Connecticut line, in Longmeadow, W1KER began watch on Wednesday, put in 80 hours continuously on 160. He was aided by W1KON and both XYL's. Chiefly, this station provided an outlet for W1IGS in isolated Ware and relayed Holyoke Dam water heights by land wire to State House, Boston.

In Springfield, W1AVK, A.R.R.L. E.C., established liaison with the mayor and operated a mobile unit on 10 at the North End dike and on 75 at City Hall. W1IOZ, W1KLN, W1DMZ, W1BPN and ex-W5ATK assisted. Much muncipal business was transmitted.

The Springfield Radio Association, W1BWY, had a tie-up with WMAS, and served the Red Cross and telephone company. Some 60 messages were handled by W1BSJ, W1DLE and others.

Bulk of the Springfield traffic went through W1FOF, whose filaments were hot from 5:33 P.M., Wednesday, through 10:20 P.M., Monday. This station was the official mouthpiece of the National Guard, with a sergeant (W1BCX) and six men detailed to it. In addition to special telephone lines, 5-meter links were provided with City Hall through W1KFA (assisted by W1KDA) and the State Armory, W1CAI. W1JQ organized the system, plus manning a mobile unit. W1KOC and W1LKQ relieved at these stations, while W1JQ, W1KUE, ex-W8PI, W1BCX and ex-K5AG took shifts at W1FOF. A total of 571 messages was handled, mostly for the National Guard, Springfield Planning Board and Hartford Weather Bureau.

W1EOB/WLGD did yeoman service through the A.R.R.S., notably in handling orders for serum, etc. W1HDQ took mobile equipment atop Mt. Wilbraham on several assignments to contact distant mobile expeditions.

Other Springfield amateurs listed as active include W1ACJ, W1BEC, W1DYA, W1FPP, W1HZC, W1IGY, W1IPV, W1ISN, W1IWL, W1KEE, W1KFV, W1KLN, W1KQM. W1KUX was on Mt. Wachusetts with 56-Mc. equipment. W1JWV was reported from Wilbraham.

Over in Westfield the A.R.R.L. Director, W1BVR/WLG, delivered a stellar performance in coördinating the A.A.R.S. networks throughout the section. At Chicopee, W1KWX was on deck, as was W1KUW.

A number of stations found work to do in Holyoke. W1GZL, using 160, had 228 Red Cross, power company, railroad and personal messages. Mr. and Mrs. W1EVZ/W1GQT, aided by W1AJD, had 176, many in connection with the Holyoke dam. W1CON (with W1BPT), W1CJK, W1GZL, and W1LIW were also on in Holyoke. W1IMF served in the 56-Mc. net, aided by W1BPT. W1CGS provided the Holyoke terminus of the National Guard 56-Mc. hook-up. W1KOS was on in nearby Willimansett.

At Northampton W1DIF took 178 messages on 75-meter 'phone, mostly for the National Guard. W1CPG was on there, too. In Easthampton W1BVG was taking traffic.

One of the most severely hit communities in western Massachusetts, Ware, received a lot of amateur attention. W1JPI went to Ware from Cambridge with a mobile unit, accompanied by a Massachusetts State Police lieutenant. A number of relief messages were handled back through the base station, W1FHY. W1IPV had a portable set-up installed at the Ware Nipple Shop. W1DLY worked with a 10-meter rig, establishing cross-band QSO's with his receiver on 5. W1CJR, W1DJU and W1IGS were also active in Ware when power was restored. In Thorndike, W1CLX was on the air.

W1DLY in Gilbertville handled 145 messages for that isolated community, many for the health department relative to vaccine, etc.

Most Worcester hams were silenced by power failure, but W1ETC got a special line, handled 224 messages for all official agencies and the press. Later W1AMI, W1ASU, W1DJU, W1IOR and W1KUD were reported on.

W1ATK operated portable in the Southbridge Police station. Aided, by W1EFC, W1JQE and W1LLT, his traffic total was 140. W1HSK/W1KOJ handled some Southbridge traffic, working on 75-meter 'phone. W1KOJ supplied a transmitter for W1ATK before power failure. W1BPG was there, too.

Other points were covered, as well. Stations were reported on as follows: Ludlow, W1HJR, W1KNF, W1KOA; Pittsfield, W1AZW, W1BKG, W1FAU, W1HAZ, W1KVN; Dalton, W1HNE; Williamstown, W1EJV; Gardner, W1BIV; Fitchburg, W1BNO; Leominster, W1KOQ; Shrewsbury, W1LC; Whitinsville, W1JVA; Webster, W1LIB; Brookfield, W1CWH.

Northern New England:

The Connecticut River and other streams were in flood, and that was the emergency in Vermont and New Hampshire. The hurricane merely came along in the middle of it and complicated things.

In Vermont, Brattleboro's E.C., W1FPS, was on with emergency power the evening of the 21st and intermittently thereafter. He also assisted W1AZV, for at 5 A.M. the next morning the latter had, with the aid of a special detail of National Guardsmen, run a temporary 1500-foot power line to his station. They operated on behalf of all agencies until the crisis passed.

W1AD in isolated Springfield used "CQ pse"

(Continued on page 76)

A New Automatic Noise Limiter

Carrier-Controlled Squelch Circuit for Superhet Second Detectors

By James E. Dickert*

SINCE James Lamb brought to our attention a method for silencing the effect of "shot type" noise,[1] several experimenters have attempted to improve the action either by changing the set-up of the original published Lamb circuit or by development through a different technique designed to accomplish similar results.

Significantly, all successful attempts, to the author's knowledge, have been approached by admitting the postulate of Mr. Lamb, that is, that bothersome "shot type" noise differs from the signal itself by exhibiting comparatively high instantaneous voltage level and extremely short duration, so that squelching the receiver sensitivity during the noise pulse will reduce the noise, and the period of reduced response will effect no practical discontinuity in the received signal.

Before description of the new automatic noise limiter, let it be said that in the author's opinion, if the Lamb silencer is properly installed, if the receiver is worthy of the name, if the operator intelligently and carefully adjusts the controls; then action is entirely satisfactory and results can be demonstrated to be of real value. The only excuse for a new type device is if a few additional requisites are satisfied:

First, the new device shall be as effective, or more so.[2]

Second, it shall cost less.

Third, the threshold control shall be automatic.[3]

Fourth, it shall be simple to construct and without manual adjustments.

Fifth, it shall be applied easily to any standard receiver without altering any of the existing functions such as pre-audio sensitivity, selectivity, or stability.

Sixth, it shall be incapable of causing serious distortion.

With these requisites in mind the following noise limiter description is submitted. At the risk of boring the reader, brief reference is made to the mechanics of detection or demodulation. A review of Fig. 1 shows progressively an unmodulated carrier (A), a 100%-modulated carrier (B), a rectified 100%-modulated carrier (C), and lastly the same carrier converted by filtering to pulsating direct current (D) as appearing across the diode load resistance. The voltage values given on the scale are arbitrary and somewhat higher than normally experienced. However, all voltages referred to in Fig. 1 and hereafter, may be considered proportional to those actually occurring in practice.

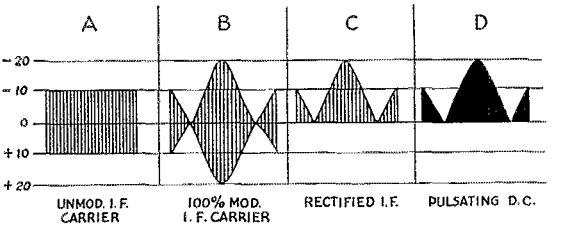


FIG. 1—GRAPHICAL REPRESENTATION OF SUCCESSIVE STAGES OF MODULATION AND DETECTION

Now in general, with properly-modulated carriers, the *average* value of rectified voltage appearing across the diode load resistor, or "stick" as we call it, is the same as the value caused by the same carrier when unmodulated. The carrier of Fig. 1-A would cause a ten-volt drop across the stick, and the carrier of Fig. 1-B would cause a drop varying between twenty volts and zero, or an average value of ten volts. To put it another way, we can generally assume that the legal and desirable peak value of modulation is just double the average level of the rectified carrier. Also we can say truthfully, that if receiver response were defi-

Here is a newly-developed noise-suppressing system which can be applied without undue circuit or constructional complications to any superhet receiver using a diode second detector. Its noise-suppressing action is determined by the level of the carrier at the second detector, and thus is automatic on both 'phone and c.w. signals. Requires only one extra tube and a few small resistors and condensers.
—EDITOR

* 339 Cavell Ave., Highland Park, Ill.

[1] J. J. Lamb, "A Noise-Silencing I.F. Circuit," *QST*, February, 1936.

[2] The term "effective" here must be considered in a relative sense. The Lamb silencer has the advantage of functioning in the early receiver stages where the receiver's selective circuits have not had an opportunity to lengthen the duration of the noise pulses (see note 1); this is a particularly important advantage when a crystal filter is used, and is not possessed by the several noise-limiting arrangements operating on the second detector or audio circuits.—EDITOR.

[3] An essential feature of the Lamb silencing system is provision for automatic threshold control from the receiver's a.v.c. system. Further improvement in this respect has been made by Mr. Lamb, but completion of the work has been delayed for the present.—EDITOR.

nitely limited to a value twice as high as average, no harm could be done to the received signal, or to its modulation component.

Refer now to Fig. 2. Section "A" is a somewhat poetic representation of the rectified carrier of Fig. 1-D when accompanied by an objectionable

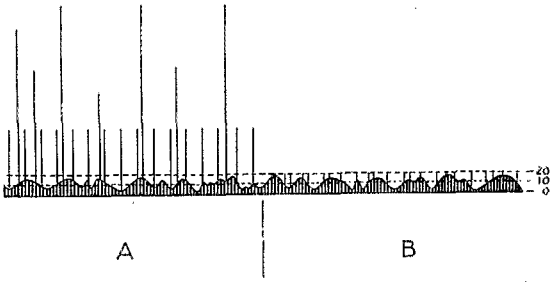


FIG. 2—MODULATED CARRIER WITH HIGH-AMPLITUDE NOISE PULSES (A), AND (B) MODULATED CARRIER WITH NOISE PULSES LIMITED TO THE PEAK MODULATION AMPLITUDE

amount of "Main Street QRN." The high vertical lines correspond to practically instantaneous voltages caused by ignition discharges and similar electrical "pops," including key clicks. Actually, instantaneous voltages as shown might not be terribly objectionable providing the highly-damped characteristic could be maintained. The sad part of it is that selective i.f. amplifiers, stray or unnecessary capacities, resonant audio systems, and above all reverberant room conditions —all add up to cause secondary effects and, what is more important, a psychological effect of aural masking. Our ears, however, are really quite rugged, and noise voltages several times signal intensity can be tolerated before interference becomes really objectionable.

If then, as in Section "B," Fig. 2, noise voltages could be reduced to a value not to exceed twice average carrier level, what little of the noise remains becomes psychologically absent. This conclusion is beyond the stage of theory. It is a demonstrated and accepted fact.

Now to figure out a way to do it! Fig. 3 shows six steps in the development of the submitted automatic noise silencer. Fig. 3-A represents a fundamental detector circuit utilizing a diode rectifier. If we assume the same order of carrier voltage as in the previous illustration, point *a* will vary from — 20 to 0 volts following the modulation. Proportions of this voltage can be taken off at the potentiometer arm of R_1. Point *c* remains at zero, or ground, which is used as reference.

Fig. 3-B is identical to (A) except that R_1 is now split into two equal resistances, R_1 and R_2. Point *a* still varies from — 20 to 0. Point *b*, which is half-way toward ground, varies between the limits of — 10 and 0.

Fig. 3-C has added a resistor and condenser combination identical to that used for storage of voltage for a.v.c. The time constant of the combination should be slower than the lowest modulating frequency encountered, and the resistor should be of a high value relative to the value of R_1 or R_2. Point *d* then will assume the relatively constant value of the carrier average whether modulated or not; that is, —10 volts.

In (D) another diode has been added to the circuit between point *b* and ground, as shown. Given the conditions as before, the cathode of the second diode will always be negative with respect to the plate, which is at ground potential, since the cathode is connected to the point *b*, which varies from — 10 to 0 volts. This means that the diode is always conducting during signal reception, and as a conductor its low impedance practically shorts the audio potentiometer R_2, giving rise to much reduced voltage level at point *b* and thence at the potentiometer arm carrying audio voltage to the amplifier. We have in effect a permanent squelch circuit, active as soon as any signal is rectified, and obliterating both signal and any noise present.

So long as this diode can be such an effective squelch it would be desirable to adjust the action so it would take effect only on voltages exceeding double the average rectified carrier level. This level, incidentally, is the same voltage level being stored at the point *d* (twice the drop from *c* to *b*). Under such conditions, any voltage in excess of that produced by a fully-modulated carrier would be limited to the 100 per cent level.

Fig. 3-E shows one way of doing just that—at least approximately. The triode which supplants the diode is the "zero bias" type such as a 6A6, a 53, or a 6N7. This type is characterized by the fact that with reasonably-small positive plate potential, the grid must be positive with respect to the cathode before conduction occurs. This means that even on the highest modulation peaks —the most negative values not exceeding 100 per cent—the grid potential only equals the cathode potential and practically no current flows through the triode. However, assuming a noise voltage only slightly higher than the maximum value of modulation, the cathode has a tendency to become slightly negative with respect to the grid, thus allowing cathode-to-plate current to flow. As can be seen from the diagram, cathode-to-plate current is another way of saying "limited current in R_2," since excess noise current which ordinarily flows to ground through R_2 is now detoured via the noise triode cathode-to-plate route and therefore cannot appear at the volume control arm of R_2.

The circuit of (E) is not the final answer for several reasons which, although important are not particularly interesting. However, there is an additional condition we should like to observe. If, instead of the triode plate being maintained

at zero potential, we were to introduce on it a voltage in exactly the same form as that appearing on the cathode, but opposite in polarity, we would have, at the instant of necessity, the greatest potential difference between cathode and plate and thence the best action.[4] On the other hand, at the time of no signal or very slight signal, all voltages would automatically adjust themselves to values in proper mutual relation.

Such a condition obtains by using the set-up of Fig. 3-F. Note that R_3 has been added in the cathode circuit of the signal diode. This resistance is rightfully part of the diode load, the only difference being that, because of the direction of current flow in the signal diode, positive voltage instead of negative is left at the ungrounded end of the resistor. If R_3 and R_2 are identical, then identical potentials built up by rectification of a given signal will be built up on each resistor except that one will have an opposing sign. Since plate current flows as soon as point b exceeds the negative potential of point d, all excess noise voltages across R_2 are literally drained off and cause the condition originally anticipated—or noise limiting.

For a slightly inaccurate but workable illustration of the noise-limiting action it may be convenient to visualize the operation illustrated in Fig. 4. During normal reception the grid is never positive with respect to the cathode so the high impedance presented by the triode plate-cathode circuit does not interfere with the standard circuit, shown by the heavy lines in (A). During excessive noise pulses, however, the tendency is for the cathode to go negative with respect to the grid. At the same time the plate is quite positive, and the tube conducts. Such conduction can be considered as a change of current path to that shown by the heavy lines of (B), Fig. 4.

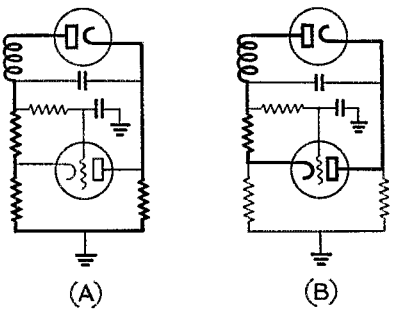


FIG. 4—EFFECTIVE CIRCUIT PATH FOR (A) THE DESIRED AUDIO SIGNAL, AND (B) NOISE OF AMPLITUDE GREATER THAN THE SIGNAL MODULATION PEAK

In other words, the lower section, of which the volume control is a part, is rather slighted for the duration of the noise peaks in excess of normal modulation. The conclusion again—noise limiting.

The fact should be understood by the analytical reader that the foregoing remarks are means toward a practical understanding of the operation in order that possible difficulties with special applications may be solved by commonsense reasoning. There are several circuit constants and functions not touched upon but which would alter somewhat the values given in the illustrations. A rigid circuit analysis not only is laborious but in a sense futile because optimum operation is determined by the listener's comfort rather than by measured or calculated performance. An undeniable fact is that the device works, and by rule-of-thumb and cut-and-try methods the circuit can be modified to produce entirely satisfactory—and to those most experienced, surprising—results.

In the experience of the author, Fig. 5 represents optimum values for all circuit components when the noise limiter is built into a standard receiver setup. It is suggested that the schematic be followed quite closely, since components and values have been chosen with care and with due regard to their effect on associated circuits.

Keep the circuit parts huddled together as much as possible, steering clear of stray capacities and long inductive leads. Put the off-on switch on an extension shaft from the front

[4] Making the plate positive at the instant the grid tends to go positive with respect to the cathode is particularly helpful because the inherently poor voltage regulation of the rectifier system will not permit a very high positive grid voltage to develop, since it must be accompanied by grid-current flow.—EDITOR.

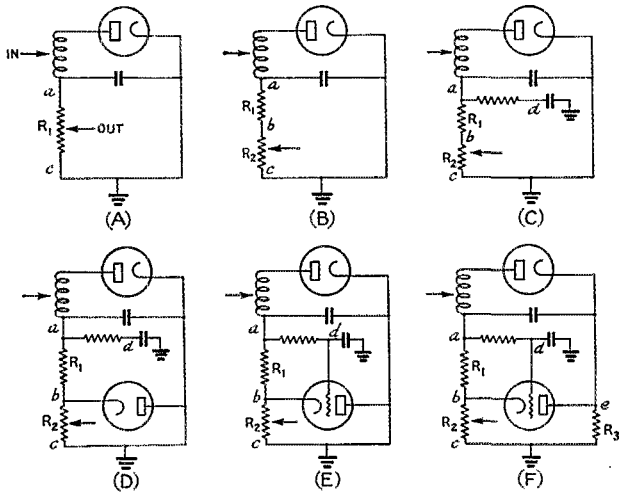


FIG. 3—DEVELOPMENT OF THE AUTOMATIC NOISE LIMITER FROM THE SIMPLE DIODE DETECTOR

panel so the switch can be located physically near the rest of the equipment; otherwise as shown. R_4 is an "extension potentiometer" across R_3, which carries most of the direct current. Shielding of leads in general is undesirable because of the added capacity involved. It is more desirable to isolate the leads physically and to keep the circuit "clean." Diode biasing of the first audio tube may be used to advantage, providing a slight amount of cathode resistance (about one-fourth normal) also is used.

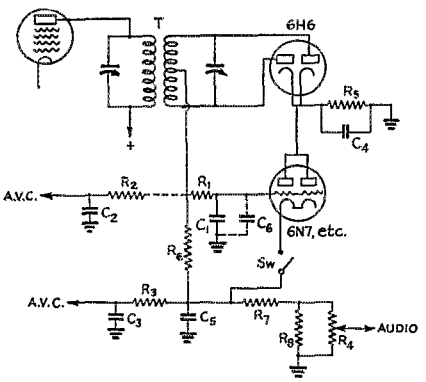


FIG. 5—PRACTICAL AUTOMATIC LIMITER CIRCUIT[5]

The values are optimum for ordinary operation. Optional a.v.c. output connections are shown.
T—Diode input transformer, center-tapped secondary.
R_1, R_2, R_3—1-megohm, ½-watt.
R_4—1-megohm volume control.
R_5—250,000-ohm, ½-watt.
R_6—100,000-ohm, ½-watt.
R_7—25,000-ohm, ½-watt.
R_8—100,000-ohm, ½-watt.
C_1—0.1-μfd. paper.
C_2, C_3—0.05-μfd. paper.
C_4, C_5—50-μμfd. mica.
C_6—0.001-μfd. mica (for additional i.f. filtering, if needed).
Sw—S.p.s.t. toggle switch.

The resistors in Fig. 5 are proportioned so as to squelch voltage peaks in excess of about 80 per cent modulation. This threshold value gives slightly better silencing than the 100 per cent value previously discussed. At the same time some slight distortion may be noticed when receiving a signal of high modulation content. In general, however, the results will be quite satisfactory as a very small proportion of even a heavily modulated carrier will exceed 80 per cent, and when such peaks do occur there is good reason to assume other forms of distortion exist in the second detector. If the hook-up in Fig. 5 is followed, however, the common distortion ordinarily experienced is minimized. If, on the other hand, most complete silencing is desired, regardless of the amount of distortion, resistor R_6 can be further reduced or even eliminated. Severe distortion will occur under all conditions of modulation but the intelligibility seems to be undisturbed. This latter condition, incidentally, is the ideal one for c.w. reception.[6] Because of the automatic relation between noise threshold and carrier level, the condition of blocking or complete squelch never can occur.

The ratio of R_1 to C_1 is adjusted to allow fast automatic change of operational threshold during tuning or when receiving fading signals. Actually the listener is not conscious of any delay whatsoever even when receiving c.w. signals. The action is particularly desirable when hunting for weak carriers, as the ordinarily high noise level between carriers when using a.v.c. is cut down enormously by the automatic feature of the limiter. This is understandable when it is remembered that noises of double average carrier level and over are squelched. In the case of no carrier at all, double that carrier is still zero, so theoretically all voltage other than steady carrier is squelched.

Finally, rather than recite a lot of claims about how well the silencer operates in practice, let us issue just one thought. In your zest to put it in your receiver at lowest possible cost, do not omit the off-on switch. It's too much fun to play with it!

[5] Full-wave diode as shown is preferable for good r. f. filtering, but there should be no reason why the system cannot be used with existing receivers having half-way rectifiers.—EDITOR.

[6] Probably some care must be used in adjusting the amplitude of the beat oscillator voltage at the second detector, since the limiting action will depend upon the rectified voltage, whether caused by the b.o. or signal. A weak b.o. voltage would seem best.—EDITOR.

Our Cover

HELL and high water descended on New England and Long Island at 3 P.M. on September 21st. Typical of many a wrecked community was Westerly, R. I., with its surrounding towns of Stonington, Conn., Watch Hill and Misquamicut, R. I., all thrown into a complete shambles and with all lines of communication torn to shreds. Three hours after the storm started, with a gale still raging, W1BDS, with gear hastily thrown together, was on the air with an antenna that at last would stay up—wrapped around a house for support! An urgent QRR was addressed immediately to Washington on 3990 kc. From then on, Burgess and his crew of ham operators kept a circuit open into and out of Westerly for the handling of all forms of emergency traffic. Our cover photograph is of this station under actual emergency conditions—the last of three setups that were used at different times. Photo by W1BAW.

Strays

W5FXO insists that an SWL of his acquaintance actually has oiled his speaker in an attempt to eliminate the "squeaks" (c.w.).

Let's Settle Those Antenna Questions

Beginning a Simplified Discussion of Antennas and Antenna Feed Systems

By T. M. Ferrill, Jr.,* W1LJI

WHAT is an antenna, and what kinds of antennas are used in amateur stations? How critical are antenna dimensions? What determines the choice of an antenna? How high should it be, and should its position be horizontal, inclined or vertical? What is the most efficient method of feeding it? How should the feeders be coupled to the transmitter? Should one antenna be used on several bands, and if so, must efficiency be sacrificed? Of what importance are wire size, insulators, resistance of joints, and guy wires in the vicinity of the antenna?

These are questions which face the beginner, and undoubtedly cause a great deal of worry for the more advanced as well. Although the number of variables and unknowns makes simple and complete answers difficult, it is hoped that the following comments will remove some of the doubts which antenna questions so frequently cause.

WHAT IS AN ANTENNA?

Entirely apart from the transmission line, insulators, poles and source of power, the antenna is the *part* of an antenna system *which radiates power.*

Until recently, nearly all amateur transmitting antennas were of the "resonant" type, and since this type still outnumbers the non-resonant antennas, it will be given the earlier part of the discussion. The resonant antenna is one whose length (and coils or condensers, if these are used in the *antenna*) determines its frequency. It is typified by "standing waves" (unequal current values at different points along its length) because of reflection at the open ends.

For operation on any single amateur band, the simplest antenna is the half-wave resonant antenna, several variations of which are shown in Fig. 1. This antenna may be horizontal, vertical, inclined, or part horizontal and part vertical. Where space and facilities permit, an effective antenna for any low-frequency band may be constructed by suspending a horizontal wire of the proper length between two reasonably high supports, and feeding it by any of the transmission lines shown in Fig. 1, (d) to (i), inclusive.

HOW LONG?

If the half-wave antenna is to operate effectively, its length must be such as to make it resonant with the transmitter frequency. The exactness with which this length must be adjusted has long been a source of worry for amateurs, probably because of the fact that antenna dimensions are often given to the nearest inch or half inch for lengths greater than 100 feet. Actually, removal or addition of a one-foot length of wire at the end of an 80-meter half-wave antenna which was originally exactly resonant with the transmitter will not affect its operation. The effect of such a change is much similar to the effect of a 23-kilocycle change in oscillator frequency on the driving power of a capacity-coupled amplifier—a much greater change of frequency is required to cause a noticeable reduction of efficiency.

Removal of a length of 8 feet from a resonant 80-meter half-wave antenna, on the other hand, has an effect similar to moving the oscillator frequency from one end of the 80-meter band to the middle (3500 kc. to 3750 kc.). This works backward, also, because moving the transmitter frequency across all or half of the 80-meter band without altering the tuning of the antenna will cause a noticeable reduction in output.

If operation of a resonant-type antenna on all frequencies in a broad amateur band is expected, then, it is desirable to have some means for readjustment of the tuning of the antenna system. This may consist of a method for decreasing or increasing the antenna length at will, or it may be some means for varying some tuning coil-and-condenser combination connected with the antenna.

In Fig. 1, nine antenna systems with 80-meter half-wave antennas, and with various ways of transferring power from transmitter to antenna, are shown. Since the length of each half-wave radiator is 133 feet, the frequency to which each is tuned (see Fig. 2-b) is approximately 3520 kc. If operation on 3900 kc. is desired, the correct length is approximately 120 feet. Thus any of the radiators shown may be retuned to the higher frequency by removal of 13 feet of wire. Any of the systems of (a), (b), (c), (f), and (g), however, may be made resonant by retuning the tank circuits connected to the antenna or feeders. In the first three, this effectively shortens the antenna itself, while in the latter two systems it has the effect of detuning the feeders, which in turn effectively shorten the antenna.

Although as was pointed out above, a difference of one foot has no noticeable effect on the operation of a half-wave 80-meter antenna, an excess or

* Technical Department, *QST*.

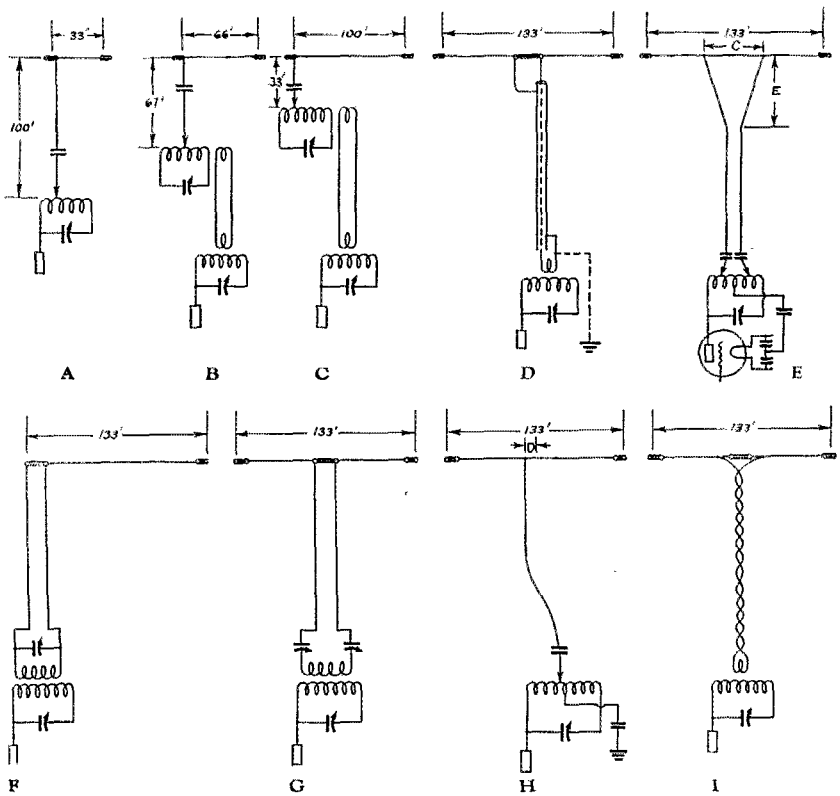


FIG. 1—ANTENNA SYSTEMS DISCUSSED IN THE TEXT

lack of as much as 13 feet causes the antenna to be noticeably off resonance, just as detuning the condenser of a plate tank circuit several dial divisions causes the circuit to be noticeably off resonance and somewhat less efficient. Hence if any of the four untuned-feeder antenna systems (Fig. 1-d, -e, -h, or -i) is to be operated at 3900 kc., a slight loss of efficiency will be experienced if no change is made in the antenna length. The antenna will still be effective, however, and the radiation pattern will be about the same. If operation throughout wide bands such as the 80-meter band is planned, the antenna—particularly one fed by an untuned line—should be cut to the length corresponding approximately to the middle of the band. If operation is to be largely confined to a frequency at one end of the band, on the other hand, the antenna should be cut for a frequency nearer this end of the band.

HOW HIGH?

Ordinarily, the general rule of "as high as you can get it" is a good one to follow for a decision about antenna height. The vertical radiation pattern is considerably changed by variation of the height of the antenna.[1] The overall effect of increased antenna altitude, with consideration given not only to the gain in all directions but also to the fact that raising the antenna an additional distance of 15 or 20 feet usually puts it more "in the clear," usually is increased effectiveness. It should be noted, however, that an antenna an odd number of quarter-waves high has increased high-angle radiation (radiation in an upward direction), while one an *even* number of quarter-waves high has increased low-angle radiation. Therefore, since extensive use is made of high-angle radiation at the lower frequencies, while lower-angle radiation becomes increasingly important at the higher frequencies, a very suitable height for an antenna to be used on several bands is a quarter wavelength for the lowest frequency band (if this is to be 80 or 160 meters) and 2, 4, 6, and 8 quarter-waves, respectively for the frequency bands successively higher. Such a height as this, with high-angle radiation on the lowest-frequency band and low-angle radiation on the higher-frequency bands, is a very logical one if installation facilities are available.

[1] Grammer, "All-Around Radiation Characteristics of Horizontal Antennas," *QST*, Nov. 1936.

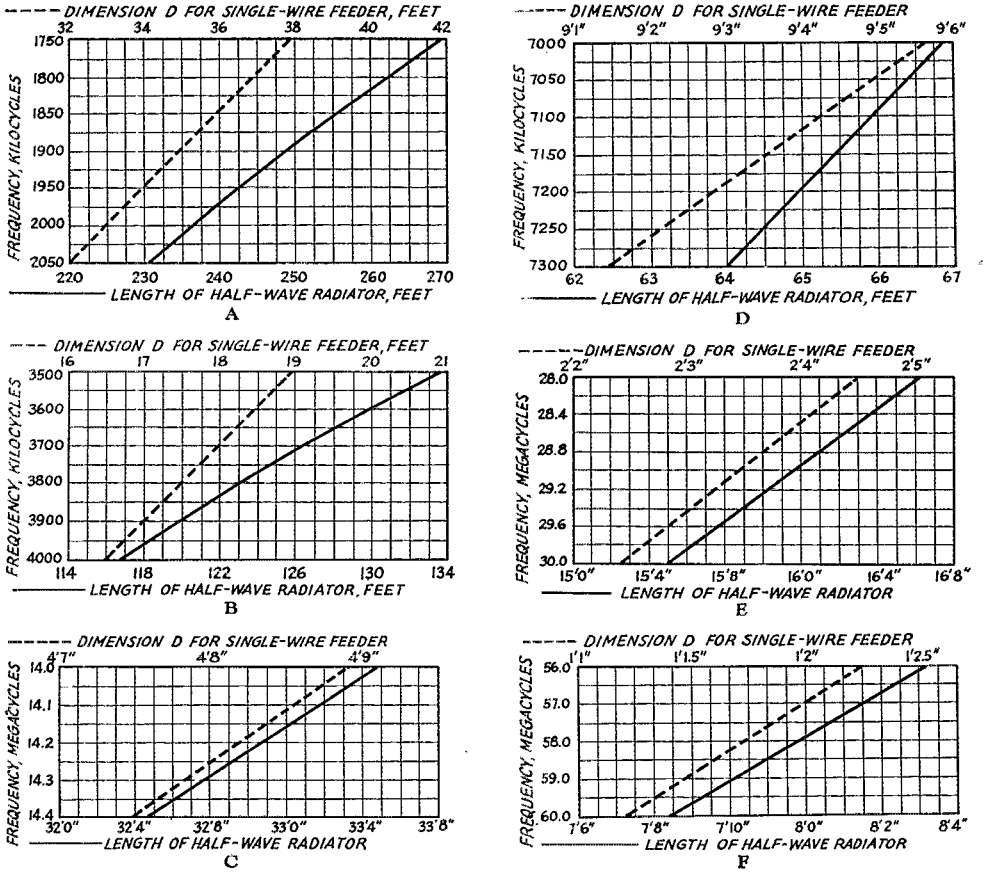


FIG. 2—CURVES FOR DETERMINING LENGTH OF HALF-WAVE RADIATOR
Center-to-feeder distance for No. 14 single-wire feeder is also given.

WIRE, INSULATORS AND GUY WIRES

Selection of antenna wire and insulators is not at all difficult, but how is a beginner to know this? Actually, there is little difference, from the standpoint of electrical efficiency, in sizes 14, 12, 10, and 8 of solid copper wire. The larger wire has slightly lower resistance, but the difference between the operation of a half-wave antenna made of No. 14 wire and one made of No. 8 is certainly not noticeable. There is practically no difference between the operation of solid copper wire and steel-core wire of the sort made for antenna use. Thus, the prime factors in the determination of the kind of wire to be used for the antenna are the weight and mechanical strength.

In the selection of insulators also, weight and mechanical strength are important factors. At ordinary frequencies the electrical losses in a dime-store glass insulator four inches long are not much greater than in a higher-priced transmitting insulator. Two short insulators may be used in series at each insulated point to provide more insurance against leakage loss along the surfaces.

The most important precaution in use of guy wires is that the wires be "broken" at the proper intervals to insure that there are no elements an even number of quarter-waves long between insulators, and that there be no elements a whole number of quarter-waves long between the ground and first insulators in the guys. A separation of 20 feet between strain insulators used to "break up" the guy wires is suitable for all bands from 160 to 10 meters, inclusive, and a separation of 10 feet is suitable for the 5-meter band in addition to the lower-frequency bands.

WHERE SPACE IS RESTRICTED

Lack of available space often makes the installation of a straight horizontal antenna for a low-frequency band impossible, unfortunately, hence it is sometimes necessary to resort to less commonly used variations.

Probably the best-known of these variations is the grounded antenna (sometimes called the

"Marconi"). If one end of an antenna is connected to ground, through a low-resistance contact such as may be had by use of several long rods or pipes driven deep into damp earth and connected together, the earth will behave as though it were an electrical mirror and the length of the wire will be doubled by reflection, the center of the antenna being at the ground connection. The resonant grounded antenna has serious disadvantages for amateur work, including the following:

1. It is difficult to obtain a low-resistance ground connection, and since the current is large at the point of connection to ground, the power loss at this point is usually much greater than that in the large-current part of a simple half-wave antenna.

2. The grounded antenna is confined to vertical or part-vertical installations, since obviously the wire cannot run along the surface of the earth from the point of connection.

3. The radiation from an antenna is normally greatest at the portions where greatest current flows, with the result that the part of the antenna at and near the ground connection radiates a large part of the power. The disadvantage of this feature can be compared to viewing distant objects from the level of a bird on the ground. If the ground is rough, or if there are bushes in the neighborhood, the bird will certainly have difficulty in seeing anything distant except the sky directly overhead. The large-current portion of a horizontal or vertical half-wave antenna suspended well above the ground, on the other hand, with the sort of view which confronts a bird sitting on a telegraph pole, will have an unobstructed view over great distances in many directions, low as well as high.

The advantage of the grounded antenna for amateurs, and almost the only reason for its use, is the fact that the total length of wire necessary for resonance is only half, approximately, the length necessary for the ungrounded half-wave antenna.

A more efficient method of making a tuned antenna for operation in cramped space on a low-frequency band is to bend the wire. If this is properly done, the compact antenna may be nearly as effective as the straight horizontal one. If operation is planned only for the band at which the antenna is a half-wave, it may have eighth-wave ends hanging vertically down so that the horizontal part is only a quarter-wave long. The radiation from the end portions of the antenna is quite small compared to that from the middle, and consequently, the radiation pattern of this compact system is little affected by the peculiar form taken by the ends. Thus, a length of approximately 75 feet may be made to accommodate a bent 133-foot antenna of which 33-foot lengths at each end drop down, leaving 67 feet in the horizontal portion. The poles for this type of antenna should, unless placed some distance from the ends, preferably be made of wood. Two wood poles 40 to 60 feet long could very well be used, spaced at least 4 feet from the hanging portions. An undesirable antenna, however, would be a half-wave antenna bent sharply at its center (Fig. 1-b, for example), with legs horizontal, inclined, or vertical. This is true because radiation from one of the legs tends to cancel that from the other much in the same way as in tuned feeders, but to a less complete extent.

FEED SYSTEMS

Any of the methods of feeding a resonant antenna may be applied to almost any form of the resonant system—vertical or horizontal, grounded or ungrounded, bent or straight. However, some feed systems are better adapted to certain applications than others. If an antenna is to be operated on more bands than one, for instance, the feeders of (d), (e), and (i), are definitely unsuitable, while that of (h) is poor.

The simplest method of coupling a half-wave antenna to the output circuit of the transmitter is shown in (a). This system requires that the end of the antenna be brought into the station and to the transmitter, and thus some of the radiation from the antenna takes place within the room. However, this is not a serious disadvantage, since the current at this part of the antenna is quite small, and the part of the total antenna radiation taking place within the station is proportionately small.

The systems of (b) and (c) are variations of (a), with separate antenna coupling tanks coupled to the output tank by means of low-impedance cable, which may be either twisted lamp-cord or some such transmission line as EO1 or concentric line. An extreme case of the (b) or (c) system would allow use of an antenna tank circuit suspended at the end of a horizontal straight half-wave antenna, with the low-impedance line linking the antenna tank circuit to the transmitter. This would be difficult to adjust, however, since the antenna tank condenser usually would not be readily available for retuning.

With the exception of the antenna systems of (a), (b), and (c), all of the arrangements of Fig. 1 use transmission lines designed to eliminate radiation.[2] With proper adjustment, all except (h) have practical elimination of radiation. The tuned feeder systems, Fig. 1-f and -g, ordinarily require use of a coil and tuning condenser(s), whereas the systems of (d), (e), (h) and (i) are free from such apparatus. The use of the tuning arrangement with the tuned feeders is more often an advantage than not, however, because of the flexibility provided.

There is no appreciable difference in the efficiency of the systems of Fig. 1-d, -e, -f, -g, and

[2] Stuart W. Seeley, "Match and Mis-Match," *QST* Nov. 1937.

-i, properly adjusted, but the efficiency of any of them is usually slightly higher than that of any of the other four shown. If poor dielectric material is used in the transmission line of (d) or (i), the loss in a great length of the line may become large when it is used to carry power on one of the highest-frequency bands. This may be particularly true of the feeder of (i) in wet weather if a waterproof covering is not used and the dielectric material is at all water-absorbent. A commercially-made feeder of the type shown in Fig. 1-i is known as EO1, and is provided with a waterproof cover over twisted rubber-insulated wires of large conductors.

In addition to proper lengths of resonant half-wave antennas, the graphs of Fig. 2 show distance-from-center dimensions for placement of the feeder tap on systems of Fig. 1-h. This position is correct for a feeder of No. 14 wire.

The length C in Fig. 1-e is obtained by use of the following formulas:

For the 160-meter band,

$$C \text{ (feet)} = \frac{123{,}000}{\text{Frequency (kc.)}}.$$

For the 80-, 40- and 20-meter bands,

$$C \text{ (feet)} = \frac{118{,}000}{\text{Frequency (kc.)}}.$$

For the 10- and 5-meter bands,

$$C \text{(feet)} = \frac{113}{\text{Frequency (Mc.)}}.$$

The two taps should be equally spaced from the center of the radiator. The distance E in the same figure is obtained by use of the formula

$$E \text{ (feet)} = \frac{148{,}000}{\text{Frequency (kc.)}}.$$

(Continued on page 59)

New Amateur Regulations Effective December 1st

JUST as we close this issue of *QST*, word reaches us that the Federal Communications Commission has adopted a complete new set of regulations to govern amateur radio commencing December 1st. While patterned upon the present regulations without change in fundamentals, there are scores of alterations, some of considerable importance. Next month we shall present the complete new text of the regs and detailed explanations of the changes, but there has been insufficient time to do it in this issue. Don't miss December *QST*—it will be of vital importance to every amateur. Meanwhile here are the highlights of the most important changes:

1. New bands assigned, 112–118 and 224–230 Mc.

2. Requirement of stable signals and filtered plate supply extended to 60 Mc. No more modulated oscillators or raw a.c. on 5 meters; they may still be used on 2½ and 1¼, but 5 now takes the same rules as 10 and up.

3. All stations must employ means independent of the frequency control of the transmitter to insure operation within bands. Ownership of such means not actually required; reg says "shall provide for measurement of the transmitter frequency and establish procedure for checking it regularly." Use of receiver itself will suffice in middle of bands; stable calibrated receivers or monitors will do for frequencies approaching edges; frequency meters probably necessary for working close; those who wish to shave the edges must have precision measuring equipment.

4. Stations using over 900 watts must possess means to measure the power accurately.

5. New emergency rules. When F.C.C. declares communication emergency, only relief transmissions may occur in 1.7 and 3.5 bands. Segments of 25 kc. on these band edges reserved for emergency calls. First 5 minutes of each hour compulsory listening period for all participating stations. Provisions for amateur policing.

6. No more television in 1715 and 56,000 bands but OK on 112 Mc. and up.

7. 'Phones not to emit carrier unless modulated for communication—no more idling while receiving. Transmission of music forbidden. Class-A bands to be used only by stations licensed to Class-A operators.

8. Portable regulations clarified. Portable designator changed from double-break to fraction mark (DN).

There are dozens of small changes in licensing procedure and in prescribed operating practice and station conduct. Details next month. Also watch in your favorite supply store for a new edition of the "License Manual," being prepared in conformity with the new regs.

Variable Frequency Control for Transmitters

An Easily-Built E.C.O. Which Fits any Crystal-Controlled Transmitter

By Dana A. Griffin,* W2AOE

A CASUAL survey of modern transmitter design discloses a decided trend towards the use of self-excited oscillators that readily may be shifted in frequency. We now find a fairly large number of transmitters in operation that can be parked near a DX station's frequency in jig time, thereby increasing the chance of making a contact. Another use for such a unit is the possibility of sliding "out from under" heavy QRM in the crowded 'phone bands.

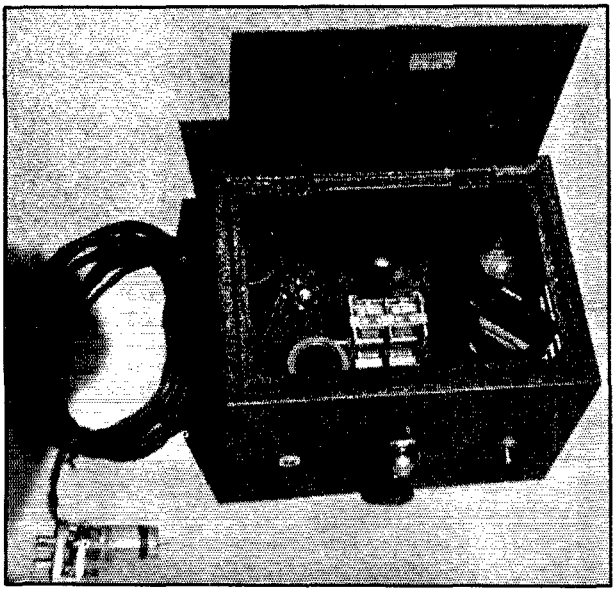
This article describes an oscillator—in fact two slightly different units—that provide this convenience. The novelty, if any, is the fact that they readily can be adapted to existing transmitters fitted with crystal switching means, without changes. Also, the units may be remotely located; that is, the oscillator can be placed on the operating table fifteen or twenty feet from the transmitter.

A gadget of this sort is a most useful station accessory provided, as the author points out, a good job, both electrically and mechanically, is done. Convenient to use, and certainly not expensive.—EDITOR.

*742 Central Street, Plainfield, N. J.

The remote control feature was easily provided by using a link-coupling arrangement which also furnishes a "band-pass" action insofar as output is concerned. Referring to Fig. 1, it will be noted that the plate circuit of the oscillator is link-coupled to another tuned circuit. The latter circuit is mounted on a base that can be plugged into the transmitter in place of a crystal. By tuning these two circuits to different frequencies in the band, it is possible to get a reasonably "flat" output throughout the band. This eliminates several otherwise annoying adjustments.

In order to avoid any circuit changes in the transmitter, it is necessary to use the former crystal oscillator tube as a doubler. Obviously, if this is not done, and the output circuit of the e.c. unit is tuned to the same band as the crystal oscillator plate tank, uncontrollable oscillation will occur.[1] With the e.c. unit output at half the frequency of the crystal oscillator plate circuit, this difficulty is avoided. Since stability and a good note are obtained on the lower frequencies with ease, this cannot be considered a hardship.



THE FREQUENCY CONTROL BOX WITH ITS OUTPUT COUPLING CIRCUIT AND CABLE

Note the coupling coil in the lower left corner, mounted with its trimmer on a 5-prong base which plugs in the crystal socket in the transmitter.

CONSTRUCTION

The photograph shows the construction of the unit whose circuit is exposed to public gaze in Fig. 1. It can easily be deduced that this unit preceded its more complicated companion shown schematically in Fig. 2. Not only is this an excellent example of evolution, but it also will enable groups with two different amounts of ambition and coin of the realm to make them work better and cheaper. The photograph enables one to tell at a glance that it is a lead-pipe cinch to build. An off-on switch, a keying jack, and a dial which

[1] Operation with the ex-crystal tube's grid circuit on the same band as the plate circuit is possible provided the grid circuit is sufficiently detuned to prevent self-oscillation. This usually requires tuning to some frequency outside the high-frequency end of the band in question. Doubling is more fool-proof, however.—EDITOR.

rotates a condenser that puts you just out of the band on one end, and in the same predicament at the other, are all that is necessary. There is an excuse for the internal appearance of the unit as it was built as an experiment that required a number of changes. Unfortunately, we ran out of film by the time beautiful unit number two was finished. The floor plan (Fig. 3) is one way that unit number two can be laid out.

To get back to Fig. 1 and the first unit again, all three tuned circuits resonate in the broadcast band, the oscillatory circuit covering a range from 860 to 1010 kc. with the padder appropriately set. When the output circuit is plugged into a transmitter in place of a 160-meter crystal, all frequencies between 1715 and 2020 kc. can be covered. This result will obtain with a 140-$\mu\mu$fd. band-spread condenser and 400-$\mu\mu$fd. padding condenser obtained from a two-section b.c.l. condenser, with a coil built to specifications. The high-C keeps the circuit stable once the initial warm-up period is over. As was mentioned above, the plate circuit and the output circuits are tuned to different frequencies, giving a band-pass effect insofar as output is concerned.

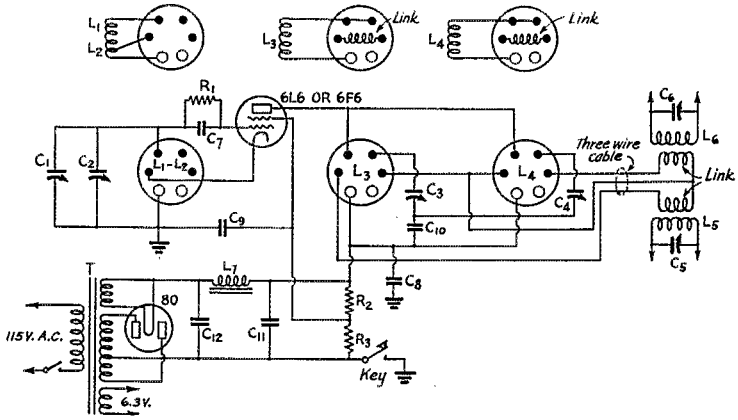


FIG. 2—THIS CIRCUIT WILL GIVE OUTPUT ON TWO BANDS

C_1, C_2, C_3, C_4—Same as in Fig. 1.
C_5, C_6—200-$\mu\mu$fd. mica trimmers.
C_7—100-$\mu\mu$fd. mica.
C_8, C_9—0.01-μfd. mica.
C_{10}—0.005-μfd. mica.
C_{11}, C_{12}—8-μfd. electrolytic, 450-volt.
R_1, R_2, R_3—Same as in Fig. 1.
L_1—Same as in Fig. 1.
L_2—24 turns No. 20 s.c.c. on 1½-inch form; cathode tap at 6th turn from ground.
L_3—90 turns No. 28 s.c.c. on 1½-inch form; link 15 turns.
L_4—42 turns No. 20 s.c.c. on 1½-inch form; link 10 turns No. 28.
L_5—B.C. coil; link 15 turns No. 28.
L_6—50 turns No. 28 s.c.c on 1-inch form; link 7 turns.
L_7—30-henry filter choke.
T—Same as in Fig. 1.

The usual constructional "musts" that everyone hurriedly skips are now in order. First, whether you like it or not, the oscillatory circuit components should be rigidly moored to the chassis. This takes time, but when the cat tramps out of the room your frequency won't take 10-kc. jumps with every footfall. After all, a cat is a quadruped. Short stiff wiring also is necessary if stability is to be obtained. A reasonable amount of hay-wire work is permissible elsewhere, for there are twenty million receivers working at these frequencies despite the best efforts of those intent on making it tough for the service man.

There is only one unusual feature in the circuit; namely, the method employed in keying or standing by. It is common practice to break some part of the oscillatory circuit for this purpose, but it was found that if this is done the position and length of keying leads affected the frequency even though the

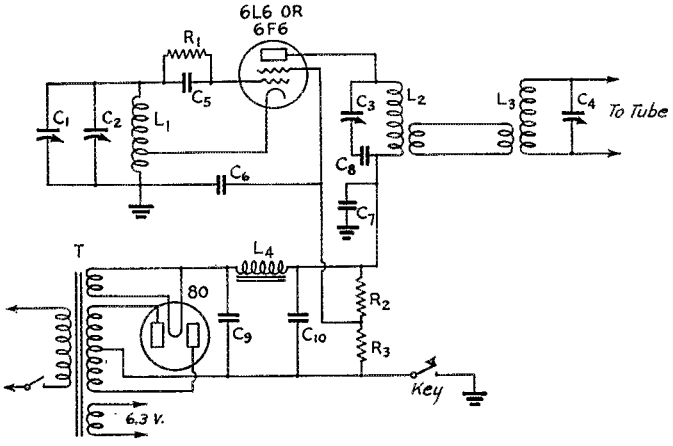


FIG. 1—CIRCUIT DIAGRAM OF THE FREQUENCY-CONTROL UNIT

C_1—140-$\mu\mu$fd. variable (band-spread).
C_2—400-$\mu\mu$fd. variable (band-set); two-gang b.c. type paralleled.
C_3, C_4—220-$\mu\mu$fd. mica trimmers.
C_5—100-$\mu\mu$fd. mica.
C_6, C_7—0.01-μfd. mica.
C_8—0.005-μfd. mica.
C_9, C_{10}—8-μfd. electrolytic, 450-volt.
R_1—100,000 ohms, 1-watt.
R_2, R_3—5000 ohms, 10-watt.
L_1—45 turns No. 28 s.c.c. on 1½-inch form; cathode tap at 15th turn from ground.
L_2, L_3—Broadcast-type coil (Meissner) with primary removed and 15-turn link wound on.
L_4—30-henry choke.
T—Power transformer, 250 volts at 40 ma., with 6.3- and 5-volt filament windings.

keying leads are heavily by-passed. Accordingly, the oscillatory circuit was tied down permanently and the B-minus connection to the chassis opened and closed instead. It should be noted that the high-voltage winding center-tap, the bleeder, and the negative side of the high-voltage condensers connect together and to one side of the key. The other side connects to chassis, but when the key is up the bleeder load is still on the power supply.

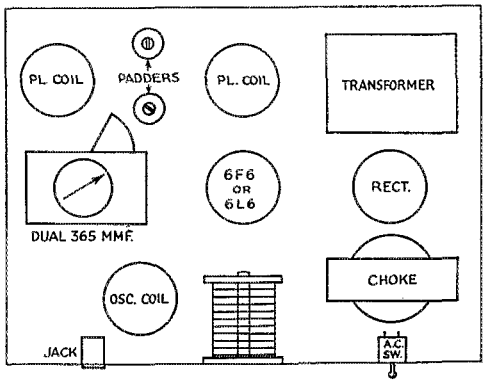


FIG. 3—SUGGESTED LAYOUT FOR THE CIRCUIT OF FIG. 2

With 250 volts on the plate and about 150 on the screen, both the 6F6 and the 6L6 function satisfactorily. The latter gives somewhat greater output, as would be expected. When pentode crystal oscillators are employed, the 6F6 will furnish sufficient output to drive such tubes as doublers. The photo shows the oscillator coil just peeping over the top at the left. Back of it in the shield can is the output plate coil. Between the coil and the tube is the tuning condenser for the plate circuit. It is mica-tuned with a screw-driver adjustment. The 0.005 condenser keeps the d.c. off the screw so that no short circuit to chassis will occur while this circuit is being resonated with the conventional uninsulated screw driver. The b.c.l. condenser is mounted directly in front of the tube, but the band-spread condenser is hidden by the front panel. The mica trimmers on the b.c.l. condenser should be removed as a precaution against drift. The cable and the output circuit with its tuning condenser mounted on a 5-prong base, also are shown. Ordinary receiving doublet wire is used for the transmission line. Both b.c.l. coils should have the primaries removed and a fifteen-turn winding wound over the secondary at the "cold" end. This size link winding seems to give sufficient overcoupling so that the band-pass feature is obtained.

OPERATION

The unit is placed into operation in a very simple manner. After the usual check of connections and circuit, the tubes should be inserted and the power turned on. If a closed circuit jack is used it will not be necessary to plug in the key in order to have the unit operate, although the circuit must be broken if break-in operation is employed. Tune your b.c.l. set to a station around 860 kc., set the band-spread condenser at maximum capacity and turn the padder until a beat note is heard. With a dual condenser having 365 $\mu\mu$fd. per section this should occur with the plates about $\frac{3}{4}$ in. By rotating the band-spread condenser to minimum capacity, it should be possible to tune in a station at 1010 kc. If this cannot be done the capacity of the band-spread condenser is incorrect, or the coil is not properly constructed. The plate circuit should next be tuned to resonance near one end of the band, and the output circuit near the other end. When this is done output is obtained throughout the band with two voltage peaks above average. A neon bulb can be used to determine the proper setting of the condensers. The output circuit must be retrimmed slightly when it is placed in the socket because of the added capacity across it.

A TWO-BAND ARRANGEMENT

This unit works in fine shape but it is limited in scope to transmitters employing 160-meter crystals. It was decided that a substitute for 80-meter crystals also would be a nice thing to have around, so unit No. 2 was constructed. The circuit is essentially the same as that of the first unit, but two sets of plug-in coils are used. The energy is transmitted by means of a three-wire cable to two output circuits permanently tuned and plugged into crystal sockets in the transmitter. As this arrangement provides broadcast and 160-meter output, both 160- and 80-meter crystals are eliminated.

The power supply and the oscillatory circuit are the same but the arrangement of the plate circuit, in order to provide the two-band outputs without retuning, is different. Coils L_1, L_3 and L_5 provide broadcast output. The others furnish 160-meter output. L_1 and L_2 plug into the same socket, but L_3 and L_4 require separate sockets so that their tuning may be permanently set and the energy transferred to the proper output circuit. If the diagram is followed carefully no undue difficulties should be encountered.

The units have been tried at W3BJR and air tests check with those made against the extremely stable broadcast carriers. A clean signal with a T9 note and practically no chirp is obtained. After the initial warm-up period of fifteen minutes the drift is a matter of cycles between transmissions with the transmitter resuming operation on the original frequency in a matter of seconds. The ability to light on the frequency of the station with whom you desire to make contact, and conversely the ability to leave a heavily QRM'd channel at a moment's notice, make such a unit a worth-while addition to any station.

Combined Beat Oscillator and I.F. Amplifier

An Easily-Applied Circuit Which Does Not Affect Normal Operation of the Receiver

By F. W. Schor*

WHERE additional socket space is at a premium or where for reasons of economy another tube is not available, it is desirable to combine the functions of beat-frequency oscillator with those of another tube. The usual result is some impairment in the performance of the other function of this tube, so that in the end another tube usually is added for the separate oscillator anyway.

It was found that the 6L7 makes a very good intermediate-frequency amplifier, running a close second to the familiar 6K7. In addition, the injector grid presents some interesting possibilities. It was at first thought that this injector grid could be coupled into the cathode using a conventional oscillator transformer. Any additional impedance in the cathode circuit immediately produced an unstable amplifier so the only thing left to do was to find some method of coupling between the plate circuit and the injector grid without appreciably affecting the i.f. amplification.

An easy method of converting the all-wave b.c. receiver for c.w. reception. On sets using octal-based tubes, no socket changes are necessary, and the circuit additions are few.—
EDITOR

Referring to Fig. 1, it will be seen that the 6L7 is used as a conventional i.f. amplifier exactly as the 6K7 would be except that the injector-grid terminal (which is the suppressor grid terminal on the 6K7) is connected to one end of coil L_1.

The plate circuit of this tube is also conventional when the beat-frequency oscillator switch is closed. The b.f.o. is off when this occurs. Upon opening the switch, however, that portion of the plate circuit across R_1 is connected to the lower end of coil L_1 through condenser C_2. The oscillating circuit frequency is determined by L_1C_1. A small variable condenser C_3 of about 50 $\mu\mu$fd. is used to control the pitch.

With the b.f.o. switch open, the 6L7 tube will oscillate efficiently while it amplifies at the intermediate frequency. We have heard fellows say that one tube cannot oscillate and amplify efficiently at the same frequency but there it is. However, the catch is that the oscillation takes place at 155 kc. or the third sub-harmonic [1] of the i.f. frequency, 465 kc. The third harmonic is more than strong enough to give a good beat note and it will be found that the most powerful c.w. signals, including local broadcasters, will not block out the beat note. At the same time, there will be no difficulty in picking the weaker c.w. tweets out of the mush.

For proper operation of this circuit, it is essential that the oscillator circuit be not overcoupled but rather coupled just enough for oscillation to take place in the injector grid circuit. The coupling can be varied by changing the relative position of the tap on the coil L_1 or easier still by varying R_1. The values given have worked with

(Continued on page 80)

[1] *I.e.*, one-third the fundamental frequency.

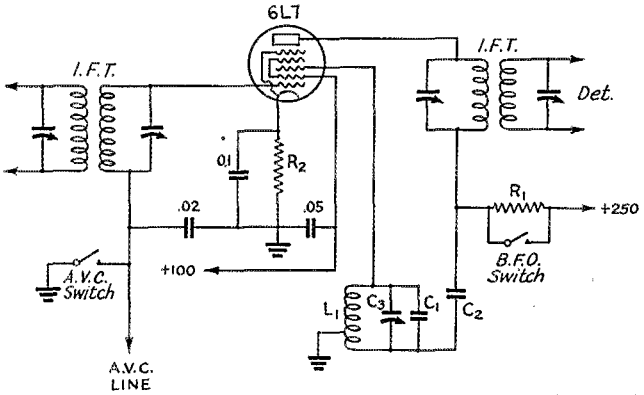


FIG. 1—COMBINED I.F. AMPLIFIER AND BEAT-FREQUENCY OSCILLATOR USING A 6L7

C_1—0.0015 μfd. (see text).
C_2—0.01-μfd. paper.
C_3—50-$\mu\mu$fd. variable (pitch control).
R_1—10,000 ohms, 1-watt.
R_2—300 ohms, ½-watt.
L_1—200 turns No. 36 pie-wound (i.f. coil fashion) with tap at 65 turns; larger coil section connected to grid.

(Note: The familiar 2.5-mh. sectional-wound r.f. choke also could be used, in which case the capacity required at C_1 would be between 400 and 500 μfd.; an appropriate trimmer should be substituted. The tap could be taken off one or two sections from the plate end.—EDITOR)

* Engineering Staff, Hallicrafters, Inc., Chicago.

A Transmitter of General Utility

Simple Three-Tube Exciter or Transmitter With Inexpensive Tubes

By Don H. Mix,* WITS

ALTHOUGH the trend in amateur transmitter design these days seems to be in the direction of those features which provide a maximum of operating convenience, even though they may involve complexity, many of us are willing to get along with some sacrifice in convenience for the sake of simplicity in circuit and construction. This conviction is quite apt to be prevalent in the minds of those who hesitate to tackle the more complicated jobs because of limited previous experience and those whose occupations limit the amount of time available for constructional work.

CIRCUIT DETAILS

In designing the transmitter shown in the accompanying photographs, effort was directed towards keeping the circuit as straightforward as possible while maintaining a broad field of utility. Thus, in the circuit, the diagram of which appears in Fig. 1, the grid-plate oscillator was chosen because it delivers satisfactory second-harmonic output although it requires tuning but one circuit. It has a reputation for being "easy" on the crystal, and keys well. The 6L6G in the buffer-doubler stage is connected as a triode principally to increase the plate-grid capacity, thus avoiding tricky neutralizing adjustments. The use of the tube in this manner also avoids critical adjustment of excitation often found necessary with beam-type tetrodes and pentodes. With the connection shown, greater power output is obtainable at low plate voltage than with the high-mu connection, sometimes used, in which the screen forms part of the control grid.

Excitation for the final amplifier is taken from the "neutralizing" end of the buffer-doubler tank coil instead of the "plate" end to help maintain a better balance for neutralizing. The blocking condenser C_8 insulates the rotors of the tank condenser from ground, permitting the use of a tank condenser with less spacing between plates. The tank condenser specified has sufficient range to permit the use of at least optimum capacity on all bands except the 1.75-Mc. band. Here a fixed air condenser C_{10} must be connected across the coil to maintain optimum capacity for the purpose of reducing harmonic output and maintaining linearity with plate modulation.

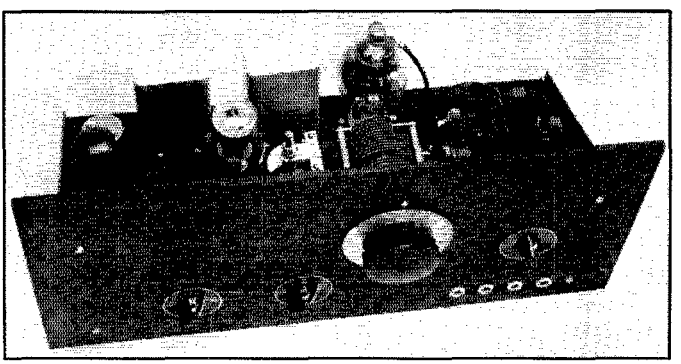
Output may be obtained on three bands with a single 1.75-, 3.5- or 7-Mc. crystal of properly selected frequency. A variety of tubes may be used in the final amplifier. With the 809, RK-11, RK-12 or HY57, an output power of approximately 50 watts is obtainable as a c.w. transmitter or exciter, or approximately 35 watts as a plate-modulated amplifier. With a plate voltage of 1000 such tubes as the T40, TZ40, or HY40 will deliver 70 watts or so for c.w. or driver work. A carrier output of 45 watts may be obtained for plate-modulated 'phone work.

POWER-SUPPLY REQUIREMENTS

Since power-supply requirements depend upon the selection of the tube to be used in the final amplifier, some thought should be given in this direction. A single 6.3-volt filament transformer will suffice if the Type 809, RK11-12 or HY57 is selected. It should have a current rating of five amperes. If any of the other tubes mentioned above is selected, a separate 7.5-volt filament transformer will be required.

A plate-voltage supply delivering 450 volts with a rating of about 150 ma. will be required for the oscillator and buffer-doubler. The 809, RK11-12 or HY57 will require a 750-volt supply rated at 150 ma. for c.w. operation or 600 volts at 125 ma. for 'phone operation. The larger tubes require 1000 volts at 150 ma.

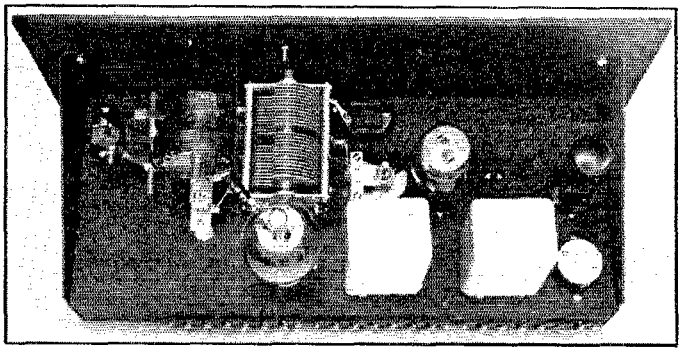
* Technical Department, *QST*.



TOP VIEW — SHOWING PANEL AND CHASSIS ARRANGEMENT

6L6's or 6L6G's may be used in the driver stages and 809, RK11, RK12, HY57, T40, TZ40, HY40, or similar tubes may be used in the final amplifier. An insulated dial must be used on the final tank condenser.

for c.w. work or 800 volts at 125 ma. for 'phone work. Rated plate currents for the smaller tubes are 100 ma. for telegraphy and 83 ma. for plate-modulated 'phone operation, and for the larger tubes, 115 ma. for telegraphy and 90 ma. for telephony. Some additional allowance must be made for bleeder current. The tank condenser specified was selected with the above ratings in mind. A source of 90-volts is required for biasing purposes.

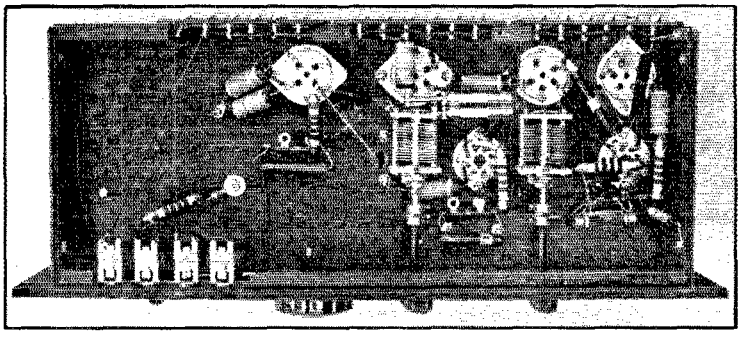


REAR VIEW SHOWING PLACEMENT OF PARTS

Final amplifier neutralizing condenser is mounted next to the tank condenser on small stand-off insulators. The blocking condenser C_8 may be seen close to the panel to the right of the tank condenser. Hole for the 6L6 neutralizing condenser may be cut in the space between the two coil shields. (See text.)

CONSTRUCTION

The unit is built up on a standard 7" by 17" by 2½" chassis with a 8¾" by 19" Masonite rack panel. The photographs require little explanation. A five-prong socket is required for the crystal located in the left rear corner for accessibility. The oscillator and buffer-doubler plate tank coils are mounted in National PB10 individually shielded plug-in units requiring five-prong sockets. The final-amplifier neutralizing condenser, the final tank condenser, immediately to the right, and the final tank coil plug-in strip are mounted on five-eighths-inch Johnson stand-off insulators. If a plate voltage above 750 is used, a neutralizing condenser with greater spacing, such as the NC800, should be used. In fact, this type will do for any of the tubes mentioned. Sufficient space should be left at the right-hand end of the chassis to allow the variable link to be swung out to minimum coupling. If the arrangement of parts shown in the photographs is followed, space will be left in the rear right-hand corner for the fixed air padding condenser for 1.75-Mc. operation. The mica plate-circuit blocking condenser is mounted near the front end of the tank condenser to the left.



BOTTOM VIEW — SHOWING ARRANGEMENT OF WIRING AND COMPONENTS

R.f. leads are short. By-pass condensers are grounded to the nearest mounting screw. Note clearance hole for wire between final neutralizing condenser and grid of tube.

Referring to the photograph showing the bottom view of the chassis, it will be noticed that all sockets and the tuning condensers for the oscillator and buffer-doubler plate circuits are mounted beneath the chassis. The socket for the final amplifier tube is lowered about one inch so that the panel height may be limited to 8¾ inches. This arrangement permits convenient wiring with short leads and provides shielding between grid and plate circuits of the final amplifier. It also results in an exceptionally clean chassis top with a minimum of wiring showing. In the final form, a 12-$\mu\mu$fd. midget condenser was substituted for the two National NC600 neutralizing condensers shown in the photograph. It is mounted in approximately the same position with a clearance hole for the shaft between the two shielded coils so that it may be adjusted from the top of the chassis with an insulated screwdriver.

The oscillator cathode-circuit inductance (r.f. choke) with its shunting 100-$\mu\mu$fd. fixed condenser may be seen mounted close to the oscillator-tube socket. The chassis is cut out at the rear and in front for the terminal strips and meter jacks. The jacks require no additional insulation since they are mounted on the Masonite panel rather than on the metal chassis. Series feed, placing both sides of the small tuning condensers at plate voltage, necessitates the use of small insulating flexible-shaft couplings. In mounting the panel, the lower edge is dropped one-half inch below the lower edge of the chassis to provide additional depth for the two variable condensers. The

supporting side brackets are also dropped the same distance.

WIRING

The location of the chief components is such that very little r.f. wiring is required. Short, rigid leads of an inch or so are sufficient to connect the low-power tank condensers to their respective coil sockets. Mica coupling condensers with pigtail terminals are self-supporting and require no mountings. By-pass condensers are connected directly to the points to be by-passed and then grounded at the most convenient mounting screw. Care should be taken to make sure that these mounting screws make good contact with the chassis. In one or two places, it will be found convenient to use insulating anchor strips to support the junction between r.f. and resistor in series. Frequently, unused tube-socket or coil-socket terminals may be pressed into service for this purpose.

All power wiring is done with push-back wire. If plate voltages as high as 1000 are to be used, however, it would be wise to use wire with heavier insulation for circuits carrying this voltage. The meter jacks may be wired in before the panel is fastened to the chassis, leaving sufficient length to permit mounting when the panel and chassis are assembled. Care should be taken to connect the jacks so that the meter will read in the proper direction when plugged into any of the four jacks. If the tip of the plug is connected to the positive side of the meter, the jack spring which makes contact with the plug tip should be connected to the positive high-voltage supply terminal in the case of the plate-circuit jacks and to the negative biasing terminal in the case of the grid-circuit jack.

COILS

Coils for the oscillator and buffer-doubler plate tank coils are all wound on XR2 one-inch-diameter coil forms and the forms mounted inside the PB10 shielded units. Winding data may be taken from Table I. Where the winding length permits, the turns specified should be spaced out to occupy the specified length. The tap on the buffer-doubler coil should be made as accurately at the center as possible so that it will not be necessary to reneutralize in changing bands. It may be necessary to shift the tap slightly to find the correct point. Dimensions given in the table should be followed as rigidly as possible. This applies particularly to the buffer-doubler coil since any appreciable deviation will make it impossible to tune to both of the bands for which the coil is designed.

In the final amplifier, Barker & Williamson type BVL coils are used. The 3.5- and 7-Mc. coils must be pruned as indicated in the Table I. The

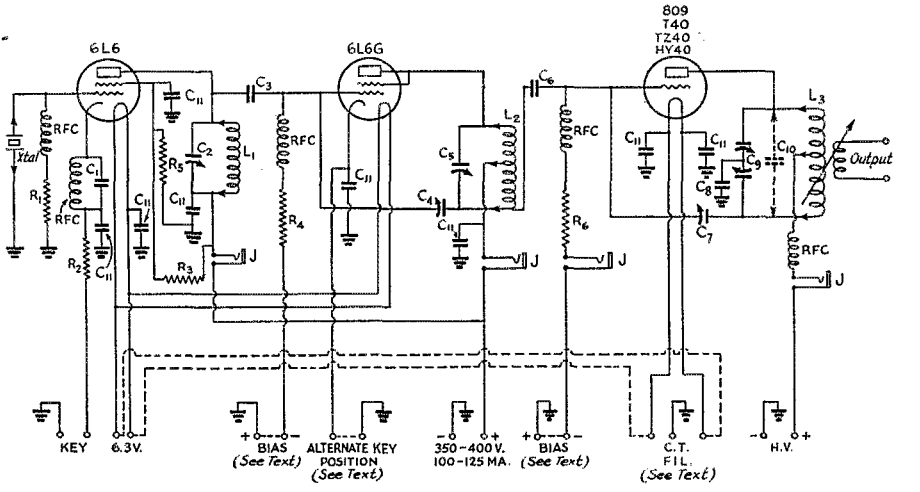


FIG. 1 — CIRCUIT DIAGRAM

C_1—100-μμfd. mica.
C_2—140-μμfd. midget (Cardwell ZU140AS) with mounting bracket.
C_3—100-μμfd. mica.
C_4—12-μμfd. (National UM-50) alternate plates removed.
C_5—140-μμfd. midget (Cardwell ZU140AS) with mounting bracket.
C_6—100-μμfd. mica.
C_7—25-μμfd. (National ST-25) or NC 800 (see text).
C_8—0.002-μfd. mica (Cornell-Dubilier 5000-volt).
C_9—260 μμfd. per section (Cardwell MR260BD), spacing 0.03".
C_{10}—150-μμfd. fixed air padding condenser for 1.75-Mc. band (Cardwell EO150FS), 0.05" spacing.
C_{11}—0.01-μfd., 600-volt paper (non-inductive).
R_1—100,000 ohms, 1 watt.
R_2—400 ohms, 2 watts.
R_3—15,000 ohms, 10 watts.
R_4—10,000 ohms, 10 watts.
R_5—10,000 ohms, 10 watts.
R_6—50,000 ohms, 2 watts.
R_6—1500 ohms, 2 watts for 809, RK12, TZ40, HY57; 5000 ohms, 10 watts for RK11, T40, HY40.
RFC—Radiofrequency choke—National R100.
J—Single open-circuit jack.
See Table I for coil dimensions.

COIL TABLE I

Coil	Turns	Wire	Diameter	Length
No. 1	62	No. 26 d.s.c.	1"	1¼"
No. 2	42	No. 22 d.s.c.	1"	1¼"
No. 3	22	No. 22 d.s.c.	1"	1"
No. 4	10	No. 18 d.c.c.	1"	1"
No. 1D	58	No. 28 d.s.c.	1"	1" *
No. 2D	32	No. 22 d.s.c.	1"	1¼" *
No. 3D	14	No. 18 d.c.c.	1"	1" *
No. 4D	7	No. 18 d.c.c.	1"	1" *

* Tapped at center.

Coil No. 1A—B & W BVL-80, no alteration
Inductance—30 microhenrys
Optional coil—15 turns, 5" diam., No. 14 double-spaced
Coil No. 2A—B & W BVL-80, remove 4 turns from each end
Inductance—17 microhenrys
Optional coil—21 turns No. 14, 2½" diam., 3" long
Coil No. 3A—B & W BVL-40, remove 3 turns from each end
Inductance—8.5 microhenrys
Optional coil—13 turns No. 14, 2½" diam., 1⅞" long
Coil No. 4A—B & W BVL-20, no alteration
Inductance—3.1 microhenrys
Optional coil—9 turns No. 14, 2½" diam., 2½" long
Coil No. 5A—B & W BVL-10, no alteration
Inductance—1 microhenry
Optional coil—4 turns No. 14, 2½" diam., 1⅝" long

BVL-80 coil will do for the 1.75-Mc. band without alteration. Therefore, in purchasing the set, the 1.75-Mc. coil should be omitted, substituting a second BVL-80. Proper inductance values as well as typical dimensions are given in the table.

TUNING

After wiring has been checked carefully to make certain that no error has occurred, proper filament voltage should be applied. If a 6.3-volt tube is used in the final amplifier, the two sets of terminals may be connected in parallel as indicated by the dotted lines. The terminals for the alternate key position should be strapped together with a wire and the key connected in the oscillator circuit. The biasing voltage should be connected to the terminals indicated; a voltage of 90 is required for the 6L6G. If a pair of 45-volt batteries is used for this purpose, a tap may be taken off at 45 volts for the final amplifier. Care should be taken that the grid-leak resistance is proper for the tube used in the final amplifier as indicated under Fig. 1. A milliammeter should be connected temporarily in series with the negative biasing lead to the 6L6G with the positive terminal of the meter towards the battery. A second milliammeter with a scale of not less than 200 ma. should be plugged into the first meter jack to the left in the oscillator plate circuit and an open-circuit dummy plug inserted in the second jack in the plate circuit of the 6L6G. Suitable crystal and coils for the desired frequency band should be plugged into the proper sockets. (See Table II.) It will be noticed that each buffer-doubler coil is designed to cover two adjacent bands so that coil changing will not be necessary so frequently. Somewhat higher driving power for the final amplifier will be obtained at the higher frequencies with coils which resonate at the desired frequency with a low value of capacity. Adequate power should be obtainable with either arrangement, however.

For this initial test, a coil combination which permits using the 6L6G as a straight amplifier should be chosen. With coils and crystal in place, the low-voltage plate supply may be connected and turned on. With the key closed, the oscillator plate current should rise to 60 or 70 ma. The oscillator tuning condenser should be rotated until a dip in plate current is obtained. At minimum dip, the oscillator plate current should be somewhere between 25 and 40 ma., the lower values being obtained at the low frequencies when not doubling frequency with the oscillator. Simultaneously a reading should be obtained on the meter connected temporarily in the grid circuit of the 6L6G; this grid current should run 15 to 20 ma. unless the plate circuit of the 6L6G happens to be tuned to resonance. The plate tank condenser of the buffer-doubler circuit should then be tuned, carefully watching the grid-current meter to detect any change in the reading. Starting with the 6L6G neutralizing condenser at minimum capacity, the capacity should be increased bit by bit, each time checking for change in grid current with tuning of the 6L6G plate tank circuit. A point should soon be reached where the tuning has no effect whatsoever upon the grid-current reading and the stage is neutralized. Increasing the capacity of the neutralizing condenser further should bring back the dip in grid current with plate-circuit tuning, indicating that the correct neutralizing point has been passed. Incidentally, the oscillator tank circuit should be adjusted occasionally to maintain maximum grid current.

The dummy plug may now be removed and the meter plug transferred to the second jack. Again, closing the key should cause a plate current in excess of 100 ma. if the 6L6G plate circuit is

(*Continued on page 62*)

COIL INDEX—TABLE II

Crystal Freq.	Output Freq.	L_1	L_2	L_3	C_5
1.75 Mc.	1.75 Mc.	No. 1	No. 1D	No. 1A	High
1.75 Mc.	3.5 Mc.	No. 2	No. 1D	No. 2A	Low
1.75 Mc.	3.5 Mc.	No. 2	No. 2D	No. 2A	High
1.75 Mc.	7 Mc.	No. 2	No. 2D	No. 3A	Low
1.75 Mc.	7 Mc.	No. 2	No. 3D	No. 3A	High
3.5 Mc.	3.5 Mc.	No. 2	No. 1D	No. 2A	Low
3.5 Mc.	3.5 Mc.	No. 2	No. 2D	No. 2A	High
3.5 Mc.	7 Mc.	No. 2	No. 2D	No. 3A	Low
3.5 Mc.	7 Mc.	No. 2	No. 3D	No. 3A	High
3.5 Mc.	7 Mc.	No. 3	No. 2D	No. 3A	Low
3.5 Mc.	7 Mc.	No. 3	No. 3D	No. 3A	High
3.5 Mc.	14 Mc.	No. 3	No. 3D	No. 4A	Low
3.5 Mc.	14 Mc.	No. 3	No. 4D	No. 4A	High
7 Mc.	7 Mc.	No. 3	No. 2D	No. 3A	Low
7 Mc.	7 Mc.	No. 3	No. 3D	No. 3A	High
7 Mc.	14 Mc.	No. 3	No. 3D	No. 4A	Low
7 Mc.	14 Mc.	No. 3	No. 4D	No. 4A	High
7 Mc.	14 Mc.	No. 4	No. 3D	No. 4A	Low
7 Mc.	14 Mc.	No. 4	No. 4D	No. 4A	High
7 Mc.	28 Mc.	No. 4	No. 4D	No. 5A	Low

Building Convenience into the Operating Table

An Easily-Constructed and Inexpensive Cabinet Which Brings All Controls and Accessories Within Easy Reach

By Joseph Walker and Charles L. Cox, Jr., W3FPE*

HOW often have you heard remarks such as these: "One of these days I intend to have a new layout here"; "Sorry, a wire just fell off and I had to put it on again before I could come back"; or, "Please allow me a few minutes to come back each time, as I have to jump up, throw three or four switches, change the antenna over to transmitter, etc., before I can settle down to enjoy our QSO."

Such conditions may be all right, if you care to put up with them. Take the following as an example: After a hard day's work, you hurry home to a quick dinner, then while the filaments are warming up for an evening of anticipated enjoyment, you must dust your feet in rosin and prepare to paddle five or ten miles per QSO, simply because you will not have operating switches at arms' length.

Here's an unconventional arrangement which provides a lot of room in a small space. Even if you don't duplicate it you're bound to get some good ideas from reading this article.—EDITOR

Is it not worth a little trouble to have your equipment so placed as to warrant a little comfort along with the pleasure of operating? We think so and, with this in mind, have designed a unit to meet this requirement. This project serves admirably as an example of the flexibility and utility of a few pieces of box lumber and plywood, which are readily obtainable from wood piles or at local stores, which almost invariably have a few pieces to discard.

To begin with, we desired to have a central station, cabinet, or whatever we could obtain or build to house the receivers, monitors, controls, etc., having them so placed as to be out of the way and yet right at our fingertips for easy access when necessary. We also wanted to patch one unit into the other, should this be necessary for various reasons. The speakers should have their spot, being properly baffled to prevent hashy noises. These things seemed desirable, yet we knew that somehow everything would have to be compactly housed to be in a convenient position and still present a fairly neat exterior that would please the OW, who hates the sight of a haywire assembly on the desk or, for that matter, anywhere. Her opinions are not to be contradicted, as open haywire equipment does present a source of danger to her as well as being a dust catcher *de luxe*.

The work required to complete this unit is straightforward and the time involved well spent. There are no really trick joints to bother one who, not being a cabinetmaker, might flinch at the idea; rather it can be easily constructed.

The materials to be used are the cheapest obtainable, and consist of box lumber cut to the desired lengths and sanded smooth. The paneling is ¼" fir plywood, finished on one side only.

While not entirely compact, this cabinet is 3 feet deep, 3 feet high, and 5 feet long. These dimensions can be altered to conform to individual needs.

A suggestion might be made here that should one have access to a power saw, a groove ¼" wide and ¼" deep could be made at each place where a panel is inserted and the plywood placed in these grooves. This method would doubtless improve both the strength and appearance, but it is not necessary, as sufficient strength is achieved in the other method of backing up the frame with the plywood.

At first we were doubtful about the possibility of covering up the grain in the plywood

* 440 Hook Road, Sharon Hill, Pa.

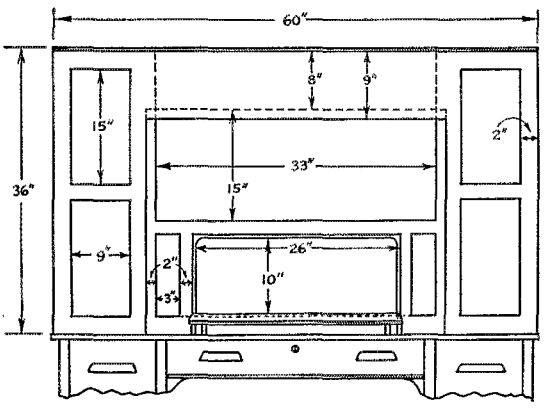
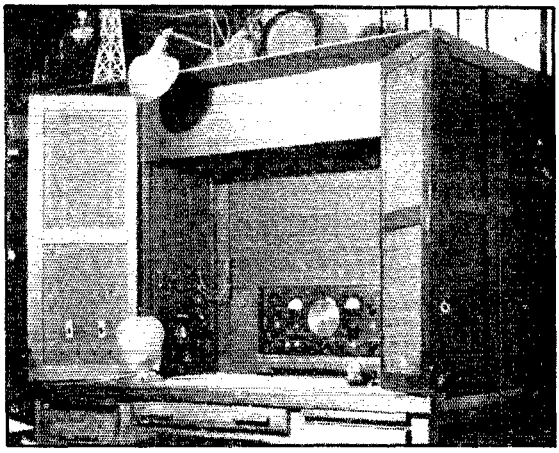


FIG. 1—FRONT-VIEW DRAWING, WITH DIMENSIONS OF THE DESK-TOP OPERATING CABINET SHOWN IN THE PHOTOGRAPH

Dimensions of the opening for the receiver will vary with the type of receiver used.

with paint, but this problem was overcome by the use of DuPont's flat black paint, a quart being more than sufficient to cover completely the entire cabinet with two coats, fully eliminating the grain and producing a smooth, glareless surface. Chrome stripping may or may not be added to this, depending upon the constructor's wishes.

A unique feature concerning the speaker installation results from the construction of the sides and back, a natural well for the speakers being formed, and for proper baffling a one-inch section of celotex is laid above the plywood. The speakers are mounted on this celotex after, of course, both the plywood and celotex have been pierced with a hole to the diameter of the opening of the cone. On the plywood, which is facing down towards the operator, a section of dark grill cloth is glued, completely covering these holes.



A DESK-TOP OPERATING CABINET WHICH PROVIDES A PLACE FOR ALL NECESSARY EQUIPMENT AND ASSURES CONVENIENT STATION CONTROL

In all, there are five useful surfaces or sides, plus the speaker well, which can be used for varied purposes.

Our needs call for the two front diagonal panels to serve as the operating switch panels only. The next two side panels (in our case) hold, left lower, 5-meter receiver; left upper, 5-meter monitor, audio oscillator; right lower, 2½-meter receiver; right upper, modulation monitor and frequency meter monitor. All input and output connections to these units terminate in pin jacks midway between upper and lower shelf (for patching purposes).

The back or main panel (lower section) holds a Skyrider receiver. The dimensions for this opening will vary with the type of receiver used. The receiver is in the lower center, resting on a sliding piece of plywood, the purpose being to slide the receiver out towards the operator (for comfort again!). On each side of the receiver are two tiny panels on which various pilot lights show up very effectively.

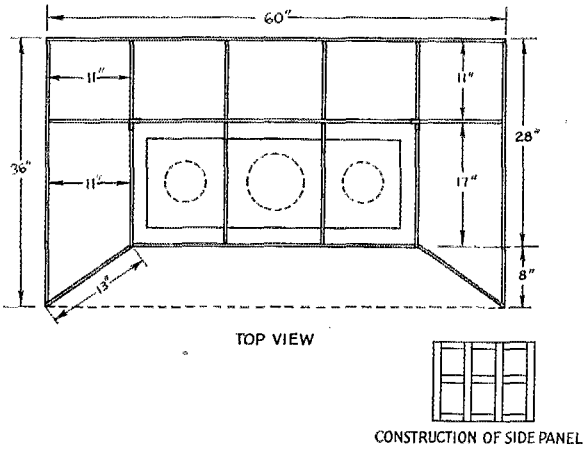


FIG. 2—TOP-VIEW DIMENSION DRAWING

The dotted circles indicate holes for speakers, in the horizontal member directly above the operating table. A space 8 inches deep is available for this purpose.

Now the question is up to the individual as to whether he would prefer to use the large panel or space above for other equipment or as a shelf for books, log, etc. It is there and can be utilized as one chooses. We put an oscilloscope there, this position being at eye level and therefore ideally suited for such a purpose. This space might also be used for a speech pre-amplifier unit.

The drawings illustrate the details of construction and general dimensions. Full information can be gained by a careful study of these drawings in conjunction with the photograph.

When this project is finished, you may be certain there is a place for all necessary gear, this being so placed as to be right at your fingertips, so that you can settle down with the feeling that your walking days per QSO are over.

Strays

"Hardware cloth makes good side, top, and back panels for transmitters," suggests W9SDG. "Much cheaper than perforated metal, it also provides more ventilation and visibility. It is a good shield because all crossings of the wires are bonded. It resembles over-size window screen, and is available in ¼-, ⅓-, ½-, ⅝-, ¾-, and 1-inch mesh, with No. 23 or No. 14 iron wire.

A 1.75- to 56-Mc. Crystal-Controlled Low-Power Transmitter

'Phone-C.W. Complete with Power Supply in One Cabinet

By Herbert W. Gordon,* W1IBY

NO doubt to a great many amateurs low power is a necessity, either for economic reasons or because of the b.c.l. interference problem. There is also the desire to operate in as much ham territory as possible. The construction of the outfit shown here was prompted by these factors, and this description is offered in the hope that it may benefit others similarly situated.

This set has given a good account of itself on the air, despite the fact that the power output is only in the vicinity of ten watts. It is convenient to operate; only two plug-in coils to change and one tuning adjustment to make when shifting bands. Can be used to drive a higher-power amplifier, of course.—EDITOR

Several points had to be considered in the design of this transmitter. It had to be small physically, it had to cover all bands and be arranged so as to operate over a portion of each band; it had to have a minimum number of controls to facilitate rapid QSY.

Originally it was the intention to use a series of 6N7's in the r.f. end as well as in the audio, but while the set was in the paper stage and various 6N7 circuits were under consideration, the fundamental-reinforced harmonic-generator circuit was described in *QST*.[1] Since its features seemed particularly suited to this outfit, the circuit was accordingly incorporated in the set.

As is often the case, the tube line-up depended to a considerable extent on the plate power available. The most suitable power transformer was deemed to be a Kenyon type T244, which delivers 425 volts each side of center at 165 milliamperes. Using the 165 ma. as a base, a search through tube data showed that two 6F6's and a 6L6 could be used in the r.f. so that their drain, plus that of three 6N7's in the audio, would just equal 165 ma. under the expected operating conditions.

THE CIRCUIT

The complete circuit diagram is given in Fig. 1. The 6F6 was selected as a pentode crystal oscillator, not only because of plate-current economy, but also because of its relatively low crystal current. The second 6F6, the buffer-doubler, has its screen and control grids tied together for operation as a high-μ triode, so that it draws plate current only when excited by the oscillator.

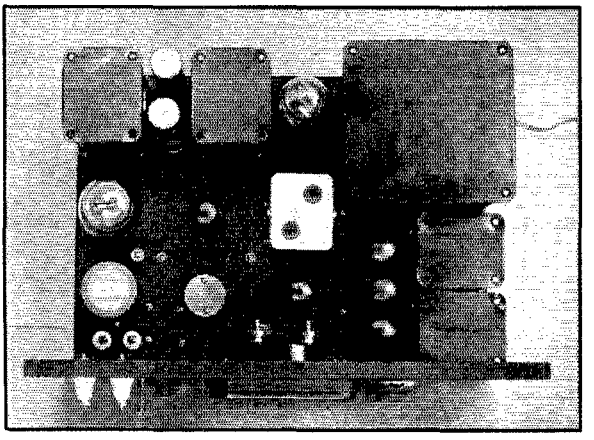
The buffer-doubler's grid is connected to the oscillator plate by means of a mica condenser. This condenser is purposely small in capacity in order to reduce the possibility of too much oscillator loading.

The third and final r.f. tube, a 6L6G, is capacity-coupled through a small isolantite-insulated trimmer condenser to the plate of the 6F6 buffer-doubler.

The crystal-oscillator tube gets its grid bias from a resistor in the cathode circuit. This resistor serves two purposes; it reduces the non-oscillating plate current and it tends to make the crystal start more easily. Keying is accomplished in the cathode circuit of the 6L6G. Inserting the key in J_2 also shorts the secondary of the modulation transformer; this was necessary because the surges resulting from keying are likely to break down the transformer. Then, too, it automatically makes available a slightly higher voltage for c.w. work by eliminating the drop in the

* 69 Main St., Rocky Hill, Conn.

[1] J. L. Reinartz, "A Fundamental-Reinforced Harmonic-Generating Circuit," *QST*, July, 1937.

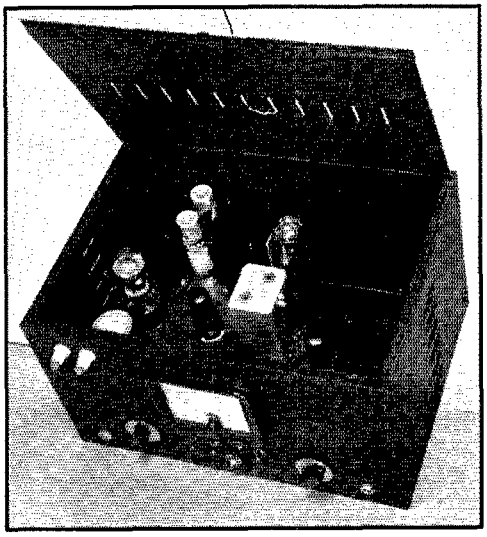


A TOP-OF-CHASSIS VIEW

Power supply components are along the back, speech amplifier at the right front. The 6L6G final tube and its tank coil are along the left-hand edge.

resistance of the secondary winding.

The meter reads the plate currents of all tubes simultaneously. When the a.c. switch is first turned on, all other switches should be off. After the filaments have warmed up, closing SW_2 puts the oscillator in operation, and under these circumstances the oscillator plate and screen current can be read directly. With the oscillator tuned, SW_3 may be closed, turning on the buffer stage. The meter will now read the sum of the plate currents of these two stages. When the buffer is tuned to resonance the current will rise to a peak. SW_4 may now be turned on, and when the final tank circuit is adjusted to resonance there will be a pronounced dip in plate current. The meter will now read the total current of all three stages. To determine the Class-C current approximately, subtract the sum of the currents of the first two stages from the total reading. When the transmitter is to be modulated, SW_5 is also closed, and with full modulation the current will swing upward about 20 ma. Because of the choke-input filter and the relatively heavy steady load on the plate supply filter, a 20-ma. plate-current increase results only in a 15-volt drop in plate voltage.



TRANSMITTER, MODULATOR AND POWER SUPPLY COMPLETE IN ONE SMALL CABINET

Power output averages 10 watts or better at normal input, on all bands from 1.75 to 56 Mc. Pre-tuned tank circuits are used in the exciter.

If the transmitter accidentally is turned on before the filaments are warm, no harm will be done because the heater of the 83-V takes as long to reach its operating temperature as do the other tube heaters. A check of the voltage drop across various rectifiers indicates that with the load imposed by this unit, the drop is as low with an 83-V as with an 83.

CONSTRUCTION

The complete transmitter is built on a black-crackle chassis measuring 13 by 10 by 3 inches, fitting a cabinet measuring 14 by 11 by 10.

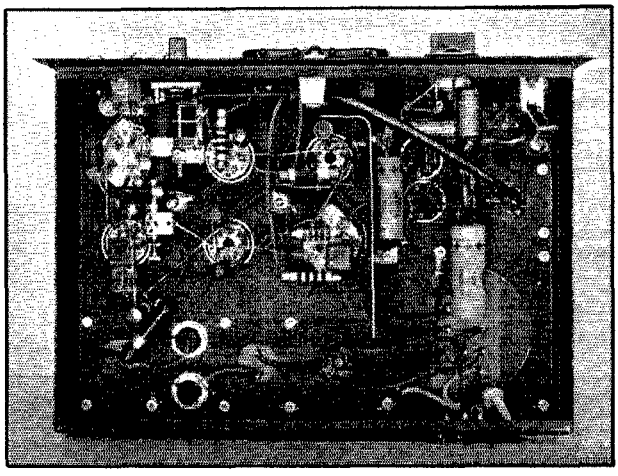
The paper wrapper in which the chassis comes can be used as a template, the points where the holes are to be drilled being marked in pencil. These markings then are prick-punched into the metal preparatory to drilling. A hole should be cut in the back of the cabinet for connection to an external standby switch; the connections are made to a two-terminal strip which is fastened on the back wall of the chassis immediately to the rear of the power transformer.

A metal strip two inches wide by 7 or 8 inches long fastened under the chassis between the audio and r.f. wiring helps materially in reducing coupling between these two sections.

It is wise to use a liberal supply of tie-ins, soldering lugs, and conical insulators. These all help to provide rigid wiring. All the r.f. tube sockets are of steatite or isolantite, while the audio and 83-V sockets are of bakelite. All are Amphenol type.

After the chassis has been drilled and all rough edges have been cleaned smooth, a sketch of the panel layout should be made. Plenty of room should be allowed for the switches underneath the junction of chassis and panel.

When assembling parts on the panel, those that mount through both chassis and panel should first be fastened firmly to the chassis alone by means of a thin nut. Then, when the panel is fastened in place, the first nut anchors the part to



BELOW-CHASSIS WIRING IS SHOWN IN THIS PHOTOGRAPH

the chassis and the second nut, on the ouside of the panel, holds the assembly firm. This provides a space between the chassis and the panel into which the front lip of the bottom of the cabinet will fit.

Another necessary precaution is to leave plenty of space between the coil-socket prong rivets and the edges of the socket holes in the chassis, to prevent possible short circuits.

Small lock washers biting into the paint are necessary to make good electrical grounds. Of course, it is wise to supplement the lock-washer contacts by scraping away the enamel. In wiring, a strip of bus or heavy tinned wire should be connected between the important r.f. grounds. Actually there are three connections of this type; one between the front baffle-shield bolt and the d.c. blocking condenser, C_{13}; another from the ground side of C_9 and C_{10} to the same blocking condenser; and the third connecting the cathode of the buffer to the ground side of C_9.

So far as possible, r.f. wiring is short and direct, while d.c. and a.f. wiring is kept separate from the r.f. and close to the chassis.

It is important that C_{17} and C_{21} be as specified, otherwise the high gain of the first 6N7 may cause motorboating.

MAKING THE COILS

The r.f. coils are not difficult to make if directions are followed closely. The specifications shown in Fig. 1 are the result of a great deal of cut-and-try, and because of the critical coupling between L_1 and L_2 as well as the small capacity of C_{12} it is suggested that they be followed closely.

The procedure in making L_1-L_2 for each band is as follows: First remove the base screws on the FXTB assemblies, then the hex nuts near the top. The shield may then be removed and the form itself may be clamped in a small vise just tight enough to hold it securely when drilling. Three pairs of 1/16-inch holes are drilled, one pair at the completion of L_1, one pair at the start of L_2 and one pair at the end of L_2. Because the small soldering lug forms an anchorage for the "hot" side of L_1 no holes are necessary at this end. At the other coil ends, the wire should be drawn through one hole and out the other in order to

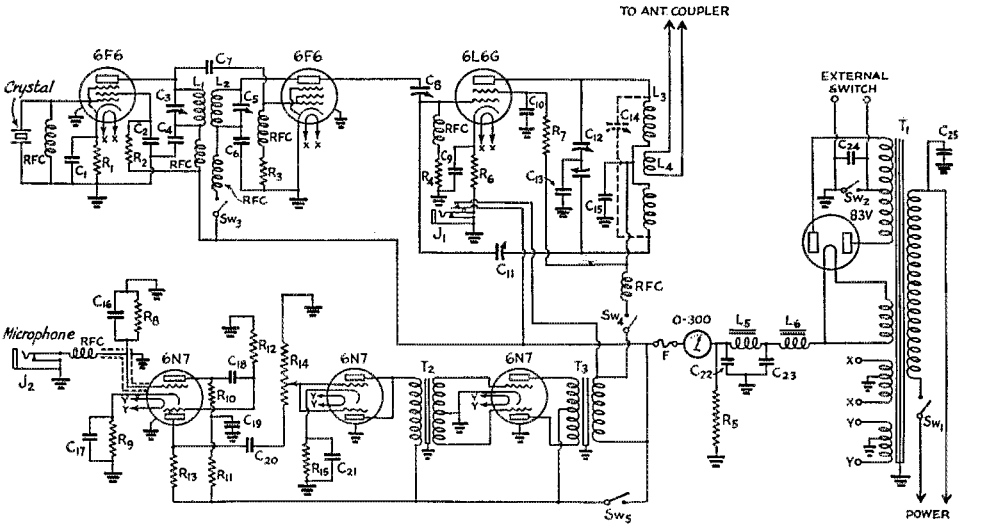


FIG. 1—CIRCUIT DIAGRAM OF THE COMPLETE TRANSMITTER

C_1, C_{18}, C_{20}, C_{25}—0.01-μfd. paper, 600-volt.
C_2—250-μμfd. mica.
C_3, C_8—75-μμfd. midget (in National FXTB assembly).
C_4, C_6, C_9, C_{10}, C_{13}—0.001-μfd. mica.
C_7—40-μμfd. mica.
C_8—50-μμfd. variable.
C_{11}—Neutralizing condenser (National NC-600).
C_{12}—Split-stator, 25 μμfd. per section (Cardwell ER-25-AD).
C_{14}—100-μμfd. midget (Hammarlund APC-100) for 1.75 and 3.5 Mc. only.
C_{15}—0.006-μfd. paper, 600-volt.
C_{16}—200-μμfd. mica.
C_{17}—50-μfd., 35-volt electrolytic.
C_{19}—8-μfd., 450-volt electrolytic.
C_{21}—25-μfd., 35-volt electrolytic.
C_{22}, C_{23}—16-μfd., 450-volt electrolytic.
C_{24}—0.1-μfd. paper, 600-volt.
R_1—500-ohm, 2-watt.
R_2—50,000-ohm, 1-watt.
R_3—15,000-ohm, 1-watt.
R_4—12,500-ohm, 2-watt.
R_5—35,000-ohm, 25-watt.
R_6—300-ohm, 5-watt.
R_7—15,000-ohm, 10-watt.
R_8—5-megohm, ½-watt.
R_9—2000-ohm, ½-watt.
R_{10}, R_{13}—100,000-ohm, ½-watt.
R_{11}—20,000-ohm, ½-watt.
R_{12}—500,000-ohm, ½-watt.
R_{14}—500,000-ohm potentiometer.
R_{15}—1000-ohm, ½-watt.
RFC—2.5-mh. r.f. choke (National R-100).
Sw_1-Sw_5, inc.—S.p.s.t. toggle switch.
J_1—Circuit-closing jack (Yaxley 705).
J_2—Closed-circuit jack.
T_1—Power transformer, 425 v. each side c.t., with 5-v. and two 6.3-v. filament windings (Kenyon T-244).
T_2—Class-B input transformer, 6N7-6N7 (Kenyon T-251).
T_3—Class-B output transformer, 6N7 to 3000 or 5000 ohms (Kenyon T-451).
L_5—Filter choke, 10 henrys, 200 ma. (Kenyon T-152).
L_6—Swinging choke, 5-20 henrys, 200 ma. (Kenyon T-506).
F—250-ma. Littlefuse.

COIL DATA

Freq.	Coil	Turns	Wire	Spacing	Coupling L_1—L_2
1.75 Mc...	L_1	60	28 d.s.c.	*	**
	L_2	60	"	*	
	L_3	90	"	close-wound	
3.5 Mc....	L_1	60	28 d.s.c.	*	⅛"
	L_2	40	"	close-wound	
	L_3	60	24 d.s.c.	"	
7 Mc....	L_1	60	28 d.s.c.	*	⅛"
	L_2	20	26 d.s.c.	close-wound	
	L_3	46	24 d.s.c.	"	
14 Mc....	L_1	18	"	"	⅛"
	L_2	10	"	"	
	L_3	20	18 enam.	length 2"	
28 Mc....	L_1	18	24 d.s.c.	close-wound	1/16"
	L_2	5	28 d.s.c.	length ½"	
	L_3	12	18 enam.	length 2"	
56 Mc....	L_1, L_2	use 28-Mc. coil			
	L_3	4	18 enam.	length 2"	

* See text.
** As much separation as possible on form.
L_4—Output link, 2 or more turns.

hold the windings tightly in place. The wire should then be brought through a hole in the isolantite mounting plate to the rotor lug of the condenser. L_1 is wound at the base of the form, and L_2 is wound in the same direction at the other end. The separation between coils determines the amount of coupling between the oscillator and doubler. To get the optimum 6L6 grid current, 4.5 milliamperes, the separation between coils must be carefully adjusted. In general, the larger the order of the harmonic in the frequency-multiplier stage the closer should be the coupling.

Because of the small space available on the FXTB forms, the 1.75-Mc. windings must be layer wound, with 40 turns on the bottom layer and the remaining 20 wound over the first 40 in the same direction. L_1 and L_2 are wound similarly.

After the windings are completed, five six-inch pieces of No. 18 tinned wire are soldered in the base pins of the form. One connects to a soldering lug which is bent over the side of the form under the screw holding the cover in place; this pin grounds the shield can. The remaining four wires are covered with spaghetti for a length of 1½ inches and are then fitted to their terminals, cut, and soldered in place. The can may then be reassembled and rubber grommets inserted in the holes in the top. The grommets are to prevent short-circuits when using a metal screwdriver.

L_3 and L_4 are relatively easy to make. The link, two or three turns in each case, is wound in the center of the coil form. L_3 is split, with the two center wires going to the plus-B prong on the 3.5- and 1.75-Mc. forms. Hammarlund APC-100 midget condensers are assembled in the forms and wired as shown in Fig. 1 (C_{14}).

TUNING

The transmitter employs only two crystals, one on the 1.75-Mc. band for output on 1.75, 3.5, and 7 Mc., and the other on 7 Mc. for output on 14, 28 and 56 Mc. With one exception the 6L6G is used as a straight amplifier on all bands, the second stage being either a doubler or quadrupler for the crystal harmonics. A coil set which octupled from 7 to 56 Mc. was tried, but even with the turns interwound, the 6L6G grid current was only 4 milliamperes—not quite enough for upward modulation. It is therefore advisable to run the 6L6G as a doubler from 28 to 56 Mc. when the latter band is to be used. The 10-meter excitation is ample for this purpose.

When everything is finished and the set is ready for tuning, the condensers in the respective coils are set between the frequencies to be used; for example, suppose two 7-Mc. crystals, one at 7118 kc. and the other at 7138 kc., are to be used. Set C_5 midway between these frequencies, or at approximately 7128 kc., so that the transmitter will operate readily at either frequency without retuning. The oscillator tuning must be adjusted so that either crystal will "start" immediately; a suitable setting for C_3 can be found experimentally. The neutralizing condenser, C_{11}, is adjusted in the normal fashion and once set properly need not be retouched for any band. C_8 should be set for optimum excitation at the highest frequency to be used. A 20-ma. meter can be connected between the lower end of R_4 and ground for checking grid current during the initial tune-up.

When everything has been wired, checked, and found working OK, assemble the unit in the cabinet and you are all set to operate efficiently and quickly on six amateur bands. With the unit described 17 watts was an average input though at times 7½ was used to work effectively over considerable distances.

Strays

The Low-Cost Single-Signal Receiver

Since publication of the description of the regenerative s.s. receiver in October *QST* (page 14) it has been found that the high-frequency oscillator may be operated at lower plate voltage without affecting the signal response, but with some reduction in plate dissipation and hence lesser warm-up drift. A 12,500-ohm 1-watt resistor in series with the plate-supply lead to the 6J5 will do.

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

J. S. Elliott, VO1J, St. John's, Newfoundland

Ross A. Hull, Editor *QST* and *The Radio Amateur's Handbook*

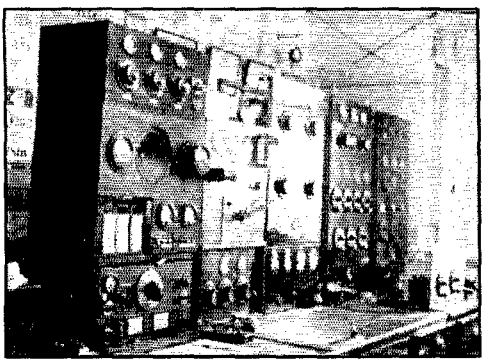
Robert W. Maloney, W2BPY, Bradley Beach, N. J.

1938 DX Competition Results

By E. L. Battey,* W1UE

HOW high is up?" . . . and "how high can a DX Contest score go?" You're wondering too? Each year we break loose with the exclamation points to give emphasis to the broken records, the new highs in results. Each year we say, "Boy, that must be the limit!" And each year we're wrong, for each A.R.R.L. DX Contest surpasses its predecessors.

The Tenth A.R.R.L. DX Competition, March



THE SHACK AT G6NF

A. D. Gay, G6NF, made a commendable score (91,696) in the c.w. period, winning the award for Great Britain for the second consecutive year. 704 contacts were made on 3.5, 7, 14 and 28 Mc. All apparatus, except receiver, is homemade. The first rack, at the top, contains two AT-cut 100 kc. bars, used for frequency measurement and cross-checking purposes. The frequency meter stands next to this rack on top of a variable-frequency exciter, consisting of an e.c.o. and buffer stages. Three separate transmitters are used for 3.5 and 7 Mc., 14 Mc. and 28 Mc., 'phone or c.w. being available on these bands with inputs up to 200 watts. In the contest P.P. RK-20's were used as final on 14 and 28 Mc., 211E single-ended on 3.5 and 7 Mc.

5th–13th (c.w.), and March 19th–27th ('phone), 1938 will long be remembered. It was an operating spree *de luxe*, crammed full of delights and disappointments alike and seething with as keen a spirit of competition as you could hope to find. And one must not overlook the fact that the contest afforded an unequalled opportunity to give the complete station *and antennas* a real break-down test. The operator who didn't discover something lacking in his equipment or operating technique is rare. Competitive operating certainly finds the weak spots in a fellow's layout. DX contests are unquestionably one of the greatest stimuli to station improvement. Bring on the next!!! . . . but wait, there are a few things to tell.

* Assistant Communications Manager.

WINNERS

Competition in the contest was confined to operators within a given League Section, or given country outside the W/VE area. That is, an operator within a given Section or country was competing only with operators within his own territory. This made for the best possible equalization of operating conditions among contestants. The official tally of scores lists 1352 c.w. operators (1013 W/VE, 339 in 66 outside localities) and 559 'phone operators (381 W/VE, 178 in 54 outside localities). Medallion awards are being made to c.w. operators in 67 A.R.R.L. Sections and 66 countries outside W/VE, and to 'phone operators in 64 Sections and 54 countries. The winners are the first-listed in each Section and country in the score list. To each victor—congratulations and well done!!

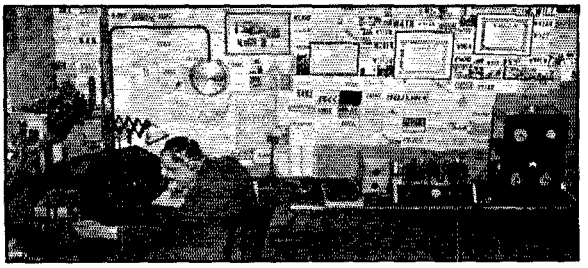
All logs submitted underwent a careful scrutiny by Tom York, W1JBJ, of the Communications Dept. In the matter of near-ties, all contacts made by stations in question have been cross-checked against the logs of stations worked. All special questions were decided by the entire contest committee.

HIGH SCORES

In any competitive activity it is natural to endeavor to roll up as big a score as possible. And how some of the lads rolled 'em up! As a matter of information and general interest we'll list the results of some of the outstandingly high scorers.

The C. W. Section

FOR the second consecutive year Ralph Thomas, W2UK, made the highest score among W's . . . 175,599! This represents 329



ALL EQUIPMENT AT PAØGN, EXCEPT RECEIVER, IS HOMEMADE

PAØGN placed second high among Netherlands c.w. participants. Type 800 tubes are used in the final stage of the transmitter; other apparatus includes a field strength meter (at left on left-hand table; and, l. to r. on right-hand table, Class B '46's modulator and 75-meter 'phone rig.

contacts. Not satisfied with breaking his previous high score record, he also broke the "countries worked" record that he established last year (71) by making contacts in *76* different countries. Nice DX, Tommy! A score like that brings its own reward. Next year? Oh, let's wait; who can prophesy?

Second highest W was W3EMM, Norfolk, Va., with 157,905 points—321 contacts with 70 countries! Among other things, EMM worked all continents nine times, twice on 28 Mc. As signal-persuaders two V-beams and a rhombic took care of the output from P.P. 250TH's which ran at 1 kw. input on 3.5, 7, 14 and 28 Mc.

The Virginia Chamber of Commerce or somebody should work on the angle that ole Virginny is the place for DX-minded hams to live. Either that or tell the world what extra training Virginia hams get to enable them to top DX contest scores. W3EVT of East Falls Church, Va., was third high W scorer, and W3CHE of Norfolk was sixth high . . . and you've heard about W3EMM!! W3EVT with 325 contacts and a multiplier of 157 came through with 150,720 points. Plenty of good antennas and judicious use of the various bands "told" in EVT's case as they do in the case of all leading DX men.

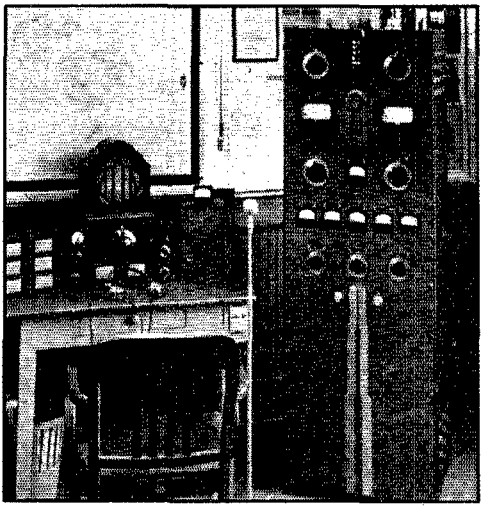
Next in line we find W1SZ 137,000; W9ARL 133,648; W3CHE 128,250; W6CXW 120,888; W3PC 120,690. Each of these topped the 1937 high—119,000, and it's interesting to note that W2UK, W3EMM, W3EVT, W1SZ, W9ARL and W6CXW are all members of the A.R.R.L. W2DC 107,520; DX Century Club!

Other outstanding scores: W2JME 111,720; W1TS 108,110; W2DC; 107,520 W2BHW 103,806; W1TW 100,110; W4AH 90,024; W8LEC 86,198; W3HIL (5 oprs.) 85,644; W8BTI 84,444; W4AJX 83,500; W9AEH 82,560; W3BES 75,864; W2CBO 75,815; W8NJP 72,540; W6CUH 71,572; W2DSB 70,725; W2CJM 67,976; W1ME 65,670; W3FQP 63,630; W6QD 62,640; W3CHH 62,604; VE4RO 61,884; W4CBY 60,216.

Leaders in multipliers (total of countries worked on each band used) are: W2UK 179; W3EMM 165; W1SZ 163; W3EVT 157; W9ARL 156; W3CHE 150; W3PC 149; W2BHW W6CXW 146; W1TS 143; W1TW 142; W2DC, W2JME 140; W4AH 132; W8LEC 131; W9AEH 128; W4AJX 125; W8BTI 124; W3HIL (5 oprs.) 122. High multipliers are mute evidence of use of several bands; these operators know how to land the DX!

FOREIGN HIGHS

The highest score among participants outside of the United States and Canada was made by XE1A, ex-XE2N, leader in the 1936 contest. XE1A's score of 236,322 represents 1419 QSO's on five bands (1.7 through 28 Mc.) in 75 hours, 40 minutes. Had he been able to put in the full 90 hours his score would have no doubt topped the '37 high. As it is, his QSO-average of 18.7 per hour is somewhat better than K5AY's average last year and he set a new record for multiplier—57! It is refreshing to note that XE1A's input was moderate—only 150 watts. This, in fact, is true of the majority of participants outside W/VE . . . they don't seem to need a "California KW" to put out decent signals. It may be due to the QRM situation on this side, or could it be that the W gang lacks confidence in low medium power? Anyhow, a row of VY FB's for XE1A!!



W8GLY, EDGEWOOD, PENNA.

The well-known station of W. S. Potter, W8GLY, led the field in Western Pennsylvania during the 'phone period. 197 contacts on 14 and 28 Mc., and a multiplier of 52 comprised the winning score of 30,524. Tube line-up: '47-807-35T-250TH; 838's in Class B modulator.

Second high non-W/VE is K6CGK, who placed third last year. His score is 145,909 . . . 931 contacts, multiplier of 53, on five bands (1.7–28). He made 5-band contacts with W6's, 4-band with W1, 5, 2, 7, 6 and 9. Input was only 85 watts, but of course that "diamond" antenna didn't have anything to do with his results (says who?)!

Other highs are K7PQ 134,872; K4KD 131,895; K4DTH 109,466; OK1BC 106,977; and GI6TK (who was not competing for award) 103,244. K7PQ made 993 contacts on five bands; K4KD 977 contacts, four bands, with all W districts worked on 3.5, 7, 14 and 28 Mc.; K4DTH 591 contacts, four bands; OK1BC 951 contacts, four bands.

Following these with scores of particular merit are LU7AZ 99,575; K5AN 94,392; G6NF 91,696; OZ2M 91,035; F8TQ 86,598; CM2AD 79,480; G6WY 78,210; OE3AH 76,239; FM8AD 73,390.

The highest scorer on each continent: Africa —ZS1AH 36,797; Asia—J3FJ 31,408; Europe—OK1BC 106,977; North America—XE1A 236,322; Oceania—K6CGK 145,909; South America—LU7AZ 99,575.

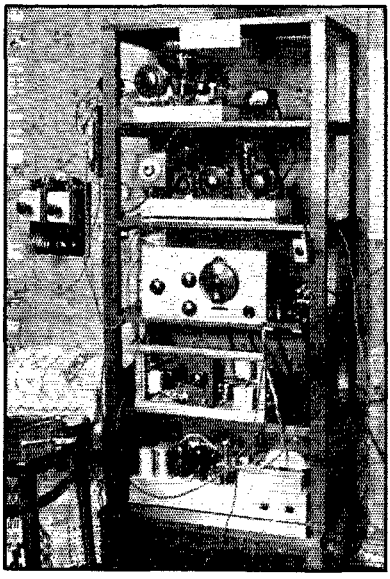
Those having the highest multipliers: XE1A 57; K6CGK 53; F8TQ 51; K4DTH 49; ON4AU 47; K7PQ 46; G6WY K4KD 45; F8ZF G6NF 44; OE3AH 43; PAØQQ 42; FM8AD 41; CM2AD G6RB PAØGN 40.

DISQUALIFICATIONS

The following are deemed ineligible for DX-score listings, or awards, in the March 1938 DX competition. Unless otherwise indicated disqualification is for off-frequency operation. For the information of those not familiar with the policy of disqualifications and the reasons for same, the subject was fully coverd on pages 22 and 23, May 1937 *QST*.

C.w.: W6GRL W6MHH W7BTH W7BVI W8LEA W8LXA W8SI W9CCI W9EZW W9FS W9VAV VE1EA VE1ET VE2EE VE3AHK.

CT2BE CX1CG D3GPF D4CJF F3LE F8MW F8NJ HB9X HR7WC LU5AN LU6DG OH5OD OK2RM ON4CD ON4HC SP1BC SP1EB SU1CH VK2ADE * VK2QL VO3X YM4AA YR5AA YR5CF YR5ML ZS1AN ZS2AL ZS5BH.



YL2CD'S TRANSMITTER

The transmitter used by YL2CD to win the Latvia award. Units sitting on the open wood rack include 2A5 c.c.o., '46 doubler and P.P. '46's amplifier. With 40 watts input on 14 and 28 Mc., 219 contacts were established with W's and VE's.

'Phone: W2JT W6LEE

In addition to the above, the following stations that did not submit contest entries were logged off frequency by observers during the period of the competition:

C.w.: W1AFR W1AJO W1DQV W2AGG W2EXM W2GDC W2GJH W2KZM W2KZQ W3ANS W3FMY W3GUB W4BUO W4CE W4CYC W4DVF W5DET W5DLZ W6AJN W6BIF W6GHU W6ITU W6LPC W6MJY W6NUD W6OTA W6WN W8ADZ W8DQV W8MEV W9CQB W9ELL W9GIL W9HER W9KGK W9KYI W9PXZ W9UYK W9VDA W9VQZ W9WQB W9WWT W9ZIS W9ZUP VE2GA VE2MU VE4AEL VE4UT VE5EO.

CM2AF CM2PW CM7AD CM8AY CM8AZ CN8AX CT1PC D3GKR EI2G F3AD F3MN F8JI FY8AA G5UG HH4AS HK4LC TI2LC U1AD U2NE U9AV U9AW U9ML XE2KG XE2Z ZL1HY.

'Phone:—W1KKJ W2ICT W9UYK YV1AQ.

The 'Phone Section

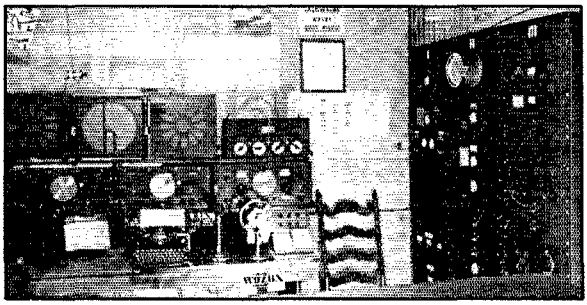
RADIOPHONE participation was 48 per cent greater than in the 1937 contest. Scores of many contestants doubled their previous efforts. Although conditions throughout the nine-day period were not the best (a magnetic storm raising havoc with 28 Mc.), the spirit of the gang was undaunted and a grand party was enjoyed by all.

Fenton J. Priest, Jr., W3EMM, second high W in the c.w. Section, made the highest 'phone score of any W or VE—97,092! And it's enlightening to note that the leading 'phone operators made more contacts than the leading c.w. operators!! W3EMM on 'phone made 374 QSO's against W2UK's 329 c.w. contacts. EMM used 3.9, 14 and 28 Mc. with Class B 805's modulating the 250TH kilowatt final. All the 'phone bands need are a few more countries to increase the multiplier and the c.w. boys will have to look to their laurels! Congratulations, W3EMM, on some snappy talking!!

W4CYU of Miami, Florida, is a good second with 94,320. He, too, kept the old tongue wagging, making 356 contacts on 14 and 28 Mc. Input was 700 and 500 watts to 100TH's.

In third position is Dave Evans, W4DHZ, operating W6GRL, Ventura, California. Dave ran up 81,780 points—318 contacts, multiplier of 87—on 3.9, 14 and 28 Mc. P.P. 250TH's at 999 watts were modulated by HD-203A's.

* Evidence submitted to us makes it necessary to disqualify this station for two-operator status reported as one—included use of two transmitters on different frequencies calling/working two stations simultaneously.

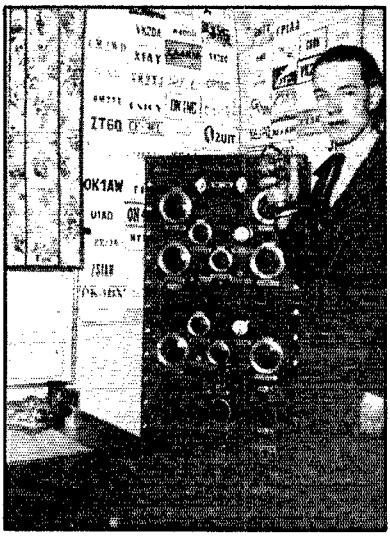


W9ZBX, CLUB STATION OF THE LAKE MICHIGAN AMATEUR RADIO RESERVE, BELMONT HARBOR, CHICAGO, ILLINOIS

Eight operators were on the job at W9ZBX in both the c.w. and 'phone contest periods. The three rigs, l. to r., were used on 7, 14 and 28 Mc. respectively, at inputs of 600, 375 and 120 watts. The first two rigs use T55's in the final. The bottom panel on the right-hand rack carries a heterodyne frequency meter-monitor. The high fidelity speech amplifier is just above the SX-17 receiver. Under this receiver and just behind the W.E. 600A mike are the red and green pilot lights for each rig; under the lights are the break-in switches; to the left of these are jacks for plugging in a key to each rig for c.w. operation.

Right up near the top also are W9ARA, 82,863; W2HNY operating W2UK, 69,264; and W9DKU, 63,525. Each of these considerably bettered his 1937 performance. Efficiently exercising their vocal chords also were W4BYY 57,174; W6CQI 57,072; W3CRG 54,599; W3PC 54,288; W6ITH 51,240; W9ARL 51,170; W4AH 50,660; W4CDG 49,511; W9YGC 48,645; W3EOZ 46,860; W4YC 44,154; W1TW 43,608; W8NJP 42,296; and dozens of others . . . see the score list!

Leaders in multipliers: W3CRG 91; W4CYU 90; W3EMM W3PC W6GRL 87: W6CQI 82; W9ARA 81; W8NJP 79; W2UK W4BYY 78; W4CDG W9DKU 77; W3EOZ 71; W6ITH 70; WITW W9YGC 69; W4AH 68; W4YC 66; W2JME 65; W4AGB 61.



W9PGS—COLORADO C.W. WINNER

Warren M. Mallory, W9PGS, is standing beside his very business-like transmitter: line-up used during the contest was 53 oscillator, 801 doubler, P.P. 801's final, running at 130 watts input on the 7, 14- and 28-Mc. bands.

FOREIGN HIGHS

A well known DX-er, R. Bartholomew, K4SA, came through with the highest score among participants outside the mainland U. S. and Canada. "Dick" rolled off 674 QSO's, and with a multiplier of 35 made a total of 70,630. His operation was on 3.9, 14 and 28 Mc. for 60 of the 90 hours. On 3.9 Mc. input was 400 watts to a pair of '52's, Class B modulated; on 14 and 28 Mc. 100 watts to RK-20's suppressor grid modulated.

Congratulations to K4SA, and to CO2WM, who is second high scorer—67,982. With 120 watts input to a T-55 on 3.9, 14 and 28 Mc., WM made 601 contacts and a multiplier of 38. If you think such a showing represents "just a lot of talk," try it sometime.

Third high for the second consecutive year is G6LK with 50,544 points . . . 468 QSO's, a multiplier of 36, in 70 hours of operating. And next comes another Cuban, CO2JJ, 48,022, followed by TI2FG 34,713; ZS6DW 30,564; KA1ME 28,308; LU9BV 28,210; HC1JW 24,264; VK2IQ 22,858; VP9R 21,620; K4EZR 21,514; PAØUN 21,033; F8ZF 19,578; ON4PA 19,446; G6BW 18,475; YR5AA 18,020; PAØFB 17,776; VK2ADE 17,388; KA1ZL 17,190; ZE1JR 17,100; F8QD 16,752; LU5AN 16,330.

The highest scorer on each continent: Africa—ZS6DW 30,564; Asia—J2MI 5745; Europe—G6LK 50,544; North America—K4SA 70,630; Oceania—KA1ME 28,308; South America—LU9BV 28,210.

Credit for the highest multipliers is due CO2WM 38; G6LK 36; K4SA 35; TI2FG 29; KA1ME 28; PAØUN ZS6DW 27; CO2JJ F8ZF LU9BV 26; G6BW PY2AC 25.

CLUB SCORES

A genuine gavel, with engraved sterling silver band, was offered to the amateur radio club whose members, operating individual stations, submitted the greatest collective score in the contest (sum of both c.w. and 'phone scores). Winner of this beautiful trophy is the South Bay Amateurs Association, Los Angeles. Seven members of this organization made a total of 244,138 points. That shows what a group of W6's can do when they set out to win! FB!! Within the S.B.A.A., W6CUH wins the club certificate for c.w., while W4DHZ operating W6GRL wins the 'phone certificate.

A very close second is the Frankford Radio Club of Philadelphia–243,366—with W3BES, c.w., and W3HFP, 'phone, winners within the club. Last year's winning group, the Tri-County Radio Assn., Inc. (Plainfield, N. J.) placed a good third with 235,391; club winners W2JME, c.w., W3CRG, 'phone.

Other clubs made good showings also and they are here listed in order of the combined score of all participating members. The calls given in parenthesis with the club names are winners of the club certificates within their respective organizations; unless otherwise stated certificate was won in the c.w. Section. . . . Schenectady Amateur Radio Association (W2DC c.w.; W2AMM 'phone) 208,001; Oakland Radio Club (W6AM c.w.; W6ITH, 'phone) 171,296; York Radio Club (Elmhurst, Ill.) (W9GY) 149,743; Trenton Radio Society (W3AIR c.w. and 'phone) 97,713; Central Illinois Radio Club (W9UQT) 70,518; Finger Lakes Transmitting Society (W8LDA) 67,296; Elmira Amateur Radio Association (W8DZC) 48,609; Birmingham Amateur Radio Club (W4ELQ c.w.; W4EHH 'phone) 48,121; Milwaukee Radio Amateurs Club (W9VDY) 46,379; Hamfesters Radio Club, Inc. (W9HFK) 34,594; Beaver Valley Radio Club (W8DWV) 33,639; Club ON4BC (ON4IF) 31,169; The Massillon Amateur Radio Club (W8KYY) 28,383; Tampa Radio Club (W4DCZ) 27,086; Winston-Salem Amateur Radio Club (W4OG) 25,656.

(Continued on page 82)

● ARMY-AMATEUR RADIO SYSTEM ACTIVITIES ●

THE Seventh Corps Area comprises eight Mid-Western States with headquarters centrally located in Omaha, Nebraska. A.A.R.S. activities began in 1927 and rocked along for three years with little military assistance. In 1931, First Lieutenant Haydn P. Roberts, Assistant Corps Area Signal Officer, reorganized the entire set-up, using active A.R.R.L. operators as net controls and other key men. Increased membership and more efficient net operation resulted. Each State operated a Local, District, State and Radiophone Net until 1936, after which time all State Army-Amateur activities, except radiophone, have been conducted on one frequency.

This arrangement is ideal in that any member may act as NCS. There are no special restrictions as to the use of these net frequencies except that the net control, when in the net, is in charge. Part of our drills are strictly business; but informal exchange of views is encouraged when time permits.

The nets, net control stations and frequencies are as follows:

Net	*Net Control*	*Freq.*
Arkansas	W5DHU	3692.5
Iowa	W9LCX	3652.5
Kansas	W9FLG	3662.5
Minnesota	W9UKB	3815.0
Missouri	W9TGN	3775.0
Nebraska	W9EDI	3745.0
North Dakota	W9YJL	3840.0
South Dakota	W9AZR	3717.5
Radiophone	W9JED	1912.5
Corps Area	W9BNT	3725.0

The record of the "Seventh" in emergency communication work is outstanding. In all such cases, the coöperation and assistance given by non-members was most important. Our danger zones for floods are the areas in east Arkansas, southeast Missouri and along the Nebraska-Kansas border. A close liaison exists between the Red Cross and the Army-Amateur Radio System. As a matter of fact, a large number of our members serve on local Red Cross Communications Committees.

Most of our drill activities are conducted on Monday nights. The State Nets operate 6:30 to 7:30 P.M. and 8:30 to 9:30 P.M., C.S.T. The Corps Area Net, which includes all State controls and the station in the office of the Corps Area Signal Officer, operates 7:30 to 8:30 and 9:30 until clear. Members should report into both of the State Net drills in order to clear "up" and "down" traffic, but are not required to keep a constant watch during these periods. On other days, excepting Saturdays and Sundays, one member of each State guards the net frequency at certain periods which are known to all other members.

All amateur radio operators are invited to copy the Code Speed Tests which are transmitted the second Monday of each month, September through May, by W9BNT on 3725 kilocycles, beginning at 9:30 P.M., C.S.T. Eight plain language tests of three minutes each at speeds of 15 w.p.m. through 50 w.p.m. at 5 w.p.m. jumps will be broadcast by automatic equipment. One complete minute anywhere in a test will qualify for that speed. Mail your copies to the Signal Officer, Headquarters Seventh Corps Area, 1013 Federal Building, Omaha, Nebraska. Notifications of results will be sent to non-members.

Most any amateur radiogram may be handled in the Army-Amateur Nets. It is the policy, however, that important messages shall be given priority on a circuit before other traffic. Messages relating to the A.A.R.S. are sent before other routine business.

The present membership of the Corps Area includes 152 c.w. and 12 radiophone members. Appointments are open to all stations equipped to communicate in the 80-meter c.w. or 160-meter radiophone bands. Membership in other organizations has no bearing in the A.A.R.S. There are no age limitations and no physical examinations are required. After six weeks of satisfactory probationary activities, a new member is issued a regular two-year appointment. Membership may be cancelled at any time by writing the Corps Area Signal Officer. The only cost, in addition to the power and general maintenance of the station, is for a net frequency crystal which may be ground locally or purchased as desired. The necessary regulations and forms are furnished by the War Department. A monthly bulletin, "Army Amateur Time," is mailed each active member of the Corps Area. For application blanks or additional information, send a card or radiogram to W9BNT.

Armistice Day Message

At 7 P.M. and 10 P.M. E.S.T. on Friday, November 11th, a message from the Chief Signal Officer to all Army Amateurs will be broadcast. As has been customary in the past, the broadcast will be made the subject of a competition among Corps Area Army Amateurs. The Corps Area having the largest number of members copying will be announced as the winner. Handicap factors based on quota membership applied.

ALL AMATEURS are invited to copy this message which will be broadcast by WLM on 3497.5 and 6990 kc.

• NAVAL COMMUNICATION RESERVE NOTES •

PLANS are being perfected for considerable activity in the U. S. Naval Communication Reserve during the coming season. The annual competition between Naval Districts was begun on September 15th when the first national drill of the year was conducted. This radio drill includes Naval Radio Washington as the senior station, together with the master and alternate control radio stations in each Naval District, of which there are at the present time thirty-two. For this drill conducted by Naval Reservists from Radio Central Navy Department, Washington, frequencies of 4045 and 8090 kcs. are used, and the drills begin at 7:45 P.M. E.S.T. for the Eastern Network and NPG Radio Central, San Francisco, Calif., at 7:45 P.S.T.

The Naval Districts are also preparing to conduct their Naval Reserve District drills which are handled by their master and alternate control stations.

There has been a great increase in the past year in the Communication Reserve personnel which is now composed of 900 officers and 5000 radiomen. Many of these officers and men were trained at sea on naval vessels during the past summer.

One great step forward in handling these drills has been the assignment of Navy-Government frequencies to the various drills of the Naval Communication Reserve. Most of these frequencies lie in the band between 2 and 3 Mcs. This has made it possible for the individual amateur, who belongs to the Naval Reserve, to operate his station when engaged in official Naval Reserve drills, on government frequencies, and use a special Naval Reserve call sign. There has been a great advantage in this arrangement to both the amateurs at large and to the Navy, because it has eliminated from the amateur 80-meter band nearly all interference occasioned by Naval Reserve circuits, and at the same time has permitted the conduct of these drill circuits on cleared channels which has greatly improved the efficiency of the drills.

During the past year considerable strides have been made in the equipment of section and unit Reserve stations, most of which are now located in Federally owned or controlled buildings. Many of the local unit stations of the Communication Reserve have been installed in new post office buildings, where the quarters are very satisfactory.

Another stride forward has been the furnishing of a Naval Reserve outfit of uniforms to Naval Reserve radiomen who can attend these drills at their unit headquarters.

Navy Day will be celebrated again this year on October 27th, and the schedules to be observed by Radio Washington (NAA) and Radio San Francisco (NPG) have already been published in *QST*. It is expected that every member of the Naval Reserve, and all other amateurs who can do so, will make a special effort to copy one or the other of these two broadcasts. As the transmitting speed this year will be raised to twenty-five words per minute, it will call for real operating ability to make a perfect copy.

For the first time, it is expected this fall to organize the U. S. Naval Reserve Aviation Bases into a point-to-point test and training circuit. There are thirteen of these Reserve Aviation Bases, of which ten are located in the Eastern Naval Districts. It is proposed to use a Navy frequency in the 6-Mc. band in the afternoons to run this test circuit between the Navy Department and the bases.

During the coming year the various Naval Districts will be afforded an opportunity to supply information for *QST* to appear under "Naval Communication Reserve Notes." Members of the Naval Communication Reserve who have any interesting news concerning general amateur activities should supply this to their section or unit commander, who can in turn transmit this information through official channel to the District Headquarters and in that way it can be included in future issues of *QST*.

The annual communication competition was won by the Twelfth Naval District for the year ending June 2, 1938. That District made a very fine record and succeeded in winning the competition by a fraction of 1 per cent, as the competition was very keen from the First and Fourth Naval Districts.

Strays

It has been suggested by W1LDC that probably the simplest way to work a station in Ireland is by calling "CQ California."

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Correction

In the circuit diagram of Fig. 1, page 36, September *QST*, C_5 and C_6 are 100-$\mu\mu$fd. midget tuning condensers.

—•••—

"Barbed wire makes a good dissuader for those kids who have destructive designs for antennas suspended between trees," suggests W9SDG. "Tack it on the limbs like a clothes-dryer, and don't forget to add a warning sign."

Hams Over Chicago!

1938 A.R.R.L. National Convention Greatest Ham Gathering of All Time

THERE were hams all over Chicago.

Most of the respectable citizens had left town, either because they had been warned of what was coming, or maybe because it was Labor Day week-end and the shores and hills were more appealing than hot city streets.

But the hams went to town! From thirty-five states, two provinces of Canada and five DX countries—from all districts and all divisions—by all modes of travel from jerking thumb to private plane—some two thousand hams made their way to the Hotel Sherman and its noisy corridors and intent meeting rooms.

Never did bedrooms see less sleep. There was a war on—a war against sleep! Even those who wanted to, couldn't. If loud voices and whistled CQ's didn't do the job of banishing mournful Morpheus, then jangling telephone bells and resounding door hammerings were resorted to. If these didn't work, then firecrackers exploding with thundering, echoing booms in the well of the inner court were certain to bring the most insensible noncombatant grabbing for his pants.

Not that it was a brawl. It was, in fact, the opposite. It was one of the cleanest, best organized, most orderly large ham conventions of recent times. There was nothing to be ashamed of. But there was such a surging of enthusiasm, such a pressure of high spirits, such a gala carnival air that normal rules and normal hours simply did not apply.

SATURDAY

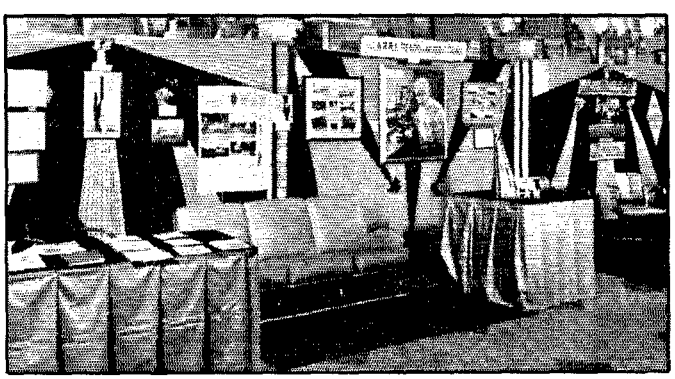
From the opening gun to the closing bell the program was timely and well-timed.

Although this reporter's personal information doesn't cover the opening sessions—the Hq. gang, held in Hartford Friday afternoon by the Maxim Memorial dedicatory exercises, pulled in early Saturday afternoon—the dope is that they went off in good style.

Shortly after the address of welcome by Convention Committee Chairman G. L. Dosland, W9TSN, proceedings were enlivened by a "man in the street" broadcast over N.B.C. from the remote pick-up car which graced the mezzanine floor—that floor being the focal point for the convention and leading to all the meeting rooms. Hearing this broadcast on his car radio while en route to the National Air Races at Cleveland, pilot W9US, in the outskirts of Cleveland, torn between two loves, turned around and drove back to Chicago and the convention!

Meanwhile Marshall Wilder, W2JKL, and author of *QST*'s initial television series, went through his television demonstration of Monotron equipment in the Grand Ball Room. This demonstration, fast becoming a classic in engineering circles, introduced many a ham to that eerie world where the ghostly shades of television dwell.

Following a recess for the viewing of manufacturer's exhibits, John Reinartz packed the ball room with eager hams for his "harmonic generator" talk. Nor were they disappointed; "Kewpie" was in rare form and didn't miss a bet. Ted McElroy turned serious and lectured the boys like a true Bostonian in connection with his high-speed code demonstration. A rare entertainer, Ted Mac's sugarcoated pills of wisdom are famous and that Saturday afternoon the old doctor was passing out liberal doses of Grade AAA tonic. Then, as a fitting climax to a big afternoon, John Kraus divulged all the latest from Ann Arbor. The great W8JK turned the problem of close-spaced directive arrays inside out and showed just what made the wheels turn and why.



A.R.R.L. LOUNGE IN THE MANUFACTURERS' EXHIBIT HALL

By that time no one was ready to dispute that dinner was in order. Empty stomachs and flagging spirits both got the proper treatment, the aisles of the manufacturer's exhibits got jammed with sight-seeing hams and stayed that way, and the elevator operators got a foretaste of what lay ahead of them that night. Despite Herculean efforts on the part of a corps of Chamber of Commerce lassies, the registration desk was a bedlam as hundreds of arriving hams collected tickets,

badges and other convention paraphernalia.

After dinner the more serious-minded of those present went to work in the Louis XVI Room to discuss the work of the A.R.R.L. Planning Committee. With Fred Schnell, W9UZ, in charge, and Communications Manager Handy a speaker, the discussion rapidly reached the "open forum" stage.

The Saturday Night Party was actually two parties; a stage show, and dancing. Featured on the show were skits including "Broadcasting from Station B-U-L-L" with W9PNV as announcer, "Major Bow Wow," an "amateur" program staged by the Hamfesters Radio Club, "Professor Quizz," a question and answer contest conducted by W9AA, and a "goof" act by W9KGK and the Chicago Suburban Radio Association. This part of the evening concluded with the "Awarding of the Chisel" to W9KEH by ex-champ W9LIP.

Following the show Cy Read, W9AA, led an orchestra recruited among C.B.S. musicians to provide music for dancing. There was either too much standing around or too little dancing—it was hard to decide which. Anyway, the music was swell . . . a grand wind-up for a big opening day.

CAST OF THE R.O.W.H. INITIATION, COLORFULLY PRESENTED BY THE GENESSEE COUNTY RADIO CLUB, FLINT, MICH.

SUNDAY

It may have been Sunday morning to some people, but to the hams it represented (a) a helluva time to get up and (b) a bleary-eyed process of trying to locate N.C.R., A.A.R.S., u.h.f., c.w., 'phone, television, DX, and traffic and emergency meetings. At that, there was an astonishing number on hand for the sessions. It's really wonderful what a couple of hours sleep will do!

In order, the chairmen and featured speakers for the various meetings were N.C.R.: Lieut. Commander Fred H. Schnell, W9UZ, Lieut. John C. McManus and Lieut. R. W. Carter. A.A.R.S.: Major A. V. Eliot, Phillip Haller, W9HPG, Radio Aide. U.h.f.: Vic Reubhausen, W9QDA, Frank Lester, W2AMJ, and E. H. Conklin, W9FM. C.w.: Eugene A. Hubbell, W9ERU, George Grammer, W1DF. Radiotelephony: F. W. McDonnell, W9YUC, Wm. Bishop, W9UI, Douglas Fortune, W9UVC. Television: Ed Gibbons, W9TAK, Ross A. Hull. DX: Roy McCarty, W9KA, Clark C. Rodimon, W1SZ. Traffic and Emergency: John Huntoon, W9KJY, F. E. Handy, W1BDI.

Having passed the good word along to the blood brethren and with circulation once more restored by the combination of lunch, the effort to think and the exercise from another promenade around the exhibit hall, at 1:30 several hundred convalescents moved collectively upon the Grand Ball Room for the A.R.R.L. meeting which featured Sunday afternoon.

Director Mathews, as chairman, led off. Recounting his acquaintanceship with Hiram Percy Maxim, he introduced President Woodruff as a fitting successor. Dr. Woodruff then expounded his philosophy of amateur radio, dwelling on the social responsibility of the individual and pointing out the benefit to youth and the institutional good of amateur radio training. Then Vice-President Bailey discussed the future of the League, in terms of what we make of it ourselves.

By the time Secretary Warner reported on "The Cairo Conference and Its Significance," the hall was a mass of attentive hams. His emphasis on the loyal support of the U. S. Delegation to the conference brought a motion from W9TSN that a suitable resolution of appreciation be prepared. A committee was appointed and instructed to bring in a draft resolution at the "open forum" session following.

Following Warner's address, Communications Manager Handy outlined the League's position on "Our Responsibility for Emergency Preparedness." The concluding talk, by *QST's* Editor Ross A. Hull, concerned "Present Problems in Amateur Radio." The meeting then adjourned upstairs to the Louis XVI room for the "open forum."

If the ghost of Louis XVI still haunts the room which Hotel Sherman saw fit to name for him, the dim mists of history must have opened to the memory of prefervid oratory echoing through the Halls of Versailles. The scene was an unforgettable, if not a memorable, one. Imagine 1500 sweating, shouting hams jammed into a room designed to seat perhaps 500. Visualize Chairman Bailey's sternly genial measures for forcing order, the clamoring competition for mike "time," the cheers and jeers, the handclapping and the booing. There was no answering of questions—no one bothered to wait for answers. It was "open forum"—the opportunity to speak was knocking—and everyone knew that opportunity knocks but once. Among the speakers were Sumner B. Young, W9HCC; Fred W. Young, W9MZN

Upper left: Doc Hard, XE1GE, shows the way it works. Upper center: Bob Henry, Fred Hager, Byron Hargrove. Upper right: Cy Reed, W9AA, blows a sweet one at the party. Left center: Fred Schnell, Ross Hull, Bob Wilson. Center: President Woodruff inspects an N.B.C. portable. Right center: Century Clubbers W8JMP, W1SZ, W8CRA. Lower left: W9EL and W1ES, hams for 27 and 35 years respectively. Lower right: W9NLP and W9ELL re-live the Ohio flood with W1EH.

Photos by Torkel Korling, courtesy *LIFE* Magazine

(Dakota Division director); R. H. G. Mathews, ex-W9ZN (Central Division director); Dr. W. S. Kelly, W9MDO; G. L. Dosland, W9TSN (Chairman, Chicago Area Radio Club Council); A. A. Emerson, W9ITQ; H. W. Hamilton, W9MRQ; Earl R. Linder, W9DZG; W. C. Heiber, Jr., W9PGB; Royal Fisler, W9NBA; Russell Bennett, W1GTN and Guy Wilson, W9EL. Despite perhaps 20,000 words of oratory let loose during the two-hour session the only tangible result was adoption of the Cairo resolution. It was ordered sent to the following: Hon. Wallace White, U. S. Senate; Rear Admiral S. C. Hooper, U. S. N.; Lieut. E. K. Jett, F.C.C.; Francis Colt deWolf Dept. of State; Gerald C. Gross, F.C.C.; Lieut. Comm. E. M. Webster, F.C.C.; and Lieut. Col. D. M. Crawford, U. S. A. It read:

WHEREAS: We, two thousand active Radio Amateurs assembled in National Convention at Chicago, being cognizant of the splendid support and recognition accorded the American Radio Amateur by the members of the United States delegation to the recent international radio conference at Cairo, Egypt, and

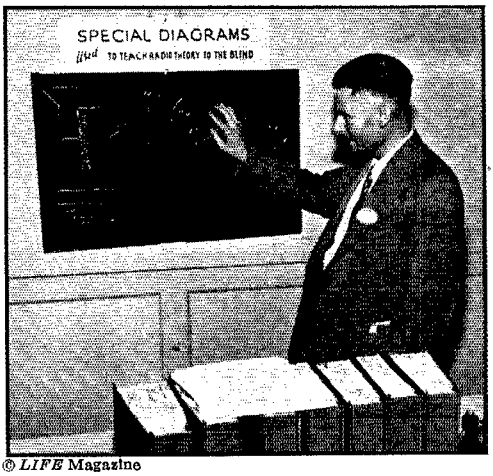
WHEREAS: We, as individual Amateurs, desire to express our individual appreciation for this support and encouragement, in addition to that expressed by our national organization, the American Radio Relay League,

NOW, THEREFORE, BE AND IT IS HEREBY RESOLVED: That we, as individual licensed Radio Amateurs, do hereby convey to each of the members of the United States delegation our sincere appreciation and gratitude for the effective support and protection given the institution of American Amateur Radio; and we pledge ourselves to so conduct our activities as individual Amateurs that we shall always merit the support and confidence of our Government.

THE BANQUET

At banquet time hams bulged the walls of the Sherman. The overflow occupied two large dining rooms in addition to the Grand Ball Room. It was the largest dinner the Hotel Sherman had ever served. With all appetites finally royally satisfied, ball room tables were removed, seats substituted, and the proceedings began.

These included a variety of events and speakers, now recalled only in kaleidoscopic fashion: Presentation of the C.A.R.C.C. Field Day cup to the York Radio Club by Chairman Dosland .. .. .. the dry style of SM-I-TH .. .. .. the bows taken by Woodruff, Bailey, Warner, Hebert, Handy, Hull, Dosland (and XYL), Eldred, Huntoon, Ashton (and XYL), Haller, Wiechmann, Kreis (and XYL), Cox, Horton, Mrs. Roberts, Schnell, Reinartz, Ransome Sherman, Directors Norwine and Young, and Paley Awardee W9MWC .. .. .. Feature event was, of course, the talk by Dick Stoddart, radio engineer on the Hughes 'round-the-world flight. Corollaries to this were the presentation of a recording of flight broadcasts made by W9JUG as a memento to Stoddart, and a brief word from his charming wife, who captivated the audience. Stoddart's talk, which followed a rising ovation from the crowd, summarized the trip and included anecdotes of radio details on flight and at the stops en route. In closing he expressed appreciation for amateur coöperation, and brought 73 and a word of tribute from Howard Hughes, himself once a ham—ex-5CY at Houston—and still a member of A.R.R.L. .. .. .. The Wouff Hong center pieces on the tables—a clever touch .. .. .. The fastest QSL on record: A W9 worked ZL2JQ via "2-lung-power" whistle, discovered to his amazement that the Zedder was sitting by his elbow at the next table, traded QSL cards. Total elapsed time for call, QSO and QSL:



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W8FIP EXPLAINS THE RAISED CIRCUIT DIAGRAMS DISPLAYED IN HIS BOOTH FOR "AMATEUR RADIO FOR THE BLIND"

The A.R.R.L. Handbook in Braille occupies the seven volumes shown in the foreground.

1½ minutes .. .. .. The heaviest ham at the convention was W9TLQ, at 322; the lightest Mrs. DeWageneire, W9ZTY, 111 .. .. .. W9NNE received the award for tallest at 6′ 5″, although W9WPF showed up later at 6′ 7″ .. .. .. ZL2JQ won the "ham who came from the longest distance" award, although had PK3AT arrived earlier there would have been some competition .. .. .. Shouted to the SWL who won the 250TH: "Tell him what it's for!" .. .. .. And was there a roar when Mrs. Eitel (Eimac) won the Taylor T-200! .. .. .. To top it off, the big transmitter—the grand prize—was won by an XYL— W9TLJ .. .. ..

The code speed championship award, a gold-plated key on a walnut pedestal, was also presented at the banquet. Again it went to John Huntoon, W9KJY. Of 33 entries, 10 qualified at 34 w.p.m. for the finals. The run-off went to 48.4 w.p.m., with W8LCW reaching 39.7 for second and W9YPO third at 37.1.

Climaxing one of the most hectic ham convention days in history, the midnight initiation into the Royal Order of the Wouff Hong, staged by

(Continued on page 116)

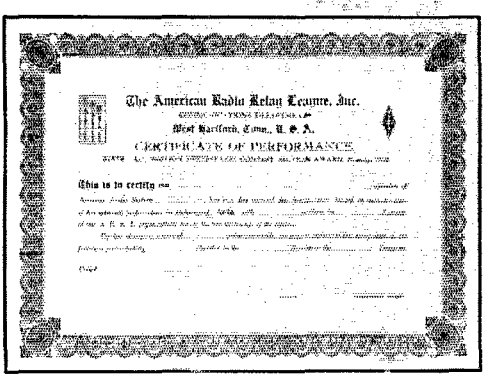
Announcing—Ninth A.R.R.L. Sweepstakes

Nov. 12th-13th-19th-20th—Contest is for W, VE, K, KA, CM and VO Hams—'Phone or C.W. Any Ham Band(s)—Test Stations—Proves Operating Supremacy—Awards to the C.W. and 'Phone Leaders in Each Section[1] and Certificate in Each Club—Gavel Trophy to Winning Club

F. E. Handy* W1BDI

DON'T miss the annual "SS." Telegraphing operators will contact and compete with other telegraphing operators. 'Phone hams will compete with other 'phone hams.

New certificate awards will be made by the League to the winners in each



A.R.R.L. Section. The illustration will give you some idea of the certificate awards. They're beauties.

Many complete their QSL-card records and achieve "WAS" through each year's "SS." This is the best chance of the year to progress toward that objective.

The idea of the contest is to see how many stations *can* be worked in the given contest time. The points derived from this will be multiplied by the number of *different* A.R.R.L. Sections [2] worked with at least a complete one-way exchange in the contest. Message swaps are *not* required in proof of QSO this year. All essential contest information is sent in the form of a standard preamble. Exchanges are for the record sent to Hq. New hams may also add to their knowledge of the way preambles to A.R.R.L. messages are sent and acknowledged, and fills requested, accuracy of 'phone communication assured, etc., if they take part and follow the standard practices set forth for these things in the new edition of *The Radio Amateur's Handbook*. Some emergencies of late years have found amateurs unfamiliar with good operating practices, resulting in delays, garbles, and inability to write or take a message in standard form. We hope that the "SS" will help both new and old timers to improve and perfect operating technique at the same time all make new station records.

Contest exchanges can be logged directly on the sheet that you send Hq. for a report. Paper work will be completed as you go along with nothing to do but total and summarize points and send it in. *Mimeographed contest forms will be sent gratis to anyone who sends a radiogram or drops a card for the same.* Use of our sheets is not required nor is advance entry necessary. The purpose is to help participants keep a uniform log. It is necessary that the arrangement or form shown with this announcement be followed. Draw your own columns on your own paper if you like . . . or ask us for the prepared sheet.

Thirty-three hours of "SS" operating in two week ends have been specified. You can work more than 20 hours on *one* of the two week ends, but in no case will any entry of more than *40 hours' total operating* in the two contest periods be accepted. Use any amateur frequency bands you choose. This timing plan permits the average ham to plan for his time for meals, for 8 hours' daily sleep, etc. Cross examination of logs makes it possible to check operating time.

Effective choice of the different amateur bands, best use of available operating hours, and operating proficiency will take one a long way toward success. Single-signal selectivity and high sensitivity will win and bring in the stations at distant points calling you. However, results mainly depend on the man behind the station!

THE GENERAL CALL

"CQ SS CQ SS CQ SS de W . . . W . . . W . . . " is used by stations looking for contacts

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*Communications Manager, A.R.R.L.

[1] Including Cuba, Porto Rico, Hawaii, Alaska, P. I., etc. Amateurs in Newfoundland are included in the Maritime Section of the A.R.R.L. field organization.

[2] See the complete list of the 71 Sections in the A.R.R.L. organization, page 4 of this issue of *QST*.

THE CONTEST PERIOD		
Time	*Starts*	*Ends*
A.S.T.	Nov. 12 & 19, 7:00 P.M.	Nov. 14 & 21, 4:01 A.M.
E.S.T.	Nov. 12 & 19, 6:00 P.M.	Nov. 14 & 21, 3:01 A.M.
C.S.T.	Nov. 12 & 19, 5:00 P.M.	Nov. 14 & 21, 2:01 A.M.
M.S.T.	Nov. 12 & 19, 4:00 P.M.	Nov. 14 & 21, 1:01 A.M.
P.S.T.	Nov. 12 & 19, 3:00 P.M.	Nov. 14 & 21, 12:01 A.M

in the Sweepstakes. A single, snappy CQ SS will bring good results! You will test station performance, work new states and Sections, improve operating efficiency and ability, and meet old and new friends.

PROOF OF QSO

At least *one* way complete six part exchange must be completed and acknowledged between two stations as "proof of QSO" [4] before points or Sections can be claimed.

It is not essential that each station worked be taking part in the contest to make your points count. Any operator who needs information can be referred to this announcement. First, ask the operator to take your preamble and come through with like information in preamble form.

POWER FACTOR AND SCORES

If the power input to the final stage (plate current times plate voltage—$E \times I$) is:

(a) Up to and including 100 watts—multiply score by 1.25.

(b) *Over* 100 watts—multiply score by 1.

Operating in both low- and high-power classes at different times is still permitted, but scoring rules do not permit Sections worked on high power to be used in the low-power classification. Points of some kind are credited for every QSO with a *bona fide* exchange, whether the station worked is a leading "SS" man or a ham outside the contest. If one breaks his power class, however, the Total Score is the *sum of scores separately computed* for each power class and added.

Scoring system in brief:

All contacts:

One point for each QSO when "receipt" is completed for an exchange one way.

Two points for each QSO when the required information is exchanged both ways.

For final score:

Multiply totaled points by the number of different A.R.R.L. Sections [2] worked, that is, the number in which at least one *bona fide* S.S. point or exchange has been made.

Multiply this [6] by 1.25 if you used 100 watts or less for transmitter input.

ADDITIONAL RULES

1. Information in contest exchanges (six parts) must be sent in the order indicated, that of the A.R.R.L. message pre-

[4] There is no point in working the same station more than once in the contest period if two points have been earned by an exchange. If but one point is made the first time, you can add a point by working this station again for exchange in the opposite direction. Underline all such exchange entries in your "list," identify them by showing parenthetically the call of the correspondent station. Leave right or left report columns blank so that other pairs of exchanges completed in *one* contact are side by side.

[6] If the power was changed between (a) or (b) during the contest, separate scores must be kept for each power class, and the two added together for the total.

EXPLAINING CONTEST EXCHANGES

Send Like Std. Msg. Preamble	*NR*	*Call*	*CK*	*Place*	*Time*	*Date*
In the "SS" Exchanges	Number contest info. sent consecutively, 1, 2, 3, etc., a new nr. for each station worked	Send your own call	CK is RST report [3] of station worked	Your city and *section* [3, 2]	Send time of transmitting this "NR"	Send date of QSO
Purpose.....	The QSO-nr tells how you are doing; aids Hq. checking	Identification	All stations exchange complete reports	The A.R.R.L. Section is vital contest data	Time and Date must check in both logs and fall within the contest period to prove each point claimed	

[3] Send the letters CK and just the three number RST report. In 'phone exchanges only two numerals need be used in the report, the first always "readability," the second "strength." Instead of just the state (which is the same as the Section in many cases), identify your A.R.R.L. Section as, for example, Salem, Eastern Mass.; Providence, R. I.; Buffalo, W. N. Y.; Omaha, Neb.; Oakland, E. Bay, etc.

amble. Incomplete exchanges or wrong order of sending justifies disqualification.

2. Entries should be (a) in the low-power class, or (b) high-power class, or submitted as the sum of separately computed work at one station falling in each class. Sections worked on high power do not count in the multiplier for low-power-score and vice versa. Logs must show the power used for each QSO or for groups of QSOs.

3. Reports must show operating time for each period spent on the air in the "SS," and the total of such operating time.

4. Logs must be marked for "Phone" or "C.W." entry grouping all work by either method together as one score.

5. All work must fall in the contest period.

6. Decisions of the award committee of C.D. staff members shall be accepted as final.

7. Reports must be received at A.R.R.L. Hdq. from all stations except those in Alaska, Hawaii, and P. I. on or before noon, Dec. 23, 1938, to be considered for certificate awards. From outlying points, reports must similarly be received on or before Jan. 20, 1939.

CLUB PARTICIPATION

Certificate awards (besides the 'phone and telegraph Section awards) will be made through each club where *three or more* individual club members, or new hams invited and reported by such a club, in addition to sending a contest report *have their club secretary* write Hq. listing their individual calls and scores, and the total of such scores. Only the aggregate of scores confirmed by receipt here of Contest Logs shall count for the club. If there are both club 'phone and c.w. entries, A.R.R.L. will provide two certificate awards for the club to give its leading members. The sum of the scores of all club participants ('phone and c.w.) confirmed by logs will be added by the secretary, *to count for the club!*

A genuine gavel, with engraved sterling silver band, is offered as an award to that club whose officers or activities' manager submits the greatest collective score from "SS" logs. Club members must send in full reports either direct or through the secretary to substantiate the club's claim on the gavel award! A chance to win honors for your club and a valuable trophy for the club's presiding officer to use at meetings!

Competition comes only from operators in one's immediate Section. Awards are for the operator running up the best communication record *for each Section* (as indicated by the score). Operators thus have equal DX conditions and operating opportunity. Fullest operating enjoyment is assured. See May *QST* for full details on the last SS or ask *any* amateur who took part last year!

(*Continued on page 116*)

STATION W/VE[1] . . . SUMMARY OF EXCHANGES 9TH A.R.R.L. ALL-SECTION SWEEPSTAKES

Freq. Band (mc.)	Time On or Off Air	NR	SENT (1 point) Stn.	CK-RST	Place	Time	Date (Nov.)	NR	RECEIVED (1 point) Stn.	CK-RST	Place	Time	Date (Nov.)	Number of each Different New Section as Wk'd	Points
3.5	On 6:10 P.M.	1	W1AW	579	W. Hartford, Conn.	6:15 P.M.	12	3	W1GME	589	Middlebury, Conn.	6:18 P.M.	12	1	2
"	"	2	"	439	W. Hartford, Conn.	6:25 P.M.	12	7	W1BHM	479	New Haven, Conn.	6:30 P.M.	12	..	2
"	"	3	"	587	W. Hartford, Conn.	6:40 P.M.	12	2	W3BKZ	389	Chevy Chase, M.D., D.C.	6:45 P.M.	12	2	2
7	"	4	"	498	W. Hartford, Conn.	10:18 P.M.	12	3	W8BEN	569	Rochester, N. Y.	10:24 P.M.	12	3	2
"	"	5	"	578	W. Hartford, Conn.	1:25 A.M.	12	7	W9TSV	589	Chicago, Ill.	1:15 A.M.	12	4	2
"	Off 3:00 A.M. 8 hours 50 min.	6	"	549	W. Hartford, Conn.	2:50 A.M.	12	15	W9VKF	479	Minneapolis, So. Minn.	2:55 A.M.	13		2
14	On 1:00 P.M.							14	W5WG	339	Ruston, La.	1:05 P.M.	20	6	1
"	"	7	W1AW	479	W. Hartford, Conn.	2:15 P.M.	20	17	W5BDI	459	Houston, So. Tex.	2:20 P.M.	20	7	2
7	"	8	"	588	W. Hartford, Conn.	3:00 P.M.	20	11	W1EWD	589	New Britain, Conn.	2:55 P.M.	20	..	2
"	"	9		578	W. Hartford, Conn.	4:06 P.M.	20								1
"	"	10	(W5WG)[4] W1AW	347		4:30 P.M.	20	16	W6MVK	439	Modesto, S. J. V.	4:31 P.M.	20	8	2
"	Off 5:20 P.M.	11	"	479	W. Hartford, Conn.	5:10 P.M.	20	9	W9IPT	579	Wheaton, Ill.	5:15 P.M.	20	..	2

4 h. 20 m.
13 h. 10 m.
3.5, 7 and 14 mc. used.
85 watts Input Power

8 Sec. 22 pts.

Number and name of operators having a share in above work.....

Claimed score: 22 points × 8 Sections = 176 × 1.25 (85 watts input) = 220.

I hereby state that in this contest I have not operated my transmitter outside any of the frequency bands specified on my station license, and also that the score and points set forth in the above summary are correct and true.

.....
Signature

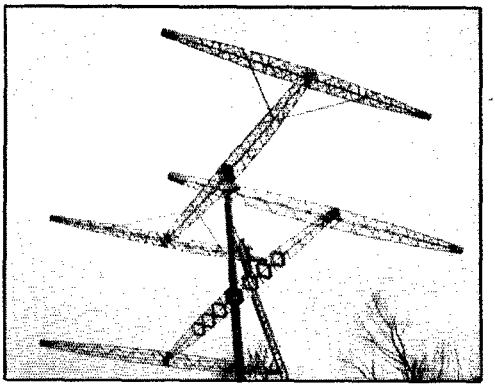
My Tube Line up.....
.....
Address

Number Different Stations Worked.....

Speaking of Rotary Beams—

WE'VE seen—both "in the flesh" and in pictures—some pretty pretentious rotary antenna structures, but there's one that strikes us as being just about the final word in he-man mechanical construction. No doubt you'll be inclined to agree, after glancing at the accompanying photograph. And it has been instrumental in producing just about *the* outstanding 10-meter 'phone signal from Europe. Yes, we're talking about GM6RG.

GM6RG, known in non-ham circles as Bryan Groom of Galashiels, Scotland, had an idea that he wanted a rotary beam with some real gain and proceeded to carry it out. Aiming for a power increase of about 12 db with low-angle radiation, pencil and paper work produced a suitable antenna design (incidentally involving the use of 20 half-wave elements) and set the dimensions of the structure. Contractors and engineers were then called in and built up the rotating outfit shown. A 50-foot telephone pole, 16 inches in diameter, set 8 feet in the ground and firmly guyed at a height of 20 feet, supports the rotating part.



THE ROTATABLE ARRAY AT GM6RG

The antenna supports are two "H"-shaped structures with lattice-work tapered members; the central beams of the "H" 's are capable of standing a steady weight of one ton when supported at the middle! At the top of the pole is the rotating mechanism, consisting of a worm gear giving a 1400:1 reduction and driven by a built-in ¼-hp. reversible motor. The antenna drive-shaft, to which the upper central beam is keyed, is a 3-foot length of 2-inch diameter steel, supported by ball bearings at the top and bottom of the gear box. The drive mechanism alone weighs 360 pounds. As a direction indicator, a 16-contact commutator is mounted on the drive-shaft, with a 16-conductor lead-covered cable running from it to the operating room. A wiping contact on the commutator controls lamps mounted on a great-circle map in the operating room, so that the part of the world at which the antenna is aimed is automatically illuminated.

The upper antenna section, on the top "H," consists of two half-waves in phase, driven, and four sets of parasitic elements. Behind each driven element is a reflector and in front, three directors, making five elements on each side or ten for the whole upper antenna section. An exactly similar arrangement is strung on the lower "H," which is suspended from the upper structure by guy wires, broken up so that they are non-resonant. The pole passes through the central beam of the lower "H" with about 1-inch clearance.

The antenna was aligned by the aid of field strength measurements at a remote point. First the two driven elements were adjusted to the right length, then the reflectors were added and adjusted to give maximum gain, then the directors similarly pruned, one set at a time. When the top section was finished the bottom section was independently adjusted by the same method. Finally, the two pairs of driven elements were connected by a two-wire line, with a coaxial cable having an impedance of about 100 ohms tapped on at its center. The line spacing was then adjusted to obtain maximum antenna current, the line sections acting as "Q" bars for impedance matching. A spacing of two inches was found optimum.

The upper and lower sections of the antenna are a half-wave apart, and the reflector-director spacing is a quarter-wave. Measurement shows that the gain over a half-wave antenna is in the neighborhood of 13 db. The rotary beam gives the same signal strength as a 28-Mc. rhombic with 4½-wave legs, an antenna which previously had given a good account of itself. Measurements of course were made on the line along which the rhombic is pointed, alternate readings being taken over short periods with first one antenna and then the other.

All in all, an ambitious undertaking, but one which has proved its worth.

—*G. G.*

"Single-Ended" R.F. Receiving Tubes

THE term "single-ended" as introduced in connection with tube construction hasn't anything to do with the circuits in which the tubes are used, but refers instead to the method of bringing out element terminals. A single-ended

(*Continued on page 57*)

BOOK REVIEW

Radio Frequency Electrical Measurements, by Hugh A. Brown, M.S., E.E. 384 pages, including index and bibliography. 177 illustrations. Published by McGraw-Hill Book Company, New York City. Price, $4.00.

The average amateur, upon first glancing through this book, might think it much too technical and containing nothing of interest to him. If he had no curiosity about measuring methods he would be correct, but the more serious type of amateur will find much to interest him. Although primarily intended for use in a university radio engineering laboratory course, the book should prove to be a useful manual for the practicing engineer and advanced amateur. The amateur need not fear the mathematics; the book is so written that anyone should find no difficulty in following instructions and methods, even though he wishes to omit analyses and discussions of theory. Many nonmathematical explanations are given for those who wish to know why certain fundamentals are true, but the mathematical development is also given in practically every case.

As would be expected, the largest chapter is the one devoted to measurement of circuit constants, and it is quite complete. The chapter given to the measurement of frequency should prove quite interesting to many amateurs, since it contains excellent descriptions of all of the various frequency-measuring methods, including Lecher wires. A chapter on antenna measurements is of interest, especially the portion devoted to the determination of the characteristic impedance of a line. Other chapters include measurement of tube characteristics: voltage, current, and power: wave form, and receiver measurements.

The book is dedicated to "my fellow amateurs at W9YH."

—*BG*

Strays

"A tip to the hams who might influence the purchaser of an electric shaver, or who contemplate one of their own: The best of the vibrator-type shavers cause excessive interference to radio reception. Electric shavers of a new type, making use of universal motors, do not cause any radio interference. With this latter type, you may shave while listening to the VK come back at you."

—*W9GDB*

—•••—

W5EOO sent this explanation of the operation of a cathode ray oscillograph taken from the front page of a large college paper:

"Other features from the Department of Physics will consist of a demonstration of the registration of sound waves on a cathode ray oscillograph. According to the loudness or softness of sound, the line of the oscillography varies from regular to irregular, the louder the sound the more irregular the line."

No wonder that modulation seemed distorted!

—•••—

"For the past three years I had been troubled at intervals with a terrific 'power line' noise. It was so loud that it blanketed a local b.c. station in our b.c.l. receiver. I could hear absolutely nothing on the ham bands during periods when the noise was on. Usually the noise stayed on about half an hour at a time. There were some periods of several weeks during which it would not be heard, but at other times it was a source of annoyance every night. One night recently when this noise came on I turned off the switches and paid a visit to a friend who possessed a galena crystal receiver. The friend and I carried the crystal set and a small antenna out in search of the interference source. After carrying the set around the neighborhood for some time, we traced the interference to a spot about 150 feet down an alley from my location. We found an antenna with sparks jumping across the insulator. Further investigation revealed that the antenna had an old-time spark transmitter connected to it, and that the owner was operating it in an effort to make the neighbors turn off their b.c.l. sets so 'his baby could go to sleep!' In the conversation that followed this startling revelation, we learned that he was an old-time ham and used to be on the air before the government ban of the war. He had some old radio magazines, and among others, a copy of *QST* published when it was only a pamphlet. During the evening he told us his whole life-story. Although I missed three skeds while talking to him, the time was well spent, for there is no longer any spark-transmitter noise to interfere with operation!"

—*W6KFC*

—•••—

New Amplifier Tubes for Television Receiving

Two new television amplifier pentodes, the 1852 and the 1853, have just been announced by RCA. These tubes, intended primarily for use in experimental television receivers, both feature a special shielded-lead construction to permit bringing out the control-grid lead to a base pin rather than to a cap. With this construction, it has been possible to keep the grid-plate capacitance as low as that of this tube if it were constructed with a grid cap. From a circuit standpoint, the proximity of grid pin to cathode pin simplifies wiring and decreases the size of the inductance loop connecting the input circuit to the tube. These are features important at high frequencies because they provide decreased feedback and improved circuit stability.

The 1852 has extremely high grid-plate transconductance (9000 micromhos). It is recommended for use in the r.f. and i.f. stages of the picture amplifier, as well as in the first stages of the video amplifier when several video stages are used.

The 1853 is another high transconductance tube (5000 micromhos). The transconductance of the 1853 is not as high as that of the 1852, because the 1853 is designed with an extended cut-off characteristic so as to make it especially suitable for use in the r.f. and i.f. stages of the picture amplifier of television receivers employing automatic gain control.

(Continued from page 55)

tube is one in which all leads are brought out through a common base.

We've been so used to working with screen-grid receiving tubes having grids out the top that the thought of bringing both grid and plate through the base is utterly untenable. Of course it would be impossible to prevent self-oscillation with such tubes in tuned r.f. circuits—but it isn't! In fact, it is claimed that greater stability can be obtained with single-ended tubes, along with greater uniformity in performance, because open-air grid leads are not used. In other words, the effective

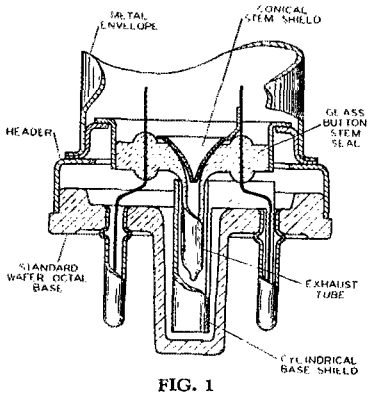


FIG. 1

grid-plate capacity is as low as with the conventional type of construction. At the same time, improved design has made possible reductions in input and output capacities, an obviously desirable feature.

Fig. 1 shows a cross-section of the base construction in the new-type single-ended tubes. The grid and plate leads are brought out to pins on opposite sides of the octal base to give them as much physical separation as possible, and shielding is inserted in the seal and in the locating pin further to reduce the capacity. A conical metal piece extends into the exhaust stem as shown, and a cylindrical shield is placed around the stem extending to the apex of the cone so that a substantially continuous shield is placed between the two leads. Both shields are connected to the metal shell of the tube. The shield in the locating pin also serves to reduce the capacity between the socket prongs as well as between the base pins. With the ordinary wafer socket the net grid-plate capacity, with the tube inserted, is practically the same as with the double-ended construction.

In using single-ended tubes in r.f. stages, arrangement of wiring can do much to prevent capacitive coupling between grid and plate circuits. Hot r.f. leads should be kept separated and should be close to the chassis; the basing arrangement helps on this. Further reduction in feed-back can be obtained by mounting the screen by-pass condenser so that it lies across the socket between the grid and plate terminals, thus using the outside foil of the condenser as additional metallic shielding.

Besides the 1852 and 1853, tubes designed primarily for television receivers, four new types of single-ended tubes are to be made available in the near future. These are the 6SJ7, 6SK7, 6SF5 and 6SQ7. Complete characteristics are not available at this writing, but the types correspond approximately to the same metal tube numbers without the "S." The 6SJ7 and 6SK7 have higher transconductance, however, than the 6J7 and 6K7, and input and output capacities are 6 and 7 $\mu\mu$fd., respectively, against 7 and 12 $\mu\mu$fd. for the older types. Pin connections on these types are as follows: 1, shield; 2, heater; 3, No. 3 grid; 4, No. 1 grid; 5, cathode; 6, No. 2 grid; 7, heater; 8, plate. The plate is pretty well surrounded by pins normally maintained at ground potential.

Receiver-manufacturing convenience and improved set-design possibilities primarily are responsible for development of single-ended construction. The nuisance of the flexible grid lead is eliminated. Possibly we can get better performance in our ham receivers by having all the r.f. circuits securely anchored.

—*G. G.*

SPACE limitations make it necessary to hold the results of Problem 21 until December *QST*.

New Transmitting Tubes

RCA 813

A NEW 260-watt output beam power transmitting tube is now available from RCA. This tube, with a new flared construction which makes possible reduced overall length, is a "big brother" to the 814 beam tube, and may be used in some applications where insufficient space in the vertical direction is available for the 814.

Typical operating conditions and ratings:

Filament voltage		10 volts
Filament current		5 amperes
Grid-plate capacity (with ext. shield)		0.2 $\mu\mu$fd.
Input capacity		16.3 $\mu\mu$fd.
Output capacity		14 $\mu\mu$fd.
Plate dissipation		100 watts
Screen dissipation		22 watts
In Class-C telegraphy operation:		
D.c. plate voltage	1500	2000 volts
D.c. screen voltage	300	400 volts
D.c. grid voltage	−70	−90 volts
Peak r.f. grid voltage	150	160 volts
Beam-forming plate voltage	0	0 volts
D.c. plate current	180	180 ma.
D.c. grid current (approximate)	6	3 ma.
Screen resistor	60,000	107,000 ohms
Grid resistor	11,700	30,000 ohms
Driving power	0.8	0.5 watt
Power output (approximate)	190	260 watts

The base of the 813 fits a special 7-contact transmitting socket. The overall dimensions are $2\frac{29}{32}$ inches by $7\frac{1}{2}$ inches, diameter and height.

RK 63

A new high-mu tube in the high-power triode group is the Raytheon RK-63. This tube, with tantalum plate and grid, thoriated tungsten filament, and hard glass bulb, is designed for use as a power amplifier, oscillator, or frequency multiplier.

The following is manufacturer's data on the RK-63:

Amplification factor	37
Filament voltage	5 volts
Filament current	10 amperes
Grid-plate capacity	3.3 $\mu\mu$fd.
Input capacity	2.7 $\mu\mu$fd.
Output capacity	1.1 $\mu\mu$fd.

Data on operation as Class-C r.f. power amplifier.

Maximum ratings:

D.c. plate voltage	3000 volts
D.c. plate current	250 ma.
D.c. grid current	60 ma.
Plate dissipation	200 watts

Typical operation:

D.c. plate voltage	3000 volts
D.c. plate current	233 ma.
D.c. grid voltage	-200 volts
D.c. grid current	45 ma.
Peak r.f. input voltage	415 volts
R.f. driving power	17 watts
Power output	525 watts

Plate temperature: The plate of the RK-63 will show a yellowish red color (see temperature color chart in Raytheon Handbook of Amateur Tube Uses) when operated at the maximum rated plate dissipation. Dissipations above the rated value should be avoided.

Ratings on RK-62

The gas-triode detector-thyratron tube mentioned earlier in *QST* as the Raytheon QY-4 experimental tube now has the published characteristics and ratings for this service given below. The tube is a combination high-sensitivity detector and relay tube for radio remote control purposes where low battery voltages are desirable. It is designed for use as a self-quenching super-regenerative detector with a high resistance relay in the anode circuit which is operated upon reception of a radio-frequency signal.

Direct interelectrode capacitances:

Grid to anode	2.5$\mu\mu$fd.
Grid to filament	2.7$\mu\mu$fd.
Anode to filament	2.8$\mu\mu$fd.

Readings and nominal characteristics:

Filament voltage	1.4 volts
Filament current	0.05 ampere
Maximum d.c. anode voltage	45 volts
Maximum d.c. anode current	1.5 ma.
Anode voltage drop (approximately)	15 volts

(at 0 d.c. grid voltage and 1.5 ma. d.c. plate current)

Typical operation:

D.c. anode voltage	30 to 45 volts
No-signal anode current	1 to 1.5 ma.
With-signal anode current	0.1 to 0.5 ma.
Relay resistance	5000 to 10,000 ohms

OPERATING NOTES

The tubes must always be operated with sufficient series resistance in the anode circuit to limit the anode current to the maximum rated value.

When operating properly the tube should be oscillating at audio-frequency except during reception of a radio-frequency signal whereupon the audio-frequency oscillation should disappear.

The useful life of the tube depends upon the anode current and is shorter than that of other Raytheon amateur types. The life may be prolonged by operating the tube with as low an anode current as possible.

RK-56, 57, 58, 59, 60

THE following four new tube types have just been added to the Raytheon tube line:

The Type RK56 is a new beam type which is similar to the RK39 but has lower ratings. It is designed for use in portable equipment or in other applications where higher output is not required.

Types RK57 and RK58 are triodes which may both be used in zero bias Class B audio circuits as well as in general purpose applications. However, if used with a low negative bias two RK57 tubes in Class-B will supply 370 watts of audio power at 1500 volts on the plate. These two types are quite similar in construction, but the top cap plate connection of the RK57 permits higher ratings than those of the RK58.

The RK59 is another type suitable for use in portable high-frequency equipment, having been originally designed for police work. It is a double triode with a filamentary cathode which heats quickly enough to allow it to be turned off during standby periods. The two sections when operated in Class-C push-pull are rated at 32 watts r.f. output.

Type RK60 is a new rectifier capable of supplying 600 volts d.c. at 200 ma. This is a full-wave rectifier with ratings between those of receiving types and those of previous amateur types such as the 866.

Joint Pacific and Southwestern Division Convention

Los Angeles, Calif., Nov. 11th, 12th, 13th

THE plans for the joint Pacific and Southwestern Divisions Convention to be held at the beautiful Elk's Temple, Los Angeles, Calif., November 11, 12, 13, 1938, under the auspices of the Federation of Radio Clubs of the Southwest,

are nearing completion, and the committee in charge has made up its mind that this convention will be something to remember. All amateurs and members of the A.R.R.L. are cordially invited to be present for three whole days of interesting events. Tell Your Friends Also. Write your director for information.

Modern Radio Course Resumes Over W1XAL

QST has in the past plugged Dr. C. Davis Belcher's "Modern Radio Course" as presented over W1XAL. In consequence, many amateurs have been instructed and entertained by listening to the lectures and many more would-be amateurs have received a lucid, coherent background of technical radio education.

With four years of experience behind the present series, the course should supersede even its past successes. The broadcasts are on Mondays at 8:00 P.M. E.S.T. on 6.04 Mc. and on Fridays at 5:00 P.M. E.S.T. on 11.79 Mc. For detailed schedules write the station, W1XAL, World Wide Broadcasting Foundation, University Club, Boston, Mass.

The story behind the course is as unusual as it is interesting.

In the fall of 1934, Dr. Belcher lectured for the Division of University Extension of the Massachusetts Department of Education. In the course of his lectures, Dr. Belcher often conducted his classes at W1XAL's transmitting laboratories. Several times during his lectures, Dr. Belcher experimented with broadcasting the actual technical information which he was giving in his lectures. Thus, by pure chance, parts of Dr. Belcher's lectures seeped out over the short waves. To his surprise, he soon began to receive dozens of letters from short-wave listeners throughout the country, asking him more about his course and how they might enroll. From this unusual incident, the Radio Course took root and grew to its present proportions — with students enrolled in nearly the forty-eight states of the Union, the provinces of Canada, and in many foreign countries.

Dr. Belcher himself has had an interesting and colorful career. Shortly after leaving high school, he went to sea as a commercial operator. For several years he served on freighters, tankers, and passenger boats. Leaving the sea to take a position with General Electric, he worked for a time testing radio equipment. Later, Dr. Belcher attended Tufts Engineering School, receiving his B.S. degree in 1930. Following graduation, he was associated with the Department of Commerce Radio Division, as a radio inspector in the New York City area. Later he was transferred to field service for the Federal Communications Commission.

In 1933 Dr. Belcher left the government service to join the United States Coast and Geodetic Survey as a radio engineer, later leaving this service to teach in the extension division of the Massachusetts Department of Education. At the same time he began his graduate work at Tufts. Receiving his degree from their School of Medicine in June, Dr. Belcher has continued his work for the Massachusetts Department of Education.

In connection with his radio course, Dr. Belcher has prepared a series of four illustrated booklets, each designed to cover eight lectures of the course. These booklets, containing blueprints, circuit diagrams, and other material invaluable to the student, are available from the World Wide Broadcasting Foundation for the cost of the printing and mailing. This is in keeping with the station's non-profit non-commercial character, for it carries no advertising or commercial programs, and is designed solely for the benefit of the listener. The price of the course is moderate—$1.00 for each set of diagrams, or $3.50 for the complete course.

—*C. B. D.*

Antenna Questions

(*Continued from page 27*)

This dimension is not critical. All of the above formulas are for use with a 600-ohm line, which may be made by use of No. 14 copper spaced approximately 5 inches, No. 12 spaced 6 inches, or No. 10 conductors spaced 8 inches apart.

Connections of the transmission lines of Fig. 1-d and -i may be made at or a few inches from the ends of a middle insulator. Usually, connection at each end of the center insulator (for the lower frequencies, two insulators in series may be used) results in a match sufficiently accurate to make unnecessary the use of a formula or table for finding an exact amount of "Y" or spread.

The feeders of Fig. 1-d and -h should be coupled to the output tank coil of the transmitter through a one- or two-turn coil. The degree of coupling between this pickup coil and the tank will control the load on the output stage.

The feeders of (e) should be equally spaced from the r.f. ground potential point on the output tank coil, and should be moved toward the ends of the coil until proper loading results. The single-wire feeder of Fig. 1-h should also be moved from the r.f. ground potential point on the output coil until the load rises to the proper value. If series plate feed is used in the stage, putting high d.c. voltage on the coil, 0.002-μfd. or larger mica condensers should be used near the coil tap to isolate the antenna from the d.c.

Details on proper tuning procedure with the tuned-feeder and direct-coupled antenna systems, and a discussion of the systems for multi-band operation, will be given later.

HINTS and KINKS for the Experimenter

Economical Two-Stage Transmitter

A C.W. transmitter featuring break-in operation with keyed oscillator and externally-biased amplifier, ease of neutralization with only one stage, moderate output on three bands with one crystal, and excellent economy (only three tubes, all receiving-type, are used) is shown in Fig. 1.

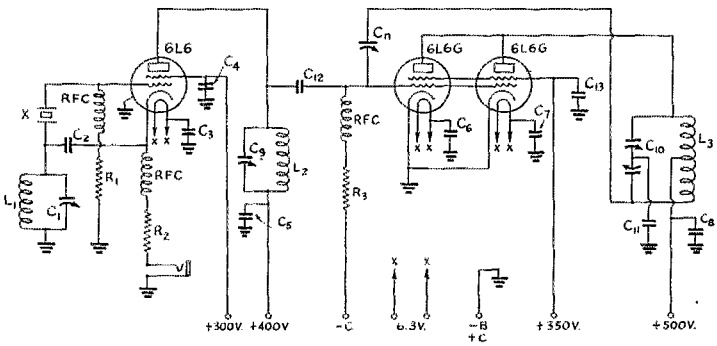


FIG. 1—MODERATE OUTPUT OBTAINED ECONOMICALLY WITH 6L6 TUBES

C1—140-μμfd. midget variable.
C2—0.01-μfd. paper tubular.
C3 to C8—0.002-μfd. mica, 600-volt working.
C9—140-μμfd. midget variable.
C10—265-μμfd. per section, split-stator (Hammarlund MTCD-250-C).
C11—0.00055-μfd. mica.
C12—50-μμfd., 600-volt mica.
C13—0.002-μfd. mica, 600-volt working.
R1—15,000-ohm, 1-watt.
R2—400-ohm, 10-watt.
R3—15,000-ohm, 5-watt.
RFC—2.5-millihenry r.f. chokes (National R100).
L1—See dimensions of L1, Fig. 813, The Radio Amateurs' Handbook.
L2—See dimensions of L2, Fig. 813, The Radio Amateurs' Handbook.
L3—See dimensions of L1, Fig. 828, The Radio Amateurs' Handbook.

With the final tuning condenser specified, the output can be tuned from 160 to 10 meters with reasonable *L-C* ratios for c.w. telegraph operation on all bands.

Typical operating currents and voltages are as follows:

Oscillator plate voltage	400 volts
Oscillator plate current	70 ma.
Oscillator screen voltage	300 volts
Amplifier plate voltage	500 volts
Amplifier plate current	175 ma.
Amplifier screen voltage	350 ma.
Amplifier grid current	5 ma.

Using a 40-meter crystal, the transmitter operates satisfactorily on 20 meters, and the amplifier may be used as a regenerative doubler for good 10-meter output.

—*K. M. Reichenbach, W2KIF*

Inexpensive Flexible Shaft Coupling

FLEXIBLE shafts of any desired length may be made at home at a cost of five to ten cents each. Speedometer shafting is used as the basis of the couplers, and the ends are soldered into brass bushings of ¼-inch diameter, approximately ⅜ to ½ inch long. If it is impossible to obtain a broken speedometer cable from one of the neighborhood garages, a new cable approximately 6 feet long may be obtained from an auto supply store at a cost of 40 to 60 cents.

The construction of the flexible shaft coupling is shown in Fig. 2. The place in the shaft where the cut is to be made for an end of the coupling

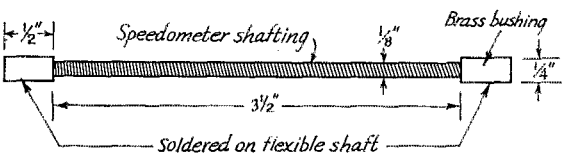


FIG. 2—HOME-BUILT FLEXIBLE SHAFT COUPLING

should be heavily tinned with solder before the cut is made. The inner surface of the bushing should also be tinned. After cutting through the soldered portions of the shaft, the ends should be sweated into the bushings with a hot soldering iron, and any excess solder on the outside of the bushing should be wiped off while warm.

—*John Wilson, W2GUR*

Simple Noise-Limiter Addition to Receiver

ALTHOUGH much has been done to simplify noise silencers and reducers, there still are many who consider these devices too complicated or costly to be added to their receivers. Because of this fact, much operating enjoyment on the high-

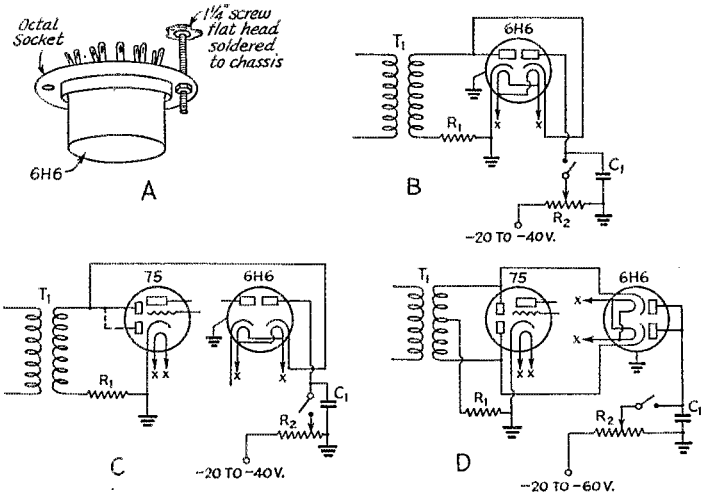


FIG. 3—SIMPLE RECEIVER CHANGE TO INCORPORATE A NOISE SILENCER

The 6H6 is mounted in an inverted position beneath the chassis by means of a single flathead screw.
R_1—Diode-detector load resistor.
R_2—25,000-ohm potentiometer.
C_1—0.1-μfd., paper tubular condenser.

frequency bands is sacrificed in regions of strong interference.

The circuit of a single-diode noise limiter is well known and extensively used with single- and parallel-diode second detectors. For receivers using full-wave diode detection, the two separate diodes of a 6H6 tube may be used in an equally simple circuit adapted from the one mentioned above. Typical circuit diagrams of the former type of noise limiter are shown in *B* and *C* of Fig. 3, while a diagram for use with a full-wave detector is shown in *D*. In any case, the total list of parts to be added to the receiver (assuming that a suitable source of negative bias voltage is available) includes only a 6H6 tube and socket, a bypass condenser, and a small potentiometer resistor.

Since the 6H6 tube and socket are light and compact, the assembly may be mounted beneath the chassis by means of a single long screw soldered in place. Alternatively, a longer screw may be substituted for one of the short screws or rivets holding a tube socket in place, and the lower extension may thus be used.

The 0.1-μfd. condenser should be mounted near the 6H6 socket. Many sets are equipped with fixed bias supply; and in these, the negative voltage applied to the suppression-control potentiometer may be set to a desirable value at the voltage-divider resistor. This should not noticeably affect the other voltages taken from the divider, as the current through the control is only a milliampere, approximately. The potentiometer resistor should be equipped with a switch and connected so that beginning rotation in a clockwise direction places the noise limiter in action, and further rotation increases the noise suppression.

Addition of the 6H6 tube to the circuit of the second detector may detune this circuit slightly. In order to check on this point, the 6H6 should be taken from its socket while a steady signal is being received, to determine whether a noticeable increase in output accompanies the removal. If a change is noticed, realignment of the i.f. transformer tuning condensers with the tube in operation should follow. It is important that the 6H6 tube be one in good condition; it might otherwise prove, because of leakage, to be a noise contributor rather than a noise limiter.

On very strong signals the noise limiter tube may cause noticeable audio distortion, although a limiter is seldom needed on signals of this sort. If such a distortion is objectionable, however, a higher value of negative voltage may be applied to resistor R_2.

The cost of the suppressor is probably less than two dollars and fifty cents. It can be used without seriously altering the receiver. The effectiveness has been checked many times on an oscilloscope and has been successfully demonstrated in practical use. Some experience in the use of this system is needed for best results in

VIEW OF THE DRIVE MECHANISM AND FEEDER CONNECTORS OF THE W8EEP ROTARY ANTENNA SYSTEM

Details of this simple but effective system were given in Hints and Kinks, QST, October, 1938. Note that wiping contacts on the tops of the large stand-off insulators have been substituted for the roller contacts described in the above article.

SILHOUETTE PHOTOGRAPH QSL CARD
This cut was made directly from the card.

setting the control for the correct threshold setting for maximum noise suppression with minimum audio distortion.

Credit must be given to W6IOF for suggestion of the easy method of installation of the 6H6 suppressor system.

—Byron Trowbridge, W9TMP

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Novel QSL Cards

IT IS probable that the many radio amateurs who are interested also in photography will dust out their photoflood reflectors and load their cameras with fresh film when they see the QSL card used by W. H. Gillard, VE3AQS.

The call letters were made of broad black ribbon pinned on the wall. Two photofloods in reflectors were used between the subject and the wall. The exposure was 1/10 second with stop at *f*.11. The final negatives size of 3½ inches by 4¼ inches was obtained, and the picture was contact printed on AXO postcards.

While mentioning unique QSL cards, credit must be given to Louis J. Gallo, W5GDU, for one requiring craftmanship and painstaking work. This "card" is carved in a block of mahogany 3½ inches wide, 5½ inches long, and ¼ inch thick. Although the finished block, properly treated, is a remarkably attractive article, it would probably require more than the customary 1-cent postal charge!

A Transmitter of General Utility

(Continued from page 35)

tuned off-resonance. At resonance, the current should fall to somewhere between 60 and 90 ma. With the buffer-doubler tuned, the meter plug should be transferred to the third jack in the grid circuit of the final amplifier. When the key is again closed, the grid current should rise to 35 to 45 ma.

The next step is that of neutralizing the final amplifier and it is carried out in exactly the same manner as described for the buffer-doubler. When neutralized, the grid current should remain constant with tuning of the plate tank circuit. In preliminary tuning of the final amplifier with voltage applied, voltage should be reduced, if possible. A 200-watt lamp may be inserted in series with the primary of the high-voltage transformer or a 100-watt, 10,000-ohm resistor connected in series with the positive high-voltage lead to protect the tube against possible damage during preliminary tuning. With plate-voltage applied, the tank condenser should be rotated rapidly until the plate-current dip is found. Care should be taken that the correct dip in plate current is selected because some of the tank coils will tune to two bands. Approximately correct settings for the tank condenser with a 100-degree dial are: 1.75-Mc.—90, 3.5 Mc.—90, 7 Mc.—45, 14 Mc.—20, 28 Mc.—10. Full plate voltage may now be applied. The minimum plate current for any of the above mentioned tubes should be approximately 15 to 35 ma. depending upon the frequency. If desired, the power output may be checked roughly by coupling a 110-volt lamp to the final tank coil either by means of the link winding or by several turns of heavily insulated wire wrapped around the tank coil. The lamp should have a power rating approximately equal to the power output expected. Grid current to the final amplifier will decrease somewhat when plate voltage is applied and again when the load is coupled. It should not fall below 25 ma. for any of the tubes suggested.

The output link is provided for coupling by link line to a suitable antenna tuning unit. When the antenna has been tuned to resonance, coupling may be adjusted to load the amplifier to rated plate current by adjustment of the variable link. In a case where home-made coils are used without variable link, the number of turns to be used in the link winding to provide the correct loading must be determined experimentally.

In case the unit is used as a driver for a high-power amplifier, it will be found that the output amplifier doubles frequency quite efficiently. If desired, the transmitter may be keyed at the alternate position indicated in the cathode circuit of the buffer-doubler tube.

For 'phone work, a modulator capable of supplying 25 watts will be required for the 809, RK11-12 or HY57. The output transformer should be suitable for a load of 7000 ohms. If the larger tubes are used, the modulator must deliver about 40 watts and the output transformer suitable for 9500-ohm load.

• I. A. R. U. NEWS •

Devoted to the interests and activities of the

INTERNATIONAL AMATEUR RADIO UNION

Headquarters Society: THE AMERICAN RADIO RELAY LEAGUE, West Hartford, Conn.

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Deutscher Amateur Sende-und-Empfangs Dienst
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Experimental Radio Society of Egypt
Experimenterende Danske Radioamatorer
Federation des Emetteurs Belges
Irish Radio Transmitters Society
日本アマチュア無線聯盟 Japan
Liga Colombiana de Radio Aficionados
Liga Mexicana de Radio Experimentadores
Magyar Rövidhullámu Amatőrök Országos Egyesülete
Nederlandsche Vereeniging voor Internationaal Radioamateurisme
Nederlandsch-Indische Vereeniging Voor Internationaal Radioamateurisme
Newfoundland Amateur Radio Association
New Zealand Association of Radio Transmitters
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Radio Club de Cuba
Radio Club Venezolano
Radio Society of Great Britain
Rede dos Emissores Portugueses
Reseau des Emetteurs Français
Reseau Luxembourgeois des Amateurs d'Ondes Courtes
South African Radio Relay League
Suomen Radioamatööriliitto r.y.
Sveriges Sandareamatorer
Unión de Radioemisores Españoles
Union Schweiz Kurzwellen Amateure
Wireless Institute of Australia

Conducted by Byron Goodman

Emergency Work:

Out at the Chicago Convention ZL2JQ was telling the fellows about the emergency set-up in New Zealand. We had of course known of the "Radio Emergency Corps," how they are well-organized and have conducted several successful field tests, and how they have assigned special letters for various parts of the country so that "CQ M S" would mean that the caller wishes to contact both Taranaki and Palmerston. But we didn't know that they are recognized to the point where they are automatically released from work in the event of an emergency, such as is the National Guard in the U. S. So far, however, their work has been confined mainly to such matters as locating private planes whose pilots lose themselves in the interior.

The editorial of the August issue of *Break-In* continues the theme:

"In January, 1931, no one in Napier anticipated such a catastrophe as an earthquake. We are unable to visualize the shape or form of future visitations, but what we can do is to prepare ourselves to emulate that Napier amateur who was able to use his hobby as a means of keeping his stricken community in touch with the outside world.

"As an amateur, besides gaining enjoyment from your hobby, you have it in your power to be of great service to your community when normal communications systems are disrupted. How easily could your existing apparatus be converted for emergency operation in the event of power failure? If this difficulty be overcome, how well could you handle traffic—not the usual amateur message—but messages with the necessary preamble so essential for filing and reference purposes? If you can reply favorably to both of these, you are pursuing your hobby not selfishly, and are considering its potential value to your community as a whole.

"When you are building your station, try to arrange it so that if necessary, parts essential to make it a self-contained communication link can readily be converted for use with batteries. This is the far-sighted attitude, and as an amateur it should be a source of pride for you to know that, with minor changes, your station could readily play its part as a link in a national emergency communication system.

"Your duty as a far-sighted citizen does not end here. The personal factor enters into it. Once contact has been established, the efficiency of an emergency link will depend upon the efficiency of the operators . . . make yourself familiar with correct operating procedure. . . .

"By preparing yourself in this way you will be an asset to your community. . . ."

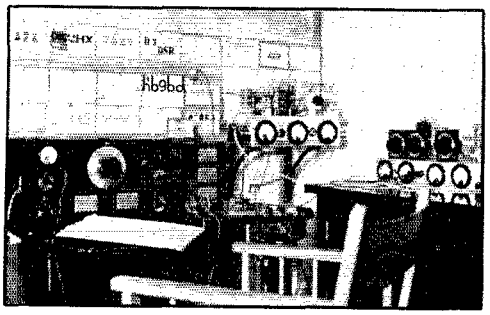
That last paragraph is true not only in New Zealand but in every other country.

—•••—

Gleanings:

Egypt: Over 90 per cent of the licensed amateurs in Egypt are members of the E.R.S.E. . . . Much interest was shown on National Field Day, expeditions venturing forth to work under the hot sun of the desert near Alexandria and also the Cairo-Suez road. . . . *New Zealand:* P. A. Morrison of Wellington reports hearing W6ENC on 56-Mc. 'phone. . . . *Sweden:* Apparently

New Mexico is playing "hard-to-get" for the SM boys. A recent issue of *QTC* lists all the New Mexico amateurs. Like many other European countries, they take their WAS seriously. . . . *Netherlands:* Much interest in 56 Mc., with the N.V.I.R. 5-meter Relay a big success. Contacts made all over the country and with Belgian stations. . . . *England:* To complete the u.h.f. picture in Europe, the R.S.G.B. gives the ultra-highs a big spread in the latest *T & R Bulletin*,



PY1AZ, RIO DE JANEIRO, BRAZIL

The straightforward arrangement has been responsible for over 80 countries worked with 150 watts input to the PP 800's final. PY1AZ is looking for Nevada, Utah and Arizona for his WAS.

detailing equipment, results of their Field Day and Relay Tests, and encouraging investigation of the wavelengths below 5. It would appear that there is a tremendous amount of interest over there right now. . . . Royal Air Force Wireless Reserve organized among British amateurs. Premium placed on code speed, with faster code men entitled to larger maintenance grants. . . . *Italy:* Transmitting licenses still not granted, although the A.R.I. hopes for a settlement of the question in the near future. . . . A.R.I. held their annual Convention on September 24th, in Milan. . . . *Roumania:* Roumanian amateurs officially licensed now. Applicant for license must be a member of the A.A.R.U.S.; the license examining commission has an A.A.R.U.S. delegate as one of its members. . . .

Ross A. Hull

(*Continued from page 10*)

it is necessary to employ licensed personnel who, presumably, are especially trained for their profession. Furthermore, the men are employed for the specific work in hand.

In spite of these facts, it is necessary to provide elaborate protective devices on all commercial and experimental transmitting installations. Amateurs, on the other hand, who in many instances are unaware of the dangers involved, are not required to take any protective measures as regards high voltage cut-off switches and the like. And so, with his back to the wall, Mr. Bubb puts his hand into the transmitter and isn't even afforded the opportunity of being thrown clear of the rig should he become involved with the high voltage.

The thought is left with you that perhaps amateur radio should take steps to remedy this situation before an arbitrary set of rules is promulgated by a regulatory body.

Sincerely,

HOWARD A. CHINN

Dear Howard:

Of course you are quite right about the insane fashion in which amateurs operate high-voltage equipment and about the equally stupid fashion in which we even go to the trouble of providing photographic illustrations of just how to do it. I would explain (not that it helps any) that the W1AW transmitters were, when the photograph was taken, still in the laboratory undergoing final checking. Since then, the transmitters have been fitted with elaborate "dust covers" and elaborate illuminated signs. There will also be much more space between the back of the transmitters and the wall and I understand appropriate cushions are to be placed along the wall and behind each of the units!

Seriously, Howard, we should take some steps to keep amateurs impressed with the dangers involved and possibly insist on some protective devices, and I think we shall come to that. We have of course run quite a lot of material on the general subject—including a problem contest for ideas on the subject—but we should do more. Aren't you impressed, though, with the better performance in the amateur world than in the professional world, particularly when one thinks of the relationship between the high-voltage-hours involved in the ham game? The most important problem is that amateurs seem to insist on the right to tune their transmitters with a lead pencil. They will not use a complete enclosure with interlock. And any of the other "safety" devices are probably worse than nothing.

How about writing a story for *QST* on ways and means?

Sincerely yours,

ROSS A. HULL
Editor, *QST*

MANY hundreds of radiograms, telegrams and letters of sympathy have been received at Headquarters from fellow experimenters and friends in the radio art and industry. *QST* gratefully acknowledges these expressions upon the passing of its editor.

Several of our advertisers expressed a desire to devote their space in this issue to his memory. It was the unanimous opinion of his associates that Ross would not want a cessation of any usual activity in the radio field—any more than he would want the magazine he edited to omit its usual editorial content and devote itself entirely to him. We have, therefore, asked our advertisers to pursue a regular course in their current copy. We thank them again here for their thoughtfulness, and for the kind inclination which led them to suggest such recognition of the passing of a friend.

We announce the reassumption of the editorship by the League's Secretary. K. B. W.

Strays

The telephone number at W4NE sounds like an interesting sequence—73880!

—···—

W3BGD received his ham ticket on his 17th birthday, his first superhet on his 19th birthday, his W.A.S. certificate on his 21st birthday, and his commercial ticket on his 23rd birthday, points out W3QP.

Whaddayasuppose his 25th birthday will bring forth???

OPERATING NEWS

Conducted by the Communications Department

F. E. Handy, Communications Manager — E. L. Battey, Asst. Communications Manager

Communications emergencies occur when wire communication circuits are overloaded, disrupted, or non-existent . . . when there is urgent information to transmit and no way to transmit it. If the *number* of wire circuits suddenly and definitely parted, and the *number* of communities and people isolated and concerned is the criterion, there is no doubt of the important part played by amateur radio in filling the breach following the recent wind storm. Amateurs may again "point with pride." At the same time, let us look over our message files introspectively to see what lessons and possible improvements in meeting future opportunities may come out of this hectic experience.

"It cannot happen here" is an expression frequently met where we have discussed amateur emergency communication organization in the last several months. This universal opinion about floods received a severe jolt a year or so back (at least in New England) and the popular skepticisms concerning hurricanes is now likewise something of the past. The first lesson for all people, and radio amateurs especially, is that ANYTHING CAN HAPPEN . . . and the only answer for the individual or organization is to ATTAIN THE FULLEST STATE OF PREPAREDNESS POSSIBLE.

All the recognized fundamentals were emphasized in this recent experience. Proper consideration for "priority" of official agency dispatches, coupled with some restraint (in general transmitting) and placing of responsibility for texts on officials signing messages (instead of unnecessary assumption by amateurs), was noteworthy throughout the week of heavy activity.

So many power circuits were interrupted that the shortage of emergency powered stations, representing communities, was at first very marked. Teamwork, universal coöperation and the coördination of community efforts of amateurs, showed progress over the past, attributable to a great extent we hope to the more general appointment and functioning of A.R.R.L. Emergency Coördinators in communities over 20,000 population. As one result of experience, we are now going to remove any "size" restriction, and extend the appointment and work of Coördinators, asking S.C.M.'s to makes these appointments *for all communities* where qualified men to represent the amateur service may be found, irrespective of the size of the city.

(1) There should be more "emergency powered" stations. Our Field Day campaigns for more individual stations must continue.

(2) Individual preparedness to serve a useful part, whether with self-powered sets *or without* must be extended. EVERY LICENSEE should be "registered" as to his station, in the League's Emergency Corps. He should be familiar not only with fundamentals of good operating, but aware of local plans, and the whole set up, and should be part of that set up! We want *every* licensed amateur to have an A.R.R.L. Emergency Corps identification card.

(3) The useful technique of certain stations equipped with e.c.o. (like W3BES and W8BQ) outside the main emergency zone, in quietly listening and hooking up stations with traffic for each other, "breaking" spot frequency nets if necessary to inform them briefly where to look, was noted . . . and we trust there will be lots more such helpful and intelligent operating in case of future need. Other stations out of the stricken area helped overcome "skip" by relaying, likewise operating with a very low ratio of transmitting time to that spent in learning full circumstances through listening.

(4) A commendable volume of traffic moved on 80-meter c.w. A great deal was handled by voice. Both methods were effective. There were a few gripes about the interference which grew to proportions at times on the low frequency 'phone bands. More telegraph circuits could have functioned to advantage. Operating included the 7-Mc. band usefully in some instances, and was in practically all cases in all the different bands, orderly. *All* our frequency bands that will cover distances involved (both telephone and telegraph) should be loaded as uniformly as possible with functioning circuits in communications emergencies, when the volume of traffic and number of stations so requires. The relatively low congestion of c.w. bands, of course, favored operation of low power isolated stations there. In this day of flexible transmitters and amateurs that use all bands, before a man asks for a general F.C.C. restriction or "hollers" about unbearable interference, he should *look* for the relatively unused channels and make use of them!

(5) The good operator who is experienced in handling recorded message traffic, knows the preamble from the address etc., is ever at a premium in communications emergencies. *Every* individual should strive to perfect his operating technique, and knowledge of "system" and forms. In some cases where operators were slow it was profitable to shift from code to voice to speed up matters.

(6) Numbered standard texts to save time and QRM, and aid in handling the secondary load of personal safety traffic, which wins so much approbation after the "official" traffic is off the hooks, may be of great help in the future. W2AQQ, W2KIU and W1PI come forward with this specific emergency-work suggestion, and we see nothing wrong with it. In fact we are proceeding to analyze some typical message files to note possible limitations and see what should be done right away. W3QP has likewise urged a similar standardization of message texts useful for routine work.

In conclusion let us say again that we may all swell with pride at the good job done. But we must not rest on our laurels. The amateur fraternity needs *every* licensee enrolled or registered in the A.E.C. It needs a representative of the amateur service, an A.R.R.L. Emergency Coördinator in *every* community, every city and town in the country. The League's program is a continuing one, and needs your full support. Are you, brother amateur, a member of the Emergency Corps? If you have a license, by all means ask your local coördinator, or your S.C.M. (address page 4) or your Headquarters, for the registration form today. Be ready for the "anything" that may come to pass. Get lined up now, today.

—*F. E. H.*

Briefs

The McGill Radio Association at McGill University, Montreal, is attempting to organize a network of Canadian university stations for the purpose of exchanging news and is desirous of hearing from all universities in Canada where there are amateur radio stations. Communications should be addressed to E. H. de Grey, VE2IN, secretary-treasurer, The McGill Radio Assn., McGill Univ., Montreal, Quebec. Information is needed on frequencies, power and operating times.

Amateurs interested in aviation radio are invited to apply for enlistment in the 108th Observation Squadron, a unit of the Illinois National Guard. For information see Technical Sergeant E. M. Isaacson, W9MEQ, at the squadron hangars, Municipal Airport, 6048 So. Cicero Ave., Chicago, any Thursday after 7:45 P.M.

Each Sunday at 9:30 A.M., EST, three members of the Rag Chewers' Club get together on 7 Mc. Known as the "ABC Net" because of their "handles," they are W2LOQ (Al) 7190 kc.; W2HRN (Bill) 7104 kc.; and W3GGP (Curt) 7276 kc. W3GGP and W2HRN have been scheduling for 19 months, being joined by W8QPS (now W2LOQ) last March.

PRIZES FOR BEST ARTICLE

The article by Mr. B. B. Greenleaf, W6VU,* wins the C.D. article contest prize this month. Each month we print the most interesting and valuable article received marked "for the C.D. contest." Contributions may be on any phase of amateur operating or communication activity (DX, 'phone, traffic, rag-chewing, clubs, fraternalism, etc.) which adds constructively to amateur organization work. Prize winners may select a 1938 bound *Handbook*, *QST* Binder and League Emblem, six logs, eight pads radiogram blanks, DX Map and three pads or any other combination of A.R.R.L. supplies of equivalent value. Try your luck. Send your contribution to-day!

"Mike" Impressions

Yours, to Determine—Good, Bad or Indifferent

PERHAPS the writer of this article has no reason to make comment regarding 'phone operation, having spent the better part of twenty years pounding brass, however, it cannot be denied that local rag chews bring a certain closer friendship that is impossible to obtain from brass pounding.

Sooooo—you Gentlemen of the phone bands, do you ever stop to realize just what your conversation sounds like to the fellow at the other end; *not to mention* any number of BCL's who may be "sitting" on your frequency.

It is not necessary or good practice to inject a lot of telegraph preamble into a phone conversation. Really, fellows, don't you think it would sound more intelligent to say, "Best Regards to you and good night," instead of "73's OM, Diddle de Bump de Bump."

Recently I listened to a very interesting discussion between a couple of phone stations and I pictured two very intelligent and educated fellows but when the sign off came it carried the usual line of silly sounding things—and I began to wonder.

Another thing that is so very noticeable is the constant repetition of certain words, especially the words "OK there." For instance, heard on the 160 meter band recently —"OK there OM fine business your YL there and OK there on your modulation there. Glad the weather there is better than here."

Dare we mention two more things?

One is the use of the CW signal "Hi." A laugh can be heard very nicely over a "Mike" so why not do a little of it when you are amused instead of shouting "Hi." And last —why not say "Go Ahead" instead of "K." It sounds more like United States!

I am not writing all this in order to bring down the wrath of all our phone brothers upon my head but I am hoping it will cause some of our good friends on the phone bands to stop and think before they start talking into the old "Mike" so carelessly. Do you actually want people listening to think you are a small boy, or an older person who is just a trifle cracked—or would the public hold amateur radio more in esteem if we all operate with a certain reserve and dignity?

Gentlemen: Why not try this sometime when at a loss to know what to say. Instead of screwing up the gain to the limit on your "Mike" so that the fellow in the next town can hear your wife rattling dishes in the kitchen—try cutting it down so that you modulate nicely when talking directly into it, or at least only a few inches from it. If necessary gather the thing in your arms and picture your friend at the other end as sitting right there in the room with you, speak in a normal tone of voice and talk to him as a friend. I'll wager you will be able to say something really worth while into the thing.

*2078 Belle Ave., San Bernardino, Calif.

July O.R.S.-O.P.S. Parties

W3BES, an "old-familiar" of Sweepstakes contests, is now displaying his operating excellence in O.R.S. parties—he placed first in the July doings with 7,554,359 points; not bad for a summer party!! It was an FB party with many of the old crew and several of the newer members of the group going right to town. It looks like a big season in the O.R.S. ranks so watch out for some real competition!

W8MBW and W2HNA fought it out in great style for leading position in the O.P.S. Party, W8MBW finally ringing the bell with 5497, just 25 points ahead of HNA! A strong third (5208) was XYL W2JZX of the radio family of East Rockaway, L. I.—W2JZX Mother, W2JDG Father, W2LJJ Son. Official 'Phone Stations continue to set the standard for high voice operating ethics. Qualified 'phone operators should affiliate their stations with this group.

Get in touch with your S.C.M. (see list in front pages of each *QST*) for information on any appointment in which you are interested. Now is the time to get lined up. Radio activities are swinging into their peak season. Get in on some organized operating!

Official Relay Station Scores

Station	Score	No. Diff. Stations	No. Diff. Sections	No. Heard	Power	Section
W3BES	7,554,359	156	41	7	150–250	E. Pa.
W1TS	5,011,776	132	45	12	350	Conn.
W4NC (4RA)	4,260,200	123	47	10	800	N. C.
W3FPQ	3,486,112	119	39	4	990	Md.-Del.-D. C.
W8ONK	3,383,030	115	40	26	250	Mich.
W9VES	3,317,017	111	40	37	—	Ill.
W8JTT	3,144,556	110	38	17	250	W. N. Y.
W1LJI	3,085,530	110	37	—	600	Conn.
W1JTD	3,026,896	110	38	32	75–100	Conn.
W8QAN	3,021,000	115	35	15	200–300	W. Pa.

Station	Score	Stations	Sections	Station	Score	Stations	Sections
W1KQY	2,704,065	116	31	W3CHH	1,513,395	88	28
W9YXD/8	2,633,175	99	36	W8BTV	1,479,075	76	35
W3NF	2,585,235	105	36	W8LII	1,392,990	82	36
W2HZY	2,348,405	105	34	W3EHW	1,371,490	81	34
W1UE	2,161,460	109	31	W9HQH	1,333,294	90	36
W9IIH	2,119,190	107	39	W9TQD	1,273,200	73	34
W3GDI	2,087,586	102	32	W8PCW	1,175,796	80	28
W4AGI	2,025,678	100	34	W8LVH	1,125,915	76	29
W2HMJ	1,963,760	95	33	W8CMH	1,053,500	70	30
W3GUB	1,817,720	100	26	W3EML	1,010,018	75	28
W3DGM	1,666,595	94	25				

Official 'Phone Station Scores

Station	Score	QSO's	Sections	No. Heard	Power	Sections
W8MBW	5497	39	23	22	600	W. N. Y.
W2HNA	5472	42	24	9	800/900	N. N. J.
W2JZX	5208	44	21	14	500	N. Y. C. & L. I.
W2HNP	4968	40	23	8	400–500	N. N. J.
W8VZ	4617	43	19	14	500/160	Ohio
W9WXL	4338	43	18	13	85–200	Ky.
W8PUN	3735	41	15	22	220	Ohio
W4CYB	3315	35	17	10	350	N. C.
W8KNF	3195	35	15	19	200	Ohio
W8BTP	3122	35	14	24	125	Mich.

Station	Score	QSO's	Sections	Station	Score	QSO's	Sections
W9NHF	3111	33	17	W8KSJ	2340	30	13
W4EM/5	3043	35	17	W8PFM	2256	21	16
W8MOL	2940	34	14	W5ECE	2254	19	14
W8KIU	2890	34	17	W6ITH	2232	24	18
W9UNS	2660	34	14	W8NNJ	2112	26	12
W8CDR	2496	32	13	W9IAW	2080	24	13

BRASS POUNDERS' LEAGUE

(August 16th–September 15th)

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
W4PL	26	108	1063	100	1297
W6IOX	22	57	740	55	874
W3EML	81	194	262	186	723
W7EBQ	16	39	588	26	669
W3CIZ	31	96	387	96	610
W9AWP	265	161	24	151	601
W6ITH*	69	148	212	96	525
K6NXD	281	71	106	65	523
W7DUE	9	—	472	34	515

MORE-THAN-ONE-OPERATOR STATIONS

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
W9NI	870	583	—	—	1453
KA1HR	694	404	204	—	1302
W5OW	137	103	488	91	819
W5DKR	336	84	176	176	672
K5AA	289	97	66	76	528

These stations "make" the B.P.L. with *total* of 500 or over. One hundred deliveries + Ex. Del. Credits also rate B.P.L. standing. The following one-operator stations make the B.P.L. on deliveries. Deliveries count!

W9OZN, 258	W3QP, 164	W2JZX, 119
W6IMI, 188	W7APS, 162	W6EJA, 118
W5BN, 174	W1KH, 139	W9ICV, 117
W6JTV, 166	W9VQG, 128	More-than-one-opr.
W6NLL, 166	W3BES, 122	W1AW, 148

A.A.R.S.

MORE-THAN-ONE-OPERATOR STATIONS

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
WLM (W3CXL)	107	81	1631	37	1856

A total of 500 or more, or 100 *deliveries* Ex. D. Cr. will put *you* in line for a place in the B.P.L.

* All traffic handled on radiophone.

W1AW Operating Schedule

(Effective Oct. 30, 1938)

OPERATING-VISITING HOURS:

3:00 P.M.–3:00 A.M. daily, except Sat. & Sun.
Saturday—8:30 P.M.–2:30 A.M.
Sunday—7:00 P.M.–1:00 A.M.

GENERAL OPERATION:

W1AW will devote the following periods daily, except Saturday and Sunday, to *GENERAL work* with all amateurs in the following bands:

Band	Frequency	Time—Eastern Standard
1.8 Mc.	1808–1800.5-kc. 'phone/c.w.	3:00– 3:30 P.M. 11:00–11:30 P.M.
3.5 Mc.	3800-kc. c.w.	3:30– 4:00 P.M. 8:00– 8:30 P.M.
3.9 Mc.	3950-kc. 'phone	4:00– 5:00 P.M.
7 Mc.	7150-kc. c.w.	1:00– 2:00 A.M.*
14 Mc.	14,254-kc. c.w.	6:00– 7:00 P.M.
14 Mc.	14,240-kc. 'phone	10:00–11:00 P.M.

* Daily except Sun. & Mon.

On Saturdays W1AW is operated from 8:30 P.M. to 2:30 A.M. E.S.T., and on Sundays from 7:00 P.M. to 1:00 A.M. E.S.T. On these days operation will be devoted to the most profitable use of bands for general contacts and to participation in special week-end operating activities and contests. The station is not operated on legal national holidays.

OFFICIAL BROADCAST SCHEDULE (for sending addressed information to all radio amateurs):

Frequencies

C.W.: 1800.5-3800-7150-14,254 kcs.

Starting Times (P.M.)				*Speeds (W.P.M.)*						
E.S.T.	*C.S.T.*	*M.S.T.*	*P.S.T.*	*M*	*T*	*W*	*Th*	*Fri*	*Sat*	*Sun*
8:30	7:30	6:30	5:30	20	15	25	15	20	—	20
Midnight	11:00	10:00	9:00	15	25	15	20	15	15	—

'PHONE:

Each code transmission will be followed in turn by voice transmission on each of the following frequencies: 1808, 3950, 14,240 kcs.

Brief

Floyd Hermanson, W4ASA, is proud to let the ham world know that he stole Elsie Reich, W4CQL, out from under the noses of other interested hams and married her! Making the wedding more interesting was the presence as witnesses of Mr. and Mrs. Atwood, W4CQJ and W4CQK. A ham wedding if ever there was one!

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Because a hill intervenes between the start and finish lines of the Soap Box Derby course in Rapid City, So. Dakota, sponsors of the event depend on the Rapid City Radio Club for starting, timing and communication between officials. Having had some difficulty with 56-Mc. rigs on the two previous occasions of the derby, the club this year turned to 3.9- and 1.75-Mc. 'phone with W9ADJ, W9YKY, W9YJX and W9YOB building "junk-box" rigs for the event. W9ADJ worked 3.9 to W9YKY on 1.75, with W9YOB and W9YJX standing by for trouble (which did not develop). The rigs were mounted in panel trucks and powered by genemotors, with six volt broadcast receivers on the listening end.

—*W9VOD, S.C.M., So. Dakota.*

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Jack Morgan, W3QP, announces the arrival on October 1st of "8¼ pounds of long-legged, brown-haired, blue-eyed boy—named David." Congratulations, Jack . . . may his vocal efforts never interfere with your trans-con schedules!

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One of a series of radio rifle matches being undertaken by the Massachusetts Rifle Association was held with the Cleveland Shooting Association on September 11. At the range used by the Cleveland team near Bedford, Ohio, was W8AVH/8, working direct with W1IWC/1 at the range of the rival club at Woburn, Mass. The Westlake Amateur Radio Association handled the Ohio end; W1IWC and W1IHI manned W1IWC/1. The Cleveland team won the match, 4138 to 3916. Some excellent newspaper publicity for amateur radio followed the event.

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As the young speedsters in the '38 Soap Box Derby at Gardner, Mass., flashed across the finish line members of the Chair City Radio Association radioed word back to the officials' stand so that results could be announced without delay. At the finish line were W1JXE and W1KIK; at the scorers' post, W1AUN and W1BIV. 56 Mc. was used.

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The Dial Radio Club, W8ROT, handled communications for the Boy Scouts of America at the Old Trails Jamboree, a mobilization of Scouts at Marietta, Ohio, July 13–17, 1938. The Jamboree was held in conjunction with the celebration of the States of the Northwest Territory at Marietta. The Queen City Radio Club, of which the Dial Club is a chapter, sent W8FVW, trustee of W8ROT, and Edward Moore to make the radio installation and handle traffic from the encampment. Mr. Moore furnished transportation and handled all registrations and filing of messages. W8FVW operated W8ROT on 3.5-Mc. c.w. and 3.9-Mc. 'phone, aided by W8RET, W8ALG and W8KSJ as relief operators. A total of 226 messages were sent and 42 received. The station was in operation 54 hours. An extensive network was established to handle the traffic, principal stations being W8PUN (Chief Net Control), W8HYZ, AHF, ICQ, VZ, AQ, MOL, DK, KSJ, NQA, OZH, FSK, PAZ, NDV, BRE, W9SYJ, ARU, CLF, W4AZI and CAT. The National Chief of the Scouts, Mr. James E. West, spoke over W8ROT to W8VZ and other members of the network praising them for their efficient and whole-hearted service. In addition to regular traffic, some of the boys were enabled to talk direct with their parents back home. Several news dispatches were sent to various papers.

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When a robbery occurred in Osaka, Va., W3FOU of that town transmitted a warning asking other amateurs to notify their local police. W8SES of Dunbar, W. Va., telephoned the message to West Virginia state police headquarters at Charleston and then retransmitted the information. He was logged by W4ESB at Goldsboro, N. C., who notified the police there—and the robbers were captured! Nice work, brother hams!!

And now comes the question—What is the DX record for contact between stations in the same call area? W9RSU, Cumberland, Ky., and W9WWL, Williston, N. Dak., think that their QSO may be something of a record—1300 to 1400 miles. Any competition?

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The A.R.R.L. Southwestern Division Traffic Net operates nightly on 3550 kc. A controlled, one-spot net, it is open to all who care to join. The control is under a Southwestern Division member at all times. The principal net function is to get traffic in and out of Los Angeles, San Diego, and surrounding territory. If interested, get in touch with D. C. Strawn, W6AXN, R.M., 516 Seventh St., Calexico, Calif.

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Amateur radio was represented at the Clay County Fair, Spencer, Iowa, September 12th-17th, by the operation of a station at the fair grounds. Actual demonstrations of two-way communication were given, some of the 139,770 people attending the affair participating in same. The following amateurs assisted in setting up and manning the amateur exhibit: W9KSS, W9TTO, W9REH (who handled the traffic via A.A.R.S. channels), W9WWK, W9GTO, W9SRR, W9ZYS, W9UOW, W9VDL and W9OC.

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What started out as a three-way QSO between W9BMA, W9RSO and W9LLW in the early afternoon of September 18th sprouted into an eleven-station round table ragchew lasting until 5:30 P.M. The principals were W9BMA, RSO, LLW, NDB, ABE, NYD, SNO, HEL, JXT, ZVS and TQD, all in the vicinity of 7010–7060 kcs. This gang plans to continue its get-togethers each Sunday. More good rag chewers are invited!

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. . . W9VPQ is on the Great Lakes aboard the S.S. *Theodore Roosevelt;* the receiver is a 1917 Marconi Wireless job with two stages of 201A amplification; the transmitter uses a pair of 211's with variable input up to three-quarters kilowatt. VPQ invites *Roosevelt* excursionists to visit the radio room. . . .

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The Hawaiian Section of the A.R.R.L. celebrated the 4th of July by staging a bang-up convention-hamfest which was attended by over 150 amateurs. The usual contests, yarns and activities went over in grand style. Acting S.C.M. Smith, K6OQE, talked on the League and the final gun was the banquet in the evening.

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The old saw "two can live as cheap as one" may have some merit, but there is little question but what "two can do more ham operating than one"!! That's apparently how a certain well known New Hampshire couple figured it, for on June 23d Miss Dorothy Wilkins, W1FTJ, became Mrs. Carl Evans (W1BFT). Hearty congratulations, "Dot" and "Carl"!

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W9ZAC will be operating 56-Mc. portable at various times while with the Cole Brothers-Clyde Beatty Circus this season. We don't know what ZAC does with the circus, but he may be the "man on the flying trapeze"! Watch for him.

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A special A.R.R.L. program was broadcast over stations W2XAD and W2XAF, Schenectady, N. Y., on May 10th, from 5:00 to 5:15 P.M. EST. The announcer for this feature was Eugene Darlington, W2ALP, who introduced Lyle Peer, W2ACB, president of the Schenectady Amateur Radio Association. ACB interviewed A.R.R.L. President Woodruff, W8CMP, and Pacific Division Director McCargar, W6EY, who were visiting Schenectady en route to the League's Board Meeting.

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As a time saver VK2TJ suggests an abbreviation to cover the usually drawn-out QSO ending, which goes something like this: "Tnx fer contact, will keep a lookout for u, cheerio, bext DX, BCNU". . . . VK2TJ suggests "92'

'or some other number or Q signal) to indicate all of our good wishes.

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Speaking of alphabetical QSO's, W9YCR had such an experience when, after signing with W2IJ*U*, he called CQ and raised W2IJ*V*.

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W8FOB points out that G8IY is in *Norwich*, England, while W8IY is in *Norwich*, New York!

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W3AKT took a message from K5AC for delivery in his own town, Boonton, N. J. Delivering it in person, he did not go into great detail as to the exact manner in which he received it. Imagine his surprise—and amusement—when he read a newspaper headline shortly afterwards: "Mrs. ——— Receives Air Drop Letter from Grandson" . . . and the item went on, "The letter had evidently been dropped by a plane and someone picked it up and brought it to Mrs. ——— to read." Better explain our service when making deliveries, gang! Hi.

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In the fall of 1937 W4APF asked W5FIY to make an effort in his contacts with VK4JU, Brisbane, to locate the mother of a friend. She had been heard of last in Brisbane many years ago. W5FIY put the matter up to VK4JU, who consented to do his best. Word received on subsequent QSO's indicated that he was having but little success in finding the woman. However, in late January, 1938, W5FIY received a letter from her, postmarked Sydney, N.S.W., with the advice that word had finally arrived through friends in Brisbane that he had word from her son. The letter was promptly forwarded to W4APF to deliver, thereby reuniting mother and son after many years.

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Determined to find out whether his station was causing QRM to BCL's, W6IHH ran an item in his local paper reading as follows: "Anyone who can prove that my amateur station (W6IHH) is causing any interference to radio receivers of modern design in the City of Willits, in the broadcast band, any time between now and February 11th, will be presented with an all-wave nine-tube receiver." That's one way to find out!

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Let's Use Break-In

The use of break-in operation (keying the crystal oscillator, grid bias, etc.) is really a necessity for traffic operation and is used by 100% of the Army Amateur stations operating on the special 3497.5- and 6990-kcs. A.A.R.S frequencies. If a letter or word is missed, the receiving operator just makes a few dots and sends the last word received and "AA." The transmitting operator breaks upon hearing this and repeats the words after "AA" (All After). Another great need for and use of break-in operation is when answering a "CQ" call. By just calling two or three times and signing once and then sending "BK IN" or "BK," it is possible to get a speedy answer to your call. This has been demonstrated time and time again in the operation of W2PF And, during the ORS Party on July 25th, it seemed that almost every ORS calling "CQ ORS" also transmitted "BK IN" after his call. I worked more than ten stations, all ORS, in less than an hour who used break-in operation.

—*W2PF.*

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While visiting her grandparents in Skowhegan, Maine, W1ATK's daughter was taken ill with acute appendicitis. She was rushed to a hospital in Waterville where a successful operation was performed. Desiring to learn of her condition W1ATK turned to amateur radio. A "CQ Maine" brought a reply from W1GOJ (Falmouth Foreside), whose mother (W1KOH) telephoned the hospital and secured a report. Following this QSO W1GOJ arranged contact with W1HSE in Waterville and kept a nightly schedule with W1ATK, passing along a daily report on his daughter's condition. The circuit HSE-GOJ-ATK functioned until the girl was out of danger and about ready to leave the hospital. These are the kind of services that make one really appreciate amateur radio. FB, W1GOJ, HSE and KOH!

A.R.R.L. DX Century Club

EIGHT new members swell the C.C. ranks this month: W1ZB, W8ADG, G5RV, W8BKP, W1JPE, W9TJ, W2CMY and W1WV. There are now 69 members and plenty of other chaps who aim to be among the "first one-hundred" to receive certificates. Go to it, gang!

MEMBERS, DX CENTURY CLUB

G6WY	(No. 5)	138	W2BHW	(No. 39)	107
W1SZ	(No. 7)	129	W9GDH	(No. 41)	107
W1TW	(No. 3)	128	G6RH	(No. 36)	105
W6CXW	(No. 4)	127	W9EF	(No. 44)	105
W8CRA	(No. 1)	126	VK5WR	(No. 49)	105
W6GRL	(No. 15)	125	W6GAL	(No. 50)	105
ON4AU	(No. 40)	125	W9KA	(No. 42)	104
W8DFH	(No. 14)	124	W3EVT	(No. 51)	104
G2ZQ	(No. 6)	123	EI5F	(No. 19)	103
W1TS	(No. 9)	122	W5VV	(No. 38)	103
W2GW	(No. 11)	121	G6KP	(No. 45)	103
W2GTZ	(No. 12)	121	J5CC	(No. 46)	103
W1BUX	(No. 2)	118	W3EDP	(No. 53)	103
W2GT	(No. 32)	118	W3EMM	(No. 58)	103
W1LZ	(No. 10)	117	W8ADG	(No. 63)	103
HB9J	(No. 13)	115	W4CBY	(No. 20)	102
W8DHC	(No. 27)	115	W6FZL	(No. 48)	102
W6KIP	(No. 28)	115	W3EVW	(No. 55)	102
W8BTI	(No. 56)	114	W9TJ	(No. 67)	102
W9KG	(No. 16)	113	F8RJ	(No. 8)	101
W9ARL	(No. 18)	112	W2CJM	(No. 47)	101
W1DF	(No. 29)	112	W2CYS	(No. 52)	101
W8OSL	(No. 23)	111	W2HHF	(No. 54)	101
W7AMX	(No. 26)	111	VK3KX	(No. 57)	101
W8JMP	(No. 22)	110	ZL1HY	(No. 59)	101
W8OQF	(No. 30)	110	W4CEN	(No. 60)	101
W2UK	(No. 33)	110	W9ADN	(No. 61)	101
W6ADP	(No. 34)	109	W1ZB	(No. 62)	101
W5BB	(No. 37)	109	W1JPE	(No. 66)	101
W8DWV	(No. 17)	108	G6CL	(No. 24)	100
ON4UU	(No. 31)	108	PAØXF	(No. 43)	100
W6HX	(No. 21)	107	G5RV	(No. 64)	100
W8LEC	(No. 25)	107	W8BKP	(No. 65)	100
W9PST	(No. 35)	107	W2CMY	(No. 68)	100
			W1WV	(No. 69)	100

The following have submitted proof of contacts with 75-or-more countries.

W1DUK	99	G6GH	88	W3AGV	81
W2GVZ	99	W1GCX	87	W5ASG	81
W2OA	99	W3ZX	87	W6FKZ	81
W3DDM	99	W8AAJ	87	W9FLH	81
W2DC	98	W8KTW	87	W9RCQ	81
W3AG	98	W9AEH	87	W1GNE	80
W3EPV	98	G2DZ	87	W3BVN	80
W4AJX	98	PAØGZ	87	W3EPR	80
W4BPD	98	VE2EE	87	W3GEH	80
G2TR	98	W1BGY	86	W3OP	80
W3GAU	97	W4CCH	86	W8DGP	80
F8RR	97	W6GHU	86	W9OYU	79
W1CC	96	W6ITH	86	G6ZO	79
VE2AX	96	HB9BG	86	VK6SA	79
W8EUY	95	W4MR	85	W1EWD	78
PA0QE	95	W4CFD	84	W8AAT	78
W2CBO	94	W8AU	84	W8FJN	78
W8BOX	92	W8BSF	84	W8MTY	78
W1GDY	91	W8DOD	84	W9UM	78
W1ZI	91	W8OXO	84	G6YR	78
W3BES	91	G2MI	84	VE2GA	78
W1FTR	90	G5BD	84	W1ICA	77
W3FRY	90	W1HX	83	W2GRG	77
W4DRD	90	W2BYP	83	W3EMA	77
FB8AB	90	W3AIU	83	W2DSB	76
SU1WM	90	G5QY	83	W3KT	76
W1ADM	89	HB9X	83	W6LDJ	76
W5KC	89	W6GPB	82	W8LZK	76
W6BAM	89	W9CWW	82	Z82X	76
W8CJJ	89	J2JJ	82	W3CKT	75
W8KKG	89	8P1AR	82	PA0JMW	75
W1RY	88	W1BFT	81	Radiotelephone	
W3JM	88	W2IOP	81	W2IXY	77
W8NJP	88				

How's DX?

How:

We like to flatter ourselves into thinking that this pillar is read by some of the DX men in the country, but apparently not a soul glances at it. Or, if they do, they think we're always kidding. Sometimes we do wield the artificial chamois but this isn't one of those times.

During the past five or six months we have tried to present as accurate as possible information about some of the more questionable stations. Some of these have been tabbed as legitimate (in the country indicated by their call) but undercover, and it has been suggested that cards for such stations be sent undercover (in an envelope with no mention of radio) or else to us for forwarding. We have stressed this as particularly true in PJ, PZ, YU-YT, LZ, Ethiopia, YS and HR. In spite of this, we have on our desk right now letters telling that PJ3CO has been *jailed* and YT7KP, YU7GL and YU7VN have been confiscated. A few months back I7AA was caught and severely reprimanded. All, dear and gentle readers, because some of you were so eager (and selfish) to get cards that you had no consideration for Mr. Johnny Undercover DX and forgot that the government runs the post office in most countries. You didn't get a card, of course, and you may have helped to jug your DX friend. Right now PJ1BV has a hundred or more cards waiting for him at his post office. Do you think he's going to collect them? Don't be silly!

Whenever some new DX pops up that can be reached by open cards or letters we'll try and give you the address. But when we say we'll forward the card because the station is undercover, please send the cards here. It usually means that we already have the address and can deliver the card, and at the same time we'll not jeopardize the position of the DX operator. Unless you know the fellow's name and address, or can send it care of the national society, don't shoot the card to the country. If you're in doubt, drop us a card and ask about it. But please give the fellow at the other end a break! Talk it up at your club, pass the word around on the air, but get the idea across! If you don't, you may wonder fairly soon why there isn't so much DX to work.

Photo by W8DWV — W3UVA

THE DX CENTURY CLUB GANG AT CHICAGO

In the front row, in the usual order: W9ADN, W9KA, W8DWV, W8OSL, W8JMP and W1SZ. In the back: W1DF, W9EF, W8OQF, W9TJ, W9GDH, W9ARL and W8CRA.

Where:

VS3OL is going to have to present quite a case for himself before a lot of the lads believe in him. They're working him from coast to coast, and the main reason for suspicion seems to be that he's nearly always too loud and lacks that characteristic sound of Asians. He gives his address as Cecil Barrister, Cerabanga, Malaya, and says he's using a rhombic antenna. He's a good argument for QSL cards .. .. .. That address we got for LX1AG from W8OXO last month didn't help at all—the cards bounced back .. .. .. Speaking of LX's, LX1AI, the secretary of the *Reseau Luxembourgeois*, sends this bitter pill: "In this country there is not a single LX station working actually on c.w., and the so-called LX stations on c.w. which have been heard are simply foreign pirate stations having usurped LX calls." There have been legit LX stations on c.w., but apparently it isn't so now .. .. .. YS2LR (7015 T7) got on the air and W1APA, W6POX, W6DIX and W1BFA were among the first to grab him. He's undercover! . . . QSL via A.R.R.L. .. .. .. W1FTR worked OY3X (14,350 T7) at 11 P.M. the other day. Can't say if he's good, although he sounded so .. .. .. That unhappy pair, W5VV and W5BB, worked ZM1AA (14,415 T9) and got his address as c/o Radio ZMA, Apia, Samoa. He's supposed to be using a diamond antenna and 100 watts. We worked him at 6 P.M. the other day, an unusual time but possible .. .. .. To further lower your spirits, we'll quote from a letter from F8DS, secretary of the *R.E.F.*: " . . . REF receives many cards for PX1A, PX1U and PX stations. To our knowledge, there are no amateur stations in Andorra, and undoubtedly there are no licensed stations there. So stations using "PX" are most certainly pirate ones." .. .. .. A. C. Embrechts, ex ON4AC, writes to say that someone played him the practical joke of sending in his name to the Call Book people as EQ4AC, with the result that for the past two years he has been flooded with correspondence for alleged Iran amateurs. It is embarrassing, to say the least, because a lot of the correspondence is marked "to Amateur EQ4AC," and ham radio is prohibited there. Mr. Embrechts says the only genuine station he knows of was EP5SO, who was on only a few days before he was caught and put off the air. EP1A and EP2RK he suspects of having been in the Balkans somewhere .. .. .. ON4AU says that YA5XX (14,300) was really in Afghanistan—using 6 watts from automobile vibrator power supply .. .. .. And W2GW adds dope on the ST gang. ST2WF was legit up to November, 1936, but phoney after that. Since November, 1936, the active stations have been ST2BN, ST2CM, ST2LR and ST6KR. 2BN and 2LR are now cancelled, and 2CM is leaving for SU, ZC6 or VQ4, which leaves only ST6KR (14,425–14,300 T9) .. .. .. W2DSV heard ZK1AA (14,130 T9x) during a peculiar magnetic disturbance on Sept. 14, at noon .. .. .. W9RBI says VK9XX (whom we were suspicious of) was VK2XK, who flew to New Guinea and is now back in Australia. So we weren't so smart .. .. .. W4BPD and W5VV report hearing FU8AA on 14,330 and W2BHW worked him when he was on 14,410, T8c .. .. .. W2AAL and W6ONG report working MX3A (14,300–14,380 T8). QSL care M.A.R.L., Box 30, Shinkyo, Manchukuo .. .. .. W6ITH has some dope on the Pacific islanders, via K6BAZ. K6DSF (7190) is on Howland, K6NVJ (7185) is on Jarvis, K6HCO (7170) is on Enderbury, K6JEG (7015) is on Baker,. and K6ODC (8100 'phone) and VR2FF (14,400) are on Canton .. .. .. W1APA says that NY1AB is operating at Cape Mala, Panama, so if you work him now you might not need to put in a modulator for HP1A (14,280 'phone). The address is NY1AB, J. C. Blume, U. S. Naval Station, Cape Mala, Panama, but you should QSL to the Balboa Call Book address .. .. .. From W9RBI, we have the address of TG9BA (14,000 'phone) as Walter Bay, Chalet Krolij, Guatemala City, Guatemala. We'd suggest you send the card undercover with no mention of radio (which means his call) on the envelope .. .. .. W6EJA says that W6ACM-K7 (7100) is on the Geodetic Survey ship *Pioneer* and does

most of his operating anchored in Dutch Harbor .. .. .. ZD4AB (14,340 T9) is still active, and has been blessing the lads with their first QSL from Gold Coast .. .. .. VE2EE got a couple of nice ones in FO8AC (14,405 T9) and VQ3HJP (14,410 T9) .. .. .. If you need Burma, look for XZ2KR (14,240 T8).

When:

Wonder of wonders, we got a 3.9 'phone DX report this month! It's a good one and might spur you on a bit. W9VBQ worked ZL2BN (3965 'phone) the other day at 6:15 A.M., good DX for Kansas and 150 watts .. .. .. With the winter season at the door, 80-meter DX should start to pick up, and any reports will be welcomed.

Ten looks mighty good about now. W2BHW worked VS7MB (28,185 T9), VQ3TOM (28,060 T7), and some LU, ZL, VK, ZE and ZS. This was on Sept. 10—Lindy could have had WAC in three hours but no Europeans came through .. .. .. W6ITH has been working ZS's on 10 'phone and hearing CN8AV and a flock of Europeans.

W8AU came through with a nice letter this month, and mentions working VQ2PL (14,420 T9x) and OY1AA (14,380 T9) among others .. .. .. Some of the better stuff worked at W4BPD includes VK4KC (14,375 T9), XU8NR (14,325 T7), CR7AF (14,260 T9), VQ3TOM (14,075 T7) and VQ2MI (14,345 T9). Heard were FM8AA (14,260 T8), VU2FC (14,285 T8) and VS7JW (14,145 T9) .. .. .. On 'phone, W6ITH gives some good tips about CR7AK (14,080, 14,320), VK4HN (14,385) in Papau, VK7CL (14,070), FA3HC (14,120) and VP7NS (14,110). Reg says the KA 'phones come through from 11 P.M. to 10 A.M. out that way .. .. .. From W9RBI, VU2LK (14,030 T9), CP1AA (14,420 T9), ZD2H (14,310 T9), VP4TK (14,060 'phone) and CX2AK (14,080 'phone) .. .. ..W2GTZ has PK3EM (14,340 T9), VS6AO (14,335 T9), VS7RP (14,260 T9), PK6XX (14,010 'phone and c.w.), XU7CK (14,350 T9), PZ1AB (14,460 T5) and UX1CP (14,010 T9) .. .. .. Texas' favored son, W5VV, keeps himself occupied and without an alibi by working VP8AD (14,300 T7) .. .. .. W9EGQ has XU6TL (14,395 T9), KA1AP (14,350 T9), KA1FG (14,385 T8) and XU6AW (14,430 T7) .. .. .. W3AOO has some nice ones, what with VS7GJ (14,120), J8CD (14,410), XU7CY (14,365), J8CG (14,410), OX7OU (14,015), PK1BO (14,400) and HR1UZ (14,440) .. .. .. W2CYS is always good for some juicy ones, and this month's include VR2FR (14,375 T8), G5UG-P (14,410 T9), portable on the Isle of Man, VR1AB (14,245 T9), PK3AA (14,350 T9), XU8ZX (14,325 T8) and XU6ST (14,420 T7) .. .. .. W1KKS adds U5HD (14,310 T6), YM4AU (14,340 T8) and CT2BC (14,310 T9) .. .. .. W6MX has PJ1BV (14,400 T7) LA6G (14,300 T9), HA3H (14,405 T9) and TG2AC (14,410 T9) .. .. .. W2BHW takes his DX seriously and when he isn't burning himself out in the VK/ZL fracas, manages to grab VS2AL (14,385 T7), PK1TM (14,205 T9) and KA1RP (14,330 T9), and hear VS7RA (14,090 T9) at 1:30 P.M., VU2EU (14,335 T9) at 2 P.M., VU2FZ (14,300 T8) and XU6LN (14,080 T8) .. .. .. W6JMR has been making a lot of apple cider lately, which may or may not account for FA8RY (14,380 T9) and FT4AG (14,415 T8) .. .. .. W9WJD got XU8CM (14,280 T9), LY1KK (14,380 T8), J5CC (14,310 T7), and heard EP5SO (14,010 T6). He arches an eyebrow at that last one, however .. .. .. W1BGY worked VS2AE (14,380 T9), ZB1R (14,320 T9), and heard CN1AA (14,350 T7) and KA1BC (14,300 T9) .. .. .. To wind it up, W2CTO worked ZE1JM (14,310 T8), and W2CHK worked CN1AF (14,280 'phone, also c.w.).

What:

W6CUH was up this way a few weeks ago and, oddly enough, the talk turned to DX, for about three days. We were bemoaning the fact that the signal reports don't mean much these days because, although the system is quite sound, you give a DX station a good report even though he's weak because you don't want to hurt his feelings and jeopardize your chances of a card or something. It was decided that, as far as reports go, a DX man is interested in how his signals *compare* with others coming from the same general area. This immediately brought forth the suggestion of a comparison or "C" report, to go along with RST. It would work quite simply: just tack on at the end of the report another number (from 1 to 9) showing how the signals stand in comparison with others from that part of the world. For example, now if you get a 339 report from somewhere you figure your antenna is down or something, but if you were to get RST 339 C9 it would mean that you were as loud as anyone from your part of the world. You'd feel better, and still know enough about the actual strength of your signal at the other end to operate accordingly.

Arriving at the value of the report would be fairly simple. Ordinarily you listen around a bit before making any calls, and thus you establish the general level of signals coming through at the time. Suppose the Asians are coming through, and the loudest one is S6 (honest, not a DX S6!). Then, when you work an Asian, if he's S6 you give him C9, if he's S5 you give him C8, if he's S4 you give him C7, etc. It immediately tells the Asian that the loudest Asian at that time is S6, and how he compares. On the other hand, VK's might be up to S9 at the same time, and an S6 VK would receive a report of C6.

We talked about it a lot, and it sounded like a good idea. It's easy to do, doesn't change any existing system, could be dropped in contests if desirable, and only entails the slight additional effort of listening around a bit to get a line on conditions. "QC?" was suggested as a signal to use in asking for the comparison.

Your suggestions and criticism would be appreciated.

Who:

The straight dope on YI2BA (14,315) is contained in a letter to W4DSY from Eddie Behnan, who has taken over YI2BA from Mellon. Mellon, plenty busy with airport duties, just didn't have time to QSL everyone, and had to give it up. He then left on leave and Behnan took over. He's trying to catch up with the cards, and asks your patience. The address is still YI2BA, Port Directorate, Margil, Basrah, Iraq .. .. .. If you're looking for Maine for your WAS, W1BFA (14,385, 14,256) will be glad to help you out .. .. .. G2ZQ, who runs second only to G6WY in a DX way, bemoans the fact that all the DX seems to be using only the high-frequency end of 20, and would like to see the boys divide their activity a bit more. How about it? .. .. .. From an unimpeachable source, we learn that HH4AS (c.w.) and HH2B ('phone) are the only Haiti stations that QSL these days .. .. .. That was straight dope about ZC6NX being ex-G5KW. He'll be on again soon, in Egypt, signing SU5KW. W1GNE set us right on this one .. .. .. W1BGY assures us that the QSL Bureau went safely through Helen Highwater, and to note that OE cards are coming through, via the D.A.S.D. bureau .. .. .. W6KIP says that K6NVJ (7190) had only a few QSL's out there on Jarvis, but he'll QSL everyone when he returns to Hawaii in December .. .. .. W8ACY-8 worked G2MI, signed, and called CQ three times. G3MI called him, making QSO's with 2MI and 3MI within two minutes apart. He thought he was copying wrong, or something! .. .. .. W9BMM passes it along that ZB1R wants Iowa for WAS—OZ4H only needs a card from W6AJP in Nevada for his .. .. .. VO3X has been working a nice lot of Asians lately, and wonders how many countries a fellow has to work to get 100 confirmations .. .. .. VE3QB, VE3 QSL Manager, is taking a crack at DX, and opens with VP1BA (14,410) .. .. .. W6ITH says Andrew Young at VR6AY said the other night, "The last ship brought 5000 letters from hams and SWL's. Will answer on I.R.C. but it helps much to have a self-addressed, stamped envelope stamped with a one pence New Zealand stamp. The envelope should not be smaller than 4½" x 6". (Jeeves, cancel that order we had for a desert island.) .. .. .. Maybe we make too much of this DX stuff. It's a pipe. For example, W1KGW worked a VK and started boobing W1KGH because KGH had never worked any DX. So KGH got an alarm clock and another crystal, and next five mornings had one QSO each morning: VK, VK, VK, ZL, VS2AE! W1KGW now has an alarm clock, another crystal, and an ear out for an Asian

. . . . . A swell letter from the XYL at W5FYZ tells how the whole family is radio-minded; OM, XYL and son at Texas Tech. They do all right too, what with AR8PK (14,425 T9) YS1BC (14,420 T9), CN8AJ (14,330 T7), ZD4AB, VR4AD (14,305 T9) and PK1MF (14,340 T9) . . . . . D4BIU, doing research at Brown U., thinks that call we suggested last month should have been "PH1Y" . . . . . Nomination for finest amateur of 1938: VP7NT. The reason: his card put us right smack into the Century Club. Yippee!

WAC and WAS:

W1KOM received his WAC the other day, which wouldn't be especially interesting if W1KOM wasn't Fred Elser and this is his second WAC. His first was from op3AA (KA3AA to you young squirts) in June, 1926, the ninth one issued . . . . . The first Alaskan 'phone WAC goes to K7FBE at Unalaska . . . . . W6IWS made his 'phone WAC with less than 45 watts input—24 countries have been worked on 'phone.

G5BJ got the first WAS in Great Britain recently, G6QS the second. The only other European WAS is OE3AH, received some time ago.

—*W1JPE*

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First Eastern DX Round-Up

Bridgeport, Conn., Nov. 5

THE Bridgeport Amateur Radio Association announces the first eastern "DX Round-Up," to be held Saturday evening, November 5th, at 8 P.M., in the B.A.R.A. clubrooms, Liberty Building, 945 Main Street, Bridgeport. The Round-Up is intended to give the eastern DX gang a chance to get acquainted and have a nice little chin-fling about everything pertaining to the latest Paris styles. Tommy Thomas, W2UK, will be present and *may* tell how to smash all DX Contest records. Lew Bellem, W1BES, will bring movies of Pitcairn and the story of VR6AY. If possible, Hugo Romander, W2NB, will attend to discuss antennas. A number of Century Club members have already signified their intention of coming.

DX men from Boston to New Jersey are making plans to get there. For out-of-towners with lean purses, the Bridgeport club members are arranging for gratis sleeping accommodations, in case anyone decides to go to bed. A nominal charge of 25 cents will be made, to cover the coffee and doughnuts to be served. All DX-minded hams are cordially invited—no others need apply.

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O.B.S.

The following is a supplement to the list of A.R.R.L. Official Broadcasting Stations in October *QST* (page 71): W1AQL, W1KON, W1WR, W3BIW, W3DNU, W3UVA, W4BJF, W4DHG, W4DSY, W4MS, W5CIQ, W5TO, W6BF, W6CFN, W6DHS, W6GTM, W6KNZ, W6ZM, W7FPN, W8IBR, W8NW, W9CWW, W9EDW, W9GY, W9YQN, VE3PL.

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Hams Afloat

The U.S.S. *Texas* lifted anchor at Philadelphia, Pa. on September 10 bound for Guantanamo Bay, Cuba, with the following Naval Communication Reservists aboard: W1HOU, W2AOS, W3FVD, GYA, QL, ESS, EYT, DLJ, GKP, CPM, ID, EZ, CMV, HAT, HIV, ECN, EHZ, SB, HIT, EO, FPA, W4DMV, W8BLL, GVT, OFO, MKQ, EFA, QBK, NZR, FQL, LBO, QFR, NQQ and CVS. After four days at sea the ship was anchored in Guantanamo Bay. Liberty was granted for the next two days and the men had the opportunity to visit Guantanamo City. Enroute home there were thrills for all when the ship rode through the hurricane which swept up the Atlantic seaboard causing much damage in New England. All types of drills were simulated giving experience in case of an emergency. Watches and circuits were rotated among the radiomen thereby giving them much schooling in Naval operating procedure. The *Texas* docked at the Philadelphia Navy Yard on September 23, completing the training duty period for the Reservists for another year. . . . The following amateurs are attending the radio school of the U. S. Coast Guard at New London, Conn.: W1GVN and W8NAZ, assigned to U.S.S. *Cayuga;* W3HCE, Floyd Bennett Field; W2LCK, U.S.S. *Algonquin;* W1IRZ, U.S.S. *Commanche;* W2HSB and W8QQQ, U.S.S. *Mohawk.* . . . W5AGG is Sparks on the S.S. *Elwood.* . . . W5ADZ pounds brass on the S.S. *Republic*, KUBS, coastwise to Baltimore, etc. . . . W8CLL was operator for the fourth consecutive year on the Tug *Sulphite*, KENQ, on the Great Lakes. . . . W9LNX signs KOGP on the S.S. *Hadnot;* the equipment consists of a 1 kw. spark transmitter and a 50 watt tube rig; the receiver is a new 4-tube metal tube t.r.f. long-wave job supplanted by LNX's March *QST* short-wave super. . . . Radiomen on the U.S.S. *Ranger* with station at San Diego are W6OLU, W6NMZ, W8JAW, W6MRE, W6PPN, W1DDL, W6PXY, W6OLI and W6PJN. . . . Recent assignments of W4EBP have included NDU, NIRF, LEMZ, VPRJ and VQNS. . . .

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Briefs

W4DSU, Concord, N. C., worked W1AFA, Norway, Maine, on Labor Day (4:53 P.M.—14 mc.) with no antenna on the rig ('47 crystal, pair '46's amp., 15 watts input). Take down the antennae, fellows, we don't need 'em any more! Hi.

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"Radio Amateurs Foil Drug Store Burglary," reads a headline in the *Milwaukee Sentinel*. W9EYH was QSO W9VZJ (both operators in Milwaukee) one morning about 3:00 A.M. The contact was interrupted by a neighbor coming to tell EYH that a burglary was being attempted in a nearby drug store. EYH promptly asked W9VZJ to notify the police, who were very shortly on the scene.

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Alaska

Alaska is one place where amateur radio is really appreciated. K7BOE recites a typical example of the extreme usefulness of ham radio there: "The out-going mail from here (Pilot Point) to Anchorage was nine days getting out this time, because at Egegik, 50 miles north of here, the pilot blew out a cylinder. Luckily there is an amateur radio station there—K7EZE, Mrs. Williams, the U. S. Government teacher's wife. Soon a plane with two mechanics was on the way there from Anchorage. (Our son Virgil, K7BND, is the operator of KIKV, Anchorage.) But the mechanics and the pilot couldn't repair the engine there, so the head pilot of the Star Air Service had to come with a new engine, and take part of the regular pilot's load of mail and passengers. When the head pilot landed about fifty miles further north at Koggiung he cracked off a ski. But luckily again, that is where K7EMV is postmaster and second winterman. I give weather reports every morning for the benefit of the planes to K7BND, my son, who has schedules three times daily with stations here in the village, K7BOE, K7EMU and K7FMM. The amateurs all up and down Bristol Bay as well as stations to the westward all give daily weather reports. K7FAD, the territorial teacher at Naknek, gives weather from there. So you see amateur radio does its part here in Alaska. If all the emergency work they have done, saving lives, etc., was written, it would make a good sized book alone." Here is one for city "cliff dwellers" to read (and then weep): Says K7FDW, "Am located one hundred miles N.E. of Fairbanks and my nearest neighbor is *sixty miles*. . . . I built a little rig, 12 watts, and reach nearly around the globe . . . right now our daylight begins about 9:30 A.M. and ends at 2:30 P.M. so we get plenty of time to operate the rig." Yep, Alaska is *some* place for amateur radio!

Station Activities on page 100

CORRESPONDENCE

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Citizen Radio

Port Wing, Wis.

Editor, *QST:*

I am suggesting the A.R.R.L.'s interfering in something entirely out of its line of business because, as far as I know, no one else is capable and interested.

I believe that the Federal government should assume a much more open policy towards the private use of non-commercial non-amateur radio on the ultra-high frequencies, and permit non-licensed operators to use sealed, fixed-tuned transmitters, possibly with state jurisdiction, much as automobiles are licensed.

While this would not be an amateur activity, amateurs would be benefited because they are qualified as service men and technicians on small transmitters.

There is a need for low-power portable u.h.f. rigs which is not filled by commercial, experimental or amateur licenses, especially in radio-autohorns, radio model control, intercommunication between salesmen and truck drivers and the home office, and between small-town fire and police departments that cannot afford an operator, plus many other uses.

—*Herbert Brooks, W9SDG*

Something Wrong Somewhere

Providence, R. I.

Editor, *QST:*

I was on five-meter 'phone from 1929 to 1934, and then dropped out of the game. I have been back into it for three weeks now, operating mostly 80 c.w.

I was having a last QSO before pounding the pillow instead of the brass, with a new ham in northern New England. He asked me to QSP to Boston—so I kindly agreed. Since he started to spell the street number, and changed to figures, I asked, "Pse rpt street number." He obliged with the state. I tried again, at about 7 per, and got the message number. The next time it was the CK. I finally got the address OK, and sent "CQ CQ Boston" five times, signed, and listened. I repeated this for an hour, and was rewarded with an S7 sig—calling from Annapolis to tell me my 6L6 was 599x down there! So I tried for a half hour more, without result and decided on one last try before QRT, deciding there was skip on, and succeeded in raising a 347 call—from White Plains, this time. Thinking he might have a sked with Boston, I asked him "QSP Boston" and got the amazing answer that his rig was built so-and-so and how he was doing, and sorry, but his rig was not reliable enough to relay with!

I threw the switch and went to bed.

I can understand a youngster hating to say QRS, but what sort of periodic deafness afflicts those who answer directional calls without noticing the direction?

—*Chester H. Page, W1CHP*

Movies and Hams

102 W. 3rd Ave., Lexington, N. C.

Editor, *QST:*

I recently attended the motion picture "Love Finds Andy Hardy" in which there is a scene showing an amateur radio station being used to get a message through to a point where there was no regular telegraph or other fast means of communication. I think scenes of this type are beneficial to amateur radio. However, I think that in such cases it would be well if a typical modern station were shown instead of the "rig" shown in this picture. I do not mean that one of the commercial looking jobs should be used but I do think that a neat job of some kind would be in order. Of more importance than the rig used is this: Correct A.R.R.L. procedure should be used in all cases. In the picture referred to the procedure was very badly bungled up. (However, I must admit that some members of our fraternity do more damage over the air than the picture will ever do!)

I should think it would be wise for the A.R.R.L. to discuss this matter with the moving picture producers in an effort to get them to show typical stations and operation procedure. It might be wise for the A.R.R.L. to furnish them with quite a bit of dope on the subject and to offer any assistance that the League may be able to give in order to produce true-to-life scenes on amateur radio.

—*William C. Harris, W4WX-W4NC*

Convention BC

Cando, Sask., Canada

Editor, *QST*:

It has been with the greatest pleasure that I have listened to the first National convention of the A.R.R.L. for fifteen years, as brought to me via N.B.C. and KFYR. You have no idea what this fifteen-minute broadcast meant to the amateurs in Canada and other parts of the world who were unable to get to the convention. Had I known of the convention six months earlier I believe I could have made it.

This short note is to express my thanks for the broadcast, and to express the thanks of pal VE4OQ, whom I telephoned thirty miles long distance telephone that he could grab a radio and tune in the broadcast. Many thanks and success to the convention!

—*Howard Walker, VE4BN*

Against Periodic Re-Exams

56 Pearl St., Gardner, Mass.

Editor, *QST*:

In regard to W3BYF's letter last month I would like to question the so-called "accomplishments" to be gained by re-examinations for every renewal. I'll take each "accomplishment" in order.

1. (Making the boys remember the code)

In the first place I doubt if there are any licensed operators to-day who haven't passed a code test. In the second place why is code proficiency so darned important? During most of the emergency operating in the last few years 'phone played as high if not a higher part than code. In case of emergency, 'phone has the decided advantage of being able to be copied by millions of S.W.L.'s throughout the country.

Let us admit that code proficiency is desirable. There are very few 'phone men who couldn't pass a code test to-morrow, and if given a week or so to brush up the percentage of failures would be practically nil.

2. (Thinning the ranks of "dabblers")

This is a rather absurd argument. After all if they are only slightly interested they certainly won't be on the air much and won't be bothering anyone. What harm is it doing anyone for a fellow to hold an operator's license and use it only occasionally?

3. (Getting rid of those guys who never took their exam)

Apparently W3BYF has heard from someone about the old class "C" mail order licenses that didn't require a personal exam, but he has failed to hear about the complete personal examination of all these old timers that took place several years ago. All the holders of those old licenses had to travel to examination points and take regular personal exams on both code and theory.

So, who are these mythical operators who never took an exam, unless W3BYF is referring to a small percentage of fellows who are physically unable to journey to examining points?

In many cases the only enjoyment these unfortunates have is in operating amateur sets and I see no point in persecuting them.

4. (Getting rid of the old timers)

Well, it looks as though another "purge" has started. All the old timers who have helped open up the new bands (I can remember when 20 meters was considered extremely high frequency) are to be thrown out on their respective ears, unless they study night and day to keep up to every latest development.

The privilege of holding a radio operator's license means a lot to most of these old timers and seems a small reward for their years of splendid work when their outfits were probably a lot more up-to-date at that time than yours may be now. So now, disregarding their years of experience you want to push them out in the cold if they happen to slip a little on modern theory, and take away their right to push a key occasionally.

5. (Making W3BYF darn unpopular)

Well you have me on this one. Here's one accomplishment that would undoubtedly take place.

The F.C.C. is doing a splendid job of handling the present flood of new applicants without dumping the whole lot on their shoulders for re-examination. I wonder if W3BYF realizes the tremendous amount of work involved? . . .

If the F.C.C. has any extra time to be devoted to charring up the amateur bands wouldn't it be much better to maintain additional monitoring stations on the amateur bands, and instead of sending out tickets, send out compulsory "invitations" to special exams to those amateurs whose operating ability appears questionable? . . .

—*Gordon V. N. Wiley, W1AUN*

Order of the Boiled Owl

Whiting, Ind.

Editor, *QST*:

I wonder how many of the old timers can remember 'way back when we used to proudly display the letters "B.O." on our cards (no wise cracks). I don't remember just when that grand old order passed away, but for the benefit of these young squirts and a lot of the old heads I think it would be a noble idea to resurrect the "B.O." I suggest that A.R.R.L. issue a certificate to those that qualify, a small one the size of a QSL card.

"B.O." stands for Boiled Owl, and in order to become such a magnificent bird it is necessary to spend an entire night pounding brass—from dark until sun-up, chewing rag, working DX, traffic, 'phone or c.w. . . . A copy of the log sheet should be sent to *QST* as evidence whereupon the "B.O." card would be sent out. . . .

—*Amos Utterback, W9FB*

Appreciation

Cleveland, Ohio

Editor, *QST*:

Will you kindly express through your columns the sincere thanks of the radio amateurs who operated at the National Air Races to the amateurs in Cleveland and vicinity for the perfect coöperation given in eliminating QRM to the low-powered portable 160-meter 'phones. This coöperation is deeply appreciated and we hope every amateur who coöperated will be able to receive our thanks through *QST*.

Joseph H. Pitzer, W8AXV
Chief of Pylon Communication

Recommended Reading

4463 Melrose Ave., Montreal, P. Q., Canada

Editor, *QST*:

. . . Last winter, I bought a book that I found especially valuable. It is "Mathematics for the Million" by an Englishman, Lancelot Hogben, F.R.S., published by W. W. Norton & Co., Inc., of New York.

The book treats algebra, trigonometry, geometry, spherical trigonometry, graphs and calculus in a most elementary manner. As far as I am concerned, it was most useful. The treatment is more by reason than elaborate mathematical proof. Yet all the elements necessary for a reasonable understanding are contained therein.

The reason I am writing you about it is that I think it a very valuable book for any ham to possess. I used the calculations for spherical trigonometry to calculate the direction of an antenna. . . .

—*W. Alan Lunan, VO6L/VE2NY*

No Phoney

W2CQB/Mobile aboard S.S. *Pan-Kraft*, Georgetown, S.C.

Editor, *QST*:

During the past several months my station has been operating portable-mobile aboard the S.S. *Pan-Kraft* on the 28-Mc. band with 9 watts, crystal controlled. However, when I sign that I am aboard ship, many of the operators answering seem to believe that the station and call are

(*Continued on page 76*)

MOST of the men who design National's products are amateurs, which is one reason why they meet amateur problems so squarely. Nevertheless, when we present a new product there are usually a number of amateurs who are very surprised at the design. They tell us they would never have gone about it that way.

There is a very simple reason for this. When an amateur designs a piece of equipment, he wishes to have it work as soon as it is assembled and adjusted. After all, it is not much fun to have to go back to the beginning and do the job over. At National, on the other hand, we do not care very much how long we work on a design. We are quite willing to spend six extra months building six extra models (and often do) if we think we can find a way to give more performance for less of the customers money.

This makes a lot of difference in the result. And to show how it does, we are going to comment on a typical design — the NTX-30 transmitter. This is appearing on the market just about now, and we expect to see raised eyebrows any minute.

The story really goes back to the NTE Exciter, because in designing the NTE we planned to use the same exciter system for the NTX-30. This involved no compromise, and had the great advantage of spreading the cost of tools. This made it possible to build a special push switch of low-loss design, for instance, without having it add too much to the cost of either unit.

The NTX-30, then started with the NTE. The exciter and power supply were there, and there was room on the chassis for the output stage, and space on the panel for controls. We wanted 30 watts of harmonic-free output, and we wanted to get it the most economical way. After much experimenting, the choice limited itself to one of three things. We could use a single 807 operating at high plate voltage. Or we could use two 6L6G's in push-pull or in parallel.

Most amateurs would have chosen the 807, partly because it is comparatively sure-fire, and partly because high voltages are favored for efficiency. We decided against it, partly because the improvement in efficiency is apt to be in large part imaginary, much of the extra power being in the form of harmonics, due to the high L/C ratio required. Also, the low plate impedance of 6L6's made it possible to maintain full output down to 10 meters. As a matter of fact, the efficiency of the 6L6's was not at all bad, being over 60% even on 10 meters. In this particular case, the 6L6's are actually cheaper also, because the extra tube cost is more than offset by the elimination of a separate high voltage filter.

In the remaining choice — push-pull versus parallel — we also went counter to usual amateur practice. Amateurs avoid operating tubes in parallel because they are considered almost impossible to neutralize and because they are prone to parasitic oscillations. However, experiment showed that both difficulties could be avoided by careful layout and attention to details.

Such being the case, parallel seemed better than push-pull, for the latter required an additional tuned input circuit. This would have made band shifting less convenient, as well as adding to the cost.

The trouble with trying to tell a story like this on one page is that so much has to be left out. It does not give a true picture of the work involved. However, it does illustrate the point that we wanted to make — that with lots of time and good equipment, one can often hew a short cut through the woods instead of going the long way around by the highway.

JAMES MILLEN

Correspondence Department

(Continued from page 74)

phoney, and possibly some stations don't call for the same reason. If space permits, I would appreciate a short note to the effect that this station is perfectly legal in every way and that I will QSL every card that is sent to my QRA as listed in the call book. . . .

—*Robert Brandt, W2CQB*

Amateur Radio Bests Catastrophe

(Continued from page 18)

instead of "QRR" for his emergency call—an object lesson for those *outside* emergency zone who still persist in using "QRR" for incoming traffic. In addition to providing press, etc., he made personal check ups on road conditions for the information of officials.

W1GNF of Windsor, aided by W1AHN, W1ERJ and W1JHK, served the power company chiefly, but handled flood levels and WU traffic as well. Duplicating his performance in the 1936 flood, W1EMQ at White River Junction provided valuable river and weather reports.

Up in St. Johnsbury, W1CBW, aided by W1JLF and W1JMO, served the State Police in various ways. W1KIE was on there, too, as was W1JLF at his own station. W1KTB, Lyndon Center, and W1KOO, Orleans, were active, the latter handling traffic for Western Union and the telephone company.

In Morrisville, W1KJG (assisted by W1KUY), W1JRU and W1QG were given the assignment by United Farmers of locating routes for milk shipments to Boston. The milk went via Montreal and Sherbrooke, but it got there!

In Burlington, W1JVS found opportunity to be of service to the city as well as to students at the local university. W1BNS, Fair Haven, was called on by the airports, Western Union, railroad, etc.

Other stations reported active in Vermont include W1GQJ and W1KWB in East Barnet; W1KNC, North Bennington, W1BJP, Newport; W1JVT, Hardwicke; W1EZ, Pownal; and W1AAJ, W1APV, W1FSV, W1GAN and W1GAZ in Rutland.

Crossing over into New Hampshire, W1KIN, Hudson, was on the air within two hours after the storm hit, using a battery rig. Town officials and the American Legion used the station.

Over in Peterborough W1KPL telephoned flood warnings to various amateurs in the state early Wednesday morning, then continued the warnings by 56-Mc. mobile from Monadnock until the hurricane drove him down. W1GDE brought a portable into town, set up at W1KPL's location, and, aided by W1HXJ, handled much official traffic over a week's period.

W1CVF built up a traffic total of 452 in four days of continuous operation at Keene. The station was powered from a truck fitted with generating equipment. All agencies were served, notably the National Guard.

With two or three masts gone and power off, W1APK at Pembroke went on with the auxiliary battery rig. Aided by W1IJB, about 150 mes-

sages were handled, among them United Press dispatches, WU telegrams, state highway road reports and all State Police messages—including the ones closing all liquor stores in the state!

W1DMD-W1BFT served as key station in the New Hampshire Emergency Net, from Concord, with W1LIN, W1JCA, W1AWU, W1HOV, W1JJD and W1FTJ as assisting operators. A total of 334 messages was handled, 163 of them being for twenty-three official and business agencies—government departments, etc.

W4F1R/1 was at the Alpine Hotel at Bethlehem, N. H., found opportunity to aid Western Union and the local citizenry, aided by W2DKM who was also at the hotel.

Amateur radio in New Hampshire did a bang-up job during this emergency—and a genuine emergency it was, too. Certainly their performance this year overshadowed that of 1936. Much of the credit for this goes to the N. H. Emergency Net. On its roster of active stations were W1JGI, North Conway; W1KLV, Littleton; W1GDE, Manchester; W1GHT, Nashua; W1AXL, Claremont (on with a 201-A and dry batteries); W1FFL, Manchester; W1AYH, Milford; W1BAC, Alexandria; W1DUK, Rochester; W1AEF, Hampton; W1CVF, Keene; W1EDN, Glencliff; W1FX, Laconia; W1HQE, Nashua; W1IJB, Suncook; W1APK, Pembroke; W1KKL, Franklin; W1CME, Manchester, and W1AAJ, Rutland.

W1KKL in Franklin turned in a traffic total of 109 in 67 hours, 30 per cent of which was official. W1CEH, Pittsburg, at the headwaters of the Connecticut, was on with a 6L6 and put 75-meter 'phone signals into Connecticut. Stations reported at other points include W1HUD, Sunapee; W1JNO/1 Laconia; W1BCP, Dover; W1CME, W1FFL, W1ICS, and W1KKS, Manchester; W1ANS and W1HGV, Milford; W1GHT and W1KIN, Hudson; W1GMD, Berlin; W1BAC, Claremont; W1LID and W1TA, Nashua; W1CCM, Center; and W1HRP, Hampton Beach.

Turning now to Maine, at North Berwick W1BFA operated on *all* bands during the emergency, found all useful but 10 and 20 less so than others. The hurricane demolished wire service in the region and all agencies were served. W1FBJ in Portland served Vermont stations well. W1GE and W1CPT were also reported on in Portland, as were W1HSE, and W1BNC, Waterville; W1BKN, Houlton; W1BWB, Kennebunk (battery-powered); W1KYT, Lisbon Falls; W1LEV, Bangor; W1IBR, Easton; W1FAP, Old Orchard Beach; W1INW, Lewiston; W1GOJ, Falmouth Foreside; W1IWA, Orono; W1IJF, Augusta; W1LIC, Bar Harbor; W1ITU, Livermore Falls, and W1IST, Rumford.

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Throughout the eastern half of the country, amateurs generally coöperated during the emergency, if only by standing by to avoid causing QRM. Despite a few notable exceptions, the bands were exceptionally quiet and QRM

was at a minimum. At no time did it seem necessary to seek special emergency quiet hours. The ham fraternity as a whole showed a sportsmanlike willingness to coöperate with the stations actually doing emergency work.

The following stations have been cited for active participation in emergency activities: W2ACB, AMX, BIG, BNU, BXC/WLNF, CBO, CDU, CGG, CMI, CQD, DSV, EOA-HXQ (700 messages), FK, GSB, GVZ, HB, HNP, HQL/WLNR, HZY, IIR, IJG, IKV, IM, IWU, JDJ, JIO, JMX, JUC, JZR, KFB, KHA, KNQ, KOI, KYH, LA, LBB, LDB, LFJ, LMC, LV, RW, SQ, UL, W3ADE, ADM, AFH, BDU, BEI, BES, BMC, BPD, BPT, BSO, CFK, CRO, CRW, CXL/WLM, DD, DNU, DUK, ECP, EDC, EML, EOG, EUD, EUG, EVA, EWF, FBM, FDY, FMF, FPU, FZ/WLMP, GIX, GKN, GNU, GPM, GXI, GXO, GZK, HCG, HDJ, HDQ, HLV, HLY, JC, LP, MX, NF/WLML, QV, SN/WLQ, UA, UX, ZI, ZD, W4AHH, AYA, BM, CEL/4, FFH, FKY, OC, W5AFS, AGZ, AHK, BTE, CDU, DLP, W7FAF, W8AOR, AU, AVK, AXV, BBW, BFR, BQ, CHR, CL, CO, CSE/WLNM, CTX, DAE, DHO, EA, GCD, GMI, GMY, GWY, HHO, HJP, HYZ, IQE, JBO, JQE, KYJ, KNF, KUK, KVX, KW, KYR, MPX, NGC, NUG, NZQ, OKK, OPB, PLA, PWI, QAN, QBU, QIS, QNW, QUL, QVJ, QZR, REN, RGA, RNW, RRS, RWC, WA, WV, W9BQW, DCV, EMS, ESJ, GM, HG, JPS, KAD, MEL, MGN, MN, NLP, NYH, PJY, QG, SYJ, TLB, TRN, VDX, VMI, VMZ, YCR, YXD, WPS, ZEF, ZMG, ZOO, ZYY.

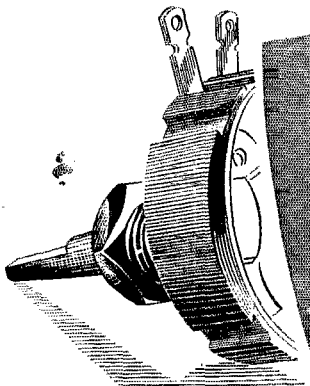
Combined Beat Oscillator

(Continued from page 31)

a large number of 6L7 tubes and no difficulty should be experienced. If, however, the tube refuses to oscillate, increase R_1. If the tube is microphonic, it is an indication that the oscillator is overcoupled and R_1 should be reduced. The automatic volume control circuit should preferably be grounded when receiving c.w. and the r.f. gain control used to control sensitivity.

C_1 should consist of a 0.001-μfd. mica condenser in parallel with a 400-800 $\mu\mu$fd. padder condenser. With the pitch control set half-way

Still THE SHORTEST PATH TO *Good Control*



STILL — through the years Servicemen are staying superbly satisfied with the smooth performance of Centralab's Standard Replacement control.

STILL — the shortest path to good volume control is this wall type resistor strip which hugs the inner circumference of the bakelite housing.

- Maximum resistor length for case diameter
- Close uniformity between resistors
- Accurate tapers
- Lower specific resistance and attendant low noise level
- Better power dissipation
- Longer life

As usual always available in standard and special replacement types.

The new 1938–39 Volume Control Guide (available at your jobber) lists thousands of recommended replacements for all current and older receivers.

Centralab

DIVISION OF GLOBE UNION, INC.
MILWAUKEE, WISCONSIN

in, the padder condenser is adjusted for zero beat with a signal tuned in. Be sure there is enough capacity to get to 155 kc. since the second sub-harmonic, 232½ kc. will not give satisfactory operation. If upon operating the pitch control, the beats are of equal intensity on either side of the zero beat, the b.f.o. frequency has been properly adjusted.

1938 DX Competition Results

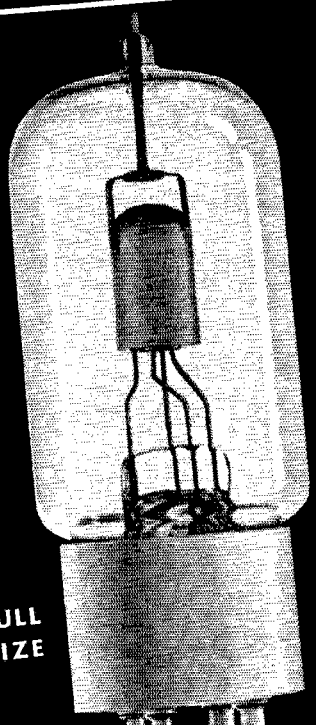
(Continued from page 45)

In addition to the above, club awards are being made to the following: W1BGY, Holyoke Amateur Radio Club; W2FSN, Raritan Valley Radio Club; W6FZL, 20–40 DX Club; W7LD, c.w., W7ESK, 'phone, Rho Epsilon Fraternity, Univ. of Wash.; W8IQS, c.w., W8QBO, 'phone, Genesee County Radio Club; W8LCO, Dayton Radio Amateur Association; VE2KS, c.w., VE2EE, 'phone, Montreal Amateur Radio Club. Awards are made only in clubs having three or more reporting participants.

MISCELLANY

A special hand is due the Southern California gang. That section of the United States experienced a serious flood just prior to the start of the contest, necessitating much emergency communication work and getting the boys off to a bad start in the competition. As W6AM puts it, "After being up almost all night and day with the flood, I was pretty tired to start on a DX test. I, like many others, gauge the year, as from DX test to DX test. One year it was an earthquake emergency, started two hours after the DX tests started, lasted for weeks. Another year it was being snowbound in the East, delayed me five days. I thought the flood was just another one of those things to spoil the DX week." . . . OK2LO found conditions best on the last day of the test, when he made 115 QSO's; not bad for an old pair of '45's either. . . . W4CYU worked 55 different countries on 'phone. . . . W8OKC started the contest true to form by working G6RB just as specified in the sample log in February *QST!* . . . Out of 977 QSO's K4KD added but one new state, Utah, to his W.A.S. list; and he worked 43 states during the contest at that. . . . Similar experiences while in quest of W.A.S. are recounted by numerous other contestants. . . . 7 Mc. was found generally FB and it has won many new boosters in the DX ranks. . . . W4CDG on 'phone made 63 contacts with stations in England proper, 73 contacts on the British Isles; 26 of these contacts were on 14 Mc. the first night of the contest. . . . Two operating complaints—from the W's and VE's: Foreign stations should indicate in what part of the band they are going to tune following a CQ . . . from the foreign contestants: W's and VE's should not call so long, especially in reply to a QRZ? . . . Nominations for extinction: (1) The chaps who tested incessantly without rhyme or reason; (2) the stations with the prehistoric notes. . . . OA4J receives the Peru award for the seventh year.

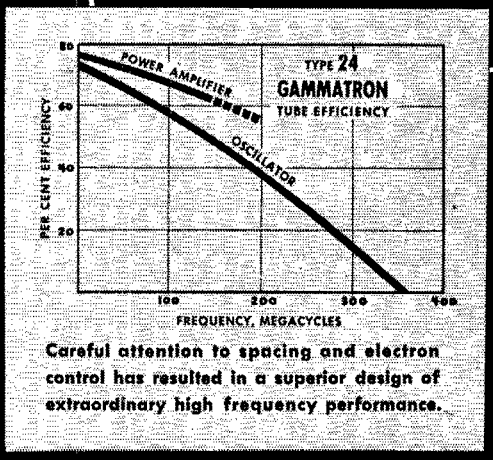
A NEW GAMMATRON SAVING



FULL SIZE

THE NEW TYPE 24 $3.50

For the first time a real low cost tantalum constructed tube is offered to the low power ham. Performance and quality is equivalent to the more expensive GAMMATRONS.



Careful attention to spacing and electron control has resulted in a superior design of extraordinary high frequency performance.

RATINGS

Power Output, watts	87.5
Plate Dissapation, watts	25
Driving Power, watts	3.8
Max. Plate Volts	1500
Max. Plate M. A.	75
Amplification Factor	25
Filament Volts	6.3
Filament Amps.	3.0

WRITE FOR DATA

HEINTZ AND KAUFMAN LTD
SOUTH SAN FRANCISCO CALIFORNIA U.S.A.

. . .Hint for working Asia: Says VU2FV, "I should like to make a comment about the operating of W/VE's. The sending was very good but the W's should come to India and hear the 'tails' they develop. Unless the signal concerned is quite strong, it is impossible to read at more than about 10 w.p.m. Perhaps this will be a help to W's and VE's wishing to work Asia in the next contest." . . . G6WY made 67 c.w. contacts with the States (one with VE1EA) on 3.5 Mc. . . . GI6TK made a four-band (including 3.5!) contact with W6GRL. . . . W6AM made W.A.C. daily for eight consecutive days. . . . Have you noticed how some of the lads use the same serial number year after year? W6JMR is superstitious that way; he sticks to 373, which adds up to 13! . . . Band-edge mania, the state of mind that causes everyone to crowd the edges of all bands, was as strong as ever. . . . More frequent use of the QMH-QML series would help that situation. . . .

Scores

Tenth International DX Competition

(Operator of the station first-listed in each Section and Country is winner for that territory, unless otherwise indicated. . . . Asterisks denote stations not entered in contest, reporting to assure credit for stations worked. . . . The multiplier used by each station in determining score is given with the score—in the case of W/VE entrants this is the total of the countries worked on each frequency band used; in the case of non-W/VE participants it is the total of the W/VE Districts worked on each frequency band. . . . The number of bands on which successful contacts were made is next listed. . . . The letters A, B and C approximate the power input to the final stage at each station; A indicates power up to and including 100 watts; B indicates over 100 watts, up to and including 500 watts; C indicates over 500 watts. . . . In cases where power is varied, this is shown by the use of more than one letter. . . . The total operating time to the nearest hour is given for each station and is the last figure following the score. . . . Example of listings: W3BES 75,864-119-4-B-83, or, Final Score, 75,864 multiplier 119, 4 frequency bands used, power over 100 watts, total operating time 83 hours. . . .)

ATLANTIC DIVISION

E. Pennsylvania

W3BES	75864-	119-4-	B-83
W3HIL	85644-	122-4-	B-90*
W3CHH	62604-	111-4-	C-70
W8OKC	32640-	80-3-	B-59
W3ENX	29646-	81-4-	B-46
W3AOJ	29106-	77-3-	BC-53
W3ASW	26988-	78-4-	B-71
W3KT	26424-	72-4-	B-77
W3CWU	24840-	72-3-	B-56
W3DPU	21045-	69-3-	C-55
W3ATR	20412-	63-3-	B-73
W3FRY	17384-	54-1-	BC-65
W3GIH	13260-	52-2-	B-47
W8FKO	13144-	53-4-	B-46
W3DDM	11205-	45-1-	C-73
W3CBK	11088-	48-3-	A-75
W3EYY	10850-	50-3-	B-37
W3FLH	10512-	48-2-	--45
W3FQG	8323-	41-2-	B-37
W3BQP	7585-	37-1-	B-65
W3DGM	6300-	36-4-	A-33
W3BYE	4930-	34-2-	A-37
W8MEH	4312-	28-1-	B-27
W3HFP	4123-	31-3-	A-59
W3AGV	3870-	30-4-	BC-33
W3GTL	3036-	22-2-	---
W3GMS	3024-	26-1-	B-35
W3BGD	2496-	26-2-	B-13
W3ANZ	2280-	20-1-	C-15
W3GKH	2140-	20-2-	A-44
W3GTV	1953-	21-1-	B-17
W3CVX	1664-	18-1-	--15
W3OP	1620-	18-1-	B-15
W3GYV	1520-	19-2-	A-
W3GDI	1350-	18-2-	B-16
W3GGT	1260-	15-1-	A-13
W3FPR	1200-	15-1-	B-25
W8DJI	672-	14-1-	B- -
W3CNP	462-	11-1-	C- 7
W8LAP	420-	10-2-	B-34
W3EBP	360-	10-1-	B- -
W3GRF	360-	9-2-	A- -
W3DGC	297-	9-2-	A- 9
W3EML	108-	6-1-	B- 4
W3EHZ	60-	6-1-	AB- 9
W3AJH	27-	3-1-	- - -
W8AZT		18-1-	B-13
W3AOC		12-2-	A-10

Md.-Del.-D. C.

W3BEN	44820-	90-3-	BC-85
W3GAU	30020-	79-3-	B-67
W3EPV	24276-	68-3-	B-61
W3APJ	20008-	61-2-	C-64
W3GKZ	15288-	56-3-	AB-62
W3GZH	13122-	54-2-	B-60
W3AYS	12600-	50-3-	B-40
W3GKN	10215-	45-2-	B-56
W3AOO	9720-	45-2-	B-43
W3GHB	7560-	35-1-	C- 7
W3CDG	7035-	35-2-	B-38
W3GXX	5594-	29-2-	A-39
W3DRD	5202-	51-4-	A-78
W3EEW	2544-	21-2-	A-52
W3GAD	2442-	22-1-	---

W3CIQ	2400-	20-1-	A-52	
W3EUJ	1326-	17-2-	B-10	
W3FRV	1170-	15-1-	B-10	
W3GBI	1125-	15-1-	A-19	
W3EKZ	855-	15-1-	C-48	
W3DKT*	576-	12-1-	- - -	
W3FSP	507-	13-2-	A-10	
W3WU	324-	9-1-	B- -	
W8JA-3	36-	3-1-	A- 4	
W3HBT	12-	2-1-	A- 2	
W3BVO	3-	1-1-	A-10	
W3DRE*	3-	1-1-	A- -	

So. New Jersey

W3PC	120690-	149-3-	C-86	
W3AIR	50787-	99-3-	B-57	
W3AIU	20601-	63-2-	B-64	
W3FAX	19630-	65-3-	B-69[2]	
W3GGL	16124-	58-3-	B-53	
W3BVE	13608-	54-2-	B-49	
W3EDP	10560-	44-1-	B-15	
W3FHY	9576-	42-1-	B-87	
W3AWH	6201-	39-4-	A-48	
W3AXU	5145-	35-2-	B-45	
W3CBR	2886-	26-3-	B-43	
W3AAE	900-	15-2-	- -37	
W3ZX	429-	11-1-	C-13	
W3BEI	238-	7-1-	- - -	
W3GHF	189-	77-1-	A- 4	
W3ECG		147-2-	A-35	
W3DBD*		3-1-	B- -	
W3ENZ*		3-1-	- - -	

W. New York

W8LUQ	56175-	107-3-	B-70	
W8AU	45885-	95-3-	B-95	
W8LDA	29184-	78-3-	B-54	
W8MCY	19068-	64-3-	- -81	
W8DSU	18942-	66-4-	C-48	
W8HJP	17934-	61-4-	BC-52	
W8DZC	17400-	58-3-	C-64	
W8CKY	14532-	53-2-	B-75	
W8DHH	13674-	53-3-	C-81	
W8CJJ	13461-	51-2-	C-52	
W8NQC	12789-	49-3-	A-38	
W8CZB	10682-	49-2-	BC-69	
W8JV	7904-	38-3-	A-30	
W8DXF	7548-	34-2-	B-64	
W8ACY-8	7289-	37-2-	AB-34	
W8CYT	6039-	33-2-	B-23	
W8BFG	6081-	28-2-	B-44	
W8LIW	5994-	37-3-	B-54	
W8FHO	5312-	32-2-	B-41	
W8OKE	3300-	25-1-	A-43	
W8EBR	2952-	24-1-	- - -	
W8GWZ	2664-	24-2-	C-24	
W8FYH	2574-	22-2-	B- -	
W8PCU*	2376-	22-1-	B-14	
W8QIR	2244-	22-2-	B-35	
W8KBS	1827-	21-3-	- -21	
W8ADG*	1794-	23-2-	B-44	
W8CWH	1782-	22-2-	B-38	
W8JIW	1596-	21-2-	A-42	
W8QKM	1530-	18-1-	A-38	
W8AAU	1320-	20-1-	B- 9	
W8PLR	1215-	15-1-	B- 7	
W8FMX*	756-	14-2-	- -15	
W8OMA	663-	13-2-	A-38	
W8EUY*	674-	16-1-	B- -	
W8CUY	576-	12-2-	- - -	
W8OXH	561-	11-1-	B-11	
W8PWU*	429-	10-3-	A- -	
W8GWT	333-	11-1-	- - -	
W8DHU	228-	12-2-	- - -	
W8LGO	210-	7-1-	A-48	
W8GWY	135-	9-1-	- - -	
W8BOX*	90-	5-1-	- - -	
W8AOR*	72-	4-1-	A-20	
W2JKN-8	54-	3-1-	A-12	
W8TC*	48-	4-1-	- - -	
W8LGV	27-	3-1-	B- 6	
W8QHX	27-	3-1-	A- 4	
W8CZP	12-	2-1-	A- 6	
W8RKA*	3-	1-1-	- - -	

W. Pennsylvania

W8JMP	36980-	86-3-	BC-83	
W8KTW	27360-	76-3-	AB-52	
W8DWV	25185-	73-2-	B-90	
W8HRD	9855-	45-3-	B-56	
W8LXS	8036-	41-3-	B-59	
W8CMK	7585-	41-3-	B-41	
W8DFH	5705-	35-1-	C-33	
W8CUG	4004-	28-2-	B-38	
W8BSF	3936-	32-2-	B-39	
W8CXX	2001-	23-2-	AB-23	
W8GTL*	1377-	17-1-	- - -	
W8GMH	1242-	17-1-	B-18	
W8MTY*	1152-	16-1-	- - -	
W8IYI	882-	14-1-	B-45	
W8KUN*	663-	13-1-	- - -	
W8NQL	300-	10-2-	B- 7	
W8EBJ	264-	8-1-	B- 3	
W8MTK	200-	8-1-	A-18	
W8KVR	180-	6-1-	B-22	
W8EYY	147-	7-2-	AB- 4	
W8CRK	88-	4-1-	A-18	
W8AJN	75-	5-1-	A- -	
W8PHD	48-	4-1-	- - -	

CENTRAL DIVISION

Illinois

W9LOJ	58644-	108-3-	- -89	
W9UQT	52326-	102-3-	C-84	
W9PST	46060-	94-3-	B-70	
W9GRV	14472-	96-3-	B-72	
W9PK	37152-	86-3-	BC-81	
W9DKU	32880-	80-2-	- -33	
W9IML	30414-	74-3-	B-76[3]	
W9GY	30310-	82-4-	B-87	
W9TH	29610-	76-3-	C-65	
W9FJB	23856-	71-3-	A-46	
W9HFK	21306-	67-3-	B-72	
W9OVU	21168-	63-2-	BC-69	
W9NST	18600-	62-3-	BC-60	
W9VIN	15045-	59-2-	A-75	
W9MUX	13284-	54-3-	B-68	
W9HLF	12699-	51-2-	C-54	
W9WLB	11100-	50-3-	A-50	
W9BU	11025-	49-2-	B-45	
W9ETP	10296-	44-2-	B-31	
W9BPU	10212-	46-3-	- -32	
W9FLH	7980-	42-3-	- - -	
W9PAE	7353-	43-3-	B-85	
W9ERU	5177-	31-2-	B-41	
W9CUH	3775-	25-1-	- - -	
W9NRB	3311-	27-1-	B-51	
W9TEG	3075-	25-2-	A-42	
W9WEN	2675-	25-3-	B-50	
W9WC	2592-	24-3-	B-16	
W9TGB	2016-	21-1-	B-39	
W9ISM	1806-	21-2-	B-39	
W9SGB	1728-	18-1-	A-48	
W9UXO	1532-	16-1-	B-20	
W9UTB	1530-	17-1-	B-33	
W9TSV*	1479-	17-1-	B-27	
W9AZP	1296-	18-1-	B-28	
W9PCZ	1206-	18-2-	AB-18	
W9LW	1215-	27-2-	C-28	
W9TMU	1156-	17-2-	B-16	
W9EAL	1008-	16-2-	B-28	
W9PXS	858-	13-1-	A- -	
W9ZBX-9	855-	15-3-	BC-42[3]	
W9VES	841-	11-1-	A- -	
W9TKN	714-	14-1-	B-30	
W9IYA*	612-	12-1-	- - -	
W9EKC	432-	9-1-	B-11	
W9VGQ	324-	9-2-	B- 7	
W9CIA*	243-	9-2-	B- -	
W9LZ*	231-	7-1-	- - -	
W9ALI	147-	7-1-	B-11	
W9ZFP	144-	6-1-	A-12	
W9ANQ*	105-	5-1-	- - -	
W9TB	60-	4-1-	C- -	
W9WIO	48-	4-1-	A- 3	
W9EUZ	36-	3-1-	A- -	
W9DGK	12-	2-1-	- - -	
W9NQI*	3-	1-1-	B- 2	
W9OF*	3-	1-1-	- - -	
W9SGZ*	3-	1-1-	- - -	
W9TOJ*	3-	1-1-	- - -	
W9VAN*	3-	1-1-	A- -	

Indiana

W9AEH	82560-	128-4-	B-80	
W9HKR	32967-	81-4-	B-79	
W9PWZ	8610-	41-3-	B-80	
W9AKJ-9	6195-	35-1-	- -42	
W9HUV	4455-	33-3-	AB-10	
W9EOC	2952-	24-2-	B-66	
W9VW	2646-	21-1-	B-12	
W9TWV	1980-	22-1-	B-30	
W9AB	1820-	20-2-	A-26	
W9WCE	1539-	19-2-	B-41	
W9FWS	1485-	15-1-	B-42	
W9NEU	1008-	14-1-	A-20	
W9EGQ	430-	10-2-	A- -	
W9EBQ	420-	10-1-	C- 7	
W9YCZ	360-	10-2-	B- -	
W9LQ*	192-	8-1-	B- 5	
W9AMM	148-	7-2-	B- 4	

Kentucky

W9PLM	36624-	84-3-	C-62	
W9PKW	22848-	51-3-	BC-83	
W9YQN*	798-	14-1-	- - -	

Michigan

W8LEC	86198	131	4	C 90
W8NJP	72540	117	4	C-90
W8OQF	33810	80	2	BC-69
W8MSK	33744	77	2	BC-77
W8QDU	31306	82	2	C-57
W8KO	26676	76	3	C-68
W8QQE	13770	54	2	C-31
W8CMH	12393	51	3	B-41
W8JAH	10048	46	2	B-62
W8BWB	6912	36	2	B-48
W8IQS	6120	36	3	B-67
W8OCT	5088	32	1	B-30
W8AGK	4455	33	1	B-29
W8MCC	3588	26	2	A-69
W8QIZ	3420	20	1	C-34
W8WU*	2430	18	1	- - -
W8ITK	2160	24	2	B-29
W8MKZ	2112	22	2	B-40
W8IWG	2001	23	2	BC-61
W8QIX	1653	19	1	B-36
W8CVU	1023	11	1	A-13
W8HA	945	15	1	B-26
W8PTD*	693	11	1	- - -
W8GTN	672	14	1	B- 5
W8NJB	552	12	1	B-14
W8JDG	430	10	2	B-19
W8DM	363	11	2	B-22
W8GQC	189	7	1	A-10
W8QYK	154	7	1	- -11
W9EMB	112	7	2	B- 7
W8IKF	75	5	1	B- 5
W8IUF	75	5	1	B-12
W8FOV	12	2	1	- - -

Ohio

W8BTI	81444	124	4	C-67
W8LIR	45318	91	3	C-77
W8NV	36034	82	3	C-65
W8LZK	32030	80	4	B-87
W8BKP	23256	68	3	AB-52
W8ERA	22287	69	2	C-60
W8KYY	21816	65	3	A-70
W8OFN	20130	66	4	B-16
W8ARO	12495	49	3	B-88
W8GKG	12243	53	3	B-55
W8LCO	11613	49	3	B-71
W8JLQ	10277	43	2	A-57
W8NK	9065	35	2	B-53
W8AVB	7518	42	2	B-51
W8JFC	5508	34	1	- -31
W8BVP	5156	31	2	B-25
W8ENH	4950	30	2	B-47
W8DAE	4920	30	2	B-40
W8ENA	4557	31	3	AB-54
W8NKU	4464	31	2	- -60
W8NOT	4321	29	2	B-48
W8YX	3817	24	2	BC-37
W8CFP	2968	28	3	B-42
W8MNM	1980	20	1	A-46
W8BOS*	1575	21	2	- - -
W8BYM*	1539	19	3	AB- -
W8NPE	1168	16	2	A- -
W8DGP	1008	16	1	B-20
W8PCS	684	12	2	B-13
W8GER	648	12	1	B-20
W8QKQ	594	11	1	A-29
W8ISK	576	12	1	A-46
W8DNC*	540	11	3	- -32
W8PMB*	510	10	2	- - -
W8QOG	418	11	1	- -23
W8QHL	385	11	2	A- 8
W8BMK	370	10	2	AB- 9
W8PGI	330	10	1	- -23
W8IPF	297	9	1	- - 7
W8DIO	240	8	1	A- 8
W8FGC	126	6	1	B- 9
W8RIH*	126	6	1	- - -
W8GDX*	12	2	1	B- 1
W8QBF	12	2	1	- - -
W8QEQ	12	2	1	B- 5
W8MVZ	3	1	1	A- 8

Wisconsin

W9HFJ	31416	77	2	BC-62
W9VDY	29600	80	3	B-62
W9VTZ	20670	65	2	B- -
W9RRT	16864	62	3	C-71
W9UIT	15345	55	4	B-41
W9RH	11374	47	3	C-66
W9RBI	10062	43	3	A-76
W9RQM	7052	41	3	B-25
W9TJI	6993	37	2	B-61
W9YEG	6270	38	2	- -66
W9BCV	5544	33	3	B-28
W9WSY	5402	37	2	A-37
W9UFJ	4437	29	1	C-59
W9RPW	3906	31	2	- -50
W9GIS	3645	27	2	B-42
W9CFT	3300	20	1	B-53
W9POS	2112	22	2	B-33
W9GWK	1350	18	2	B-16
W9BQM	1224	17	3	B-44
W9WDI	715	13	2	AB-37
W9MRW	432	9	1	B-24
W9FJQ	363	11	2	B-14
W9PTE	288	8	1	B- 7
W9SHO	264	8	1	B-19
W9YCV	165	5	1	B-24
W9VSO	126	6	1	B- 6
W9KXK	72	3	1	B- 6
W9WQM*	48	4	1	- - -
W9FNU	45	3	1	A-17
W9TXF	36	3	1	B- 2
W9WYP	27	3	1	A- 7
W9GVL*	3	1	1	- - -

DAKOTA DIVISION

North Dakota

W9UBB	8668	43	3	B-21
W9EIG	60	5	1	B-19
W9YJL*	3	1	1	- - -

South Dakota

W9USH	7326	37	2	B-56
W9YEZ	138	6	1	A-13
W9FOQ	12	2	1	A- 1

Northern Minnesota

W9RXL	15105	53	3	B-75
W9DNY	1728	18	2	A-81
W9YCR	1530	17	3	A-57
W9RIA	975	13	1	A-22
W9KRG	663	13	1	A-20
W9TFB	217	7	2	A-20
W9RIL	27	3	1	B- -

Southern Minnesota

W9DWU	24012	69	3	B-51
W9DGH	9450	42	2	B-43
W9SNW	8360	40	2	B-51
W9HIE	2016	24	2	B-18
W9TQW	1728	18	1	- - -
W9FNK	1014	13	2	B- -
W9HGN	715	13	2	A-27
W9DEI	504	12	2	C-25
W9FWN	390	10	2	AB-12
W9CYA	210	7	1	B-46
W9VIP*	36	3	1	- - -
W9TYE	18	2	1	B- 3

DELTA DIVISION

Arkansas

W5ASG	6156	36	2	B-60
W5EOF	75	5	2	B- 5

Louisiana

W5KC	28152	72	3	B-65
W5BRR	21056	64	3	C-65
W4BGO-5	5597	29	2	B-40
W5ACA*	342	9	1	B- -
W5DWW	192	8	1	- - -
W5BDJ	96	6	1	B-11
W5EUK	27	3	1	B- 4

Mississippi

W5DNV	4743	31	3	B-17
W5FIT	114	6	1	A-18
W5GEA*	3	1	1	- - -

Tennessee

W4DCK	40194	87	3	A-79
W4SW	18600	62	3	C-58
W4RM	6786	39	2	B-40
W4AIS	2244	23	2	B-19
W4LN	828	12	2	B-47
W4DQH	819	13	1	B- 8
W4ZZ	561	11	3	A-37

HUDSON DIVISION

E. New York

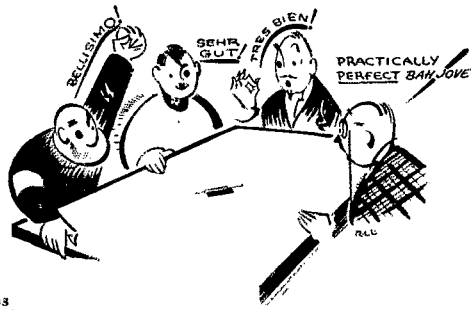
W2DC	107520	140	4	B-90
W2CBO	75815	117	4	B-90
W2DSB	70725	115	4	B-88
W2CJM	67976	116	3	B-78
W2OA	31692	76	2	C-51
W2AWF	30020	79	3	BC-41
W2AMM	18056	62	2	B-82
W2HCZ	7696	37	3	B-73
W2UL	7656	44	4	B-20
W2GMM	4176	29	4	B-28
W2IZO	1767	19	1	BC-18

PARIS TO PODUNK

UNDERLYING all of the highly touted deals between Dictators and Diplomats are personal differences and mental reservations. Among them, a whole-hearted agreement on anything is as rare as five meter DX. About the only subject on which the World Powers seem to be in *real* accord is in their liking for our Insulated Resistors.

While we have been making about a hundred million in the U. S. A., other IRC factories and licensees in seven foreign countries have been taking care of the growing Worldwide demand. As a result, you will find these little Metallized units in popular favor wherever in the World radio is known and enjoyed — from Paris to Podunk and Timbuctoo.

Thus, due to their wide utility, a few notes on their design and application may be of interest.



In manufactured products as well as in diplomatic conferences there are always compromises. If the product is a popular one, you can be sure that the designer has struck a happy balance between the various qualities desired. This is true of automobiles, lipsticks, breakfast cereals and shot-guns — and even resistors.

The characteristics outlined below are made possible by their Metallized construction and offer some explanation for the widespread adoption of the Type BT.

1. *Life.* There is no known limit.

2. *Stability.* Under normal weather and humidity conditions they will remain within 1% of their original value at no load and within 2 to 5% when run continuously at rated load.

3. *Overload Capacity.* Will remain within 5 to 15% of original value (depending on the size and range of the resistor) when run under a 100% overload for 1000 hours.

4. *Temperature Coefficient.* (Change in resistance with temperature.) From minus .02% to minus .05% per degree Centigrade change in temperature — the lower value for the lower ranges.

5. *Voltage Coefficient.* (Change in resistance with changes in applied voltage.) From 0% to .01% per volt applied.

6. *Noise Level.* From 0.1 to 1.5 microvolts noise per volt applied to the resistor. Noise level is a function of voltage per unit length; therefore for extremely low noise level applications the longer units should be used.

7. *Voltage Rating.*

Type BT-½ (½ Watt) 350 Volts Maximum
Type BT-1 (1 Watt) 500 Volts Maximum
Type BT-2 (2 Watt) 500 Volts Maximum

8. *Insulation.* Better than 1000 volts breakdown to ground through bakelite covering.

9. *Mechanical Strength.* Lead wires withstand better than 20 pounds pull.

10. *Humidity Protection.* Molded bakelite insulation insures against moisture penetration; will withstand salt water immersion.

11. *Small Size.*

Type BT-½	3/16" Dia. x 5/8" Long
Type BT-1	1/4" Dia. x 1 1/4" Long
Type BT-2	5/16" Dia. x 1 3/4" Long

12. *Tolerance.* Standard tolerance plus or minus 10% (or plus or minus 5% on Special order).

13. *Frequency Characteristic.* Suitable for general use from DC up to 5 or 10 megacycles. Low resistance ranges, up to 25,000 ohms, have constant impedance at frequencies up to 10 megacycles. High range units (0.5, 1.0 megohm, etc.) drop off in impedance at frequencies above 1 megacycle. For high frequency operation, where the resistance value is 100,000 ohms or above, our Type F resistor is recommended.

14. *Temperature Rise.*

At rated load.....	BT-½	35°C.
	BT-1	40°C.
	BT-2	50°C.

15. *Ranges Available.*

BT-½	50 ohms to 20 megohms
BT-1	150 ohms to 20 megohms
BT-2	200 ohms to 20 megohms

The application of these resistors in receivers, low power transmitters, oscilloscopes, etc. is common knowledge. The above noted figures may suggest their use in voltmeters, ohmmeters, etc. They are entirely suitable for such use and, in fact, we count several of the well known meter companies among our customers. They should not be substituted for Precision Wire Wound Resistors where 1 or 2% accuracy is necessary.

In this service we would recommend operating them at a low load — say, not more than a fourth their rating. This reduces the temperature rise and drift due to temperature changes. For higher voltages than rating, series operation is feasible. Series operation will increase the wattage rating in proportion (providing the resistors are all the same value) and still further reduce the noise level, due to the increased length. Parallel operation of the same value resistors will also increase the wattage rating in proportion (if the resistors have air circulation around them) but won't increase the voltage rating or lower the noise level. The noise level, however, is low enough to be completely neglected.

In summary: We make many special types of resistors excelling in certain characteristics for particular uses but for general purpose low wattage applications where cost is important the Type BT is our recommendation.

INTERNATIONAL RESISTANCE COMPANY • 401 NORTH BROAD STREET, PHILADELPHIA, PA.

W2HUB	975	15-1	B-14	
W2JRH	910	14-1	B-33	
W2JBQ	210	7-1	B-11	
W2KFB	60	4-2	A-17	
W2SZ	36	3-1	- - -	6
W2HVR	27	3-2	A- 4	
W2ISJ*	12	2-2	- - -	

N. Y. C. & Long Island

W2UK	175599	179-4	C-88	
W2BEF	53550	102-3	C-90	
W2BJ	37944	102-4	B-51	
W2AHC	34611	83-4	AC-59	
W2IRV	25528	73-3	A-69	
W2IOP*	16800	56-2	AB-35	
W2GTZ	14193	57-2	B-45	
W2BHD	11421	47-2	A-42	
W2ALB	11340	45-1	B-56	
W2DVA	7752	38-3	B-47	
W2FSK	7616	34-3	C-53	
W2CTO	7215	37-1	B- -	
W2AIS	6615	35-4	A-54	
W2HYA	6336	33-2	A-46	
W2BAK	5236	34-2	A-38	
W2HDT	4896	34-2	A-66	
W2DXL	4278	38-3	B-58	
W2OQ	4031	28-3	A-31	
W2WV*	3892	28-2	A- -	
W2CKO	3888	27-1	B-14	
W2DYJ	3510	26-1	B-24	
W2BO	3276	26-1	B-21	
W2GRA	2508	22-2	B- -	
W2DKF	2346	23-1	B-16	
W2FFV	2200	22-2	B-32	
W2HAY	2037	21-2	A-23	
W2JIN	1326	17-1	B-16	
W2HXT	1104	16-2	B- 7	
W2DAG	1035	15-2	A-26	
W2KIR	924	14-1	B-217	
W2BJQ	570	10-1	B- 8	
W2EQG	504	12-2	- - -	
W2FJH	486	9-1	B- 7	
W2DYT	462	11-2	B- 4	
W2KZQ	429	11-2	A- 7	
W3AJL	270	9-1	B-19	
W2EW	248	8-1	B- 9	
W2EVA	168	7-1	A- -	
W2HQX	165	5-1	A- 6	
W2AOY	108	6-1	B- 5	
W2HSL	90	5-2	B-16	
W2GP	60	4-1	A-12	
W2IGA*	60	4-1	- - -	
W2APZ	45	3-1	- - -	
W2HCN	45	3-1	B- 4	
W2HUG	40	4-1	A- 7	
W2LAY*	27	3-1	- - -	
W2KKR	12	2-1	B- 2	
W2APO*	3	1-1	- - -	
W6CFT-2*	3	1-1	- - -	
W2HBO*	3	1-1	- - -	
W2KAM*	3	1-1	- - -	

No. New Jersey

W2JME	111720	140-4	- -88	8
W2BHW	103806	146-3	B-88	
W2GUM	52800	100-4	C-83	
W2WC	36651	82-3	B-59	
W2ZA	32536	83-4	C-72	
W2DZA	18961	67-4	B-52	
W2BHM	15982	61-3	B-36	
W2AER	15372	63-3	B-49	
W2CYS	15370	53-1	C-34	
W2GT*	13200	50-1	B-44	
W2ARB	12240	48-1	C-42	
W2JAB	11520	48-2	B-73	
W2CMY	11408	46-1	C-58	
W2AWU	10530	49-2	B-52	
W2KBM	8370	45-3	B-51	
W2ADP	6528	34-1	A-39	
W2KAK	6270	38-3	B-43	
W2FSN	6222	34-3	A-43	
W2KHT	6156	36-3	B-51	
W2GVM	5728	29-2	B-67	
W2FPM	5706	34-3	B-34	
W2ALO*	5445	33-1	B-67	
W2GVZ	5256	36-3	C-47	
W2JMS	4495	29-1	A-43	
W2BZB	3975	25-1	B-31	
W2BDQ	3400	25-2	B-45	
W2FXE	3164	28-1	B-27	
W2DBY	3059	16-4	B-29	
W2DEW	2886	26-2	B-21	
W2IUV	2662	22-1	B-15	
W8DBP-2	2340	20-1	A-28	
W2IVC	2016	21-2	B- 9	
W2WZ	1881	19-1	C-32	
W2HHR*	1680	20-2	A-18	
W2BWI	1520	20-2	A-30	
W2DEU	1404	18-1	B-15	
W2DJT	1224	17-2	A-13	
W2HAE	1334	18-1	B-27	
W2EWM	1008	14-1	B-16	
W2GFF	1008	14-1	B-30	
W2BUF*	960	16-1	B-17	
W2JFF	944	10-2	A-30	
W2GW	864	16-1	C-15	
W2GGW	756	14-2	A- -	
W2IBJ	624	13-2	B-10	
W2CAY	480	10-1	B- 7	
W2GRG*	432	12-1	C-17	
W2CCU	306	9-1	A- 9	
W2DSV	306	9-1	A-11	
W2HYV*	297	9-1	- - -	
W2IYQ	252	9-1	A-19	
W2BNU	240	8-1	B- 7	
W2JVD	210	4-2	A- -	
W2JJE	144	6-1	B- 3	
W2HZN	108	6-2	B- -	
W2JSS	75	5-1	A- -	
W2JKH	72	4-2	- - -	
W2CBT	48	4-2	A- -	
W2JLK	48	4-1	B- -	
W2KNN	27	3-1	B-20	
W2JOG	12	2-1	A- 3	
W2KSM	6	1-1	- - -	
W2ASY*	3	1-1	- - -	
W2KEG	3	1-1	- - -	

MIDWEST DIVISION

Iowa

W9AJA	7641	43-3	B-50	
W9HAQ	4470	30-1	- -68	
W9FDL	3360	28-2	B-24	
W9GKS	1680	20-1	B-71	
W9VRD	840	14-3	B-12	
W9LDH	486	9-2	B-19	
W9JSO*	405	9-2	A-31	
W9ARE	378	9-1	B- -	
W9AZZ	189	7-2	B-10	
W9DIB	144	6-2	B-17	
W9FQA	144	6-1	B-19	
W9TIJ*	60	4-1	- - -	
W9YXK	24	2-1	A- 9	

Kansas

W9ARL	133648	156-4	C-89	
W9CWW	17748	58-3	ABC-55	
W9AWP	6253	37-2	C-29	
W9AOQ	162	6-1	B-9	
W9YAH	84	4-1	- - -	
W9HJF*	12	2-1	- - -	
W9VBQ*	3	1-1	- - -	

Missouri

W9NNZ	47880	95-4	B-87	
W9TJ	40176	93-2	C-49	
W9AVS	18300	60-3	B-84	
W9BMM	17388	54-2	BC-60	
W9GBJ	12054	22-3	B-33	
W9DAE	5565	35-2	C-19	
W9MYX	2394	21-1	B-44	
W9WCM	1824	19-2	B-32	
W9TPH	1782	18-2	B-21	
W9LBB*	1152	16-2	- - -	
W9EYM	792	12-1	A-21	
W9FFR	684	12-1	B-27	
W9ARH	147	7-2	A-10	
W9WBT*	126	6-1	- - -	
W9CTR	77	12-1	B-16	
W9ZFF*	48	4-1	- - -	

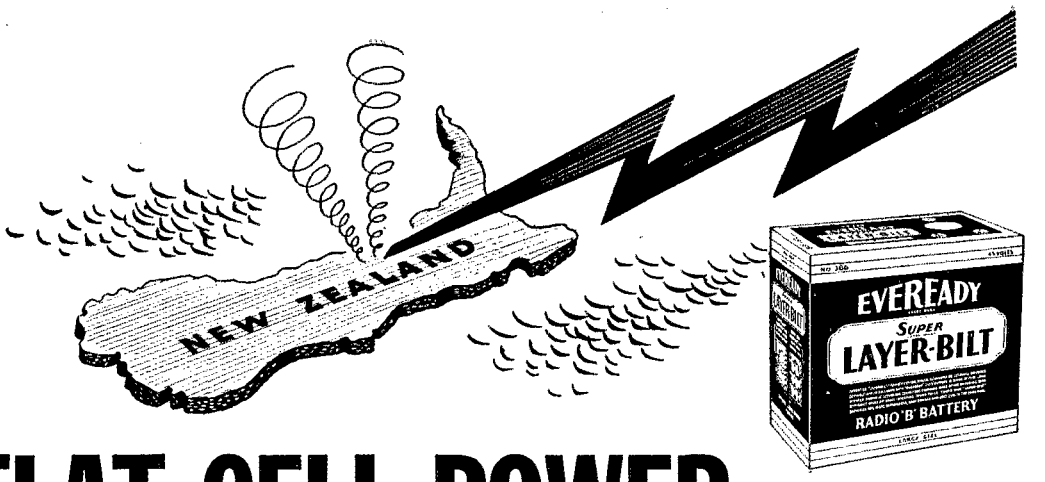
Nebraska

W9BBS	4650	31-2	B-50	
W9DMY	3570	10-3	- - -	
W9ZNA	1120	14-1	B-23	
W9POB*	960	16-1	- - -	
W9DGL*	108	7-1	- - -	
W9RQS	27	3-1	A- 5	

NEW ENGLAND DIVISION

Connecticut

W1EWD	41205	93-4	B 90	
W1FTR	40950	91-2	- -71	
W1NI	31509	81-3	B-62	
W1IED	31388	76-3	C-64	
W1GCX	20670	65-3	B-87	
W1DIO	11660	53-4	B-57	
W1FVF	9900	44-2	B-54	
W1KOK	9504	44-2	C-44	
W1APA	8658	39-3	BC-49	
W1EJT	7236	36-3	B-45	
W1AFG	5359	29-1	A-59	
W1CSC	3741	29-2	B-28	
W1CUH	3528	28-2	B-50	
W1DGG	2943	27-3	B-32	



FLAT-CELL POWER CONTACTS NEW ZEALAND AT ARRL FIELD DAY

T. E. Powers, W9CNM, a member of the Hamfesters Radio Club, Inc., of Chicago, reports on the A.R.R.L. Field Day:

"Your heavy-duty 'Eveready' 'Super Layer-Bilt' 'B' batteries were used to power a single 6L6 CW transmitter with an input of 20 watts, and saw *continuous* service for 26 hours. During this period communication was established with every U. S. district, three Canadian districts and one 100% QSO with New Zealand!

"Our battery powered equipment actually saved the day for the field group because our three A.C. operated transmitters failed us for various reasons. The combined total of the four transmitters was 1294 points; and of this 1072 points were made with the tiny QSL 40 transmitter with battery power. Unquestionably the success and ability of this 'rig' to get out as it did was due to the steady constant supply of D.C. power that cannot be obtained from rectified sources."

And *now,* all "Eveready" "B" batteries (except those for special purposes) are "Layer-Bilt" batteries, and priced competitively with shorter-lived, old-fashioned round-cell "B" batteries. Today, more than ever, it's wise to insist on reliable, longer-lived, flat-cell construction. You get *more power per dollar* when you buy "Layer-Bilt" "B" batteries.

NATIONAL CARBON COMPANY, INC.

General Offices: New York, N. Y. *Branches:* Chicago and San Francisco
Unit of Union Carbide UCC *and Carbon Corporation*
The words "Eveready," "Layer-Bilt" and "Super Layer-Bilt" are trade-marks of National Carbon Co., Inc.

W1JPB	2178-	22-2-	B-28	
W1BTU	1387-	19-2-	B-11	
W1JUD	1110-	15-2-	A- -[9]	
W1AVB	960-	15-1-	B-40	
W1BIH	270-	9-2-	A- -	
W1HSX	270-	9-1-	- - -	
W1CEJ	161-	7-2-	B-12	
W1AB	126-	6-2-	B- -	
W1DDX	48-	4-1-	- - -	
W1BGJ*	3-	1-1-	- - -	
W1KKI*	3-	1-1-	A- -	
W1SZ	137000-	163-4-	C-B9[10]	
W1TS	108110-	143-4-	B-87[10]	
W1JPE	13035-	55-3-	AC-24[10]	
W1JTD	8970-	46-3-	B-40[10]	
W1JBJ	1080-	15-2-	AB-15[10]	
Maine				
W1DFQ	14465-	55-2-	AB-56	
W1BFA	13158-	51-2-	B-54	
W1CPS	8034-	39-3-	B-51	
W1COM	2016-	21-2-	B-54	
W1ACW	756-	14-2-	A-21	
W1GXY	351-	9-1-	B-14	
W1EIO	243-	9-2-	B-17	
W1QH	224-	8-1-	B- 6	
W1DHH	75-	5-2-	B- 4	
E. Massachusetts				
W1TW	100110-	142-4-	B-89[11]	
W1ME	65670-	110-4-	B-77	
W1ADM	54075-	103-4-	C-73	
W1DZE	50796-	83-2-	B-87	
W1CBZ	38097-	83-3-	A-54	
W1KHE	37632-	84-4-	B-81	
W1ICA	35018-	87-4-	A-74	
W1KPP	26040-	70-4-	AB-34	
W1GLF	13676-	52-3-	B-70	
W1EVJ	12440-	51-4-	B-59	
W1BFR	9933-	43-2-	B-63	
W1WV	8856-	41-3-	B-71	
W1RY	8557-	43-3-	A-33	
W1HX	8184-	44-4-	B-48	
W1AQT	7068-	38-2-	B-50	
W1DKD	5148-	36-2-	B-51	
W1CPB	4650-	31-2-	B-27	
W1DIA	4452-	28-2-	- -24	
W1GDY*	3864-	28-2-	- - -	
W1CCA	3366-	33-2-	B- -	
W1BAQ	3321-	27-1-	A-68	
W1IYJ*	3026-	24-2-	- - -	
W1HA	2205-	21-1-	A-30	
W1HYJ	2091-	17-2-	B-19	
W1JEA	1843-	19-1-	B-53	
W1KTG*	1638-	24-1-	B-22	
W1BGW	1200-	16-1-	A-11	
W1EHT	693-	11-1-	A-10	
W1DGA	486-	9-1-	A-18	
W1DJK	407-	11-1-	B- 6	
W1KM*	370-	10-1-	B- -	
W1SX*	180-	6-2-	B- -	
W1DOP	144-	6-1-	B- 8	
W1CWV	105-	5-1-	A- 7	
W1BSM	60-	4-1-	B- 3	
W1LN	52-	4-1-	B- 2	
W1BDF	48-	6-1-	A- 6	
W1BDU*	48-	4-1-	- - -	
W1BB	27-	3-2-	A- 6	
W1FKS	27-	3-1-	B- 2	
W1JCI*	12-	2-1-	- - -	
W1KWU*	9-	1-1-	- - -	
W1IKU	3-	1-1-	- - -	
W. Massachusetts				
W1ZB	52790-	105-4-	C-90	
W1JLT	35784-	84-3-	B-69	
W1COI	31615-	76-4-	B-56	
W1AVK	22914-	67-3-	B-69	
W1FAU	22680-	70-4-	B-63	
W1BDW	20328-	66-3-	BC-63	
W1BGY	19620-	60-3-	B-71	
W1BPN	5733-	39-3-	A-54	
W1EOB	5412-	41-4-	A-16	
W1IKT	5301-	31-2-	A-59	
W1FPP	5022-	31-3-	B-61	
W1IGR-1	3808-	28-2-	B-32[12]	
W1DYA*	2850-	25-1-	- - -	
W1IGL	2079-	21-2-	B-23	
W1CC	2050-	25-1-	BC- -	
W1KOM	1140-	20-1-	B-34	
W1HRV	936-	18-2-	B-43	
W1CQR	704-	14-2-	- - -	
W1EHH	594-	11-1-	A-24	
W1IEI	288-	9-1-	B-12	
W1ICW	147-	7-1-	B- 3	
W1ZD*	108-	6-1-	- - -	
W1HRN*	72-	4-1-	- - -	
W1CGY*	36-	3-1-	- - -	
W1JJO	36-	3-1-	C- 2	
W1AJ*	18-	2-1-	- - -	
New Hampshire				
W1AVJ	55650-	106-4-	BC-69	
W1BFT	52700-	100-4-	B-64	
W1DUK*	10620-	60-2-	B- -	
W1IVU	5328-	36-3-	BC-37	
W1BLA	1275-	17-2-	B-12	
Rhode Island				
W1KIV	20592-	66-2-	C-45	
W1AFO	19260-	60-3-	B-73	
W1KOF	17416-	56-3-	BC-43	
W1GBO	14352-	52-3-	B-53	
W1BBN	9246-	46-3-	B-48	
W1IQF	6480-	36-2-	A-43	
W1CAB	4247-	31-3-	B-24	
W1KLR	27-	3-1-	A- 9	
W1KWA*	3-	1-1-	- - -	
Vermont				
W1EZ	41130-	90-3-	B-74	
W1JVS	15792-	56-4-	B-90	
W1FGO	210-	7-1-	B- 3	

NORTHWESTERN DIVISION

Idaho				
W7BYW	38367-	87-3-	C-78	
W7BKF	11844-	47-2-	B-56	
W7ACD	1680-	20-2-	B-20	
W7EQX	864-	12-2-	B-23	
Montana				
W7EOI	5600-	35-3-	BC-70	
W7GBI	4690-	35-3-	B-71	
W7EC	168-	7-3-	A-57[13]	
Oregon				
W7AMX	41856-	96-3-	B-84	
W7AMQ	2592-	24-1-	C-40	
W7EZX	2405-	23-4-	A-17	
W7ABB	1392-	16-1-	B-28	
W7DWQ*	858-	13-3-	- - -	
W7DDZ	216-	8-2-	B- 9	
W7FMX*	48-	4-1-	- - -	
Washington				
W7FUL	35490	78-4-	B-86	
W7DVY	13950-	50-3-	B-70	
W7FMK	9900-	44-3-	B-76	
W7EJG	9592-	44-3-	B-66	
W7CMB	6534-	33-4-	A-48	
W7FP	5285-	35-3-	BC-54	
W7GLH	4212-	27-3-	A-36	
W7ADU	3660-	30-3-	- -37	
W7BBB-7	2921-	23-4-	C-35[14]	
W7FHW	2756-	26-3-	B-48	
W7ESN	2622-	23-3-	AB-21	
W7JB	1638-	18-1-	B-47	
W7LD	1598-	17-4-	A-26	
W7GKF*	1482-	19-2-	- - -	
W7GEW	1008-	14-2-	A-24	
W7FWD*	966-	14-1-	- - -	
W7EYI	384	8-3-	A-12	
W7BTZ	326-	8-2-	B-13	
W7FVZ	144-	6-1-	A-11	
W7BTB	108-	6-1-	B- 9	
W7BYK	75-	5-2-	A- 7	
W7KK*	12-	2-1-	- - -	
W7CWN*	3-	1-1-	A- -	
W7FKC*	3-	1-1-	- - -	

PACIFIC DIVISION

Nevada				
W6LCJ	1780-	13-2-	A- -	
Santa Clara Valley				
W6AHZ	18331-	59-3-	C-47	
W6LCF	16758-	57-4-	A-62	
W6MZH	4852-	33-4-	A-79	
W6DZE	4620-	28-3-	B-33	
W6IWS*	2376-	22-3-	- - -	
W7MF-6	2142-	21-4-	A-39	
W6PBV	513-	9-1-	A-10	
W6NHW	420-	10-2-	A-30	
W6LSX	350-	7-2-	B-11	
W5AAX-6*	3-	1-1-	- - -	
East Bay				
W6MVQ	19886-	61-3-	B-57	
W6IFZ	7659-	37-3-	B- -	
W6PFD	4530-	30-3-	A-84	
W6ABE	4284-	28-4-	AB-52	
W6GHG	758	13-2-	B- -	
W6NGC	252-	7-1-	B- 6	

W6ITH	108-	6-1-	C- 1
W6DHS*	45-	3-1-	- - -

San Francisco

W6GPB	36210-	85-3-	C-73
W6CIS	13988-	52-4-	C-58
W6JMR	4836-	31-2-	B-28
W6MCQ	4371-	31-3-	B-22
W6IPH	3588-	26-3-	B-21
W6DIX*	162-	6-1-	- - 5
W6NEN	105-	5-1-	A- 3
W6MUF*	12-	2-1-	- - -

Sacramento Valley

W6AJD	28152-	69-3-	BC-84
W6EFM	975-	15-2-	B-17
W6NKT	84-	4-1-	B- 2

San Joaquin Valley

W6KUT	25530-	69-3-	AC-63
W6FZA	3693-	28-3-	A-20
W6GGI	288-	8-1-	B-21
W6CLZ	84-	4-1-	A- 6

ROANOKE DIVISION

North Carolina

W4AH	90024-	132-4-	C-90
W4MR	16008-	58-2-	C-46
W4OG	15714-	54-3-	B-59
W4RA	9789-	46-3-	B-66
W4TPI	2835-	27-2-	B-20
W4CEI	1980-	20-1-	A-15
W4DGF	1120-	16-2-	A-17
W4ESO	304-	8-1-	B- 6
W4BVD	297-	9-1-	C- -
W4WX	144-	6-1-	B- 9

South Carolina

W4FEH	18228-	62-2-	B-27
W4CPZ	8160-	40-2-	C-32
W4AUW	2160-	24-2-	A-36

Virginia

W3EMM	157905-	165-4-	C-90
W3EVT	150720-	157-4-	- -80
W3CHE	128250-	150-4-	C-69
W3FQP	63630-	105-3-	C-78
W3BWA	24990-	70-3-	B-50
W3BIW	24618-	66-2-	B-78
W3EMA	22680-	70-3-	BC-41
W3CSY	22042-	66-3-	B-62
W3BZE	19620-	60-3-	AB-65
W3AG	10206-	42-1-	B-36
W3FGJ	7938-	42-3-	B-23
W3BSB	6360-	40-3-	A-54
W3CYV	2603-	19-1-	B-41
W3AII	1023-	11-2-	- - -
W3ELN	854-	14-1-	C-24
W3DDY	546-	13-2-	A-59
W3CFL	126-	6-1-	B- 6

West Virginia

W8KWI	30537-	81-2-	BC-54
W8OXO	8857-	43-1-	B-52
W8LCN	8528-	41-3-	- -46
W8QBQ	1080-	18-1-	C-18
W8ASI	684-	12-2-	C-13
W8HEP	320-	10-1-	A- 9

ROCKY MOUNTAIN DIVISION

Colorado

W9PGS	21186-	66-3-	B-69
W9WTW	13005-	51-3-	B-60
W9AUJ	9675-	43-2-	B-66
W9TSQ	5940-	36-3-	B-44

Utah-Wyoming

W6DTB	26289-	69-3-	B-59
W6PDV	3654-	29-3-	B-52
W6OWV	45-	4-1-	A- 6

SOUTHEASTERN DIVISION

Alabama

W4ELQ	44226-	91-4-	BC-76
W4APU	30212-	83-5-	B-76
W4BOE	7182-	38-3-	C-35
W4EHH	3277-	29-2-	B-53
W4BLL	378-	9-1-	C-12
W4BHY	288-	8-1-	B- 7

E. Florida

W4AJX	83500-	125-3-	BC-89
W4DCZ	22646-	67-3-	B-41
W4EPV	15903-	57-3-	A-66
W4DIQ	11900-	50-3-	B-43
W4QN	10464-	48-3-	B-48
W4EGL	4176-	29-3-	A-37
W4DBF	2755-	29-1-	B-32
W4EZK	2574-	22-2-	B-42
W4COV	1615-	19-3-	A-26
W4EEO	1539-	12-2-	B- 7
W4DVO	264-	8-1-	A- 7
W4EQK	189-	7-1-	BC-13
W4ATM	96-	6-1-	B- 4
W4EYI*	9-	2-1-	- - -
W4FAO*	3-	1-1-	B- -

W. Florida

W4CDE	45360-	90-3-	B-63
W4EPT	1224-	18-3-	A-24
W6BOY-4	108-	6-1-	- - -

Georgia

W4CBY	60216-	104-3-	C-67
W4YC	34325-	73-2-	C-79
W4DMB	8018-	41-2-	B-30
W4AQL	4773-	37-2-	B-30
W4QZ	1287-	13-1-	B-15
W4AMM	825-	15-1-	B-17
W4FEC	324-	9-1-	- -10

SOUTHWESTERN DIVISION

Los Angeles

W6CXW	120888-	146-4-	C-84
W6CUH	71572-	116-3-	C-76
W6QD	62640-	108-4-	C-89
W6AM	51670-	95-5-	C-90
W6AQJ	20538-	63-3-	C-56
W6GAL	19234-	59-3-	B-44
W6GPU	14100-	50-3-	C-74
W6FZL	9504-	48-4-	C-41
W6BXL	7371-	39-3-	B-29
W6GK	7140-	34-1-	C-68
W6PNO	6120-	34-3-	B-62
W6NLZ	5928-	39-1-	BC-36
W6GNZ	4896-	34-3-	B-33
W6GWL	4896-	32-1-	B-37
W6NEP	4488-	33-3-	B-45
W6FKZ	3744-	32-1-	- - -
W6GM	3444-	28-4-	B-27
W6NLI	2508-	22-3-	A-30
W6LEE	2064-	24-4-	- - -
W6KNF	1620-	18-2-	C-19
W6BSV	1200-	16-2-	B- 8
W6DIO	816-	16-3-	B- 9
W6MNA*	798-	14-1-	- - -
W6NPL	798-	19-1-	B-32
W6ETJ	756-	12-1-	B-14
W6OXQ	630-	14-5-	A-13
W6ACL	576-	12-2-	B-30
W6OSP	451-	9-2-	A-13
W6DLN*	216-	8-1-	B- -
W6EA	198-	6-1-	A-25
W6CPG	144-	6-1-	B-21
W6DZK	125-	5-1-	B- 7
W6BUK	105-	5-1-	B- 6
W6PHB*	84-	4-1-	A- -
W6TS*	76-	4-1-	- - -
W6AIX*	75-	5-1-	- - -
W6FXL*	36-	3-1-	B- 3
W6CNE	27-	3-1-	B- 2
W6AAE*	12-	2-2-	A- -
W6IOX*	3-	1-1-	- - -
W6OCN*	3-	1-1-	- - -

Arizona

W6NGD	23400-	64-3-	C-40
W6DRE	20473-	59-4-	A-85
W8KZL-6	2163-	21-3-	ABC-49
W6LAI	897-	13-2-	AB-20
W6NUX	3-	1-1-	- - -

San Diego

W6GCX	54400-	100-3-	B-78
W6EPZ	42453-	89-3-	C-72
W6ITY	26864-	73-4-	B-90
W6BAM	25631-	71-3-	BC-74
W6MTC	17380-	55-3-	B-77
W6AXC	12672-	48-4-	- - -16
W6GCT	8712-	34-2-	C-36
W6BVX	5115-	33-3-	B-43
W6LDJ	4884-	37-3-	B-25
W6OMR	384-	77-1-	A-12
W6OMV	18-	2-1-	- - 4
W6GTM*	9-	3-2-	A- -

WEST GULF DIVISION

N. Texas

W5DN	41220-	90-3-	B-74
W5ENE	36036-	84-3-	BC-43
W5FRD	15930-	59-3-	B-60
W5DQD	4384-	32-3-	B-34

W5DXA	2652-	26-3-	B-19	
W5GBC	192-	88-1-	A- 6	
W5FBQ	105-	5-1-	A- 4	
Oklahoma				
W5YJ	46035-	93-4-	C-90	
W5FFW	1292-	17-2-	B-13	
W5CVA	390-	9-2-	A-19	
So. Texas				
W5VV	19305-	65-3-	--45	
W5FI	18081-	63-3-	BC-48	
W5BB	10486-	49-3-	C-41	
W5EWJ	4092-	33-2-	--27	
W5FNA	3810-	30-2-	B-38	
W5ARO	627-	11-2-	A-25	
W5GLK	594-	11-2-	A-11	
W5BDI	217-	7-3-	---	
W5MN	3-	1-1-	A- -	
New Mexico				
W5HAG	1104-	16-2-	A-37	
W5GGX*	54-	3-1-	---	
CANADA				
Maritime				
VE1CO	1649-	17-2-	---	
VE1FB	1512-	18-2-	A-15	
VE1KJ	510-	10-1-	A- 8	
VE1AP	96-	8-3-	---	
VE1MK	3-	1-1-	---17	
Ontario				
VE3QD	25456-	74-3-	B-79	
VE3QI	9306-	47-2-	B-48	
VE3HP	6364-	37-2-	AB-41	
VE3ES	5587-	37-3-	A-45	
VE3GH	3690-	30-3-	A-88	
VE3VU*	1716-	22-1-	AB-20	
VE3GT	1680-	20-4-	A-24	
VE3AGX	460-	10-2-	A-47	
VE3ADV	108-	6-1-	B- 9	
VE3AJE	68-	4-1-	---	
VE3IR	48-	4-2-	A- 6	
VE3QT*	12-	2-1-	A-10	
VE3DU*	3-	1-1-	---	
VE3XY*	3-	1-1-	---	
Quebec				
VE2EW	10032-	44-3-	B-77	
VE2KA	9198-	42-2-	B-75	
VE2EP	4176-	29-2-	A-21	
VE2KS	3744-	26-2-	B-26	
VE2HG*	1653-	19-1-	---	
VE2GZ	910-	14-1-	B-21	
VE2DQ	450-	10-1-	B-19	
VE2AA*	18-	2-1-	B- -	
Alberta				
VE4GD	4089-	29-3-	A-59	
VE4GE	1035-	23-1-	A-12	
British Columbia				
VE5QP	11891-	47-4-	AB-73	
VE5FG	4941-	27-3-	AB-72	
VE5AAD	3528-	28-2-	B-30	
VE5MZ	3432-	26-2-	AB-47	
VE5HR	1794-	23-2-	A-16	
VE5VO*	336-	8-1-	---	
VE5VP	196-	7-2-	B-13	
VE5ADD	3-	1-1-	A- 1	
Manitoba				
VE4RO	61884-	108-3-	C-86	
VE4DU	4089-	29-2-	B-26	
VE4BO	1200-	16-2-	A-31	
VE4SH*	513-	9-1-	---	
VE4AJP	231-	7-1-	A-29	
VE4NM*	192-	8-1-	---	
VE4AEO	168-	7-1-	A-10	
VE4MJ	162-	6-1-	A- 2	
Saskatchewan				
VE4JV	2725-	25-2-	B-43	
VE4BD	1159-	19-2-	B- -	
VE4ZC	360-	9-2-	A-78	
VE4AT	126-	6-1-	A-11	
AFRICA				
Egypt-SU				
SU2TW	162-	6-2-	A- 2	
SU1WM*	90-	2-1-	---	
Madagascar-FB8				
FB8AB	3820-	10-1-	A- -	
Madeira-CT8				
CT3AB	22064-	28-3-	A-47	
CT3AN	11438-	19-2-	A-45	
Mauritius-VQ8				
VQ8AB	135-	5-1-	A- 2	
Morocco-CN8				
CN8AV	21663-	29-3-	---	
Mozambique-CR7				
CR7AK	126-	2-1-	A- -	
Southern Rhodesia-ZE				
ZE1JR	6171-	17-2-	A-27	
ZE1JI	880-	5-1-	A-15	
Southwest Africa-ZS3				
ZS3F	12-	2-1-	A- -	
U. of So. Africa-ZS/ZT/ZU				
ZS1AH	36797-	31-3-	A-65	
ZS5AB	8866-	13-1-	A-45	
ZS5BB	1400-	8-1-	A-11	
ZS1B	1134-	8-1-	---	
ZS4U	114-	6-1-	A- 3	
ASIA				
China-XU				
XU6MK	2286-	9-1-	A-25	
XU8LS	432-	4-1-	A-16	
Hong Kong-VS6				
VS6AG	6360-	12-1-	A-23	
India-VU				
VU2FV	1390-	10-1-	A-27	
VU2FH	544-	8-1-	A- 6	
VU2FX	504-	8-1-	A- 9	
VU2EO	315-	7-1-	A- -	
Japan-J				
J3FJ	31408-	26-3-	--68	
J2LL	20300-	25-3-	A-47	
J2MH	10626-	23-3-	A-24	
J2NG	905-	5-2-	A-17	
Chosen (Korea)-J8				
J8CH	318-	2-1-	A-20	
EUROPE				
Austria-OE				
OE3AH	76239-	43-4-	A-90	
Azores-CT8				
CT2BC	7245-	15-2-	A-32	
CT2BO	3627-	9-1-	---	
Belgium-ON				
ON4AU	48974-	47-4-	B-78	
ON4FE	47056-	34-3-	B-76	
ON4LX	32637-	33-4-	AB-77	
ON4NO	32508-	28-2-	B-53	
ON4BR	22128-	24-2-	A-61	
ON4NW	20804-	28-3-	B-72	
ON4IF	20496-	28-3-	B-50	
ON4ZC	6083-	11-1-	--41	
ON4SG	4590-	15-2-	B-27	
ON4AW	1710-	10-1-	B-12	
Czechoslovakia-OK				
OK1BC	106977-	39-4-	A-88	
OK2LO	50762-	34-4-	A-66	
OK2MV	20385-	27-3-	A-58	
OK1CX	15525-	27-3-	A-52	
OK2HM	13795-	28-3-	A-82	
OK1AW	8001-	21-2-	A-31	
OK3VA	3696-	21-2-	A-17	
OK2KJ	1716-	12-2-	A-26	
OK1ZB	1170-	9-1-	A- 9	
OK2PN	840-	10-2-	A- -	
OK1BM	51-	3-1-	A- 4	
OK1XA	24-	2-1-	A- -	
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OZ9Q	62907-	39-4-	A-82	
OZ7CC	7714-	19-2-	---	
OZ4H	7344-	17-3-	--39	
OZ7UU	432-	8-1-	---	
OZ8B	390-	5-1-	A-10	
OZ2PX	174-	6-2-	A- 2	
OZ4S	3-	1-1-	A- -	
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EI5F	18018-	26-3-	A-40	
EI5G	13024-	22-2-	A-35	

EI2M	11063-	23-3-	A-22
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Estonia-ES			
ES5D	17708-	19-2-	A-60
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F3PK	8008-	22-3-	A-33
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F8WK	3621-	17-2-	A-14
F8TM	2864-	16-3-	A-31
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F3QW	483-	7-1-	A- 4
F3II	192-	6-1-	A-13
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D4AFF	35508-	33-3-	A-86
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D4BUF	28479-	33-4-	A-80
D4QET	21175-	25-3-	A-57
D4WXD	21088-	32-4-	A-39
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D4HYG	13100-	25-3-	A-66
D4LWN	12327-	21-3-	A-84
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D4IZI	112-	4-1-	A- 3
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D3AUK	60-	5-2-	A-16
D4WTD	60-	4-1-	A-13
D4IOH	55-	5-2-	A- -
D4LEU	12-	2-1-	A-10
D4YYK	12-	2-2-	A-12
D3AVK	3-	1-1-	A- 9
D3CEK	3-	1-1-	A- 6
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G6WY	78210-	45-4-AB-	90
G6QX	57262-	39-4-	B-87
G6RB	45040-	40-4-	B-83
G2MI	32994-	39-4-	- -84
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G8HH	5760-	10-1-	A-47
G2XC	5280-	20-2-	A-26
G6GH	4896-	16-2-	A-26
G2OA	3808-	16-2-	A-24
G6CL	1677-	13-3-	- -15
G5FA	1518-	11-2-	A-20
G8KH	1064-	8-1-	A-57
G5PY	496-	8-2-	A-10
G5BD	216-	4-3-	A- -
G8HA	165-	5-1-	- - -
G6NG	95-	5-1-	A- 5
G2RO	68-	4-1-	- - -
G2UX*	68-	4-1-	- - -
Hungary—HA			
HA8D	55136-	32-3-	A-90
HA4H	20212-	31-3-	B-75
HA8C	18084-	33-3-	A-31
HA7P	2979-	9-1-	A-30
HA2N	1364-	11-2-	A-17
Italy—I			
I1TKM	52272-	36-4-	B-69
I1KN	12167-	23-3-	A-37
I1MH	8262-	18-2-	A-35
I1EC	4301-	11-2-	B-45
I1LT	2210-	10-1-	A-12
I1EP	748-	11-2-	A-28
I1LD	634-	7-1-	A- 6
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YT7MT	3055-	13-1-	B-17
Latvia—YL			
YL2CD	13440-	21-2-	A-44
Lithuania—YL			
LY1J	26406-	27-3-	- -58
LY1S	8595-	15-2-	B-56
LY1HB	2860-	11-1-	B-20
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PAØGN	57520-	40-4-	A-76
PAØQQ	54852-	42-4-	A-79
PAØPN	37224-	33-4-	A-73
PAØEA	31078-	34-4-	A-75
PAØKZ	15000-	25-3-	A-50
PAØUV	14337-	27-3-	A-71
PAØXM	11970-	21-3-	- - -
PAØAD	6688-	19-2-	A-36
PAØFLX	6058-	26-4-	A-65
PAØOO	6028-	22-4-	A-29
PAØJX	3640-	20-3-	A-49
PAØXF	2124-	12-1-	A-20
PAØFX	1677-	13-2-	- -26
PAØZM	1638-	9-1-	A-23
PAØDA	1151-	9-1-	A-31
PAØJR	1104-	12-3-	A-16
PAØEP	792-	6-1-	A-25
PAØXG	204-	6-1-	- -10
PAØCV	24-	2-1-	A- -
Northern Ireland—G1			
GI5QX	16005-	15-2-	A-74
GI6XS	8580-	13-1-	A-45
GI6TK*	103244-	53-4-	A-84
Norway—LA			
LA4K	18018-	25-3-	A-65
LA2B	17010-	27-3-	A-53
LA4A	668-	6-1-	A-44
LA3B	540-	9-1-	A-11
LA4X	536-	8-1-	A- 7
LA3V	124-	4-1-	A- 5
LA2U	54-	3-1-	A- 1
LA4R	30-	2-1-	- - -
Poland—SP			
SP1MX	8380-	20-3-	A-40
SP1LP	1890-	10-1-	A-35
SP1JC	3-	1-1-	A- 1
Portugal—CT1			
CT1KH	23736-	23-2-	A-76
CT1ZA	180-	5-1-	A- 5
Roumania—YR			
YR5VV	2550-	15-3-	B-19
YR5TP	1026-	9-2-	A-14
YR5AR	954-	9-1-	A-12
YR5VC	486-	6-1-	A- 4
YR5XJ	120-	5-1-	A- 3
YR5EV	70-	5-2-	A- 3
Scotland—GM			
GM6NX	54648-	33-3-	A-78
GM8SV	3708-	12-1-	A-54
GM5YN	3509-	11-1-	A-30
GM8MJ	2442-	12-2-	A-19
GM8FR	1424-	8-1-	A-16
Sweden—SM			
SM7UC	22607-	37-4-AB-	44
SM5UM	20125-	25-3-	A-60

(Continued on page 106)

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5—Double getter flashed for highest vacuum, longest life.
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9—Forty degrees of light contrast due to special processing of fluorescent screen.
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For Technical Details and Nearest Dealer write: **National Union Radio Corp., Newark, New Jersey**

Station Activities

HUDSON DIVISION

EASTERN NEW YORK—SCM, Robert E. Haight, W2LU—2KFB schedules SC daily with FB results on traffic. LLU hails from Feura Bush. KWG is ready for any West Point traffic on 3.5 or 3.7 Mc. KXF starts traffic season with FB line-up of schedules. HCM attended S.A.R.A. Hamfest with YF. HTU sports new center fed Zepp, 130 ft. long. FQG is sticking to 3.9-Mc. 'phone. BLU's new rig: '47-10-211, about 150 watts input. KXF reports 2LOR new ham in Port Jervis. HOA is pounding out on 3.9- and 1.75-Mc. 'phone with 35T final. GTG increased power on 3.9 Mc. to 500 watts. JHO is building for 28 Mc. while JJO is perking on that band. HLV, brother to JHO, is blasting out on 14-Mc. 'phone. CLJ was on Long Island Labor Day with portable 3.9-Mc. 'phone. BTY is chief opr. at 2GGP. HOA, GTG, CLJ and FQG attended S.A.R.A. Hamfest. ACB, popular E.C. of Schenectady area, did a fine job assisting in handling emergency traffic during recent hurricane in New England. E.N.Y. welcomes back our old friend BSH. DC, E.N.Y.'s P.A.M., was active assisting during emergency work. The Naval Communication Reserve Nets are in full swing. Let every amateur get behind the U. S. and offer his services by signing with the N.C.R. Information may be obtained from any "N" station or from your S.C.M. ISQ, back to school, has 6L6 crystal-6L6-6L6-35T buffer-250TH final. LLH from Brooklyn joined E.N.Y. Section and promises support while at R.P.I.

Traffic: **W2**KFB 106 LU 62 LLU 36 KWG 17 KXF 10 HCM 8 HTU 7 FQG 3 BLU 3.

NEW YORK CITY & LONG ISLAND—SCM, Ed. L. Baunach, W2AZV—LOQ is now O.R.S.; he is former 8QPS. IBT is back in N. Y. C. from the west coast. LAP is now located at 1799 Popham Ave., N. Y. C. For the next few years KVY's QTH will be the Georgia School of Tech. PF has been doing active duty at Fort Bragg, N. C. from Oct 2nd to the 15th. This report is being written during one of the worst hurricanes that L. I. has ever experienced and it is proving that emergency power supply is a very great necessity as the power has been off for over three days on the island. HYJ and LAH rushed to Fire Island and maintained contact with the mainland on 56 Mc. JZX and DXO operated a 3.5-Mc. rig from the State Police Barracks at Bay Shore and acted as a link for Fire Island. We want all operators in Suffolk County who have portable equipment capable of operating on their own power supplies to get in touch with us for enlistment in the A.E.C. net of this Section. KJY is looking for a 70 foot mast for his portable QTH at Mt. Siani. DVU completed his rig and it works FB on all bands. Two seven pound twin girls arrived at BRB's shack. Congrats, Ed. EVA has plenty of QSL's waiting for their owners. HAK had a surprise one day when he was in W.U. office; VE1BH whom he worked several years ago was there visiting N.Y. KCV returned from Pittsburgh where he was visiting 8KVR. LED is operating from Michigan on all bands. KSI at 954 St. Nicholas Ave., N. Y. C. says he has never operated on 56 Mc. and his call is being bootlegged. HMJ completed rebuilding his transmitter. KYO made W.A.C. when he worked YI2BA. JBL has new receiver that works FB on 14 Mc. IHT just works DX. KTF is putting up a 3.5-Mc. Zepp and 56-Mc. "Q" for the winter season. IXZ built a 14-Mc. rig with a 25L6 in the final. BMW had an FB time at the National Convention. HBO is back after a summer lay-off. JEQ is back from vacation. EC reports that A.P. trunk line on nightly at ten P.M. on 3630 kc. 1XQ swapped a 1000 volt power supply with KTA for a portable typewriter. Bill, the opr. at SC, is busy with A.A.R.S. and C.A.N.C.S. duties. JVK in first report advises he is using a '10 final on 7 Mc. GMS and KIF got a kick out of handling Maxim Memorial Relay messages. DOG is busy grinding a number of crystals. KYV is looking for traffic on 3.5 Mc. CHK is working his 8JK beam to perfection. After three years on 7 Mc. HGO is going on 3.5. JWE is QRL R.C.A. institute. BVE resigned as president of Tuboro R.C. APM is now president. LEA reports a new club in Ridgewood known as the Queens Radio Amateurs; the officers are: Pres. LPJ; vice pres. CWE; sec. LEA: treas. CHT. LJC schedules 8IWV on 7133 kc. LFN moved from Amity Harbour, L. I. LR is getting portable gear working. We are pained to hear of the death of Ross Hull; he was the Marconi of the 56-Mc. band and his loss will be deeply felt by the gang.

Traffic: **W2**SC 260 (WLN 354) AZV 120 JZX 151 KYO 36 PF-KCV 17 HMJ-LR 16 LOQ 15 LFN 14 LED-CIT 11 AA-DLR 10 HYL-FJE 9 DBQ-CHK 8 KYV-FLD 7 IHT-KIF-HGO 6 EC-ADW 5 GMS-GUV 4 DVU-HSO-IRC 3 KJY-AHG-BYL-GRJ 2 LJC-CET-AGC 1.

NEW JERSEY—SCM, Fred C. Read, W2GMN—N.N.J. Traffic Net 1 resumed operation Sept. 6. Members are GVZ, HOZ, CMC, HCO and KTR. KTR is new member of A.A.R.S. GFW rebuilt his transmitter for the higher frequencies. KSW is studying at Stevens Tech. IOZ visited all the New England States in one week-end. HRN is member of the "ABC" Net, a 7-Mc. net which operates every Sunday morning. CIZ has Class A license. LMN worked 31 countries during his first 3 weeks on the air. KHA improved his transmitter. JKG at Yale University intends to spend some of his spare time in traffic work. JYK has new "expander" unit. FB has been designing new 28-Mc. antenna. HZY with 175 watts input gets fine reports on 7 Mc. HXI is attending Northeastern Univ.

Traffic: **W2**CGG 184 HSI 55 HZY 30 JKG 30 KTR 29 HQL 17 (WLNR 23) GVZ 12 IZV 6 KHA-LMN-CIZ-JUC 5 HRN 3

ATLANTIC DIVISION

EASTERN PENNA.—SCM, John B. Morgan, W3QP —Asst. S.C.M. in charge of Emergency Coördination: W3AKB, R.M.'s: 3AKB, 3AQN, 8ASW. Reports indicate intensive preparation for fall-winter schedules throughout this Section. The Eastern Penna. Traffic Net has swung into operation on 3595 kc. with about seven members. All stations are O.R.S., report regularly, and operate in the best standard procedure. Membership in this group will indicate outstanding ability, and may be had only after careful investigation by Route Manager Stumpf, W3AQN, who is the Net Control. Any O.R.S. interested in joining should communicate with W3AQN, Paul L. Stumpf, 1330 West King Street, York, Penna., and give full information about his experience and length of service, class of license, equipment, etc. Application for membership, however, is not an assurance of acceptance. Those interested in joining the A.R.R.L. Emergency Corps for this Section should communicate direct with W3AKB, Miss Frances V. Rice, 202 E. Gorgas Lane, Mount Airy, Philadelphia.

Traffic: **W3**ADE 26 3AKB 10 3AOC 5 3AQN 11 3BES 147 3BRZ 4 3DGC 61 3DGM 1 3DXC 9 3ECP 7 3EDC 49 3EML 723 3GAG 10 3GDI 15 3GMK 21 3GUB 23 3GYY 1 3HCT 2 3QP 267 8ASW 109 8EKG 11 8EU 9 8FLA 16 8OML 9.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA—SCM, E. L. Hudson, W3BAK—3CQS, 3CXL, R.M.'s; 3BWT, Chief R.M.—8JA-3 is going to Indianapolis for several weeks. WU and ME are working plenty of DX.

Traffic: **W3**CIZ 610 BWT 151 GKN 43 GZK 17 FPQ 12 8JA-3 13 ME 11 EZN 4 BAK 1 CXL 137 (WLM 1856).

SOUTHERN NEW JERSEY—SCM, W. Walter Filson, W3BEI—BZX in Cape May Court House, N. J. sent his first report; he was 3ARC back in '28. AEJ keeps a couple of schedules. The Delaware Valley Radio Ass'n held a very successful Hamfest and Outing at Sullivan's Grove, Washington Crossing Park, N. J. on Aug. 14th with over 350 present from as far as Delaware to Conn. The S.J.R.A. ran into another rainy day like last year for its 56 Mc. hunt and outing on Sept. 18 at Berlin Park. DNU turned in a nice traffic report, most of it the result of the N.J.N.G. Camp at Indiantown Gap, Pa. The Atlantic City unit of the N.C.R. is now housed in the A. C. Coast Guard building. FFE is going to U. of P. this fall. FPA, QL and GIA left on a cruise on the U. S. S. *Texas* on Sept. 10 for two weeks. The South Jersey 3700 kc. net is again getting into shape.

Traffic: **W3**DNU 106 BZX 38 AEJ 16 ZI 7 BEI 4.

WESTERN NEW YORK—SCM, H. E. Preston, W8CSE —R.M.'s: 8BJO, 8DSS, 8JTT. P.A.M.: 8CGU. Activity in all phases of ham radio is on the upgrade. The S.C.M. would appreciate receiving news and reports from any and all active amateurs in this Section. All stations with a "W8" call in New York are in the Western New York Section. Your report should be mailed so that it reaches the S.C.M. by the twentieth day of each month. The Binghamton Hamfest was well attended. Motion pictures taken on Pitcairn Island were shown by Lew Bellam, W1BES, who installed VR6AY. It was very fitting that the first showing of these pictures should be made in the home town of W8CNA, who was the first contact ever made from VR6AY. BDV went on a Naval Reserve cruise. PCW is back at the Univ. of Cincinnati. MKA "hopes" to become O.R.S. RKA is putting up a new antenna. CTX reports that the Utica

radio club started off with a feed on Sept. 22 and has plans for a big season. AU works lots of stations from 7000.0001 kc. AON sold the one kw. final and is on with fifty watts to a 6L6. FEJ takes exception to the statement in August *QST* that he has a 500 watt 'phone; he wants a little credit given to the other 300 watts that go to make up the 800 watts that he is using on 1.75-Mc. 'phone. DHU is getting ready to resume schedules. NA is still working for 56-Mc. contacts. (Shh! So am I). The low power DX man ACY has been W.A.C. twice since returning to Rochester. RXG is now member of R.C.C. and is preparing for O.R.S. RMF is leaving for R.P.I. DEQ has an FB7XA and keeps a few schedules! RFX is returning to Endicott from his summer home in Vestal. BJO has been working nice DX with his "Bi-Push" on 7 Mc. JTT has a 100-kc. crystal and a 10-kc. multivibrator for accurate QSY. QHX reports a fine time at the Binghamton Hamfest. ROI is all settled in new QTH at Aurora; with a whole 75 watts input to the final he needs only Asia for W.A.C. RTX is doing a nice job of traffic handling on 1.75-Mc. 'phone. QXS is doing great work with that three watt 'phone on 1.75 Mc. also. AVD gets out with only six watts on 3.9-Mc. 'phone. KEK has been on 3.5 Mc. QQM plans to use 6L6G's in oscillator and buffer stages. ABV is located in Oswego. MJV and JFW are planning on a school station at Oswego Normal. MVQ does a little operating now and then. KDY is very active on 1.75-Mc. 'phone. LYJ, SED and RDJ in Syracuse are on 1.75 Mc. also. RZX is going to St. Lawrence Univ. SHC in Syracuse is busy on 3740 kc. CSE visited RKM on Sept. tenth and a tour was made of the ham shacks in Cortland. (Bet they aren't shined up like that all the time. Hi.) QLT has separate "Hammarlund" type finals for 14 and 7 Mc. REI wanders from band to band. QXB also visited RKM and the Cortland gang on Sept. 10th. SHO is the ham call of WANC, the emergency unit of the Jamestown American Legion Post; they operate on 3520 kc. and would like to gather reports from anyone who hears them in order to determine the effectiveness of their equipment. CSE and PLA and their families spent the most enjoyable Labor Day week end of their lives as guests of VE3EF and VE3SG. On Sunday, Sept. 4th about a dozen local hams and their families gathered at VE3EF's summer home at King, Ontario, and a grand and glorious time was had by all. Western New York Hams are reminded that one of the section's finest hamfests will be held in Auburn early in November. Don't miss it.

Traffic: W8CGU 12 RTX 14 JTT 24 DHU 9 CTX 15 MVQ 6 RXG 12 RKM 7 CSE 17.

WESTERN PENNSYLVANIA—SCM, Kendall Speer, Jr., W8OFO—R.M.'s: 8KUN, 8KWA, 8MOT, 8GBC. A.A.R.S. Liaison R.M.: 8UK. N.C.R. Liaison R.M.: 8KOB. P.A.M.: 8RBI. Emergency Coördinators: McKeesport; 8DNF: Pittsburgh, QAN; Erie, AQJ; St. Marys, NDE; Butler, DDC; New Castle, NQO. New appointments: O.R.S.; OEM, IZS. O.P.S.: PJJ, QEM. The Altoona Horseshoe Radio Club reports new meeting room with larger facilities; September meeting included interesting speaker and movies of amateur radio's part in the Cleveland Air Races. Although the N.C.R. is going on a pay basis next year there are still a few openings for good amateur operators. For details contact the Section Commanding Officers, Lt. Williams, N8ZD-ZAE, and Ensign Hiner, N8FUW. PFW says that each member of the A.A.R.S. state net originated messages in the Maxim Memorial Relay. FUW maintains daily schedule on 3610 kc. from 6:30 to 8:00 P.M. for N.C.R. traffic. KUN says 9YXD-8 is ready for another rush traffic season. RQA divides his time between 3610 kc. and 14 Mc. VE3SF visited NCJ for a few days. The XYL op. at NCJ is busy with DX on 14 Mc. IOH attended the Toronto Fair. NDE went away for several weeks. OEM is building new rig with 211 or '03A final. KXP is rebuilding his exciter. QEM operates 1.75-Mc. 'phone. PER lost his wife after brief illness. Our sympathies, OM. OSI rebuilt rig into metal rack with P.P. 809's final. ROA has been doing nice work with new doublet antenna on 1.75-Mc. 'phone with 20 watts input. RTU worked 30 states and 5 countries in a short time on 7 Mc. with only 30 watts. JZZ will be active as O.R.S. on 3.5 Mc. FER completed emergency rig using 6F6-807 with 6N7-6A6 Class B modulator for 3.9 and 1.75-Mc. 'phone with emergency power equipment. OUT works 14-Mc. 'phone. IZS uses 89 e.c.o.-6L6G modulated by 76-6L6G on all bands. RYD has had 19 contacts with 1.5 watts input, one contact lasting 3¼ hours. KBJ says "believe it or not"—QAN is on 14-Mc. 'phone. RBD's 89-89 rig works fine under very poor operating conditions. KQX is on 1.75-Mc. 'phone. ASE is rebuilding using seven foot rack layout with '03A final, 325 watts. BOZ changed from 211 modulators to TZ40. KYW is rebuilding. NTJ is building new radio shack. APQ heard three Asians—almost went W.A.C. DGL is getting his shack in shape since his honeymoon. MIM, RTV runs 300 watts to 802-6L6-P.P. T20's-P.P. T55's modulated Class B with '03A and '45's drivers. MQT, QEA and SHL made the N.C.R. cruise on the U. S. S. *Arkansas* to Portland, Maine. QFM is rebuilding for more power. RYD operates low power 1.75-Mc. 'phone. HAJ is experimenting with portable equipment. RIT operates 1.75-Mc. 'phone during summer and 3.5-Mc. c.w. in the winter. AYH is active on 7 Mc. ATTENTION—The O.R.S. Net resumed operation October 3. Arrange to route your traffic through this channel for rapid and dependable service. FGI is now Lt. (JG) in the N.C.R. Congrats. Western Penna. boys making the N.C.R. Cruise on the U.S.S. *Texas* to Guatanamo Bay, Cuba, included LBO, NQQ, FQL, BLL, OFO, EFA, QBK, NZR and QFR.

Traffic: W8PFW 74 FUW 81 KUN 56 RQA 55 ZD 46 NCJ 34 OFO 32 IOH 13 NDE 12 OEM 9 KXP 7 QEM 5 RAU 4 CMP 3 OSI 2 ROA 4 RTU 3 MJK 1

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Frederick Ells, Jr., W1CTI—All Connecticut amateurs mourn the untimely passing of Ross Hull. AW is on the air and leads the Section in traffic. Welcome to George Hart, 3AMR, second operator at AW. JXP reports A.A.R.S. nets in full operation. KQY is rebuilding power supplies and reports on the local gang. AGT, HSX and JHM are building new 28-14-Mc. transmitters. GC has new ACR111. JAK has nearly finished kw. P.P.—HF 200's and beam antenna. JHN moved to West Haven. KUK is DXing on 28 Mc. GRF is doing the same on 14 Mc. BYW is trying a new ACR111. FMV is back from the West Coast. N.H.A.R.A. resumed activities with election of officers October 7. EAO handled his traffic on 3.9-Mc. 'phone. ITI has new HRO and is building an addition on home to serve as sunparlor and radio room. AMQ is back on 3.5 Mc. and all set for traffic. The Manchester Radio Club held its first meeting Sept. 13. DJC has portable-mobile 56 Mc. crystal rig. DUD is on 7 Mc. with 6L6G. DJC, CSC, BUE and JAM enjoyed the Chicago Convention. DVO has a Meissner "Traffic Master." LMK uses ACR136 and 6L6G crystal with 30 watts input. September 21, 1938 is a date that will always remain in the memory of the Conn. amateur . . . —hurricane and flood, power lines down, telephone and telegraph communications generally wrecked!! If you have not already done so, please advise A.R.R.L. Headquarters at once of your radio activities pertaining to emergency work.

Traffic: W1AW 232 JXP 103 KQY 98 KFN 97 EAO 71 ITI 40 BIH 36 AMQ 22 TD 21 KKS 20 JJL 18 UE 17.

MAINE—SCM, Winfield A. Ramsdell, W1FBJ—The Pine Tree Net starts the traffic season with following members: GOJ Net Control, IST, INW, KCO, IJF, CEM, HSD, IBR and FBJ. This net will operate on 3597 kc. (spot frequency), five nights weekly at 7:30 p.m. JJP is now teaching school in Massachusetts. KKT is working into Mass. FB with 1.6 watts on 1.75-Mc. 'phone. LMQ is new ham in Farmington. LHI moved to Dover-Foxcroft. LHD added pair of 6L6's to the rig and now has 90 watts input, also new Sky Buddy. GOJ has regular schedules with NY1AB, Canal Zone. EIY is rebuilding for 1.75-Mc. 'phone. CPT is new O.R.S. HZI is building new rig for 1.75 Mc. with 211 final, class AB modulation. EJS is going on 28 Mc. to finish working the DX he couldn't get on 56 Mc. DVP obtained First Class Commercial ticket. CFO reports the Army Net swinging into action with FAP, GVS, KOU, GE and HMS already on the active list. IIE is still plenty interested in Radio Rifle Matches and reports that a recent issue of "Rifleman" devoted a whole page to this branch of our operating. They also ran pictures of ham stations that have run matches. It certainly is very fascinating work and it is hoped that more stations will become interested. If you have a Rifle Club in your vicinity, why not offer your station for a trial? How many of us felt the need for an emergency power supply during the recent hurricane which hit most of New England? How did you feel when the power service went off, while you were standing by to be of some assistance to the people in the stricken area? We have always felt safe from anything like this but it should look different now. Let's get going on the emergency line of thought and be

(*Continued on page 104*)

Standard Frequency Transmissions

Date	Schedule	Station	Date	Schedule	Station
Nov. 4	A	W9XAN	Dec. 2	A	W9XAN
	A	W6XK		A	W6XK
Nov. 11	BB	W6XK	Dec. 9	BB	W6XK
	A	W9XAN		A	W9XAN
Nov. 12	BX	W6XK	Dec. 10	BX	W6XK
Nov. 13	C	W6XK	Dec. 11	C	W6XK
Nov. 18	A	W6XK	Dec. 16	A	W6XK
Nov. 25	A	W9XAN	Dec. 23	A	W9XAN
	B	W6XK		B	W6XK
			Dec. 30	A	W9XAN
				A	W6XK

STANDARD FREQUENCY SCHEDULES

Time (p.m.)	Sched. and Freq. (kc.) A	B	Time (p.m.)	Sched. and Freq. (kc.) BB	C
8:00	3500	7100	4:00	7000	14,000
8:08	3600	7100	4:08	7100	14,100
8:16	3700	7200	4:16	7200	14,200
8:24	3800	7300	4:24	7300	14,300
8:32	3900		4:32		14,400
8:40	4000				

Time (a.m.)	Sched. and Freq. (kc.) BX
6:00	7000
6:08	7100
6:16	7200
6:24	7300

The time specified in the schedules is *local standard time at the transmitting station.* W9XAN uses Central Standard Time, and W6XK, Pacific Standard Time.

TRANSMITTING PROCEDURE

The time allotted to each transmission is 8 minutes divided as follows:

2 minutes—QST QST QST de (station call letters).

3 minutes—Characteristic letter of station followed by call letters and statement of frequency. The characteristic letter of W9XAN is "O"; and that of W6XK is "M."

1 minute—Statement of frequency in kilocycles and announcement of next frequency.

2 minutes—Time allowed to change to next frequency.

W9XAN: Elgin Observatory, Elgin National Watch Company, Elgin, Ill., Frank D. Urie in charge.

W6XK: Don Lee Broadcasting System, Los Angeles, Calif., Frank M. Kennedy in charge.

WWV Schedules

EACH Tuesday, Wednesday and Friday (except legal holidays), the National Bureau of Standards station, WWV, transmits with a power of 20 kw. on three carrier frequencies as follows: 10:00 to 11:30 A.M., E.S.T., on 5000 kc.; noon to 1:30 P.M., E.S.T., on 10,000 kc.; 2:00 to 3:30 P.M., E.S.T., on 20,000 kc. The Tuesday and Friday transmissions are unmodulated c.w. except for 1-second standard-time intervals consisting of short pulses with 1000-cycle modulation. On the Wednesday transmissions, the carrier is modulated 30% with a standard audio frequency of 1000 c.p.s. The standard musical pitch A = M440 c.p.s. is also transmitted from 4:00 P.M. to 2:00 A.M., E.S.T., daily except Saturdays and Sundays, on a carrier frequency of 5000 kc., power 1 kw., 100% modulation. The accuracy of the frequencies of the WWV transmissions is better than 1 part in 5,000,000.

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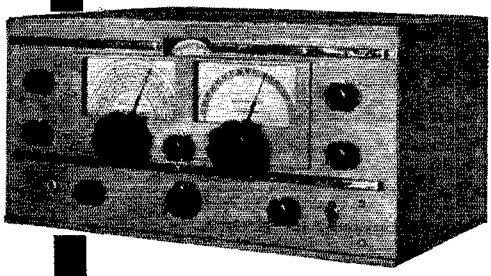

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THE DB-20-70

The two stage R.F. amplifier and pre-selector may be ordered to match the outward appearance of the RME-70. Frequency Range from 550 to 32,000 KC. Net price, with tubes and change-over switch, black or gray finish..... **$42.60**

THE COMBINATION

The RME-70 and DB-20-70 are also built into one cabinet, either black or gray finish. This combination makes one of the finest and most up-to-date units for any amateur radio station. Net price, complete with the newly designed speaker and tubes **$181.80**

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This frequency expander is available in the front trim to match the RME-70 receiver at no additional cost. Frequency coverage 28 to 70 megacycles. Very effective in image suppression. Net price, with tubes and change-over switch, black or gray finish **$45.10**

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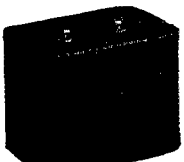
1500 V. DC. 1½ mfd.



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2 mfd., 2000 V. DC 4⅛ x 3⅛ x 1¾, 1¼ lbs.	$1.50
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3 mfd., 1500 V. DC 5 x 3¼ x 1¾, 1½ lbs.	1.50
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(*Continued from page 101*)

prepared. The boys in the thick of the fray certainly did a wonderful job. Congratulations to those who were able to get on the air and help do this job and we sympathize with those who were unable to salvage enough of their equipment to do so. W7GCO, Wallace H. Leland, 3017 O'Neil Ave., Cheyenne, Wyo., would be glad to schedule any Maine amateur who is looking for a Wyoming QSO for W.A.S.

Traffic: **W1**FBJ 31 IIE 11 LHD 4 LDC 3 CPT 10.

EASTERN MASSACHUSETTS—SCM, Sam Gross, W1IWC—KH attended National and New Hampshire Conventions. KMQ is running 100 watts on 56 Mc. to pair of HY25's. JNF is using RK-20 crystal osc. JJY added pair of 809's to rig. KZT is new net control station for E. Mass. Net. KPW got news of conditions on Cape through to papers when storm isolated Cape Cod. AGX is putting HY25's in final. Hope you're able to be up and around soon, HWE. HRE is active in A.A.R.S. and E.M.N. LLX finds time to work VQ3HJP on 14 Mc. IWC is back to handling traffic again. BDU applied for O.R.S. GAG is planning new rig with RK-38's in final. JKT is trying to get rig perking on 28 Mc. WV worked ZD2H for 108th country and made his 984th "G" QSO. KKO is attending Northeastern Univ. JXU is running pair of T20's at 90 watts input. IHI is spending his time on 28-Mc. 'phone. LOC (ex-3GRX) applied for O.R.S. LBY, IWC and IHI went to Woburn Sept. 11 and handled the Massachusetts end of a rifle match with Cleveland, Ohio. The Westlake Amateur Radio Ass'n with Sec'y 8LVH and 8AVH did the job at the Cleveland range. The Massachusetts shooters were licked again although their high man made a new record for this type of target. A return match is tentatively set for Oct. 2. This report is being made up with the aid of a flashlight and the old kerosene lantern and not so easy for me with my hunt and peck system! Maybe we won't have another storm like this one but we might—why not enroll in the A.R.R.L. Emergency Corps and be ready when another one hits. The S.C.M. had several real old fashioned rag chews when LOC and LLX dropped in to see him last month. RE also stopped in to say hello and pay his respects to the chickens. The Eastern Massachusetts Net opened for business September 19. KZT is the N.C.S. and the net now meets at 7:30 P.M. every evening except Sunday. Active stations so far are KZT, BMW, BEF, IHI, IWC, LBY, HRE, LLX, LOC, JJY and EPE. The South Shore Amateur Radio Club held its first meeting of the year Sept. 23.

Traffic: **W1**KH 183 EPE 177 AKS 118 KMQ 103 KCT 98 EMG 97 JNF 75 JJY 71 KZT 63 KPW 36 AGX 32 HWE 26 HRE 20 LLX 13 IWC-JSM 12 LBY 8 BDU-GAG 5 JKT 3 BMW 2 WV 4. (July–Sept.: W1JSM 35).

WESTERN MASSACHUSETTS—SCM, William J. Barrett, W1JAH—AJ reports plenty cards from European DX. IOR is looking for new men for A.A.R.S. BIV's 6L6G tri-tet portable worked swell on Delco system while Pres was vacationing in Barnet, Vt. How about a few more stations getting equipped for emergency-powered operation? Let's get started, gang, on something for 3.5- or 1.75-Mc. c.w. or 'phone. JAH is rebuilding but as of yore the ole input will stay about ten watts. VO1D visited JXE recently en route to A.R.R.L. Hdqs. COI is still working on his speech amplifier. KXR, our newest O.R.S., was visited by BJP of Newport, Vt. LHY had swell time handling Maxim Memorial Relay traffic. KJK/9 again reports from Wisconsin. Romander's extended double Zepp is perking fine for BNO on 14 Mc.; he also has new SX-16. And that, brethren, winds up the smallest mailbag ye S.C.M. ever got—How about some action? The Section extends its sincerest sympathy to those bereaved by the passing of Ross A. Hull.

Traffic: **W1**AJ 15 IOR 14 (WLGJ 12) BIV 9 JAH 8.

NEW HAMPSHIRE—SCM, Carl B. Evans, W1BFT-DMD—As this is being written, we are just recovering from the worst emergency in which amateur radio has ever been called upon to render assistance in this Section. The N. H. Amateurs were "johnny-on-the-spot" giving excellent service to the public utilities and state departments. The two state nets on 3735 and 3840 functioned exceedingly well despite the loss of power in practically all sections of the state. It was our first opportunity to use our recently organized emergency net in a case of actual necessity. Results were favorable, but left plenty of room for improvement. Various "bugs" will be ironed out of our system in the following months in an attempt to give even better service the next time that we are called upon. Please accept my personal thanks to every one who helped in the crisis. We certainly will appreciate further coöperation in an attempt to smooth out rough angles in our emergency networks in the future. The Fifth Annual N. H. Hamfest and A.R.R.L. N. H. Section Convention was held at the Hotel Carpenter in Manchester, on September 17. From all reports a good time was had by all. 250 hams from all of the New England states were present. JNO is experimenting with an automatic limiting amplifier. KIN is now using an RME-69. APK and IJB have been handling traffic from VE1IN, Kents Island Expedition on 3.9-Mc. 'phone. KBR is rebuilding with an 809 final. IMB is active on 28 Mc. 'phone. EDN is rebuilding his oscillator using a 53. LKK is a new ham in Manchester. HJI is on 3.9-Mc. 'phone with a T-40 final and class B modulator. DMD, the new station of your S.C.M. in Concord, was kept on the air continuously for 109 hours by a staff of operators belonging to the M.V.A.R.A. and the N.C.R. during the recent emergency; 161 messages were handled for various state departments and public service companies plus many messages of a personal nature. The New Hampshire Net (NHN) is now functioning regularly on 3840 daily except Sundays at 6:30 P.M. All N. H. amateurs are welcome to either join the net, or break in occasionally. 3900 to 3700 kc. is covered regularly by QRZ's so that it is not necessary for all to be on the spot frequency.

Traffic: **W1**KIN 132 APK 14 BFT 1.

RHODE ISLAND—SCM, Clayton C. Gordon, W1HRC—All R. I. Amateurs join in the feeling of great loss which the League and radio as a whole have sustained in losing Ross Hull, our Editor of *QST*. Very few of us are so gifted with talent that we may be leaders in science and point the way for others to follow. The loss is bound to be felt more and more as time goes on and the many contributions which he made to our hobby are realized. May his sacrifice serve as a real warning to the rest of us, no matter how familiar we become with our apparatus, that high voltage is no respecter of persons, and that carelessness may bring about a loss which can never be replaced. LAB moved to new QTH: 12 Baldwin St., Pawtucket. KWA has 35-T final on 14 Mc. and has worked all but 7 states for W.A.S. KLR has 3752-kc. crystal for A.A.R.S., 802 tri-tet linked to pair of '10's with 60 watts and new Sky Challenger. FB, OM, and certainly glad to see A.A.R.S. spreading out over the state instead of keeping bunched up here in Providence and Pawtucket. KTU of Fort Adams and LAL of Providence are signed up with A.A.R.S. and GTN is gunning for more members. INU and INT have moved to California Ave., Prov. JUE is still the e.c.o. expert. HRC has e.c.o. job now, along with the usual set of crystals. The P.R.A. is holding a membership drive and the present membership will now, under new rules recently adopted, be given membership in A.R.R.L. after they have kept their membership dues in the P.R.A. in force for a three months' period. This will make P.R.A. 100 per cent A.R.R.L. inside of a year.

Traffic: **W1**GTN 29 LAB 26 INU 15 HRC-CPV 13 KCW 10 INT 9 JDX 7 KWA 2.

VERMONT—SCM, Alvin H. Battison, W1GNF—GAZ is operating at WSVB. KVB hopes to contact the Vermont fellows during Christmas vacation. EZ is turning to traffic. JRU-IQG have a photo-radio laboratory. KXL is attending Mass. Radio Club. DPO is still in Burlington. KWC moved to North Springfield. KIE, KWB, KVB, LFM and 2BAQ kept St. Albans on the map. GNF and brother have an ignition eliminator, one hundred per cent proof—a Stanley Steam Car—Vintage of 1913. KJG visited KIE, 2BAQ and KBW. 2AZX is attending Caselton Normal School. The following attended the Manchester Hamfest: AAJ, AVP, ELR, FSV and JLF. AVP won an RME-69 there. FSV is anxious to hear from all who are interested in a 1.9-Mc. 'phone A.A.R.S. net. Don't forget. . . . We were all going to be active this year!

Traffic: **W1**EZ 50 KVB 21 GNF 10 FSV 7 AHN 1.

ROANOKE DIVISION

NORTH CAROLINA—SCM, H. S. Carter, W4OG—The entire North Carolina gang enjoyed having our Communications Manager Mr. Handy as a visitor to the various clubs throughout the State. CYB is a member of the A. A. R. S. 'Phone Net meeting every Monday night; he now has a pair of T-125's final. ETE is attending school at Wake Forest. FT and BRK are on 28-Mc. 'phone. BJU is working 14-Mc. 'phone. EDY handled some traffic as portable, as well as working some good DX on 7 Mc. The Charlotte Club will entertain the Carolina Floating Club the first Sunday in November. Be there. DLX is making some

good schedules for the winter. AEN's "Q" blew down while he was out of town, but BX saved the "Q" bars for him. BIP is putting the final touches on his rig for Fall and Winter work; he attended the Chicago Convention, along with BVD and BHR. FJS returned from C.C.C. camp where he has been working WUNB this summer; he is going on 1.75-Mc. 'phone soon. ECW and FIX went "afloat" with N.C.R. on the Arkansas. TO is building a 3.9-Mc. rig with pair of 849's final. HX is putting his rig back in cabinets. DPF vacationed in Ohio with portable rig. GW is running a kw. on 14-Mc. 'phone. BC is back on 14-Mc. 'phone. EJ and EFX left for Wake Forest to attend school. The Raleigh Club is gathering parts to build an emergency portable transmitter. EBA handles N.C.R. drills every Thursday night. The N.C.R. will be on soon from the Post Office building with call FNG. FIB, a new ham, has Thordarson 100-watt transmitter and is working 7 and 28 Mc. JB sticks to 14-Mc. 'phone. DW and ESO took part in the Maxim Memorial Relay. ESO is attending school in Raleigh. AE is on 3.5. Mc. FLG and FFX are keeping the 7-Mc. band hot in Raleigh. BNL, CGL and BRT attended the Convention in Chicago. BRT is keeping a daily schedule with CDD in New Holland. OQ5AE is on furlough in Rockingham until 1939. AHF is keeping the air hot working DX; he has boosted his total to 63 countries since March. FB. DWB left for Chapel Hill where he will attend school. DGV says his new RME is the berries. 4NC with a new pair of 806's has been DXing on 14 Mc. OG attended the National Convention. CYY is wondering about FI8SI, worked while his feeders were shorted!

Traffic: **W4**CDD 65 DLX 21 BRT 21 EDY 19 ETE 11 EBA 10 CYB 8 ESO 4 ANU 3 DWB-DW 2.

SOUTH CAROLINA—SCM, Ted Ferguson, W4BQE—CZN has his A.A.R.S. Net going Mon., Wed. and Fri. nights. Moultrieville has a new ham, FNT. Welcome, OM. OW is now located in Asheville, N. C. CUS and DGD are working 1.75-Mc. 'phone. BWA is on active duty at Charleston Navy Yard. FDN and BDT are active on 3.5-Mc. EUX is going to Ga. Tech. DXF is back on with new remote controlled rig. CZA will soon have another rig on the air. DRF is working 7 Mc. and has applied for O.R.S. BAY is on the air again. EXJ has new antenna, four half waves in phase. CQU is active in A.A.R.S. FFO returned to Clemson and will be on 3946 kc. EPJ acquired some new equipment and will be on 3.9-Mc. 'phone. CQG glassed in the back porch for a new shack. CPX is building new exciter. MN entertained the Palmetto Club at his country place known as "Egypt." DTU sticks to 28 Mc. DQY is working on his portable rig. DNR has been appointed Emergency Coordinator. ECG is revamping his rig. ETF has a new beam for working west. EJK completed a new steel vertical for working 1.75-Mc. 'phone. CE is active in C.C.C. Nets as well as Naval Reserve. The North Carolina Floating Club will meet in Charlotte, N. C. Sunday, November 6th. Will see you there. 7GCO, W. H. Leland, 3017 O'Neil Ave., Cheyenne, Wyoming, would be glad to schedule any S.C. ham who needs Wyo. for W.A.S.

Traffic: **W4**CZN 80 CQU 16 CZA 12 DGD-CPX 4.

VIRGINIA—SCM, Charles M. Waff, Jr., W3UVA—P.A.M.'s: AIJ, GWQ—R.M.'s: DJC, GTS—Thanks, fellows, for a good response this month. Are you in on all the fall activities? FQO is W.A.C. with 40 countries verified. AHC is on 1908 kc. DZW has new NC-101X receiver. FHO wants O.P.S. EXW worked VS7MB. HAE wants O.R.S. after rebuilding finishes. 4BAB moved back into Tenn. BSW went to Chicago for National Convention. EQQ likes 7 Mc. CGR looks forward to hamming, after nice fishing this summer. GKL is moving shack back to Richmond from summer location; new shack is being built in back yard. WS, UVA, EQQ and BZE drove to A.R.R.L. National Convention at Chicago stopping by WLW on way back. HAO is ex-4AYX of Clearwater, Fla., with new QTH in Richmond. HRC is new ham in Norfolk. GWQ is new O.P.S. and P.A.M. for 1.75 Mc. All interested in a Net for 1.75 Mc. write GWQ who will act as Net Control. BZE is rebuilding. AHK will consolidate with GKL; new vertical antenna in prospect. BKG is preparing for action. NT, along with EMM, BEK, GCH, II, FGJ and FQP were on at request of Red Cross at Norfolk preparing for hurricane with a 1.8-Mc. 'phone net covering that area. GCO is planning 125-ft tower with rotating beam for 7, 3.5 and 28 Mc. 5FUM and YF spent vacation at Virginia Beach. BRA is back ashore after a spell of operating on S.S. *Malchace*, KULC. BRY is putting up vertical antenna. SE is located at Chincoteague Island on the Eastern Shore. GBC moved to Hancock, Md. AOT is on 1900-kc. 'phone. EVT was first W3 to make DX Century Club; congrats; some of his latest DX: K6NVJ, PZ1AB, VP9X, LZ1ID, VQ8AS, OY4C. ENO has new QTH. FQQ is now 4FFO at Clemson College, S. C. FHF will be on 'phone and c.w. with new rig. GFX is trying for W.A.S. with a single '45 with 4 watts input. Looks like FKQ is leaving for San Francisco soon. CA is back on 3580 Kc. AIJ is building new speech amplifier. GTS wants Virginia schedules. HQ has new NC-81X receiver. FFC is building new six-band rig with 35T final. GJP has been working some DX. AAI is experimenting with 28-Mc. portable-mobile unit. DJC had his mast blown down. GSG passed Class A exam. EBK is at V.P.I. FMY is preparing for the SS Contest. HEZ is on 14 Mc. GBA is practising on a bug. GTS would like to hear from hams interested in A.A.R.S. FBL gives code class on 1929 kc. Mon., Wed. and Fri. from 5 to 6 P.M. ZU was Richmond contact station for Va. National Guard when they were at Virginia Beach. UVA is back at old QTH; P.O. Box No. 1212, University, Charlottesville. Actual location is 7 miles south of Charlottesville. Richmond Amateur Radio Club had a banquet Sept. 23rd with twenty-three present. New officers were installed and the National Convention was described. Watch this live-wire club. Send club news to the S.C.M. as well as your own activity regularly on the 16th; all persons reporting will receive "QRX" monthly.

Traffic: **W3**FBL 5 FMY 6 GTS 5 (WLMG 49) AIJ 3 GFX 2 GKL 3 GWQ 2 GSG 1.

WEST VIRGINIA—SCM, C. S. Hoffman, Jr., W8HD/-W8NS—Several of the clubs want a Club Radio Net sponsored. A frequency of 1810, 3620, 7240 kc. has been suggested, giving fellows in all three bands a chance to QSO W. Va. Those interested, drop the S.C.M. a line. It is hoped those State DXers on 7 Mc. will be interested too. Wheeling Radio Club selected delegates to represent them at the Pittsburgh Radio Council as follows: Delegates: 8AZD, 8BWK, 8HD; Alternates: 8CDV, 8KSJ, ex-8EO0. 4DW, our Director, asks all W. Va. radio clubs to consider if they can handle a Division Convention during 1939. This should be considered seriously, if your club is interested. The S.C.M. would be glad to act as a clearing house for your ideas, and exchange them between clubs. It will be FB to have a Convention in W. Va. in 1939! RDH is new O.R.S. and R.C.C. Congratulations, OM. PHY says the 7040 Kc. Round-Table schedule in W. Va. will begin soon. SDK is new Crystal, W. Va., ham. MLW is on 1.75 Mc. with new 'phone rig. JKN put up an 8JK two Section 14-Mc. beam, getting lots of DX on single 6L6 osc. LCN is DXing on 28 Mc. PQQ has worked 72 countries; five times W.A.C. and once W.B.E. QFN completed tests on his new 'phone job. JM is active again and wants O.P.S. Lots of 'phone activity at MOL and AHF. KIU/DSJ has new YL opr. born July 16th! 2CTT, 8RFP and PQQ are attending W.V.U. JJA has worked 33 countries and is now W.A.C. JKN, writing for Buckhannon hams, wants to sponsor a movement for hams to write their State Senators, asking that suitable legislation be passed to retard ignition QRM to high frequency radio. If you are interested, write your State Senator and send JKN a copy of the letter. BTV hopes to be on A.R.R.L. Trunk Line this fall.

Traffic: **W8**RDH 9 KSJ 3 MOL 4.

SOUTHEASTERN DIVISION

ALABAMA—SCM, James F. Thompson, W4DGS—R.M.'s: 4DS, 4APU; P.A.M.'s: 4DHG, 4BMM; E.C.'s: 40A, 4ECI; O.O.: 4EBZ. The B'ham Club reports via APU: ERW has new 35T on 3.5 and 7 Mc. DUK is still messin' with 56 Mc. We believe that DUK has the two crystal freqs. with the greatest separation: 1803 and 57,508 kc. EDR will be APU's alternate on Trunk Line "J". EYY is still on 14,314 kc. FIG breaks into the traffic column. EBZ has new rig for all bands built up with metal chassis and 6L6-TZ20-P.P. 801's; he remote controls it so he can use the family Breting receiver. BLL has new Jr. Opr. Congrats, Tom. FAT works 7 Mc. only. EHH added T55 buffer and now has excitation to spare; he still holds down 28-Mc. EDR renewed O.P.S. and O.R.S. ECP is working the Academy Club station at West Point. DQW had a letter from ex/BOU who is a W8 lid as 8SBQ. BCU changed to P.P. 50T's. BHY is 14 Mc. AIY is heard once in a while. CRG left for the U. of Ala. all ready for DX and calculus. BAQ has new rig. DQW has new e.c.o. for future contests.

DX Scores

(*Continued from page 98*)

SM5ZF	8169-	21-2-	AB-31	
SM7YE	5015-	17-4-	A-38	
SM6UJ	2416-	16-3-	B-22	
SM5WJ	2115-	15-2-	A-14	
SM5OI	1540-	11-1-	A-13	
SM7MF	630-	9-1-	A-11	
SM5ON	399-	7-1-	A-17	
SM5XW	399-	7-1-	A- 6	
SM5RH	144-	6-1-	A- 5	
SM5OJ	64-	4-1-	A- 4	
SM5SI	24-	2-1-	B- 1	
SM2VP	5-	1-1-	- - -	
Switzerland—HB				
HB9BN	5040-	18-3-	A-36	
HB9J*	90-	5-1-	- - -	
Wales—GW				
GW2GV	3262-	14-2-	A-21	
NORTH AMERICA				
Alaska—K7				
K7PQ	134872-	46-5-	AB-79	
K7FNE	46527-	39-4-	A-60	
K7CHP	41610-	30-3-	A-61	
K7GOM	30600-	30-3-	A-36	
K7EVM	4288-	16-3-	A-12	
K7FBN*	2832-	14-3-	A- -	
K7FSX	324-	9-3-	A- 7	
K7QI	24-	2-1-	- - -	
Canal Zone—K5				
K5AN	94392-	38-3-	A-82	
K5AY	41412-	34-4-	B-20	
K5AU	1305-	9-2-	A-11[18]	
Costa Rica—TI				
TI2FG	27027-	33-3-	B-23	
Cuba—CM				
CM2AD	79480-	40-4-	A-83	
CM2OP	18760-	28-3-	B-15	
CM2AO	4608-	12-1-	B-31	
Haiti—HH				
HH1P	16097-	13-1-	A-40	
Honduras—HR				
HR4AF	2964-	19-2-	AB-10[19]	
Martinique—FM8				
FM8AD	73390-	41-4-	A-65	
Mexico—XE				
XE1A	236322-	57-5-	- -76	
XE1AM	41679-	33-3-	B-52	
XE1AX	23270-	26-3-	B-31	
Newfoundland & Labrador—VO				
VO1N	9170-	14-2-	A-20	
VO4Y	8145-	15-3-	A-23	
VO3Z	245-	7-1-	A- -	
Nicaragua—YN				
YN1AA	5247-	11-1-	B-13	
Puerto Rico—K4				
K4KD	131895-	45-4-	A-88	
K4DTH	109466-	49-4-	B-87	
Virgin Islands—K4				
K4AAN	672-	7-2-	- - 5	
Windward Islands—VP8				
VP2LA	19360-	22-2-	A-54	
VP2LB	10890-	18-2-	A-34	
OCEANIA				
Australia—VK				
VK2TI	42012-	36-3-	B-59	
VK2RA	34510-	34-3-	A-61	
VK5FM	33805-	23-3-	A-42	
VK3IW	31589-	31-3-	A-60	
VK4JU	23500-	24-2-	- - -	
VK4UR	20433-	21-2-	A-67	
VK6SA	16551-	27-3-	A-42	
VK6LJ	13488-	24-3-	- - -	
VK4AW	12528-	27-3-	- -21	
VK3QK	6383-	13-1-	A-44	
VK3UM	5643-	19-2-	A-51	
K3VXB	3990-	14-2-	A-22	
VK2VA	3280-	10-1-	- -19	
VK3JA	2034-	18-2-	A- 8	
VK3BV	1790-	10-2-	A- 8	
VK2AFJ	1560-	13-2-	A- -	
VK3CX	1503-	9-1-	A-13	
VK5GR	1485-	15-2-	A-11	
VK3HG	1235-	13-2-	A- 6	
VK3BG	864-	9-2-	A-10	
VK3VQ	616-	8-1-	A- 7	
VK5QR*	396-	6-1-	A-15	
VK4CG	344-	8-2-	A- 6	
VK2PV*	336-	7-1-	- - -	
VK3RX	296-	8-1-	A- 5	
VK5RX	288-	6-1-	- - -	
VK5HM	80-	8-1-	- - -	
VK3MV	36-	3-1-	- - 3	
VK2AS	26-	3-1-	- - -	
VK4RC	18-	3-2-	A- -	
Hawaii—K6				
K6CGK	145909-	53-5-	A-87	
K6HZI	47600-	23-3-	B-50	
K6PAH	13133-	23-2-	A-53	
Howland Island—K6				
K6BAZ	18-	2-1-	- - -	
New Zealand—ZL				
ZL1MR	46655-	35-3-	A-64	
ZL1CK	28352-	32-3-	A-40	
ZL4CK	27900-	25-3-	A-44	
ZL1BR	25425-	25-2-	A-60	
ZL1GX	20160-	32-3-	A- -	
ZL4AP	8700-	20-2-	A-26	
ZL1BT	4620-	22-3-	A-26	
ZL4AC	4532-	11-1-	- - -	
ZL3GR	4032-	12-1-	A-19	
ZL1FT	276-	6-2-	A- -	
Philippine Islands—KA				
KA1SL	10676-	17-2-	A-37	
KA1YL	6888-	12-2-	B-27	
KA1AX	4368-	13-2-	B-28	
KA4LH	244-	5-1-	- - -	
KA1AA	180-	6-2-	B- 5	
Tasmania—VK7				
VK7CM	3904-	16-2-	- - -	
VK7LZ*	1071-	9-1-	- - -	
VK7AL	264-	4-1-	A- 7	
SOUTH AMERICA				
Argentina—LU				
LU7AZ	99575-	35-3-	A-90	
LU9BV	48137-	38-3-	A-90	
LU3DH	11088-	22-2-	A-16	
LU3EV	6852-	12-1-	A-37	
LU7BK	1053-	9-1-	- - -	
LU2CW	3-	1-1-	- - -	
Brazil—PY				
PY2AC	27297-	27-2-	B-57	
PY1AZ	25375-	25-2-	B-45	
PY5AG	2002-	14-2-	A-25	
PY2BJ	60-	4-1-	- - -	
Chile—CE				
CE4AD	3894-	11-2-	A-13	
CE1AU	468-	6-1-	A-17	
Colombia—HK				
HK1PA	5764-	11-1-	- - -[20]	
HK1JB	4047-	19-2-	A- 6	
Ecuador—HC				
HC2HP	1740-	10-1-	A-17	
Peru—OA				
OA4J	60004-	34-3-	B-61	
Uruguay—CX				
CX1FB	184-	8-3-	- - -	

Phone Scores

ATLANTIC DIVISION

E. Pennsylvania

W3EOZ	46860-	71-3-	C-51
W3LN	7700-	50-1-	B-46
W3DHM	6697-	37-2-	B-20
W3FXC	2300-	23-1-	C- -
W3ANZ	840-	10-1-	C- -

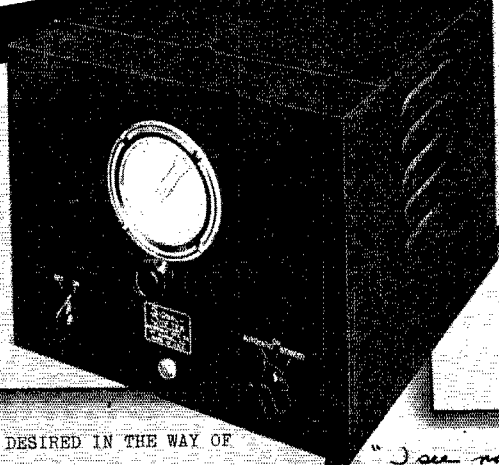
W3GTL	288-	8-1-	- - -	
W3HFP	100-	5-2-	A- 6	
W3EEE*	95-	5-1-	- - -	
W3FNF*	27-	3-1-	- - -	
W3GYH	24-	2-1-	B- 2	
W3CHH	6-	1-1-	B- -	
Md.-Del.-D.C.				
W3BNC	4929-	31-2-	B-44	
W3GWL	1530-	17-1-	- -20[21]	
So. New Jersey				
W3CRG	54599-	91-2-	B-87	
W3PC	54288-	87-2-	C-70	
W3AIR	24534-	58-2-	- -44	
W3BVE	3864-	24-1-	B-33	
W3BMA	2880-	16-1-	B- -	
W3CRY	1638-	18-1-	B-26	
W3BBO*	780-	10-2-	- - -	
W3ZX	611-	13-2-	C-15	
W3EDP	420-	10-1-	B- 3	
W3ENZ	36-	3-1-	B- 2	
W3AXU	27-	3-1-	A- 3	
W3AWH	3-	1-1-	A- -	
W. New York				
W8LUQ	9065-	35-2-	B-37	
W8DST	4239-	27-2-	- -37	
W8NXQ	1926-	18-1-	B-25	
W8JLW*	429-	11-1-	- - -	
W8FOB*	6-	1-1-	- - -	
W. Pennsylvania				
W8GLY	30524-	52-2-	B-90	
W8RED	10395-	33-1-	B-65	
W8KBJ	1116-	12-1-	C-12	
W8RHK	374-	9-1-	- - 9	
W8OJM*	312-	8-1-	- - -	
W8OCR*	99-	3-1-	- - -	
W8BOZ*	3-	1-1-	B- -	
CENTRAL DIVISION				
Illinois				
W9DKU	63525-	77-2-	C-54	
W9QI	12267-	47-2-	B-64	
W9NDA-9	3654-	29-2-	A-30	
W9SQE	1008-	16-1-	B-19	
W9ZBX-9	567-	9-1-	B-37[22]	
W9UQT*	507-	13-2-	B- 8	
W9WC	351-	9-2-	B- 9	
W9RRX	312-	6-1-	- - -	
W9OF	204-	6-1-	- - -	
W9BG	168-	7-1-	B- -	
W9WXT	168-	7-1-	- - 6	
W9LXX*	105-	5-1-	- - -	
W9TDG*	36-	3-1-	B- 3	
W9TB	27-	3-1-	B- -	
Indiana				
W9YGC	48645-	69-2-	C-80	
W9LQ	9870-	47-2-	B-32	
W9MM	9630-	30-1-	- - -	
W9AXH	4442-	22-1-	C-30	
W9TMP	4294-	28-2-	B-26	
W9LZP	486-	9-2-	B-20	
W9USU	48-	4-1-	- - -	
W9UTL*	36-	2-1-	- - -	
W9QEI	27-	3-1-	A- -	
Kentucky				
W9ELL	24450-	50-3-	C-79	
W9NGZ*	1428-	14-1-	- - -	
W9YHQ*	972-	18-1-	- - -	
W9EYW	60-	4-1-	- - -	
Michigan				
W8NJP	42296-	79-3-	C-71	
W8KML	15650-	30-2-	C-56[28]	
W8QDU	5676-	33-2-	BC-19	
W8MSK	5022-	31-2-	B-33	
W8QGZ	3075-	25-1-	B-75	
W8QBO	1275-	17-1-	B-26	
W8PAA	360-	8-1-	- - -	
W9EMB	350-	10-1-	B-11	
W8MCC	312-	8-1-	A-16	
W8KSL	140-	8-1-	- - -	
W8BTP	105-	5-1-	B- 8	
W8IQS	76-	4-1-	A-15	
W8PTD*	48-	3-1-	- - -	
W8QAG*	3-	1-1-	- - -	
Ohio				
W8AAJ	14256-	36-1-	- -48	
W8NK	7986-	34-1-	B-37	
W8NV	7344-	34-2-	C-28	
W8NXF	3744-	24-1-	B-32	
W8YX	3300-	25-2-	BC-54[24]	
W8KYY	3168-	22-1-	A-59	
W8JFC	1921-	17-1-	A-22	
W8KZD	1248-	16-1-	B-54	
W8QUM	108-	6-1-	B-11	
W8LCO*	27-	3-1-	- - -	
Wisconsin				
W9BCV	20007-	57-2-	B-41	
W9RBI	6300-	29-2-	A-57	
W9FAA	5664-	32-2-	B-55	
W9CCI	4425-	25-2-	B-55	
W9ZTO	2024-	23-2-	BC-30	
W9SPV	1394-	17-1-	B-39	
W9OFL	1326-	17-1-	- -12	
W9CGO	884-	13-1-	A-30	
W9YKH	12-	2-1-	A- 1	
DAKOTA DIVISION				
South Dakota				
W9USI	5018-	26-1-	B-39	
So. Minnesota				
W9VXZ	15327-	39-2-	C-89[28]	
No. Minnesota				
W9JIE	342-	6-1-	- - -	
W9LQT	270-	9-1-	A-18	
W9RIL	189-	6-2-	B- 7	
DELTA DIVISION				
Arkansas				
W5ASG	16899-	43-2-	B-72	
W5AKZ	12528-	36-2-	B-34	
W5GKZ	11400-	38-1-	B-56	
W5AYH	192-	8-1-	A-14	
Louisiana				
W5BMM	10080-	30-2-	B-47	
W4BGO-5	3762-	22-2-	B-42	
W5CXH	2508-	19-2-	B-21	
Mississippi				
W5DNV	32804-	52-2-	C-51	
Tennessee				
W4DYP	10076-	35-1-	AC-22	
W4EHG	621-	9-1-	B-12[26]	
W4DLK	72-	3-1-	A- 6	
W4NL*	3-	1-1-	- - -	
HUDSON DIVISION				
E. New York				
W2EOA	20043-	51-3-	BC-38	
W2AMM	11700-	45-2-	B-44	
W2HVI	9870-	30-2-	- -89[27]	
W2CIF	9720-	40-2-	C-27	
W2HHU	8880-	37-2-	B-79	
W2IKV	4488-	24-1-	BC-25	
W2AN	648-	9-1-	C-13	
W2DSB*	363-	11-2-	- - -	
N. Y. C. & Long Island				
W2UK	69264-	78-2-	C-80[28]	
W2KHR	2584-	19-1-	B- -	
W2GHK	528-	11-1-	B-13	
W2GRA	495-	11-2-	B- -	
W2CLA	378-	9-1-	- - -	
W2CHK	198-	6-1-	B- -	
W2FHJ	45-	3-1-	B- -	
W2KOT	27-	3-1-	B-10	
W2HID*	6-	1-1-	- - -	
No. New Jersey				
W2IUV	39324-	45-2-	B-60	
W2JME	34125-	65-2-	- -68	
W2HEM	14850-	45-2-	B-55	
W2HNA	13680-	38-2-	- -39	
W2JV	5200-	26-2-	BC-32	
W2GNQ	5046-	29-2-	B-19	
W2AER	2001-	23-2-	B-24	
W2IDQ	1782-	22-1-	B-13	
W2IDI	1589-	18-2-	A-22	
W2GRG*	637-	13-2-	C-11	
W2HSC	550-	11-2-	A-17	
W2HYV	402-	5-1-	- -20	
W2JUJ	279-	9-2-	- -11	
W2CAY	105-	15-1-	B-11	
W2COT	12-	2-1-	- - -	
MIDWEST DIVISION				
Iowa				
W9MCD	22758-	49-2-	C-87	
W9JOL	10140-	39-2-	B-42	
W9GFQ	1920-	16-1-	- - -	
W9AZZ	378-	9-2-	B-10	
W9VRD	90-	5-1-	B- 4	

"I Have Been Using a Meissner Signal Shifter In Lieu of a Crystal with My Transmitter and Have Found It to be the Exact Answer to Dodging Around QRM That Every Ham Should Have."

K. A. K. – Chicago

"I haven't missed a single QSO since I put in my Meissner Signal Shifter . . . ."

THE SIGNAL SHIFTER THAT REALLY WORKS!



"---there are lots of empty spots on all the bands with your signal shifter."
R. M. B.
Ludington, Mich.

"---I have one of your signal shifters and it is performing wonderfully."
Elgin, Ill.

"giving me results far beyond my expectations especially in the 20 meter phone band"

H. S. L. – Honolulu

"LEAVES NOTHING TO BE DESIRED IN THE WAY OF OPERATION"

O. B. G. – Tulsa

"I see no reason for putting out money for crystals when such an instrument can be had."
W. E. G. – Hot Springs

"I WOULD NOT EXCHANGE MY SIGNAL SHIFTER FOR A BOX FULL OF MOUNTED XTALS."
E F K STLOUIS.

"A few hours operation with this instrument on any QRM crowded band will convince the most skeptical Ham."

E. S. – [illegible]sville, Ky.

"---and for the first time I can get away from QRM instantly."
– N. C.

SEE YOUR JOBBER OR SEND THIS COUPON!

Meissner

MT. CARMEL, ILL.

"A FAMOUS NAME FOR TWO DECADES"

Meissner Mfg. Co. Dept. Q-11
Mt. Carmel, Ill.

Please RUSH full details
SIGNAL SHIFTER RECEIVER KITS

Name .....

Address .....

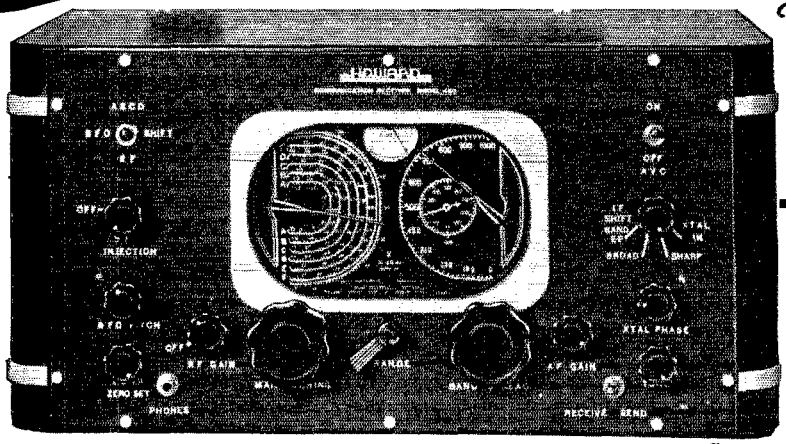
City ..... State .....

W9JRY*	84-	4-1-	- - -	
W9REG	27-	3-1-	B- -	
Kansas				
W9ARL	51170-	59-2-	C-71[29]	
W9BEZ	6336-	32-2-	B-34	
W9SJV	3588-	26-1-	B- -	
W9TTS	1800-	18-2-	B-32	
W9BPL	624-	13-2-	B-36	
W9TVU	504-	12-1-	A-22	
W9VZL	252-	7-1-	A-12	
W9VBQ*	12-	2-1-	- - -	
Missouri				
W9ARA	82863-	81-3-	C-88	
W9EYM	540-	12-1-	A-20	
W9VAV	216-	8-2-	B- 7	
W9LBB	147-	7-1-	- - -	
W9ZFF	12-	2-1-	- - -	
W9KEF*	3-	1-1-	- - -	
Nebraska				
W9ZNA	6156-	27-1-	B-57	
W9BBS	1368-	19-2-	B-31	
W9AGS*	1068-	14-2-	- - -	
W9WOA	192-	9-1-	B- 8	
NEW ENGLAND DIVISION				
Connecticut				
W1IED	10803-	39-2-	B-30	
W1COJ	7384-	32-2-	A-43	
W1FMP	1995-	15-1-	- -19	
W1WR	440-	11-1-	B-10	
W1JWX*	162-	6-1-	- - -	
W1JXV	120-	4-1-	B- 8	
W1DIO	75-	5-1-	A- 6	
W1APA	45-	3-1-	B- -	
Maine				
W1ASQ	156-	4-1-	B- 6	
W1GKJ	40-	4-1-	A- -	
E. Massachusetts				
W1TW	43608-	69-3-	B-67	
W1AXA	37017-	57-2-	C- -	
W1ADM	24013-	59-3-	C-67	
W1BLO	9424-	38-2-	- -23	
W1JCX	7902-	38-2-	B-42	
W1BTL	4784-	26-2-	B-18	
W1QM	3168-	24-1-	B-25	
W1GYZ	2056-	22-2-	B-16	
W1BBX-1	1638-	12-1-	B-10	
W1DJK	891-	11-1-	A-25	
W1JIL	405-	9-1-	B- -	
W1GDY*	390-	10-1-	- - -	
W1GEX	351-	9-1-	C- 9	
W1HRS	231-	7-1-	A-13	
W1JTG	210-	7-1-	A- -	
W1KTG*	180-	6-1-	- - -	
W1WV	150-	5-1-	B-16	
W1AGW	144-	6-1-	A- 7	
W1IGO	60-	5-1-	A-14	
W1JCI*	36-	3-1-	- -14	
W1KM	36-	3-1-	B- -	
W. Massachusetts				
W1COI	9918-	29-2-	B-27	
W1CGY	6325-	25-1-	B-37	
W1DSK	5040-	28-1-	B-30	
W1AEP	4992-	32-2-	B-42	
W1DIC*	1092-	14-1-	- - -	
W1AQM	600-	12-1-	B- -	
W1ZD*	144-	6-1-	- - -	
W1DYA	48-	4-1-	- - -	
W1CQR	36-	3-1-	- - -	
New Hampshire				
W1IVU	54-	3-2-	B- 4	
Rhode Island				
W1JFG	15920-	40-1-	C-54	
W1CJH	10560-	40-2-	- -67	
W1BDS	3381-	23-2-	B-13	
W1BBN	12-	2-1-	- - -	
W1DQ	3-	1-1-	- - -	
Vermont				
W1DQK	7960-	40-1-	B-30	
NORTHWESTERN DIVISION				
Idaho				
W7ACD	540-	10-1-	B-10	
W7EZS*	12-	2-1-	- - -	
Montana				
W7EOI	115-	5-1-	B- -	
Oregon				
W7AMQ	1536-	16-2-	C-30	
W7CHT	1410-	15-2-	B-20	
W7GKJ*	18-	3-1-	- - -	
Washington				
W7DVY	8777-	34-2-	C-64	
W7ESK	8160-	34-2-	- -83	
W7AXS	420-	10-2-	B-30	
W7FVL*	72-	4-1-	A- -	
W7ADU	12-	2-1-	- - -	
PACIFIC DIVISION				
Nevada				
W6LCJ	3-	1-1-	- - -	
Santa Clara				
W6MPS	4032-	24-1-	B-58	
W6GUJ*	105-	5-1-	A- -	
East Bay				
W6ITH	51240-	70-4-	C-90	
W6OCH	37758-	58-2-	BC-61	
W6CQS	16170-	35-2-	C-61	
W6AMG*	7344-	24-1-	- -36	
W6IDY	7172-	22-1-	C-42	
W6LCT	1600-	16-2-	A-61	
W6MVQ	1488-	12-2-	B-12	
W6JSS-6	147-	7-2-	B-10	
W6CUG*	36-	3-1-	- - -	
San Francisco				
W6SG	155-	11-1-	B-11	
Sacramento Valley				
W6EJC	12180-	35-2-	- -62	
W6AK	108-	6-1-	B- 6	
San Joaquin Valley				
W6CQI	57072-	82-3-	C-74	
W6GCA	1575-	12-2-	A-16	
W6IWU	1027-	13-3-	AB-73	
ROANOKE DIVISION				
North Carolina				
W4AH	50660-	68-2-	C-70	
W4CDG	49511-	77-3-	B-75	
W4FT	13200-	40-1-	C-51	
W4OC	8190-	39-2-	BC-29	
W4GW	1818-	18-1-	- -21	
W4EC	264-	8-2-	B- -	
South Carolina				
W4EDQ	2503-	19-1-	B-12	
W4FEH	2205-	21-1-	B-10	
Virginia				
W3EMM	97092-	87-3-	C-89	
W3FGJ	6528-	32-2-	B-15	
W3FQP	363-	11-2-	B- 5	
West Virginia				
W8MOL	1027-	13-1-	B-15	
W8RJ	27-	3-1-	- - -	
ROCKY MTN. DIVISION				
Colorado				
W9FUH	5580-	31-2-	AB-41	
W9WJJ	3700-	21-1-	C-45	
W9PGS	47-	3-1-	- - -	
W9IVT*	3-	1-1-	C- -	
Utah-Wyoming				
W6DTB	10680-	40-2-	B-44	
SOUTHEASTERN DIVISION				
Alabama				
W4EJQ	576-	12-1-	C-14	
W4EHH	240-	6-1-	B-21	
W4BOE	133-	7-1-	C- 6	
E. Florida				
W4CYU	94320-	90-2-	BC-90	
W4AGB	31454-	61-3-	B-62	
W4EQK	3744-	32-1-	C-29	
W4DDB	328-	8-1-	A-37	
W. Florida				
W4MS	1683-	17-1-	B- -	
Georgia				
W4BYY	57174-	78-2-	B-72	
W4YC	44154-	66-2-	A-82	
W4DAA	6600-	22-1-	- -34	
W4EGT	2220-	20-1-	B-24	
W4FBH*	660-	11-1-	A- -	
W4EFQ*	86-	6-1-	- - -	
W4EGJ*	86-	6-1-	- - -	

LISTEN to the HAMS RAVE...

YOU CAN QSO THE WEAKEST SIGNAL ON A HOWARD

NEW MODEL 450-A



● Frequency Coverage 65 MC to 540 KC in Six Bands: (a) .55 to 1.2 MC, (b) 1.2 to 2.8 MC, (c) 2.8 to 6.5 MC, (d) 6.5 to 16 MC, (e) 16 to 40 MC, (f) 32 to 65 MC . . . Twelve Tubes, eight metal, four glass: 6K7 — Signal Freq. Amplifier; 6L7 — First Detector (Mixer); 6J5-G — Oscillator; 6K7 — I.F. Amplifier; 6K7 — I.F. Amplifier; 6Q7G — Second Detector — 1st AF Amp.; 6J5G — Phase Inverter: 6V6G — Push-pull Output; 6V6G — Push-pull Output; 80 — Rectifier; 6J7G — R Meter Voltage Amplifier; 6J7G — Beat Frequency Oscillator . . . Electrical Band Spread . . . Illuminated Dual-Dial accurately calibrated, with new S.L.F. calibrations . . . Band spread RE-SET or LOGGING scale finely divided for accurate repeat readings . . . CERAMIC coil forms of special Howard design . . . 2 three-gang S.L.F. STRAIGHT LINE FREQUENCY CERAMIC insulated tuning condensers . . . MICROMETER BAND SPREAD. Band Spread scale has a total length of 47 inches divided into 1,000 divisions . . . B.F.O. Shift Switch providing beat oscillator on each of the I.F. circuits (1560 KC and 465 KC) . . . Flywheel tuning on both tuning controls . . . Calibrated R Meter . . . Band-In-Use Indicator . . . R.F. Stage on all bands except five-meter band . . . R.F. Coil system coaxially designed with band switch, eliminating coil secondary leads . . . AIR-TUNED R.F. and oscillator circuits . . . Iron Core I.F. Coils . . . Dual channel, variable selectivity I.F. circuits, providing crystal switching, 1560 KC I.F. for the five-to-ten meter bands, broad and sharp for other bands all accomplished with one control knob . . . High Gain antenna coils . . . High translation mixer circuit . . . Push-pull Beam Power Output, 9½ Watts . . . B.F.O. with amplitude and pitch controls . . . Output terminals for 5 and 500 ohms . . . Headphone Jack . . . Terminals for standard and doublet aerials. Separate five-meter antenna connection. Relay connection for break-in work . . . Send-Receive switch . . . Heavy copper-plated chassis. Headphone Jack on front of panel . . . Modern cabinet design, finished in brushed silver and telephone black . . . Speaker in cabinet to match design of receiver.

Here are some of the comments:

"The weakest fone or CW sig can be pulled thru qrm and qrn on a Howard 450-A."

"The Howard 450-A certainly makes a 100% Sunday afternoon 'qso-ing' on 20 meters."

"I didn't know there were so many on 10 meters till I got a 450-A."

"I can now give an accurate QRG on my 450-A."

"An RAC will soon be mine."

PRICES

Model 450-A, including tubes, less speaker, less crystal	$87.50 Net
Model 450-A, speaker only	7.95 Net
Model 450-A, equipped with tubes, crystal filter and speaker	105.45 Net

Pacific Coast and Export Prices slightly higher.
Available for long wave operation, 25 cycle, or special line voltages.

HOWARD RADIO COMPANY
America's Oldest Radio Manufacturer

HOWARD RADIO COMPANY
1731-35 West Belmont Ave., Chicago, Ill.
☐ Please send me more information on your Model 450-A; ☐ Other Communication Receivers.

Name .....

Address .....

City ..... State .....

Cable Address—"Howardco"

SOUTHWESTERN DIVISION

Los Angeles

W6GRL	87780-	87-3-	C-85[29a]
W6AM	29550-	50-3-	C-74
W6GAL	13827-	33-2-	B-58
W6FZL	12825-	45-3-	B-57
W6NLS	10812-	34-1-	C-44
W6CKR	3008-	32-1-	B-27
W6PDB	2980-	20-1-	B-46
W6NEP	1974-	21-2-	B-33
W6PNO	1358-	14-1-	--18
W6PKK	1344-	16-1-	A-79
W6LOY	1215-	15-2-	B-30
W6MHH	630-	14-2-	- - -
W6KNF	462-	11-2-	A-15
W6ITD	318-	6-1-	A-14
W6NHK	243-	9-2-	B-14
W6QD	105-	5-1-	- - -
W6KYT	48-	4-1-	B- -
W6MEP*	48-	4-2-	- - -
W6OKH*	30-	2-1-	- - -
W6IOX*	8-	2-1-	- - -
W6BUK	3-	1-1-	B- -
W6NWP	3-	1-1-	A- 3

Arizona

W6OJK	3726-	23-1-	C-49
W6PNX	3000-	20-2-	A-13[30]
W5AUI-5	6-	1-1-	B- 2

San Diego

W6GCX	14400-	38-1-	B-49
W6LUB	7140-	34-2-	C-56[31]
W6GCT	5994-	27-1-	C-24
W6MHL	1332-	12-1-	B-17

WEST GULF DIVISION

N. Texas

W5YF	4356-	22-1-	C-32[32]
W5CHG	990-	15-2-	A-21
W5ECE	966-	14-1-	A-12
W5EKF*	650-	13-1-	- - -
W5AEJ-5	390-	10-2-	A- -
W5FIX*	3-	1-1-	A- -

So. Texas

W5EDX	1296-	12-2-	B-18
W5EBP*	949-	13-1-	- - -
W5AMX	324-	9-1-	B- 2
W5CCU	72-	3-2-	B- 9[33]
W5GYY*	36-	3-1-	- - -
W5GJS	27-	3-1-	- - -
W5FOD	2-	2-1-	A- -

New Mexico

W5DWP	714-	14-1-	B-14

CANADA

Maritime

VE1DQ	2940-	20-1-	B-23
VE1DG	2100-	21-2-	A-14
VE1EL	1995-	15-1-	A-46
VE1FQ*	147-	7-1-	- - -
VE1CO	60-	4-1-	- - -
VE1CF*	18-	2-1-	- - -

Ontario

VE3QL	8764-	28-1-	B-78
VE3AFD	3744-	26-1-	B-37
VE3NB	3048-	24-1-	A-36
VE3VK	2856-	21-1-	B-27
VE3WY	2193-	17-1-	A-23
VE3AHK	1080-	15-2-	B-42
VE3MZ	850-	10-1-	A-32
VE3YY	627-	11-1-	A-19
VE3LB	12-	2-1-	- - -
VE3RT*	12-	2-1-	A- -
VE3AEV	6-	1-1-	B- 6
VE3AQB*	3-	1-1-	A- -

Quebec

VE2EE	7200-	32-2-	A-39
VE2FK	5270-	31-2-	B-45
VE2EW	5096-	28-2-	A-46
VE2BO	1261-	13-1-	A-10
VE2BV*	864-	12-1-	B-26
VE2HG*	480-	8-2-	B- 8
VE2ID	144-	6-1-	- - 3
VE2AA*	72-	3-1-	A- -

Alberta

VE4GD	3800-	25-2-	A-40

British Columbia

VE5VO	10745-	35-2-	B-52
VE5VP	2295-	17-2-	B-32
VE5FZ	506-	11-2-	--14
VE5ACJ*	90-	5-1-	- - -

Manitoba

VE4SS	5775-	33-2-	B-37
VE4ZK*	168-	7-1-	- - -
VE4DU	125-	5-1-	B- 5

AFRICA

Algeria—FA3

FA3HC	855-	9-1-	A- 9

Egypt—SU

SU2TW	210-	5-1-	A- 3
SU1RD	68-	2-1-	A-10

Morocco—CN8

CN8AV	9519-	19-2-	- - -
CN8MU	819-	7-1-	A-10

Southern Rhodesia—ZE1

ZE1JR	17100-	18-2-	A-51

Southwest Africa/ZS3

ZS3F	4530-	15-2-	A- -

Union of S. Africa—ZS/ZT/ZU

ZS6DW	30564-	27-2-	--45
ZS2N	3315-	13-1-	A-10
ZS2AF	1965-	15-2-	- - -
ZS1B	1812-	12-1-	- - -
ZS1BL	135-	3-1-	A- -

ASIA

Hong Kong—VS6

VS6AG	1080-	8-1-	- - 9

India—VU

VU2CQ	720-	6-1-	- - -

Japan—J

J2MI	5745-	15-2-	A-44
J2NF	3718-	13-2-	- - -
J2NG	430-	5-1-	- - -

EUROPE

Belgium—ON

ON4PA	19446-	21-3-	- - -

Czechoslovakia—OK

OK1FF	2061-	9-1-	A-15
OK3VA	752-	8-1-	A- 8
OK2KO	318-	6-1-	A-10
OK1XA	8-	2-1-	A- -

Denmark—OZ

OZ9Q	9570-	22-3-	A-35

Eire—EI

EI3J	999-	9-1-	--10
EI2M	3-	1-1-	- - -

Estonia—ES

ES5D	3653-	13-2-	A-21

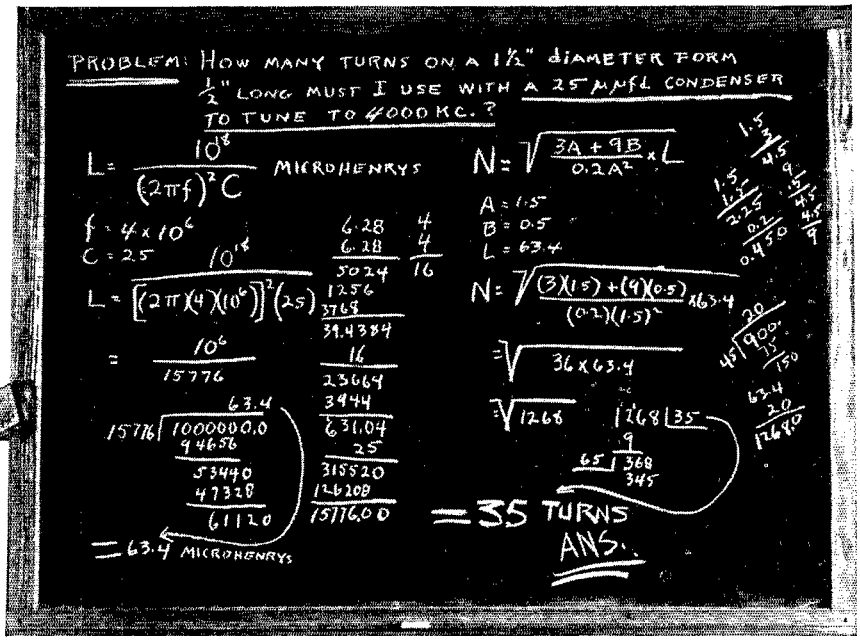
France—F

F8ZF	19578-	26-3-	A-45
F8QD	16752-	24-2-	A-37
F8KI	15528-	24-2-	--48
F8RR	6300-	15-2-	A-32
F8YZ	3120-	16-2-	--10
F3OO	2343-	11-1-	A-30
F8WK	837-	9-2-	A- 5
F8JQ	116-	4-1-	- - -
F8BM	45-	3-1-	A- -
F8PY	92-	4-1-	- - -
F8SI	92-	4-1-	A- 3

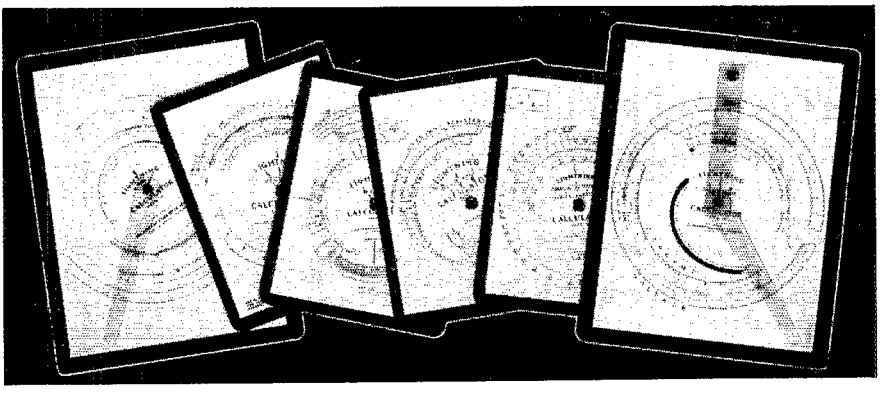
Great Britain—G

G6LK	50544-	36-3-	B-70
G6BW	18475-	25-2-	A-65
G2PU	12840-	20-2-	A-45
G6WY	11688-	24-3-	A-30
G2AI	9086-	22-2-	A-23
G6NF*	8690-	22-2-	B-16
G5RV	8652-	21-2-	A-43
G6GS	6864-	13-2-	- - -
G5BM	6208-	16-2-	A- -
G5BD	5060-	22-3-	A-41
G6VK*	3756-	15-2-	A-22
G6CL	3552-	16-2-	- - -
G6XN	2790-	15-2-	--20
G8SA	1608-	8-1-	A-48
G8MX	1188-	11-2-	A-12
G8GX	825-	11-2-	- - -

PROBLEMS



EASY



LIGHTNING CALCULATORS

Six Types Solve ALL Problems

This Problem Quickly and Easily Solved with Type A Calculator

TYPE A — For problems involving frequency, inductance and capacity, in design of radio frequency circuits. Direct reading answers for size of coils and condensers for any range between 400 kc. and 150 mc. Price, $1, postpaid.

TYPE B — Gives direct reading answers to calculations involving current, resistance, voltage and power with scale for resistance of copper wire and scale for calculating decibel gain or loss. Price, $1, postpaid.

TYPE C — More information on electrical conductors than you could find in a book full of tables. Price, 50c, postpaid.

TYPE D — Gives decibel gain or loss when input and output voltages, currents or power are known. Price, 50c, postpaid.

TYPE E — Direct reading total resistance of resistors connected in parallel, and total capacity of condensers connected in series. Price, 50c, postpaid

TYPE F — Permits measurement of resistance, from 1 ohm to 1 megohm by use of a voltmeter. Makes an ohm-meter of your voltmeter. Price, 50c, postpaid.

AMERICAN RADIO RELAY LEAGUE, INC., West Hartford, Conn.

G8DM	704-	8-1-	A- 5
G8IG	584-	8-1-	- - -
G8JV	392-	8-2-	A- 4
G5IQ	330-	5-1-	- - -
G6AH	234-	6-1-	A-12
G8GM*	162-	6-1-	- - -
G8QH*	54-	3-1-	- - -
G8WC*	6-	2-1-	- - -
Italy—I			
I1IT	3927-	17-2-	A-23
I1KN	2040-	12-2-	A-15
Jugoslavia—YT			
YT7MT	3-	1-1-	A- 2
Lithuania—LY			
LY1HB	100-	5-1-	A-12
Netherlands—PA			
PAØUN	21033-	27-3-	A-55
PAØFB	17776-	22-2-	A-70
PAØAD	1032-	12-2-	- - -
PAØXF	144-	6-1-	- - 5
Northern Ireland—GI			
GI5QX	1386-	9-1-	A-20
Norway—LA			
LA1F	1368-	8-2-	A-46
LA3B	108-	6-1-	- - 5
LA3V*	3-	1-1-	A- 1
Poland—SP			
SP1DC	2610-	15-2-	A-28
Portugal—CT1			
CT1ZA	350-	7-1-	A-10
CT1DA	18-	2-1-	A- 1
Roumania—YR			
YR5AA	18020-	20-2-	B-60
YR5VV	48-	4-1-	B- 4
Scotland—GM			
GM8RJ	10051-	19-2-	A-28
GM6RG	9024-	12-1-	B-19
GM2UU	7464-	12-1-	A-38
Sweden—SM			
SM7YA	3859-	17-2-	A-21
SM5WJ	1288-	7-1-	A-15
SM7UC	960-	10-2-	A-10
SM5SI	200-	5-1-	A- 3
SM5SD	60-	4-1-	B- 1
SM2VP	22-	2-1-	A- -
Switzerland—HB			
HB9J	5377-	19-3-	A-29
NORTH AMERICA			
Alaska—K7			
K7PQ	4816-	14-4-	B-11
K7DWH	3-	1-1-	- - -
Barbados—VP6			
VP6YB	9660-	21-2-	B-13[34]
Bermuda—VP9			
VP9R	21620-	20-2-	A-64
VP9L	12864-	16-2-	A-52
Costa Rica—TI			
TI2FG	34713-	29-2-	B-24
TI2AV	7266-	14-1-	- -27
Cuba—CO			
CO2WM	67982-	38-3-	B-61
CO2JJ	48022-	26-2-	A-90
CO2LY	1740-	10-1-	B- -
CO7EV*	84-	4-1-	- - -
CO2BG*	55-	5-1-	- - -
Dominican Republic—HI			
HI7G	24-	2-1-	B- -
Haiti—HH			
HH2X	3614-	13-1-	B-20
Honduras—HR			
HR5C	3386-	14-2-	- - -
HR4AF	2730-	10-1-	A-16
Leeward Islands—VP2			
VP2AT	3366-	17-2-	A- -
Mexico—XE			
XE2BJ	11854-	13-2-	A-46
XE2HD	8073-	13-1-	A-29
XE1GK	6048-	14-1-	- - -
XE1GE	5040-	8-1-	- - -
XE1BT	3128-	12-1-	- - -
XE2CY	1162-	9-1-	- - -
Newfoundland & Labrador—VO			
VO6D	3224-	13-3-	- - -
VO3Z*	18-	2-1-	- - -
Nicaragua—YN			
YN1OP	7344-	12-1-	A-24
YN3DG	2535-	13-2-	B- -
Puerto Rico—K4			
K4SA	70630-	35-3-	AB-60
K4EZR	21514-	14-1-	B-68
OCEANIA			
Australia—VK			
VK2IQ	22858-	22-2-	A-52
VK2ADE	17388-	21-2-	A-35
VK2VV	14136-	19-2-	A- -
VK2UC	13392-	18-2-	- - -
VK3ZL	10944-	19-2-	A-57
VK2ADT	10800-	20-2-	- - -
VK4JU	6552-	14-1-	- -54
VK5WD	6474-	13-1-	- - -
VK3XJ	4970-	14-1-	A- -
VK4LW	3762-	11-1-	A-19
VK4AW	2782-	13-2-	- -12
VK2VA	1688-	8-1-	- -12
VK4CD	1580-	10-1-	A-17
VK3MX	1576-	8-1-	A-11
VK3IW*	1548-	12-2-	- - -
VK3TZ	1500-	10-1-	A- 8
VK2AS	1422-	9-1-	- - -
VK5QR	1350-	9-1-	- -15
VK6WS	1161-	9-1-	- - -
VK2OQ	783-	9-1-	- - -
VK2QM	664-	8-1-	- - -
VK4RG	512-	8-1-	- - -
VK4LO	72-	4-1-	- - -
VK4CG	63-	3-1-	A- 3
VK3ZY	48-	4-1-	A- -
VK2JZ*	42-	2-1-	- - -
VK2AFQ	30-	2-1-	- - -
Hawaii—K6			
K6CGK	9198-	21-4-	A-46
K6LKN	1504-	8-2-	B- -
K6OTH*	522-	6-1-	B- -
K6PIR	252-	6-1-	- - -
K6PCF*	185-	5-1-	- - -
K6OXT*	12-	2-1-	- - -
Howland Island—K6			
K6BAZ	864-	8-2-	- - -
New Zealand—ZL			
ZL4AO	2810-	10-1-	A-25
ZL4AC	406-	7-1-	- - -
Philippine Islands—KA			
KA1ME	28308-	28-3-	- -46
KA1ZL	17190-	18-2-	B-49
KA1CS	2484-	9-1-	A-48
KA1BH	1458-	6-1-	- - -
Sumatra—PK4			
PK4JD	552-	6-1-	A- 8
SOUTH AMERICA			
Argentina—LU			
LU9BV	28210-	26-2-	A-79
LU5AN	16330-	23-2-	A-34
LU7AG	13020-	20-2-	A-45
LU3AX	5782-	14-2-	A-38
LU3EJ	4860-	18-2-	- - -
LU2BG	1430-	10-1-	A- -
LU7BK	720-	10-1-	- - -
LU3HA	12-	2-1-	- - -
LU3AN	6-	1-1-	A- -
Brazil—PY			
PY2AC	14875-	25-2-	B-40
PY5AQ	4655-	19-2-	B-20
PY2BJ	3-	1-1-	- - -
Chile—CE			
CE1AH	6156-	12-1-	B-40
Colombia—HK			
HK3LDC	2478-	17-2-	- - -
HK4EA	2016-	7-1-	- - -
HK1PA	12-	2-1-	- - -

Ecuador—HC					CX2AK	936-	8-1-	B- 7
HC1JW	24264-	24-2-	B-37					
Uruguay—CX					*Venezuela—YV*			
CX1FB	1280-	8-2-	- - -		YV6AL	212-	5-1-	- - -

[1] Station score, Schuylkill Valley Radio Club; oprs. scores—W3CRW 9288; W3FGB 9102; W3GHS 3096; W3GCI 1740; W3ERM 22. [2] Station score; opr. W3FAX 7708; W3DBD 5105. [3] Two oprs., W9IML, W9RHK. [4] Station score, Lake Mich. Amateur Radio Reserve; oprs.—W9QNS ZRJ SSU MK FFG NHL VSZ WDM. [5] Station score, four oprs.—W8PQQ ODV PMA W9SQC. [6] Station score, two oprs.—W9KHG, W2DIJ. [7] Station score, two oprs.—W2KIR JWF. [8] W3CGU opr. [9] Station score, two oprs.—W1ILA, GKM. [10] Member A.R.R.L. HQ's staff; ineligible for contest awards. [11] Score of 1st opr.; 2nd opr., 2028. [12] Station score, two oprs.—W1IGR, Charles Wilde. [13] W7JC opr. [14] Station score; oprs. scores—W7DRF 720; ENW 135; DSY 126; AEA 90; CSF 80; BDW 60; ETN 60; EAW 18; ETE 12; LD 6; FXP 3; Rho Epsilon Frat., Univ. of Wash. [15] Station score, four oprs.; W4DAR 370; DXI 270; ERD 756; AJI 32. [16] W6BBR opr. [17] Halifax Amateur Radio Club; VE1KG opr. [18] Score of opr. J. Zeleznik; opr. Talleur 1120; opr. Scott 1089. [19] Score of opr. E. Aymar; opr. Shay 2739. [20] Score of opr. C.L.I.; opr. L.I. 2654; station score 9180. [21] W3GAD opr. [22] Station score, oprs. W9QNS AI NHL ZCN ZRJ SXQ MK WDM. [23] Score of opr. W8KML; opr. W8LUP 100; station score 16900. [24] Station score, oprs. W8QDV ORN ORL PMA PQQ W9SQC. [25] Three oprs., Weber, Overby, Lamm. [26] W4EYB opr. [27] Station score, five oprs., W2HVI W3CIF W6FZR W7AOF W6DXU. [28] W2HNY opr. [29] Station score; opr. "M"—W9ARL 42185; "D"—W9GDH 1872. [29a] W4DHZ, opr. [30] Station score, two oprs., W6PNX NGD. [31] Station score, three oprs., W6LUB ITY BBR. [32] W9PEV opr. [33] Station score, two oprs., W5CCU GWL. [34] Score of opr. Mrs. T. A. Archer; opr. T.A.A. 4368.

Sweepstakes Contest

(*Continued from page 54*)

REPORTING RESULTS

Report [7] to A.R.R.L., West Hartford, Conn., as soon as the contest is over. Use the log form shown in the example. List all operators [5] whose work at your station is responsible for any part of the score.

All active ham operators are invited to take part and report. You will work a new bunch of stations, make new records for your station, get QSL cards (be sure to send one for each QSO), have a lot of fun, meet new friends, and perhaps rate an A.R.R.L. award at the conclusion. Do your best operating. Send A.R.R.L. the results for *QST* mention. MAIL YOUR REPORT IMMEDIATELY AT THE END OF THE CONTEST TO AVOID DELAY AND INSURE THAT YOUR RESULTS ARE CREDITED AND KNOWN THROUGH *QST*.

[5] The highest individually-attained score of any *one* of the operators of amateur stations having more than one operator is the official score for such a station. The summary of score must show *all* stations worked by *all* operators however, circling the entries of stations and/or Sections that cannot count in the official total. Awards will be based on the official total and will be made to the individual operator accredited with this total. To show the possible scores that can be built up by several operators at one station, such scores (all Sections listed by all points listed) may be shown parenthetically after the "official" score that counts toward a possible award.

[7] All hams are requested to submit lists, even if they only show a small score, on a postal. By doing this they help support claims made in logs from other stations and receive credit in *QST*.

Hams Over Chicago!

(*Continued from page 51*)

the Genesee County Radio Club of Flint, Mich., thrilled some 400 or more novices and old members—the largest group ever to attend such a ceremony. Although the eerie, impressive ceremony was born in Flint in 1921, it was an altogether new crop of hams, led by W8JYP, that put on the 1938 version.

MONDAY

The Monday morning diet was heavy, but highly worthwhile. Prof. F. E. Hartig of the

University of Minnesota provided an illuminating demonstration of the behavior of resonant lines by the use of mechanical analogies. Fritz Franke of Bendix reported recent developments in aircraft radio in terms of amateur applications. Ross A. Hull, editor of *QST*, discussed recent experimental work with u.h.f. gear, especially in receiving. Boyd Phelps, W9BP, ended the technical sessions with his discourse on "ultra-ultra" high-frequency antennas. The closing address was by Chairman Dosland, expressing the good wishes of the Chicago Area Radio Club Council.

This account would not be complete without mention of the manufacturers' exhibit. About forty of the leading suppliers of amateur equipment were represented, many with colorful and elaborate booths that showed the expenditure of time and thought. It was not their fault that the convention committee ended with a deficit (written off by contributions from Chicago dealers and manufacturers). It was estimated by some one that $100,000 worth of gear was on display at the various exhibits.

First place in the exhibition hall was occupied by the Hamfesters amateur station, operated under the call W9YQH. Two transmitters were used—100 watts to a pair of T-20's and 175 watts to an RK-47—and three receivers. A 250-foot single-wire feeder ran to the 66-foot Hertz on the roof. Break-in was used at all times, and skeds were kept with W8QHJ, W9POG, W8BBH and W4PL. The traffic total reads: Originated, 258. Relayed, 3. Hours of operation: 19. A feature of the display was the old rig used by W9HRM of the Milwaukee Radio Club under the call 9EJ in 1915.

The ladies committee, under the chairmanship of XYL-W9YMF, arranged a program for the non-radio XYL's and YL's in attendance, including a tour of Marshall Field & Co., a bridge tea, Sunday church attendance, trips to the Flower Show, Garfield Park, and the Chicago Historical Society, and, on Monday morning, viewing the N.B.C. "National Farm and Home Hour" broadcast. Adding these to the Saturday night party and the banquet provided a full round of things to do for the ladies.

IN GENERAL

The registered attendance by divisions and countries was as follows: Atlantic, 63; Central, 1555; Dakota, 38; Delta, 13; Hudson, 21; Midwest, 133; New England, 30; Northwestern, 1; Pacific, 4; Roanoke, 24; Rocky Mountain, 10; Southeastern, 7; Southwestern, 11; West Gulf, 14; Ontario, 32; Manitoba, 4; Mexico, 3; Philippines, 1; New Zealand, 1; Java, 1; France (S.W.L.), 1. Total: 1966—the biggest A.R.R.L. convention ever held. Of course, this figure does not include several hundred interested members of the public who wandered in and out meetings and the exhibition hall and pestered attendants with inquiries concerning the "free television demonstration"!

All credit to N.B.C. and C.B.S. for splendid coöperation in the way of spot broadcasts, use of exhibit space, etc., in support of the convention

Where to buy it

A directory of suppliers who carry in stock the products of these dependable manufacturers.

super skyrider hallicrafters ultra skyrider

ALBANY, N. Y. Uncle Dave's Radio Shack 356 Broadway
ATLANTA, GEORGIA 265 Peachtree Street
Wholesale Radio Service Co., Inc.
BOSTON, MASS. Radio Shack 46 Brattle Street
BOSTON, MASS. 110 Federal Street
Wholesale Radio Service Company, Inc.
BRONX, N. Y. 542 East Fordham Rd.
Wholesale Radio Service Company, Inc.
BUTLER, MISSOURI 211–215 N. Main Street
Henry Radio Shop
CHICAGO, ILL. 833 W. Jackson Blvd.
Allied Radio Corp.
CHICAGO, ILL. 901–911 W. Jackson Blvd.
Wholesale Radio Service Company, Inc.
COLUMBUS, OHIO 203 N. Fourth St.
Bell Radio Parts Co.
DETROIT, MICH. 171 E. Jefferson Ave.
Radio Specialties Co.
DETROIT, MICHIGAN 11845 Woodward Ave.
Radio Specialties Co.
HARTFORD, CONNECTICUT 227 Asylum Street
Radio Inspection Service Company
HOUSTON, TEXAS 625 East 14th Street
R. C. Hall & L. F. Hall
JAMAICA, L. I. 90–08 166th Street
Wholesale Radio Service Company, Inc.
KANSAS CITY, MO. 1012 McGee Street
Burstein-Applebee Company
NEW ORLEANS, LA. 902 Poydras Street
Shuler Supply Company
NEW YORK, N. Y. Gross Radio, Inc. 51 Vesey St.
NEW YORK, N. Y. Harrison Radio Co. 12 West Broadway
NEW YORK, N. Y. 100 Sixth Ave.
Wholesale Radio Service Co., Inc.
NEWARK, N. J. 219 Central Ave.
Wholesale Radio Service Co., Inc.
OAKLAND, CAL. 2085 Broadway
Offenbach Electric Co.
POTTSVILLE, PENN. E. Norwegian & George Sts.
Jones Radio Company
READING, PENN. 404 Walnut St.
George D. Barbey Company
READING, PENN. 104 North Ninth Street
Jones Radio Company
SAN FRANCISCO, CAL. 1452 Market Street
Offenbach Electric Company
SPRINGFIELD, MASS. T. F. Cushing 349 Worthington St.
WASHINGTON, D. C. 938 F Street, N. W.
Sun Radio & Service Supply Co.

TRIPLETT INSTRUMENTS

ALBANY, N. Y. Uncle Dave's Radio Shack 356 Broadway
ATLANTA, GEORGIA 69 Forsyth Street, N. W.
Garvin Electric Company
ATLANTA, GEORGIA 265 Peachtree Street
Wholesale Radio Service Company
BOSTON, MASS. Radio Shack 46 Brattle Street
BOSTON, MASS. 110 Federal Street
Wholesale Radio Service Company, Inc.
BRONX, N. Y. 542 East Fordham Rd.
Wholesale Radio Service Company, Inc.
BUTLER, MISSOURI 211–215 N. Main Street
Henry Radio Shop
CHICAGO, ILLINOIS 833 W. Jackson Blvd.
Allied Radio Corp.
CHICAGO, ILLINOIS 25 North Franklin Street
Electric & Radio Supply Co., Inc.
CHICAGO, ILL. 901–911 W. Jackson Blvd.
Wholesale Radio Service Company, Inc.
DALLAS, TEXAS 1905 Commerce Street
Southwest Radio Supply
JAMAICA, L. I. 90–08 166th Street
Wholesale Radio Service Company, Inc.
LITTLE ROCK, ARKANSAS 409 W. 3rd St.
Beem Radio Company
MIAMI, FLORIDA 123 Second Street, N. E.
Tropical Camera Stores, Inc.
MINNEAPOLIS, MINNESOTA 1124–26 Harmon Place
Lew Bonn Company
MONTREAL, CANADA 285 Craig Street, West
Canadian Electrical Supply Co., Ltd.
MUSKOGEE, OKLAHOMA 204 North 12th Street
Home Radio Mart
NEW ORLEANS, LA. 902 Poydras Street
Shuler Supply Company
NEW YORK, N. Y. 100 Sixth Avenue
Wholesale Radio Service Company
NEWARK, N. J. 219 Central Ave.
Wholesale Radio Service Company
OAKLAND, CAL. 2085 Broadway
Offenbach Electric Co.
POTTSVILLE, PENN. E. Norwegian & George Sts.
Jones Radio Company
READING, PENN. George D. Barbey Co. 404 Walnut Street
READING, PENN. 104 North Ninth St.
Jones Radio Company
SAN FRANCISCO, CAL. 1452 Market Street
Offenbach Electric Company
WASHINGTON, D. C. 938 F Street, N. W.
Sun Radio & Service Supply Co.

Listings on this page do not necessarily imply endorsement by QST of the dealers or of other equipment sold by them.

. . . . . Both put on network shows . . . . . The convention committee did a total of 1042 man-hours of actual work, according to Chairman Dosland; this doesn't include the time of Al Cox, business manager, who was going full-time for a solid six months . . . . . National conventions are some job!

And for that reason, plus a lot of others, the Chicago Area Radio Council and Director Mathews deserve an undying vote of gratitude on the part of the ham fraternity in general for the tremendously successful job they did. The Chicago *Daily News* truly set the spirit of the committee and of the occasion when it editorialized:

"Welcome, hams, to Chicago. Here you will find a degree of public understanding and sympathy with your activities exceeded by no other city."

Thanks, Chicago! We had a wonderful time.

—*C. B. D.*

Book Review

Engineering Electronics, by Donald G. Fink; 358 pages, 217 illustrations. McGraw-Hill Book Company, New York. $3.50.

Primarily a volume for engineers who wish to acquaint themselves with the ramifications of the electronic art, *Engineering Electronics* nevertheless is a readable book for the active-minded amateur who likes to keep abreast of progress in radio and allied fields. The book fills a need not quite met by the several texts on vacuum tubes, in that it discusses the various types of gas-filled tubes and lamps, as well as the familiar radio vacuum tubes, photo-cells and cathode-ray tubes.

The subject matter is divided into three sections, the first on the physical principles underlying the operation of electron tubes, the second on various practical tube structures, and the third on applications. Chapters in the first section discuss the electron, electron emission, control of electrons, and current flow in gases, on the basis of present-day theoretical physics. The treatment of practical tubes includes design considerations and performance characteristics of vacuum, gas-filled, photo-sensitive, and cathode-ray tubes, as well as electronic sources of light. In the section on applications, circuit theory, power transformation, communication circuits and industrial control are covered. A useful feature of the book is an appendix containing definitions of terms used in connection with electron tubes.

Although no treatment of a subject of this nature can be non-mathematical, *Engineering Electronics* achieves a high degree of intelligibility for the layman. Equations are given in a form easily handled with high-school mathematics. Examples are worked out and problems given in each chapter. The general reader will find the meanings of the equations satisfactorily explained in words, so that there is no difficulty in forming a mental picture of the processes discussed.

—*G. G.*

Strays

When W8OFO experienced trouble with "hash" in b.c.l. and amateur receivers caused by the 866 rectifier tubes, he tried the simple expedient of exchanging the two plate leads to the 866 tubes before attempting use of r.f. chokes at this point. Strange to say, the exchange of the plate wires completely cured the trouble.

A.R.R.L. QSL Bureau

FOR the convenience of its members, the League maintains a QSL-card forwarding system which operates through volunteer "District QSL Managers" in each of the nine United States and five Canadian districts. In order to secure such foreign cards as may be received for you, send your district manager a standard No. 10 *stamped* envelope. If you have reason to expect a considerable number of cards, put on an extra stamp so that it has a total of six-cents postage. Your own name and address go in the customary place on the face, and *your station call should be printed prominently in the upper left-hand corner.*

W1—J. T. Steiger, W1BGY, 35 Call Street, Willimansett, Mass.

W2—H. W. Yahnel, W2SN, Lake Ave., Helmetta, N. J.

W3—Barron P. Freeburger, W3DK, 435 5th St., N. E., Washington, D.C.

W4—G. W. Hoke, W4DYB, 328 Mell Ave., N. E., Atlanta, Ga.

W5—E. H. Treadaway, W5DKR, 2749 Myrtle St., New Orleans, La.

W6—Horace Greer, W6TI, 414 Fairmount Ave., Oakland, Calif.

W7—Frank E. Pratt, W7DXZ, 5023 So. Ferry St., Tacoma, Wash.

W8—F. W. Allen, W8GER, 324 Richmond Ave., Dayton, Ohio.

W9—Roy W. McCarty, W9KA, 11 South Michigan Ave., Villa Park, Ill.

VE1—J. E. Roue, VE1FB, 84 Spring Garden Rd., Halifax, N. S.

VE2—C. W. Skarstedt, VE2DR, 236 Elm Ave., Westmount, P. Q.

VE3—Bert Knowles, VE3QB, Lanark, Ont.

VE4—George Behrends, VE4RO, 186 Oakdean Blvd., St. James, Winnipeg, Manitoba.

VE5—H. R. Hough, VE5HR, 1785 First St., Victoria, B. C.

K4—F. McCown, K4RJ, Family Court 7, Santurce, Puerto Rico.

K5—Norman F. Miller, K5AF, 15th Air Base Squadron, Albrook Field, Canal Zone.

K6—James F. Pa, K6LBH, 1416D Lunalilo St., Honolulu, T. H.

K7—Dean Williams, K7ELM, Box 2373, Juneau, Alaska.

KA—George L. Rickard, KA1GR, P. O. Box 849, Manila, P. I.

Strays

W3FXG, M. O. Marple, Jr., was called for jury duty recently, and found in the group chosen W3CAF, another ham bearing the Marple family name. W3QP wonders whether all the Smith hams may be collected together on some such memorable occasion.

—•••—

Upon noticing some wild barley lodged between the feeders of W9XJL's transmitting antenna, an amateur, observing from some distance, exclaimed, "Look at the nice *brush discharge.*"

—*W9ONI*

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.
(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.
(3) The Ham-Ad rate is 15c per word, except as noted in paragraph (6) below.
(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.
(5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.
(6) A special rate of 7c per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League takes the 7c rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him takes the 15c rate. Provisions of paragraphs (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

Having made no investigation of the advertisers in the classified columns, the publishers of *QST* are unable to vouch for their integrity or for the grade or character of the products advertised.

QUARTZ—direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 719 World Bldg., New York City.

RADIO engineering, broadcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Byrd St., Valparaiso, Ind.

USED receivers. Bargains. Cash only. No trades. Price list 3¢. W3DQ, Wilmington, Del.

QSL'S, all colors, cartoons, snappy service. Write for free samples today. W1BEF, 16 Stockbridge Ave., Lowell, Mass.

CALLBOOKS—Fall edition now on sale containing complete up-to-date list of radio hams throughout entire world. Also world prefix map, press schedules and new time conversion chart. Single copies $1.25. Canada and foreign $1.35. Radio Amateur Call Book, 610 S. Dearborn, Chicago.

QSL'S. Cuts. Cartoons. Free samples. Theodore Porcher, 7708 Navahoe, Philadelphia, Penn.

CRYSTALS, mounted, 80–160 $1.25, V-cut 40 $2.25. R9 Crystals, 338 Murray Ave., Arnold, Pa.

QSL'S. Free samples. Printer, Corwith, Iowa.

GENERAL Electric 24/750 volt 200 mill dynamotors with filter, $20. Westinghouse 500 watt 6–15 volt, $8. 500 watt 500 cycle, $8. 900 cycle 200 watts, $15. Henry Kienzle, 215 Hart Blvd., Staten Island, N. Y.

QSL'S, finest quality, lowest prices, 500—$2. postpaid. Free samples to hams. Howe Brothers, Wisner, Neb.

RADIO amateur course, 50¢ postpaid. W9KJF, Indianapolis.

AMATEUR Tube Engineering Handbook and Transmitter Circuits Hamanual and log book all for 50¢ postpaid. W9KJF, Indianapolis.

NATIONAL, Bliley, Hammarlund, Hallicrafter, RME, RCA, Taylor, Thordarson, etc. Van Sickle, W9KJF, Indianapolis.

QSL'S, SWL's: one color 45¢, two color 60¢ hundred, postpaid. Samples. W1FTM, 268 Piedmont, Waterbury, Conn.

BASSETT buys for cash Collins, Harvey, Temco transmitters; National, Hammarlund, RME receivers; etc. Send data and desired price to W9ZDO.

CRYSTALS: X-cut, 1750–2000, 3500–4000, ± five kilocycles, $1.50; spot frequency, $2.50. Three small, 80 meter blanks, including carborundum, $1.20. William Threm, W8FN, 3071 Moosewood St., Cincinnati, Ohio.

TELEPLEXES, instructographs, omnigraphs bought, sold. Ryan's, Hannibal, Mo.

QSL'S, SWL's. 100—3 color—75¢. Lapco, 344 W. 39th, Indianapolis, Ind.

METER repair: d.c. milliammeters, springs repaired, $1.75. Thermocouples 1 to 5 amperes, $2.50. Factory parts used, repairs absolutely guaranteed. Prices quoted on all meters. Braden Engineering Co., 1809 Fifth Ave., Dept. B, Dayton, Ohio.

QSL'S—print your own. W8HRL, 749 E. Moore St., Flint, Mich.

METER bargains: Weston Model 506 d.c. amperes 0–5, $2.50. GE Type AO, a.c. amperes 0–30, $2.50. W.E. galvanometers, $2.50. Set of 12 new Ward Leonard vitreous enamel resistors 7/8" x 5 3/8" long, 600–1000–2000 ohms, $1. Miller Surplus, 2553 Madison, Chicago, Ill.

SELL crystal microphones non-directional eight-ball model. Brand new latest factory product, $8. each. White Sound Studio, 151 W. 63 St., New York, N. Y.

TRANSMITTER complete: 200 watts phone, 300 watts c.w., 10–20 meter coils, rack and panel, 9 Weston meters, Hammarlund, Cardwell, UTC, etc., parts. 53–807-p.p. 801's-T–125, 10 watt speech, 800's p.p. Class B. mod. Make offer. W3ASQ.

NAT. FB7A complete—best cash offer or trade for candid camera, F-2 lens. W9ZJZ.

QST'S—What is oldtime amateur offered for complete 15-year file of QST, 1923–1937 inclusive, in standard QST binders? Box S, QST.

QSL'S of quality. W2AEY, 338 Elmora, Elizabeth, N. J.

MUST sacrifice surplus equipment. Send for list. E. Hatch, Box 691, Hyannis, Mass.

NEW standard W.E. relay racks, $12.50 f.o.b. W6OZZ, 2603 Grande Vista, Oakland, Calif.

HAVE no time for radio; practically giving away hundred-watt transmitter, $25.; super-gainer receiver, $10. W5EUP, Box 692, Sweetwater, Texas.

SELL QST 1929–1934. Best offer. W9VBO.

HF300's, one nearly new, $14.; two good, $11.50 each. W7DES, c/o KDFN, Casper, Wyo.

SELL super-gainer complete kit, chassis, coils 10–200 tubes, less 6F6, $16. VE4WF.

WEBSTER X71A2 Pickup. Used two hours. Guaranteed, $5.50. W9CTF.

QSL'S. Finest cards—lowest prices. Maleco, 1805 St. Johns Place, Brooklyn, N. Y.

CRYSTALS: Eidson's T9, 40–80 m., $1.60. Holders, $1.10. C.O.D.'s accepted. Espy's, W5CXH, 2223 State, New Orleans.

BOOKS—my entire library of radio and electrical engineering books at a fraction of their original cost. Write for list. Francis C. Kramer, W9DEI, St. Charles, Minn.

SELL: One 110 v. a.c. 60 cycle generator and gas engine rated 500 watts self-excited, 700 watts externally excited, one 32 v. d.c. to 110 v. a.c. at 2.2 amps. converter. Cash or trade or both. W3BBV, 859 E. Market St., York, Penn.

CRYSTALS? BLILEY. Patronize W8DED.

QSL'S? Samples? Stamp. W8DED, Holland, Mich.

MEISSNER signal shifters, $39.95. W8DED.

COMPLETE 40 meter rig, $15.; transceiver, $12.50; 5 meter transmitter, $7.50; new RCA 801's, $5. pair. W1HIL, Melrose, Mass.

SELL: complete three-stage transmitter, $19.50. Stimpson, 615 Alabama Ave., S.E., Washington, D. C.

HALLICRAFTER 1937 Sky Challenger, $40. Complete all-band 200 watt phone. W1FZX, 37 Oakland St., Natick, Mass.

WANTED: cheap good National 80X or 81X receiver complete. W2IOP.

TELECHART'S copyrighted method will help you learn code. Easy and fast. Only 50¢ complete. Telechart, Box 25-Q, Knoxville, Tenn.

SELL QST's 1923 through 1937 complete—fine condition. W3KJ.

SELL PR-16 complete, $50. Also noise silencer, $4. F. M. Fiolle, W5DPE, Canadian, Texas.

CRYSTALS: see Eidson's Hamad for complete dope. Van's very fine 160 meter crystals, $1.25. Van Radio, 464 E. 117th, No. 7, Cleveland, Ohio.

NATIONAL NC81X—new condition—complete. Best offer. W2DCO.

WHY spray or squirt your signals? Shoot 'em straight down the bore with a tilting head rotary. Our variable speed worm drive starts, accelerates, reverses, stops, instantly. Drives any beam. Steer it with a Selsyn type synchronous direction indicator. Ball-bearing beam heads, $5. Telescoping aluminum tubing. Save half on your beam. W8ML.

WANTED: FBXA. W2KCK.

ARTISTIC QSL's. T. Vachovetz, Elmsford, N. Y.

ROTARY beams—complete arrays or special heat treated tubing only—very reasonable—write International Arrays, 1577 Olivewood Ave., Lakewood, Ohio.

OLD QST's. Will buy, sell, or trade. W9VKF.

BIG profits for radio hams selling shortwave diathermy apparatus and other electro-medical equipment to physicians. Old established firm. Exclusive territory. Intensive instruction course. McIntosh Electrical Corp., 225 N. California Ave., Chicago.

LISTEN for high frequency broadcast station W9XA, 26,450 kilocycles, Kansas City.

QSL'S, samples. Meador, Box 1534, Savannah, Ga

1 mfd. 3000 v. mica, $1.50; 203A Class B transformers, $5., for 46's, $3.50 (pairs); Western Electric 387W, $3.50; misc. Thordarson transformers. Write for list of used bargains. Police Radio WMO, Highland Park, Mich.

ANTENNA wire, 42-strand phosphor bronze, rope center, 1¾ cents per foot prepaid. Minimum order 150 feet. Wanted: Dumont or NU 5-inch oscilloscope. John T. Duty, 30 Murray, Augusta, Me.

BOOK matches imprinted with your call letters—50 for $1.00. Marine Crafts, 1360 Hicks St., Bronx, N. Y.

CUSTOM-built oscillograph, 3-inch tube, 13 tubes, relay rack mounted, used 30 hours. Thomas F. Marker, 1523 S. Emerson, Denver, Colo.

GENUINE EO1 cable, antenna wires. W8DT.

SELLING out—rig using RK20 final. Complete 1500 v. power supply. Write for details. W9TAY.

TRADE pair UTC 250W Class B, power equipment, VT73 Turner mike, pair T20's, all new, for Superhet. W6CZO, 1314 Hacienda, Bellflower, Calif.

T9 crystals: thousands of amateur and commercial users know from experience that Eidson crystals are tops in high power output and dependability. You, too, will like these features together with our prompt service and reasonable prices. X-cut 40 and 80 meter bands, $1.60; 7301–7500 kc. range, $2. postpaid. C.O.D.'s accepted. Commercial folder on request. Announcing: improved T9 ceramic holder only $1. You can't afford to pay less, why pay more. Fully guaranteed. These and other reputable dealers sell and vouch for T9 crystals: Espy's, 2223 State St., New Orleans, La.; Pembleton Laboratories, Ft. Wayne, Ind.; Frank Anzalone, 375 W. 46th St., N. Y. C.; Henry Radio Shop, Butler, Mo.; The Hargis Company, Austin, Texas; Casa Edison, Havana, Cuba; Van Radio, 464 117th St., No. 7, Cleveland, Ohio; or Eidson's, Temple, Texas.

TRANSMITTER 6' metal rack and panels. 5 mtr. receiver complete. Write for particulars. Stanley Peirce, Topsfield, Mass.

WANTED: a 1938 Hallicrafters SX16 or SX18—will pay cash. Write to Edward Frazier, 46 E. Albion St., Somerville, Mass.

BRILLIANT 6" neon R.F. indicators, 50¢; super-sensitive, 75¢. W9LWB.

WANTED: Peak preselector. Ewing, 1057 Pratt, Chicago.

OHIO only: high power transmitter, receiver for sale. W8IPF

TAYLOR and RCA transmitting tubes. Distributor. W8DT

TRANSCEIVER for 5, 30 w. phone trans. wanted. Ken Merian, Healdsburg, Calif.

SEND three cent stamp for list of tubes, amplifiers, meters, microphones, cables, condensers, test equipment, etc. Closing out former station W8EKX and public address systems. All apparatus hi quality. No junk. Charles Taylor, 235 Baker St., Corning, N. Y.

ESCO MG, 110 volt d.c. to 220 three phase a.c., 3.5 k.v.a., GE transformer 1300/2250 secondary, primary 220 three phase, tapped, 3 k.v.a. Both slightly used. Best offer takes them. W2AN.

WHEN buying amateur equipment whether you pay cash, trade equipment, or buy on terms, it's to your advantage to write me. Write me for quickest delivery of the latest equipment. Bob Henry, W9ARA, Butler, Mo.

BRAND new in factory cartons: S-10 Ultra-Skyriders, $69.; ACR-175's, $79.; PR-15's, $99.; ACR-111 demonstrator, $89. W9ARA.

BARGAINS: reconditioned guaranteed communications receivers shipped on ten-day trial. Practically all models at big savings. Buy these as well as all new models on my economical 6% terms. List free. W9ARA.

CODE machines rented. W9ARA.

OUR phonograph records of ur sigs, phone, CQ, etc., are FB. Write for sked. 75c. Brown's Radio Lab., Dolgeville, N. Y.

CRYSTALS: spot frequency 80M crystals for AARS, NCR, etc. Mounted AT cuts, $2.75. Ham Crystals, 1104 Lincoln Place, Brooklyn, New York.

TRANSMITTERS—power supplies—complete portable station. Write for complete list, now. Glassford, W2EQK, 12 Beekman Place, N. Y.

JENSEN A-12 hi-fidelity speaker, a.c., output transformer, baffle, hardly used, $6. W2EXR.

BEST QSL's—SWL's made. Fritz, 455 Mason, Joliet, Ill.

CRYSTALS: free air mail service. Guaranteed crystals 160-80M AT and 40M X, $1.95; 40M AT, $2.75; loloss mounting, $1. State frequency desired. Commercial crystals quoted. C.O.D.'s accepted. C-W Mfg. Co., 1170 Esperanza St., Los Angeles.

SELL cheap or swap—short wave receivers, double button mikes, motor generator, speech amplifiers, Class B mod, P.A. system, other parts. Want 852 and 845 tubes or what? Riley Parsons, Old Forge, N. Y., W8BXY.

RECEIVER headquarters. W8ANT.

BEAM antennas. W8ANT.

TRANSMITTER headquarters. W8ANT.

ALL lines of new and used transmitting and receiving equipment. Everything for the amateur. Equipment bought, sold, exchanged. Write to Southern Ohio's only amateur owned amateur business. Jos. N. Davies, W8ANT, 2767 N. Bend Rd., Sta. A., Cincinnati, Ohio.

Your Nearest Dealer Is Your Best Friend

Your nearest dealer is entitled to your patronage. You can trust him. He is equipped with a knowledge and understanding of amateur radio. He is your logical and safe source of advice and counsel on what equipment you should buy. His stock is complete. He can supply your needs without delay. His prices are fair and consistent with the high quality of the goods he carries. He is responsible to you and interested in you.

Patronize the dealer nearest you—You can have confidence in him

ATLANTA, GEORGIA
Wholesale Radio Service Company, Inc.
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Radio Electric Service Co.
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Everything for the amateur

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BRONX, NEW YORK
Wholesale Radio Service Company, Inc.
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BUFFALO, NEW YORK
Dymac Radio
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Ham and BCL Equipment W8RRL, W8OLB, W8GJ Cl. 2080

BUFFALO, NEW YORK
Radio Equipment Corp.
326 Elm Street
W8OBK — Ham, service and sound equipment

ELMIRA, NEW YORK
Miller's Radio Shack
205 Railroad Avenue
Fine equipment for amateurs

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Quality parts and equipment for discriminating buyers

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NEW YORK, N. Y.
Gross Radio, Inc.
51 Vesey Street
Fair dealings plus fair prices. Anything in radio

NEW YORK, N. Y.
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W3EQQ—"The Virginia Ham Headquarters"—W3FBL

ROCHESTER, NEW YORK
Radio Parts & Equipment Co.
244 Clinton Avenue, North
Complete stock amateur-BCL parts. Standard discounts

You Are *Protected* When You Buy From *QST* Advertisers

¶ "Advertising for *QST* is accepted only from firms who, in the publisher's opinion, are of established integrity and whose products secure the approval of the technical staff of the American Radio Relay League."

Quoted from *QST*'s advertising rate card.

Every conceivable need of a radio amateur can be supplied by the advertisers in *QST*. And you will know the product has the approval of the League's technical staff.

Index to Advertisers

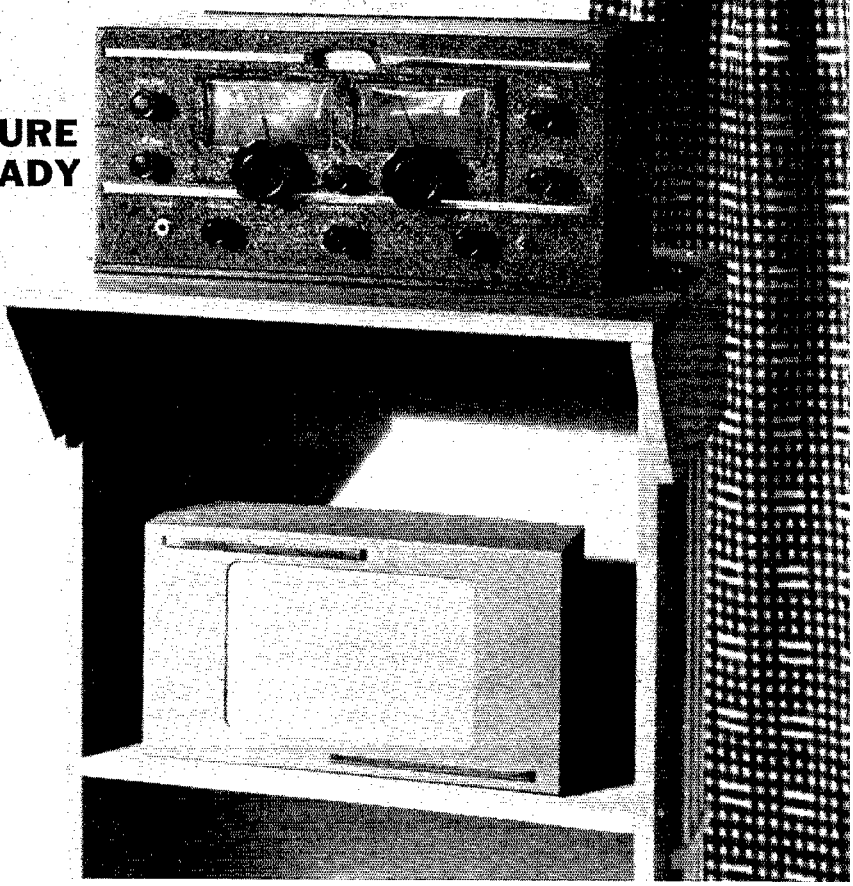
The RME-70

now on display at your dealers, and awaiting your approval . . . a **REAL** Communication Receiver at a very moderate cost

CHECK THESE FEATURES

- ✔ Frequency coverage from 550 to 32000 KC
- ✔ Designated controls lettered on front panel
- ✔ Variable phasing crystal filter circuit, complete with crystal
- ✔ 3 iron core IF Transformers with extreme selective tuning
- ✔ 1-stage radio frequency amplification
- ✔ New automatic noise suppressor
- ✔ Break-in relay control circuit
- ✔ Monitor circuit incorporated
- ✔ Either black or gray crinkle finish—optional

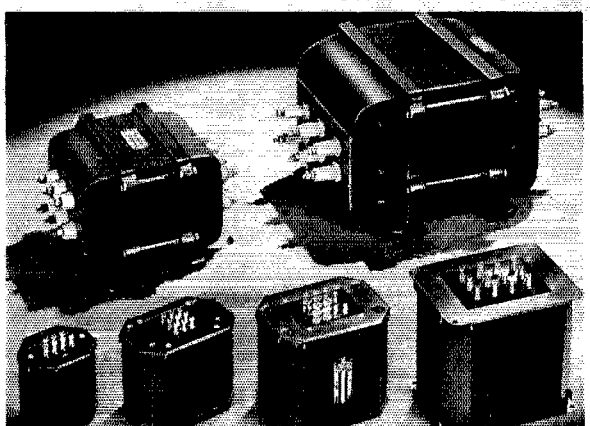
NEW LITERATURE NOW READY



RADIO MANUFACTURING ENGINEERS, INC.

ONE ELEVEN HARRISON STREET PEORIA, ILLINOIS, U. S. A.

NEW COMMERCIAL TYPE POWER SUPPLY COMPONENTS



THE new UTC PA power transformers and chokes have been designed to commercial standards. Temperature rise and insulation requirements are in accordance with the conservative specifications of the A.I.E.E. and Fire Underwriters. Temperature rise is less than 55 degrees C., and units are tested for breakdown on all windings at twice working voltage plus 1,000 volts. In addition, plate transformers are given a surge test at 2½ times normal applied voltage using a 500 cycle supply. In view of the conservative ratings and manufacturing procedure, these units are suitable for use on most types of government and standard commercial communication equipment in addition to amateur service.

LOW POWER FILTER CHOKES

Type No.	Inductance Henrys	D.C. MA	D.C. res. Ohms	Case No.	List Price
PA-40	10	200	110	PA-2	$4.50
PA-41	5–25	200	100	PA-2	4.50
PA-44	30	100 max.	375	PA-2	4.00
PA-45	250	15 max.	4500	PA-1	4.50
PA-48C	100	50 ma.	2500	PA-1	4.50

SMOOTHING CHOKES

Tapped for humbucking circuit. Commercial safety factors. Inductance rating at max. DC.

Type No.	Inductance Henrys	D.C. M.A.	D.C. res. Ohms	Case No.	List Price
PA-100	12	150	115	PA-2	$5.00
PA-102	12	200	105	PA-3	8.00
PA-104	12	300	90	PA-4	12.00
PA-108	10	500	60	CA-1	20.00
PA-1S	10	1000	50	CA-1	35.00

HIGH POWER PLATE TRANSFORMERS

Primaries for 105, 115, 220, 230 volts, 50/60 cycles. For reduced power secondary voltages can be reduced to half by using 220V. Pri. on 110 volts. These transformers may be used on 25 to 43 cycles if 220V Pri. is used on 110 volts.

Type No.	High Voltage	D.C. Voltage	D.C. MA	Case No.	List Price
PA-300	625-515-0-515-625	500/400	200	PA-3	$10.00
PA-301	580-530-300-0-300-530-580	475/425/250	500	PA-4	14.00
PA-302	950-750-0-750-950	760/610	325	PA-4	17.00

Type No.	High Voltage	D.C. Voltage	D.C. MA.	L	W	H	Wt. lbs.	List Price
PA-303	1500-1235-400-0-400-1235-1500	1250/1000 300	300 175	8	7½	5½	32	$25.00
PA-304	1500-1235-0-1235-1500	1250/1000	800	14	11	9¼	118	65.00
PA-305	2400-1750-0-1750-2400	2000/1500	300	10	7½	5½	50	35.00
PA-306	2400-1750-0-1750-2400	2000/1500	500	14	11	9¼	120	65.00
PA-307	3500-3000-2400-0 2400-3000-3500	3000/2500/ 2000	300	13	11	9¼	110	60.00
PA-308	3500-3000-2400-0 -2400-3000-3500	3000/2500/ 2000	500	15	11	9¼	140	85.00
PA-309	3500-3000-2400-0 -2400-3000-2500	3000/2500 2000	1000	17	14	11¼	210	135.00
PA-310	4600-4050-3500-0 -3500-4050-4600	4000/3500/ 3000	600	15	14	11¼	168	105.00
PA-311	1500-1235-0-1235-1500	1250/1000	500	10	7½	5½	50	35.00

ALL PRICES SHOWN ARE SUBJECT TO AMATEUR DISCOUNT. YOUR COPY of the NEW PS-403 Bulletin is waiting at your local UTC JOBBER

COMBINED PLATE AND FILAMENT TRANSFORMERS

Primary 115 volts 50/60 cycles. *Tapped for either voltage. ¶ Replaces former transformer types PA-22, PA-425 and PA-426

Type No.	High Voltage	DC. MA.	Fil. 1	Fil. 2	Fil. 3	Fil. 4	Case No. List Price
¶PA-422	435-365-0-365-435 125-0-125	125 25	5V-3A	5V-2A	6.3 VCT-3A	2.5 VCT-5A	PA-3 $10.00
PA-428	500-0-500 80-0-80	250 100	5V-3A	5V-2A	6.3 VCT-4A	*6.3 VCT-3A 2.5 VCT-3A	PA-4 14.00
PA-429	600-525-0-525-600	250	5V-3A	6.3 VCT-3-A	*7.5 VCT-3A 6.3 VCT-3A		PA-4 15.00
PA-431	500-400-0-400-500 80-0-80	500 100	5V-6A	5V-2A	6.3 VCT-5A	6.3 VCT-3A	CA-1 22.50

UNIVERSAL BIAS TRANSFORMERS

Primary 115 V 50/60 cycles. No filament windings.

Type No.	D.C. Voltage	D.C. Ma.	Case No. List Price
PA-315	Tapped for any voltage from 15 to 100 V within 6 %	250	PA-2 $8.50
PA-316	Tapped for any voltage from 75 to 400 V within 6 %	250	PA-4 15.00

SWINGING INPUT CHOKES

Type No.	Inductance Henrys	D.C. M.A.	D.C. res. Ohms	Case No.	List Price
PA-101	5–25	150	115	PA-2	$5.00
PA-103	5–25	200	105	PA-3	8.00
PA-105	5–25	300	90	PA-4	12.00
PA-109	5–25	500	60	CA-1	20.00
PA-1C	5–25	1000	50	CA-1	35.00

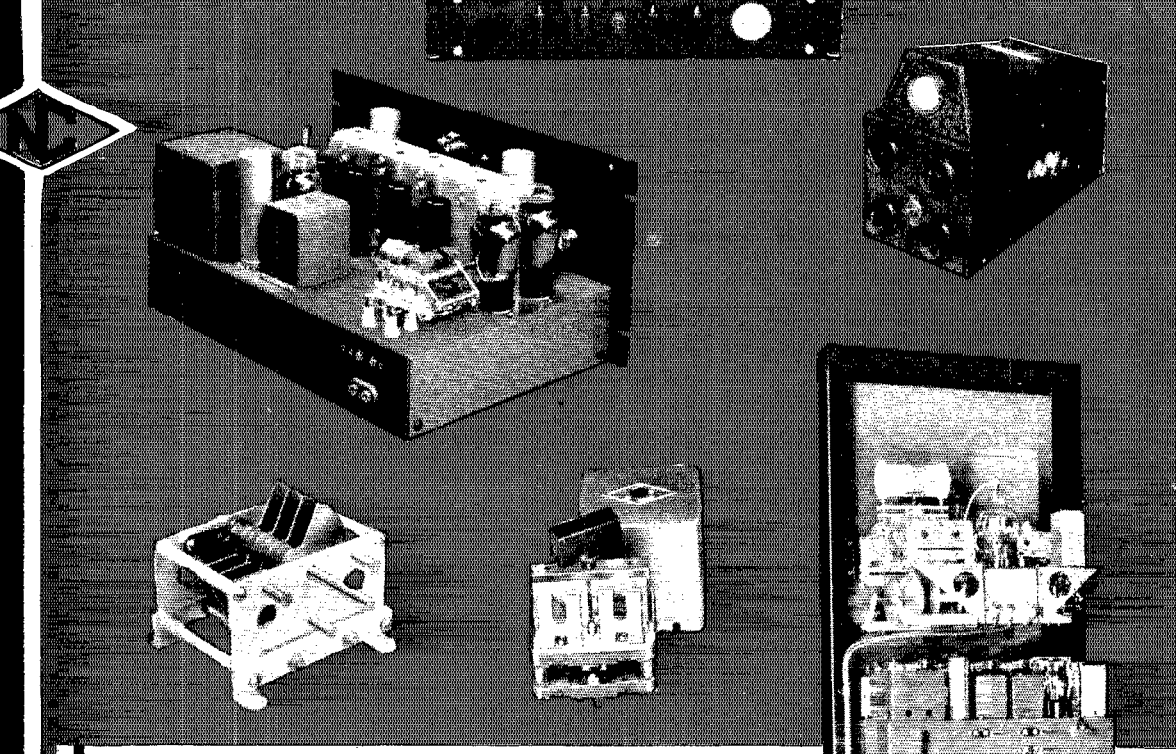
FILAMENT TRANSFORMERS

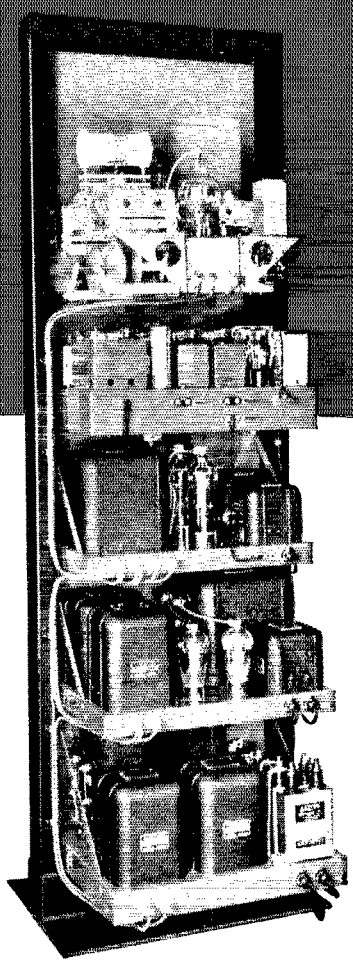
Primary for 105, 115, 220, 230 volts, 50/60 cycles. These transformers may be used on 25 to 43 cycles if 220 volt primary is used on 110 volts. Secondary voltage is simultaneously reduced to half.

*Two Windings.

Type No.	Sec. Volts C. T.	Sec. Amps.	Working Voltage	Test Voltage	Case No.	List Price
PA-34	2½	10	2500	6000	PA-2	$7.50
PA-120	2½	10	5000	11000	PA-3	9.00
PA-121	5	22	5000	11000	PA-3	14.00
PA-122	7.5/6.3	8	1500	4000	PA-3	11.00
PA-124	10	10	1.00	4000	PA-3	12.00
PA-125	14/12/11	10	1500	4000	PA-3	14.00
PA-126	*14/11/10 14/11/10	10 10	1500	4000	PA-4	20.00

RUMFORD PR
CONCORD, N





LOW IN COST
LONG LIVED
VERSATILE
HIGH IN PERFORMANCE
NATIONAL QUALITY

NATIONAL makes a complete line of Transmitting Equipment, ranging from acorn tube sockets to complete transmitters. Right down the line, every item is designed to meet amateurs' needs dependably, conveniently and at low cost. And most important, National products have versatility as well as long life so that gear bought for today' s needs will find its place in next year's rig.

Tomorrow's Tube TODAY!

NEW RCA 813

gives 260 watts output

with less than 1 watt

Driving Power!

IT'S A FACT! This sensational new RC Beam Power Transmitting Tube actually r quires less than one watt driving power to gi 260 watts output in Class "C" Telegraph se vice. Needing no neutralization, a pair of 81 makes a bang-up final for that quick-ban change, high-power transmitter.

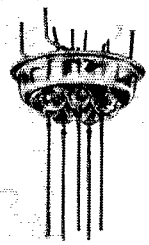
The new 813, is among the finest transmitting tub RCA has ever developed, employs a new stem structu which makes practical a compact tube—only 7½" lo —having very short heavy leads and low lead indu tance. Because of its design, this new high-power bea tube can be operated at full ratings up to 30 meg cycles without neutralization.

Other noteworthy features of this new tube a Heavy-duty thoriated-tungsten filament, oversiz graphite plate, dome-top bulb with cushion mou supports, low screen current, and a new Giant 7-p base having short shell and wide pin spacings.

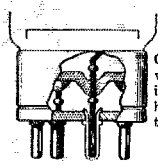
Typical Operation (Class "C" Telegraphy)

Filament Voltage	10 volts (a. c. or d. c.)
Filament Current	5 amperes
D-C Plate Voltage	2000 volts
D-C Screen Voltage	400 volts
D-C Grid Voltage	−90 volts
D-C Plate Current	180 milliamperes
D-C Screen Current	15 milliamperes
Driving Power	0.5 watt
Power Output	260 watts

Price, $28.50 Amateur Net.



View of moulded glass stem assembly showing individual lead seals.



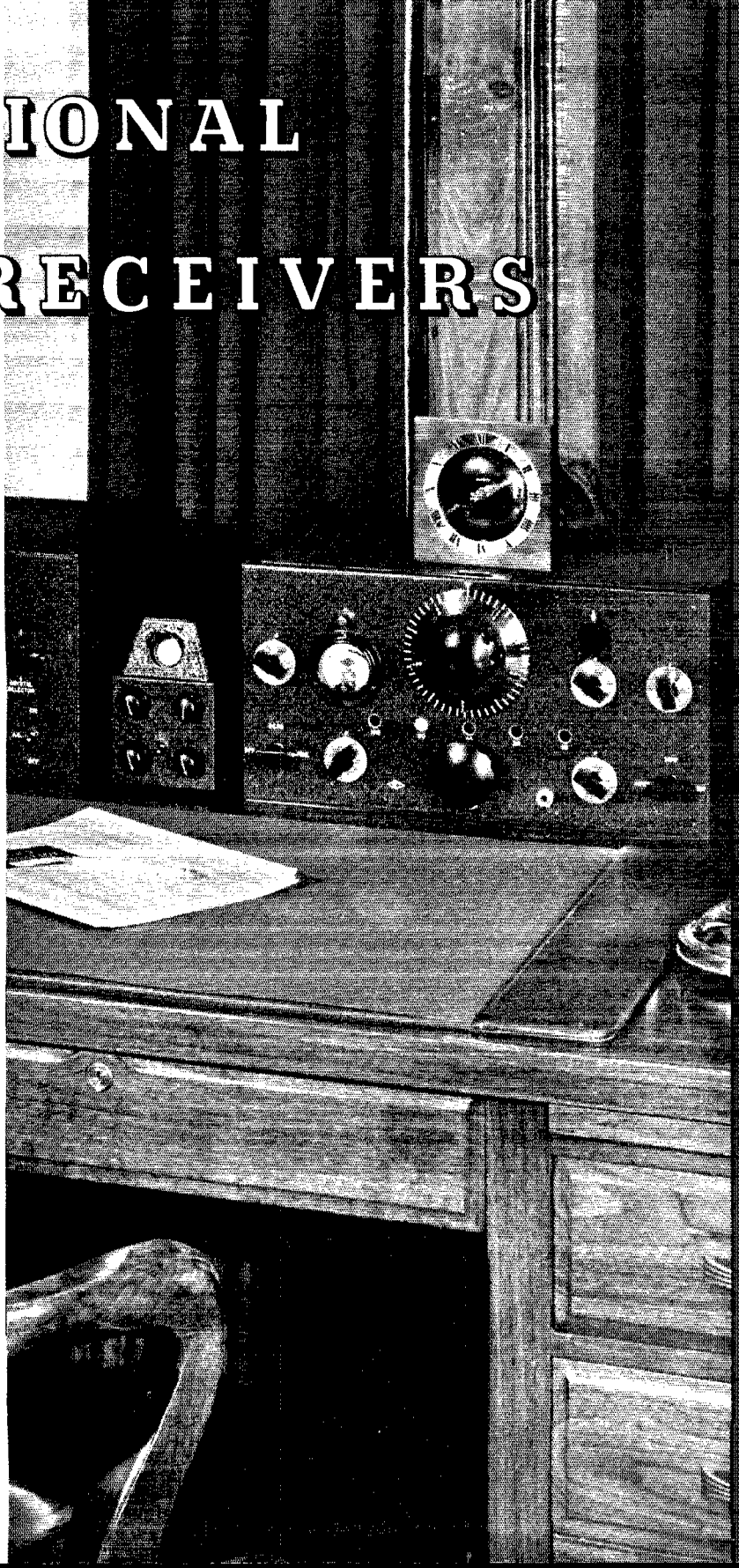
Cut-away view showing short, heavy leads to terminal pins.

RCA Radio Tubes

RCA MANUFACTURING COMPANY, INC., CAMDEN, N. J.

A Service of the Radio Corporation of America

NATIONAL RECEIVERS

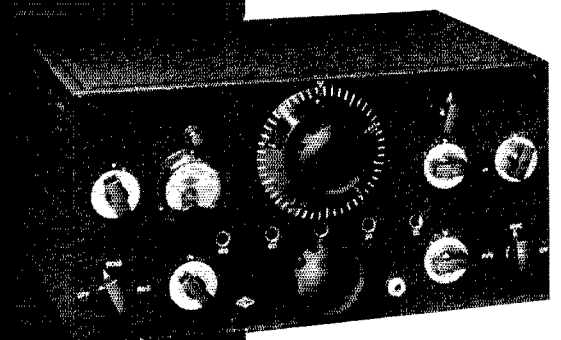


NATIONAL HRO

A professional receiver, designed for maximum performance. Two preselector stages give remarkable weak signal response, signal-to-noise ratio, and image suppression to the HRO. Two high gain IF stages employ Litz-wound coils and air condensers. The usable sensitivity and selectivity are exceptionable. Circuit details include AVC, MVC, S-meter, crystal filter, CW oscillator, phone jack and Send-Receive switch. When standard HRO coils are used for general coverage, each of the four coils includes two amateur bands and the spectrum between. A simple switching device is provided which makes these same coils bandspread their respective amateur bands over a span of 400 divisions on the dial.

A simplified model having the same constructional and design features, but omitting the crystal filter, the S-meter, and the bandspread feature on the coils, is known as the HRO Junior. It is considerably lower in price.

The net price of the standard HRO table model, including coils (1.7–30 MC), tubes, speaker in cabinet and power supply is $210.18. Refer to the general catalogue for a complete listing.

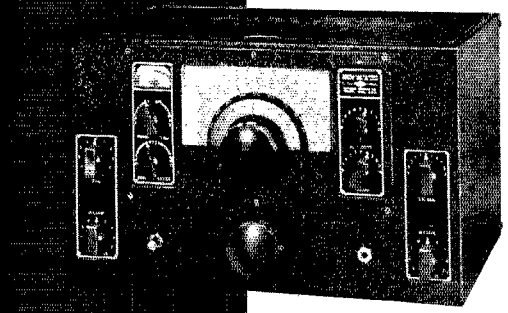


NATIONAL NC-100A NC-101X

Fine Communication Receivers with splendid tone. These 11 tube superheterodynes are self-contained (except for the speaker) in table model cabinets that can be readily adapted to relay rack mounting. One stage of RF and two stages of IF amplification are used. High quality construction throughout gives a performance approaching that of the HRO. Automatic plug-in coils are selected from the panel by rotating a knob. Circuit details include AVC, MVC, S-meter, crystal filter, CW oscillator, phone jack and Send-Receive switch.

The NC-101X, illustrated above, is built strictly for the amateur bands. It covers only the ranges: 1.7–2.05 MC, 3.5–4.0 MC, 7.0–7.3 MC, 14–14.4 MC and 28–30 MC.

The NC-100XA, illustrated below, gives continuous coverage from 540 KC to 30 MC. The NC-100A is similar, but without the crystal filter.



The net prices of the AC operated models, complete with tubes and 10-inch speaker in cabinet are as follows: NC-101X, $129.00; NC-100XA, $142.50; NC-100A, $120.00.

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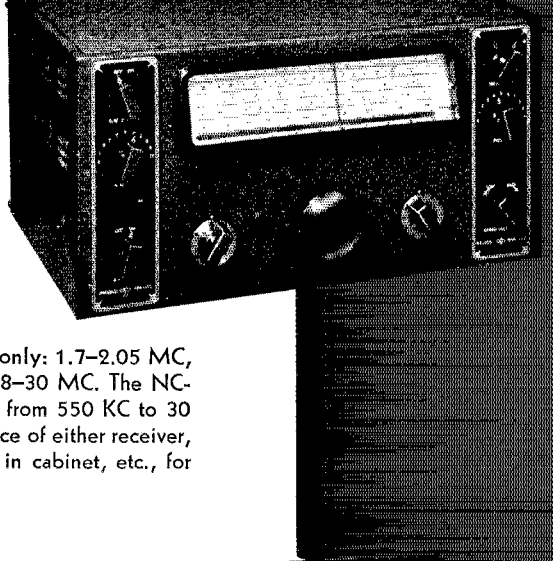
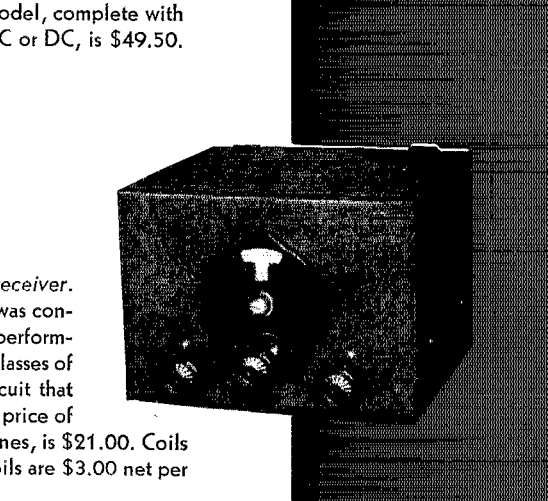
NATIONAL
NC-81X



An excellent Communication Receiver at a moderate price. This inexpensive ten tube superheterodyne uses a 1560 KC IF Amplifier, giving excellent image suppression (better than in many receivers having elaborate preselectors). The crystal filter is of advanced design, with continuously variable selectivity from 400 cycles to 5 KC, and with phasing range similarly extended. The range changing system is similar to the NC-100. The NC-81X is an amateur model, covering the following bands only: 1.7–2.05 MC, 3.5–4.0 MC, 7.0–7.3 MC, 14.0–14.4 MC, and 28–30 MC. The NC-80X is a similar receiver with continuous coverage from 550 KC to 30 MC, except for a small gap at 1560 KC. The net price of either receiver, complete with tubes, crystal filter, 8-inch speaker in cabinet, etc., for 115 V., AC or DC, is $99.00.

NATIONAL
NC-44

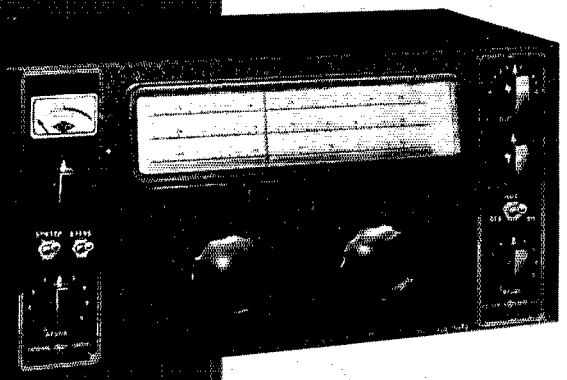


For capable performance at very low price. A seven tube superheterodyne with continuous coverage from 550 KC to 30 MC in four ranges, with coil switch. A straight-line-frequency main condenser is used in conjunction with a separate bandspread condenser; both have inertia-type tuning. A CW oscillator is provided. The net price of the NC-44 Table Model, complete with tubes, coils and speaker chassis, for 105–130 V. AC or DC, is $49.50.

NATIONAL
SW-3

An old favorite — the dependable regenerative receiver. When the SW-3 was first introduced its performance was considered phenomenal. Today, after seven years, its performance is still rated so high that it is preferred for many classes of work. It uses three tubes in a highly developed circuit that provides maximum sensitivity and flexibility. The net price of the SW-3, without tubes, coils, power supply or phones, is $21.00. Coils are available for coverage from 9 to 3000 meters. Coils are $3.00 net per pair for all amateur frequencies.

NATIONAL



NATIONAL NC-510

A specialized superheterodyne covering 28 to 64 MC. The NC-510 is strictly a communication receiver, embodying all the features commonly needed in such work, but is specialized to give maximum performance in the range from 28 to 64 MC. The RF circuit and tubes are built completely inside the frame of the three gang tuning condenser. The coils are mounted in a revolving turret shield directly below the condenser assembly. This compact assembly provides the shortest possible leads from coils to condensers to tubes. A 956 acorn is used in the RF, a 954 in the first detector, and a 955 in the HF oscillator. Circuit details include a wide range crystal filter (300 cycles to 7 KC), CW oscillator, AVC, S-meter, stabilized HF oscillator and phone jack. Output is two watts for speaker. Inter-channel noise suppression for quiet standby operation can be supplied on special order. The net price of the NC-510, complete with tubes, coils, speaker and power supply is $150.00.

NATIONAL ONE-TEN

A specialized receiver for the range from 1 to 10 meters. The One-Ten Receiver is intended primarily for the experimenter. It is a thoroughly satisfactory receiver for the ultra-high frequencies, but cannot equal the NC-510 or the HRO on the frequencies which they cover. A four tube circuit is used, composed of one tuned RF stage, a self-quenching super-regenerative detector, first audio, and power output. Acorn tubes (954 and 955) are used in high frequency circuits. The net price of the One-Ten, with 6 sets of coils, but without tubes, power supply or speaker, is $51.00.

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