QST

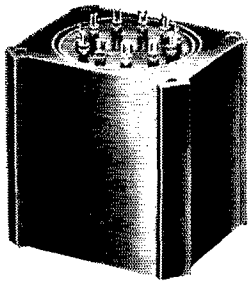
July, 1949
40 Cents

devoted entirely to

amateur radio

PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

Linear Standard Units.



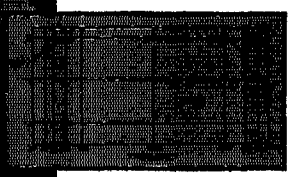
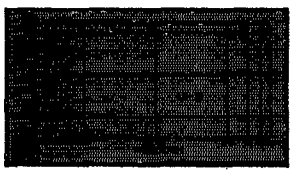
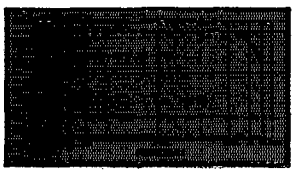
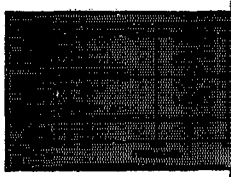
THE ULTIMATE IN QUALITY...

UTC Linear Standard Audio Transformers represent the closest approach to the ideal component from the standpoint of uniform frequency response, low wave form distortion, high efficiency, thorough shielding and utmost dependability. UTC Linear Standard Units offer these features:

- **True Hum Balancing Coil Structure** . . . maximum neutralization of stray fields.
- **Balanced Variable Impedance Line** . . . permits highest fidelity on every tap of a universal unit . . . no line reflections or transverse coupling.
- **Reversible Mounting** . . . permits above chassis or sub-chassis wiring.
- **Alloy Shields** . . . maximum shielding from inductive pickup.
- **Hiperm-Alloy** . . . a stable, high permeability nickel-iron core material.
- **Semi-Toroidal Multiple Coil Structure** . . . minimum distributed capacity and leakage reactance.
- **Precision Winding** . . . accuracy of winding .1%, perfect balance of inductance and capacity; exact impedance reflection.
- **High Fidelity** . . . UTC Linear Standard Transformers are the *only* audio units with a *guaranteed* uniform response of ± 1 DB from 20-20,000 cycles.

TYPICAL LS LOW LEVEL TRANSFORMERS

Type No.	Application	Primary Impedance	Secondary Impedance	±1 db from	Max. Level	Relative hum-pickup reduction	Max. Unbalanced DC in prim'y	List Price
LS-10	Low impedance mike, pickup, or multiple line to grid	50, 125, 200, 250, 333, 500/600 ohms	60,000 ohms in two sections	20-20,000	+15 DB	—74 DB	5 MA	$25.00
LS-10X	As Above	As above	50,000 ohms	20-20,000	+14 DB	—92 DB	5 MA	32.00
LS-12	Low impedance mike, pickup, or multiple line to push pull grids	50, 125, 200, 250, 333, 500/600 ohms	120,000 ohms overall, in two sections	20-20,000	+15 DB	—74 DB	5 MA	28.00
LS-12X	As above	As above	80,000 ohms overall, in two sections	20-20,000	+14 DB	—92 DB	5 MA	35.00
LS-26	Bridging line to single or push pull grids	5,000 ohms	60,000 ohms in two sections	15-20,000	+20 DB	—74 DB	0 MA	25.00
LS-19	Single plate to push pull grids like 2A3, 6L6, 300A. Split secondary	15,000 ohms	95,000 ohms; 1.25:1 each side	20-20,000	+17 DB	—50 DB	0 MA	24.00
LS-21	Single plate to push pull grids. Split primary and secondary	15,000 ohms	135,000 ohms; turn ratio 3:1 overall	20-20,000	+14 DB	—74 DB	0 MA	24.00
LS-22	Push pull plates to push pull grids. Split primary and secondary	30,000 ohms plate to plate	80,000 ohms; turn ratio 1.6:1 overall	20-20,000	+26 DB	—50 DB	.25 MA	31.00
LS-30	Mixing, low impedance mike, pickup, or multiple line to multiple line	50, 125, 200, 250, 333, 500/600 ohms	50, 125, 200, 250, 333, 500/600 ohms	20-20,000	+17 DB	—74 DB	5 MA	25.00
LS-30X	As above	As above	As above	20-20,000	+15 DB	—92 DB	3 MA	32.00
LS-27	Single plate to multiple line	15,000 ohms	50, 125, 200, 250, 333, 500/600 ohms	30-12,000 cycles	+20 DB	—74 DB	8 MA	24.00
LS-50	Single plate to multiple line	15,000 ohms	50, 125, 200, 250, 333, 500/600 ohms	20-20,000	+17 DB	—74 DB	0 MA	24.00
LS-51	Push pull low level plates to multiple line	30,000 ohms plate to plate	50, 125, 200, 250, 333, 500/600 ohms	20-20,000	+20 DB	—74 DB	1 MA	24.00
LS-141	Three sets of balanced windings for hybrid service, centertapped	500/600 ohms	500/600 ohms	30-12,000	+10 DB	—74 DB	0 MA	28.00

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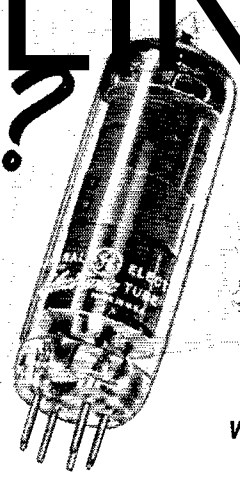
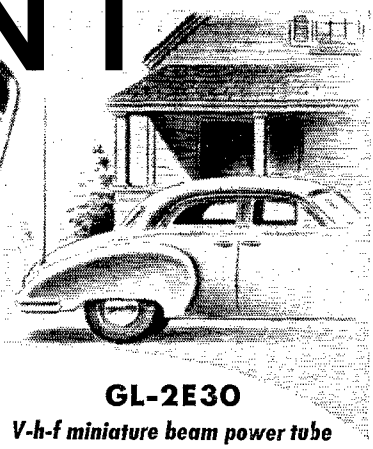
Going Mobile?

go modern... go miniature!





GL-2E30

V-h-f miniature beam power tube

RATINGS, CLASS C TELEPHONY

Filament voltage	6.0 v
current	0.65 amp
Max plate voltage	200 v
Max plate current	60 ma
Max plate input	12 w
Max plate dissipation	6.6 w

IF you were to write your own "specs" for an all-purpose tube for portable-mobile rigs, you'd end up describing the GL-2E30.

Compact—the max over-all height is only 2⅝ inches, which helps keep down transmitter size and weight. The special *6.0-volt filament* checks with your car's battery potential. The tube is versatile . . . it will handle *all stages* of your rig right through to final, where a pair in push-pull, using 200 v on the plate, readily will take 18 w phone input. That's ample power for many pleasant QSO's, or for a message to base camp miles away.

With a frequency range up to 165 mc, the GL-2E30 will operate wide-open on 2 meters; while the instant-heating filament—approximately 2/10 second—means (1) you're on the air as soon as you pick up your mike to talk, and (2) the filament can be turned off during standby periods, with consequent saving in power.

No neutralization is needed, which simplifies GL-2E30's application in your circuit. Here's a beam power miniature jampacked with usable performance! Study the tube, learn its low price, at your G-E tube distributor. Or write *Electronics Department, General Electric Company, Schenectady 5, New York.*

Series 4 in a listing, by areas, of tube distributors who can supply you with Ham News, G. E.'s bi-monthly magazine:

Charleston, W. Va.: Chemcity Radio and Elec. Co.; Hicks Radio; Mountain Electronics Co., Inc.
Chattanooga, Tenn.: Specialty Distributing Co.
De Queen, Ark.: McKeever Radio Supply.
Fort Smith, Ark.: Wise Radio Supply.
Huntington, W. Va.: King and Irwin.
Jefferson City, Mo.: Central Missouri Distributing Co.
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Memphis, Tenn.: Bluff City Distributing Co.; General Elec. Supply Corp.; W. and W. Distributing Co.
Nashville, Tenn.: Electra Distributing Co.; General Elec. Supply Corp.
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(List as of April 25, 1949)

ELECTRONIC TUBES OF ALL TYPES FOR THE RADIO AMATEUR

GENERAL ELECTRIC

180-HA4

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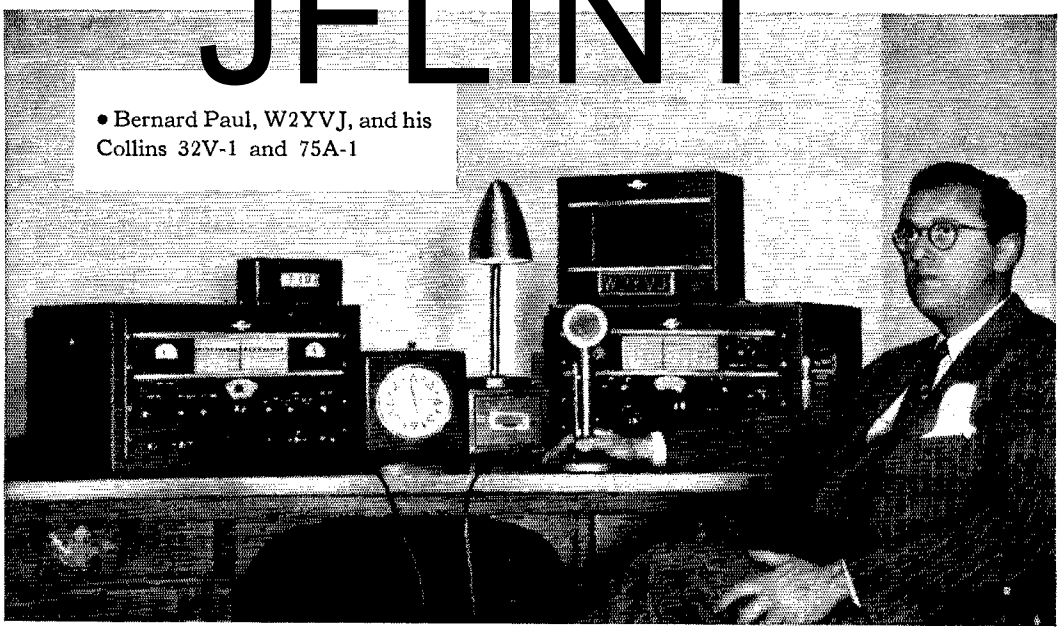

• Bernard Paul, W2YVJ, and his Collins 32V-1 and 75A-1

100% QSO's, New York...Saudi Arabia

• Reports continue to arrive about the excellent performance of the Collins 32V-1 transmitter, with its 150 watts input on CW and 120 watts input on phone. The following letter from Bernard Paul was written last March 16:

"Just a line to let you know of the success WØIAX/MM SS Pendleton and myself, W2YVJ, have been having with our 32V-1's.

"On February 18, the Pendleton and myself arranged a schedule for 1200 GMT 7 AM EST. The ship was then about 200 miles east of Halifax.

"We have had *100% QSO's and never missed a morning* all the way to Ras Tanura, Saudi Arabia, on the Persian Gulf. They arrived in port there on March 22 after an 8500 mile trip. On that day we held it for 3 hours handling traffic for the crew as well as the pilot who came aboard in port.

"Frank (WØIAX) and myself really marvelled at our success in keeping these schedules as each day went by. New conditions and 350 miles further apart each day failed to interfere.

"Many thanks for a fine receiver and transmitter."

FOOTNOTE to amateurs who are also professionals: You can expect the same high performance from Collins broadcast equipment and Collins airborne and ground station communication and navigation gear.

FOR RESULTS IN AMATEUR RADIO, IT'S . . . COLLINS

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 West 42nd Street, New York 18, New York **458 South Spring Street, Los Angeles 13, California**

QST FLINT

JULY 1949

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JEL INT

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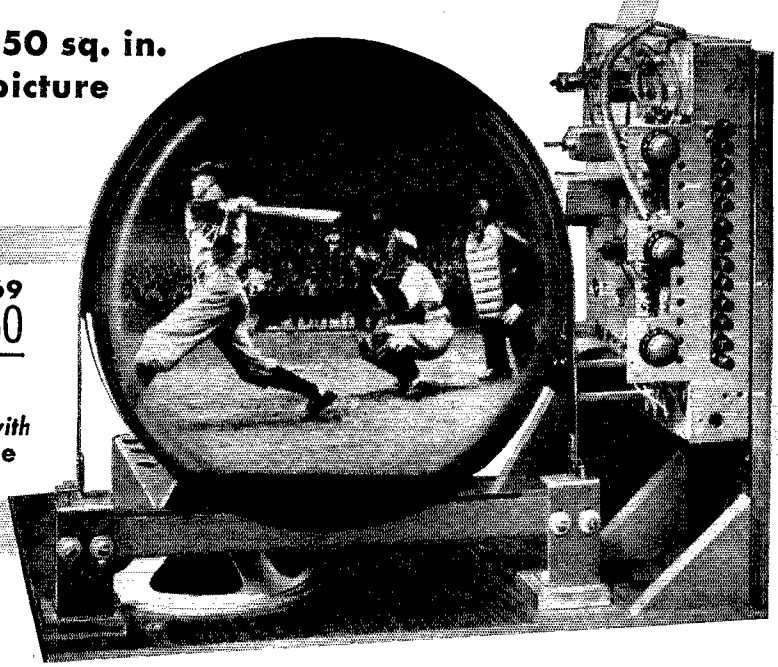
hallicrafters

15-in. Custom Installation TV

150 sq. in. picture

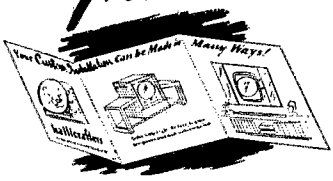


MODEL T-69

$259.50

complete *with* 15-in. tube

Free



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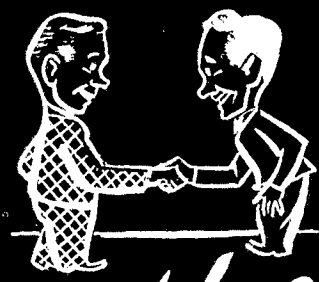
How to Make Friends



and keep them!

Many a beautiful friendship has been lost to a handful of kilocycles! More and more... under crowded present day band conditions... amateurs are learning IT PAYS TO STAY PUT... with PR Precision CRYSTAL CONTROLS. Yes, PRs pay off . . . with stable, trouble-free operation on spot frequencies... where you can make friends and keep them. Whether you operate phone or CW, or both, you will appreciate the fine dependability, high output, economical operation and hair-line accuracy of PR Crystals. They're UNCONDITIONALLY GUARANTEED, and your Jobber can supply you with the EXACT FREQUENCY YOU WANT (Integral kilocycle) WITHIN THE AMATEUR BANDS AT NO EXTRA COST, NO PREMIUM. Insist on genuine PRs!—Petersen Radio Company, Inc., 2800 W. Broadway, Council Bluffs, Iowa. (Telephone 2760)

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40, 80 & 160 METERS PR Type Z-2.	Rugged, low drift fundamental oscillators. High activity and power output with maximum crystal currents. Accurate calibration.. $2.75

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Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio Club reports are also desired by SCMs for inclusion in *QST*. **All ARRL Field Organization appointments** are now available to League members. These include ORS, OES, OPS, OO and OBS. Also, where vacancies exist SCMs desire applications for SEC, EC, RM, and PAM. In addition to station and leadership appointments for Members, *all amateurs* are invited to join the ARRL Emergency Corps (ask for Form 7).

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THE AMERICAN RADIO RELAY LEAGUE, *INC.*,

is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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 noncommercial 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, although full voting membership is granted only to licensed amateurs.

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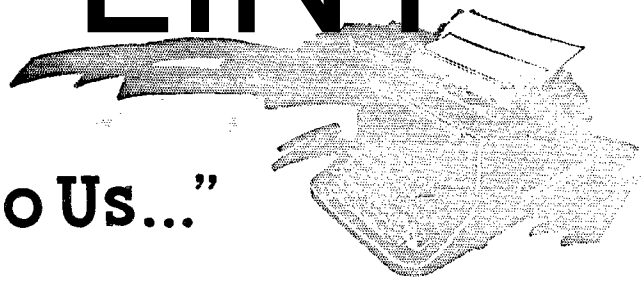

"It Seems to Us..."

LEAGUE GOVERNMENT

It was just twenty-five years ago this month that there met in Hartford an ARRL Board of Directors which was for the first time composed of men nominated and elected by the members of the various League divisions, as provided in the new League Constitution which had been adopted in 1923. As we write, it is just before 1949 Board-meeting time, and it strikes us that we might well discuss once again on these pages just how our League government is set up and how it operates.

Before 1924, we should first explain, the ARRL Board was in effect self-perpetuating. There was membership voting, nationally, but the only names on the ballot were those the Board had hand-picked. True, a member could write in any name he chose, but this was never done in a sufficient number of cases to elect anyone not on the Board's own slate. It was largely at the recommendation of the late Secretary Warner that the Board in 1923 adopted a new Constitution, which KBW drafted, providing for directors nominated and elected by members of each division to represent them in the government of League affairs.

We pause at this point to note that there were other ways in which the democratic system could have been applied. For one, the League might be governed by regular meetings open to all members; the obvious fault here is, of course, that members living near the city chosen for such meetings would predominate, and control of the League would thus be largely restricted to the members in one comparatively small area. Another possibility is a referendum system, whereby each member could vote by mail on each and every matter which confronted the League. Democratic, yes, but cumbersome and in many respects actually fraught with danger. Cumbersome? Yes, because there would have to be a constant flow of polls of opinion or ballots between the membership and the Hq. Well, someone suggests, poll amateurs only on the important questions. The obvious clinker in that one is: Who decides which questions are the important ones? You answer that; we can't. We also expressed the belief that the referendum system would be dangerous. For one thing, under such a procedure it would be impossible to consult all members immediately at crucial times. More than that, even if it were possible, each member could not be expected to have available the data necessary to be fully informed, and thus be capable of an intelligent decision, on various aspects of each matter — particularly in the case of a world conference or even a domestic legislative matter on which a quick decision is needed. That need occurs perhaps more often than the average member realizes.

And so, some 25 years ago, the old Board examined various ways in which the League might be set up, chose our present system of government and adopted a new Constitution to put it into effect, voted itself out of office, and thus willed us the democratic system by which the League has since been governed. In the membership's hands alone they placed the responsibility of seeing that the various divisions are adequately and properly represented. Come election time each year (as it will soon — August *QST* will carry an election notice), the members in half our divisions look around to select the fellow amateurs they want to represent them on the Board. They examine the record and attributes of their current director, and if satisfied they will nominate him for reëlection. Other groups, feeling either that they have a better man or believing simply that competition for the job is a healthy sign, nominate additional candidates. Then the qualifications of the nominees are talked up over the air, in club meetings, and through correspondence and mail "campaigning." Shortly, along comes a ballot listing the eligible candidates. By this time each member has made up his mind, and he marks his ballot accordingly. When the ballots are tabulated, the man with the most votes is declared elected. Thus the membership has exercised complete control in the selection of their representatives on the Board.

Each director represents a division, these areas having evolved as natural geographic entities. Elected by the membership at the same time as the director is an alternate

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director, who is empowered to act in the absence or inability of the director. Directors customarily appoint assistants to help them further in the administration of the division's affairs. Various means are used to determine the thinking of the division's amateurs on matters of the day. Among the more common are club travel, hamfest and convention visits, correspondence, and contacts over the air. Some directors have inaugurated systems whereby each of the various affiliated clubs appoints one of its members to meet in council with the director periodically. In such ways the director is able to receive a great deal of information from a large percentage of his constituents.

So, every member has a voice in League affairs by writing to or visiting with his director at club meetings and conventions. But the director does the day-to-day worrying about League affairs. It is part of the duties of the Hq. staff to keep directors and their alternates and assistants well informed, but let us emphasize again that the staff does not set League policy. That can be done only by the Board of Directors. The Hq. is a service organization. It keeps the directors informed by means of periodic Secretary's Letters plus supplementary individual correspondence; it develops new apparatus and techniques and answers the technical inquiries of members; it produces *QST* and the League's supplementary publications; it takes care of the membership correspondence; it organizes operating contests and activities; and it maintains liaison with various Government agencies as necessary. All this activity is carried on in accord with general policies laid down by the Board, and under the supervision of officers who are hired (and can be fired) by the Board.

Your director on that Board represents you in the conduct of ARRL affairs, and if you don't like the way things are going you have the choice of nominating and voting for a different man at the next elections. Of course, it may happen that what you want done doesn't agree with what a majority of the other hams in the country want. That is why the League structure provides for a Board — to furnish a common meeting ground where the elected representatives of amateurs all over the country may gather to discuss problems of the day and come to mutual agreement on the best course to follow to give amateur radio, individually and collectively, its greatest strength and brightest future. Unless you are burning with a white-hot flame of genius and know for certain that every one else is out of step, you may realize that your personal viewpoints aren't necessarily going to be adopted, and that you'll just have to adjust yourself to the wishes of the majority. It goes without saying that there is bound to be a difference of opinion in a group of some 80,000 people, be they industrial executives, auto mechanics, or radio amateurs. But the thing that must be emphasized is that the minority groups must be bound by the same rules and provisions as the majority.

Now, to ensure that majority rule is in fact accomplished, it is desirable that every League member make some contribution. Do you know the name of your director? Have you, when you have had convictions about some phase of ham radio, communicated them to him? If not, then you have failed yourself and amateur radio as a whole. The necessity for keeping in touch with your director can't be too fully stressed. It is well known that the "downtrodden" minority is usually vocal. In fact, their voices often completely mask the contentment being radiated by those who are completely satisfied with the way things stand. Thus, it is a foregone conclusion that if you don't like something, you'll be heard from. But, please, if you are satisfied with the situation at hand, let your director know that, too, so that he'll have a *true* picture of the state of affairs in his division. In other words, get to know your director, and let him get to know you. It'll be mutually profitable.

We'd like to add one more comment on the referendum or poll system, which seems to be a sore spot in a few ham circles today. It's the only democratic way, some insist. Yet the facts indicate that the amateur membership of the League is far less interested in polls of opinion than it is in electing directors. In none of the *QST* polls of opinion has the return ever been more than 33 per cent of League members nor more than 20 per cent of the amateur body as a whole. Compare that response, please, with the return of from 45 to 60 per cent in the membership voting for director. It seems to us that the body of amateur membership has itself thus indicated that they are willing to place in the hands of their elected representatives the power to speak for them in matters of League policy, content in the belief that, having selected mature, experienced and capable amateurs to represent them, the right answers to amateur problems are assured 99 times out of 100.

Flash—

W2CFT-W1AW QSO on 2-Meter Teletype!

• As predicted by W2BFD in his teletype article in October, 1948, *QST*, two-way a.f.s.k. teletype on 144 Mc. between the New York City area and central Connecticut (approx. 90 miles) has become a reality. Al Waring, W2CFT, and Senior Operator Tom McMullen of W1AW were parties to this 2-meter DX record, which was rung up on June 6th.

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Narrow-Band Pulse Transmission

Some Revolutionary Possibilities in Amateur Communication

BY DANA A. GRIFFIN,* W2AOE

• There are two ways of putting a maximum number of noninterfering signals in a given band of frequencies. In one method, sharp, stable, continuous signals may be placed side-by-side in frequency until the given band is filled. This is the method with which all of us are familiar. In the second method, each signal may be so broad as to cover the whole given bandwidth, but the band is shared among several signals by allowing each to be transmitted for only a small fraction of the total time, i.e., by *pulsing* the various signals so that only one is occupying the band at any instant. Thus far, we have found the first method most adaptable to amateur work. But at least one outstanding weakness lies in the fact that its application becomes increasingly difficult as the frequency is increased. While time division may bring in other factors not immediately solved so far as ham work is concerned, its application has no such limitation as to frequency. This article discusses some of the underlying principles and possibilities — including the simultaneous use of conventional signals and pulsed signals in the same band without interference!

EVERYONE working in electronics engineering is familiar with radar development. They know in the broad sense that an immense amount of work was done in this field during the war. At the same time it is quite safe to say that little has been done in applying radar techniques to other fields since the cessation of hostilities. Outside of multiplex pulse telephony systems and their by-products in the telemetering field, there is little evidence of appreciable activity in the application of these techniques to communications and other fields.

There are a number of reasons for this, the most important being the reduction in the amount of development being conducted, the lack of a free flow of information to all branches of the electronic engineering profession, and the continued activity of the several specialized groups of engineers on specific problems in their own particular fields. Last but not least, is the all-too-prevalent habit of relying on the printed word as the "final authority," even though the text may not apply exactly to the situation in question. In this regard the writer wishes to take exception to a widely-held opinion. In so doing we believe that the ideas that result from this stand will be of interest to those engaged in radio communication and frequency-allocation work to say nothing of a number of other possible fields of application.

The generalities frequently heard are first, that the DX capabilities of radar, using the "average-power" radiation as a guide, provide a good basis on which to predict pulse-communication performance, and second, that pulse transmissions require too much bandwidth for consideration in communication applications except in the microwave spectrum.

We have no quarrel with performance predictions of radar equipment based on a knowledge of the average power output nor with the bandwidth requirements of radar where precise ranging data are required. However, the situation is entirely different if relatively low-speed telegraphic communication is considered. Here our sole interest is in the transmission of intelligence in one of several forms, not in the measurement of the arrival time of echoes.

In communications work, pulses of much longer duration than those employed in radar can be used. In addition, their shape can be sinusoidal or nearly so. Thus the basic advantages of pulse transmission can be retained with a very substantial reduction in the bandwidth requirements normally used in radar work. Radar requirements have evidently stopped most thinking on the possible application of pulse techniques on the lower frequencies. The advantages of pulse transmission are well known. Multiplex operation by means of time division is possible. This in turn makes it possible to work "duplex," or to "look through" local transmissions without interference. Secondly, this type of transmission can easily be automatically relayed by means of transponders. Third, large peak-power outputs can be obtained from low-powered tubes. Fourth, substantial power outputs can be obtained for use in easily-transportable field equipment with small average-power drains.

Simultaneous Band-Use

There are several other advantages that can be obtained with pulse transmissions that do not

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seem to have been investigated to any great extent. However, they offer possible opportunity for advances in the communication field that are revolutionary in nature. The first point is that in transmitting telegraph signals by radio, normal c.w. transmission is extremely wasteful of power and transmitting time. The intelligence can be transmitted by means of pulses equally well.

An increase in transmitted bandwidth over the requirements for c.w. transmission is accepted as unavoidable for pulse communication. To use such transmissions in the medium-frequency communication bands (3 to 30 Mc.) looks impossible at first glance, in view of the fact that our spectrum is already overcrowded. However, if we take advantage of the principle of time division, we find that we need not sacrifice spectrum space if we assign a number of stations to the same channel, or group of channels, assuming that they all are engaged in slow-speed pulse-type communications such as telegraph, teletype, facsimile.

Another tremendous advantage can be obtained because pulse telegraphy can be transmitted on the same frequencies occupied by conventional a.m. or f.m. telephone or c.w. signals without mutual interference. We can, in effect, "double up" on the utilization of the spectrum, providing certain rules are obeyed and proper transmitting and receiving techniques are employed. The prospect of using the spectrum "all over again" is particularly appealing, if the immense demand for channels evidenced at the 1947 Frequency Allocations Conference at Atlantic City is a criterion.

There are practical points that permit the use of pulse transmissions in a band occupied by telephone or c.w. stations despite the wide bandwidth requirements. The average communications receiver has a maximum passband of approximately 10 kc. Most communications receivers are supplied with noise limiters. The narrow passband limits the amount of energy received from a pulse-type transmitter. The noise limiter operates on the pulse signals in the same manner as it does on ignition noise at the higher frequencies. Both of these facts make it possible to receive 'phone or c.w. through "pulse interference."

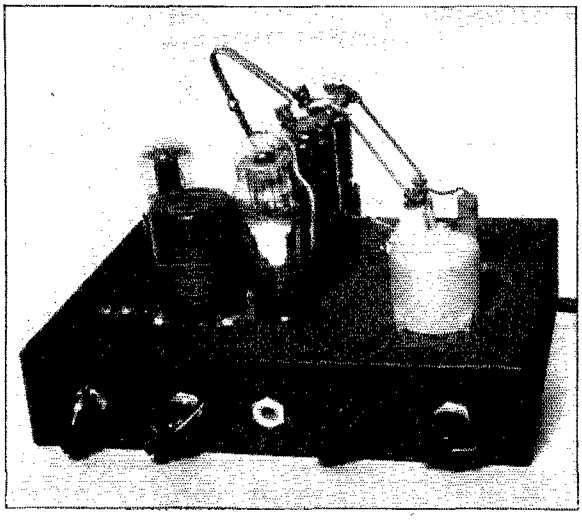
If we consider the operation of a number of pulse telegraph transmitters "on top of" 'phone or c.w. signals, the interference limit with respect to such transmissions will be reached when the receiver picks up enough energy from the pulse transmitters to approach, equal, or exceed the carrier level of the station to which the receiver is tuned. A small amount of experimental work indicates that a substantial number of pulse transmitters can use a portion of the spectrum simultaneously with 'phone or c.w. transmitters without interfering with them. This point requires further analysis and considerable field testing.

If we allow a channel width of 10 kc., ten 'phone stations using a.m. can be placed on ten such adjacent channels without interference. This sets up a band 100 kc. wide. A single pulse transmitter will occupy this band; that is, it can be heard throughout the band using an ordinary communications receiver. From a practical standpoint little energy will be radiated outside this band if the pulse transmitter (or transmitters) uses pulses of 50 microseconds duration, substantially sinusoidal in shape.

In order to put a number of pulse transmitters on this "band" or pulse channel, time division must be used. A repetition rate of 100 pulses per second (p.p.s.) will take care of keying speeds up to 100 w.p.m. and automatic transmissions such as teletype and facsimile. If all stations are equally spaced in time, and all use 50-microsecond pulses, 100 transmitters can operate "simultaneously," allowing 50-microsecond spacing between the pulses of each transmitter as a safety factor.

Two basic requirements of this plan are that the pulse amplitude exceed that of any 'phone or c.w. transmitter at the receiving location and that the receiver must have a noise limiter. With normal communications receivers having a 5-kc. passband, serious interference on 'phone reception will not occur until the integrated energy received from all of the pulse transmitters begins to approach that of the 'phone station being received.

♦



A simple experimental pulse transmitter capable of 1-kw. peak power output.

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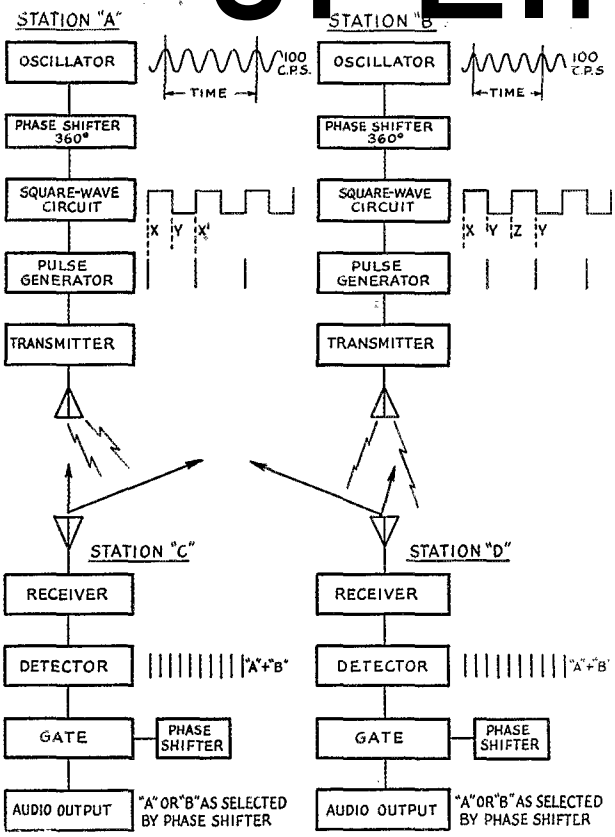

Fig. 1 — **Block diagram illustrating a time-division communicating system.**

The problem of selecting the pulse transmissions in the presence of 'phone "interference" is solved by the use, after the second detector, of a differentiator that does not respond well to audio modulation, plus the use of delay bias. Two second detectors are employed, one for 'phone and c.w. reception in the conventional manner, and one for pulse code reception as outlined above. It is thus possible to receive two entirely-different types of information on a single channel if desired. This possibility is, of course, of potential value to many services aside from amateur applications.

Experimental Checks

The question of what has been done experimentally to confirm the assumptions made of course are of paramount interest. Because of the "compartmentation" of prior art and present development, it is impossible for us to review the situation adequately. However, some work has been done along these lines and more will unquestionably be done in the future. It is a matter of record that the British transmitted false a.m. and f.m. signals, together with pulse code transmissions containing the actual intelligence on the same channel, to confuse the Germans. Likewise, certain pulse code transmitters that do an outstanding job on an extremely small battery drain have been constructed for the transmission of weather data. Work has been done in the v.h.f. field developing simple circuits for pulse transmission together with some observations on the lower frequencies in conjunction with ionosphere recorders. These stations, together with loran stations, afford the only pulse signals that can be observed at present in the spectrum below the microwave frequencies.

During a recent trip to ARRL headquarters at West Hartford, the writer discussed the use of pulse transmissions on both low- and high-frequency amateur-band assignments. This location afforded an opportunity to study the transmissions of W1XJ, the ionosphere transmitter of Harvard University at Boston, which transmits on a fixed frequency of 3490 kc. This transmitter has a peak-power output of 20 kw. It emits 50-microsecond pulses at a 30-p.p.s. repetition rate. Despite the fact that the amplitude of the W1XJ signals at West Hartford is more than 20 times as great as that of the strongest amateur signal observed, the interference to amateur operations on 3500 kc. was negligible when the series noise limiter of a National NC-173 receiver was put into action. We also connected a signal generator to the receiver in parallel with the antenna and introduced a signal of 3490 kc. with 30% modulation, simulating a 'phone transmitter on W1XJ's frequency. With a 10-microvolt input, the pulse signals were inaudible. With 5 microvolts input, the signal from the generator was perfectly readable with slight interference. Readability was poor at 2 microvolts input. The same tests were made with respect to the loran signals on 1950 kc. Their amplitude was slightly greater than that of the W1XJ ionosphere transmitter, but the results with respect to intelligibility were the same.

Observation at the writer's home at Plainfield, N. J., of W1XJ transmissions showed an amplitude of approximately twice that of the strongest 80-meter amateur signal. Here signals of 5 microvolts could easily be copied through the pulse interference of W1XJ without the use of a noise limiter. The receiver used was a BC-342. While these observations are few in number, it seems reasonable to conclude that with a pulse transmitter putting out 5 times the amplitude of a

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telephone transmitter at the same location, sufficient amplitude differential would be available everywhere to insure perfect copy of pulse transmissions. No interference should result insofar as the radiotelephone signal is concerned until the 'phone signals become marginal if a.m. noise limiters or f.m. circuits are employed in the communications receiver.

In the application of narrow-band pulse telegraphy on frequencies below 30 Mc. multipath transmissions must, of course, be considered. These limit the precision of the spacing in time of various transmitters occupying the same channel and consequently reduce the number of stations that could otherwise use the same channel. This, of course, is not true in the v.h.f. and u.h.f. portions of the spectrum where reflections from the ionosphere do not ordinarily occur. On the low frequencies, it should be possible to group a number of stations transmitting regular c.w. on adjacent channels. If the total frequency assignment is 100 kc. wide, it is possible to set up between 40 and 100 additional pulse telegraph transmitters on this "band" or channel, using time division. This will effectively double the amount of information transmitted. Pulse telegraphy can also be superimposed on 'phone channels if they are allocated on the basis mentioned above.

In the v.h.f. and u.h.f. fields much more can be done, since the circuits are limited in range and ionospheric phenomena do not affect the arrival of the signals. Here amplitude and timing relationships can be accurately maintained. Elaborate systems can be set up involving the simultaneous transmission of many types of data. In mobile work means must be provided in the receiver to make it "slave" on the desired transmission. This is not necessary in fixed-station work since synchronism can be obtained from accurate local time standards at both locations.

We are doing a small amount of work on circuits at the present time along the lines outlined above. This is an assembly rather than a development. Practically all of the circuits necessary have been developed during the war so that the problem is one of selecting those best suited to the job at hand.

Fundamentals

For the benefit of those who are not too familiar with the field, the fundamentals are shown in block-diagram form. Fig. 1 illustrates the principle of time division. Both stations *A* and *B* use an accurately-established repetition rate of 100 p.p.s. They are both equipped so that this frequency or repetition rate is used to determine the *exact* time that they transmit a pulse at the 100-cycle rate. This is accomplished by converting the sine wave to a square wave and generating the pulse at the beginning or the end of the square wave. The position of the sine wave in time is then altered by the phase shifter so that the pulses occur at any time desired during the cycle. The elapsed time from X to X_1 is 10,000 microseconds with a 100-cycle repetition rate. If station *A* emits pulses of 50 microseconds duration, starting at X, there will be an elapsed time of 4950 microseconds before station *B* emits a pulse, assuming it transmits at Y. It is obvious that no matter how fast either transmitter is keyed (within the limitations of the repetition rate), or when they are keyed, the signals will be well spaced in time.

At hand-keying speeds of 20 w.p.m., approximately 5 pulses would be transmitted to represent a telegraphic dot and 15 to represent a dash. Receiving stations *C* and *D* can select either transmission *A* or *B* by moving the gating time of their receivers to coincide with the arrival time of either signal. The receivers are inoperative except during the interval selected, so that any interference must occur during the relatively short "on" interval employed. It is of course possible for two pulse signals of this type to arrive simultaneously, particularly on the lower frequencies. This can be corrected by shifting the time of

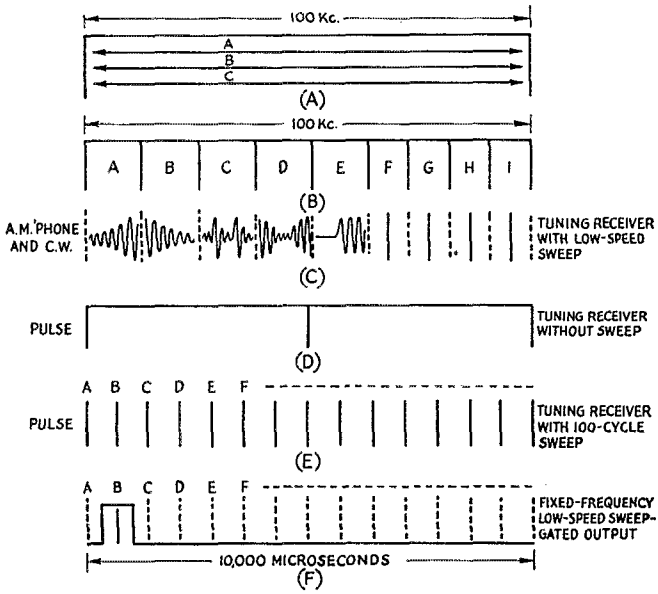

Fig. 2 — Graphic illustration of simultaneous use of a single channel for standard transmissions and narrow-band pulse signals.

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transmission slightly until an unused time interval is found.

Fig. 2 shows the basic ideas necessary to use the same group of channels simultaneously for standard transmissions and narrow-band pulse code. Fig. 2A shows a band 100 kc. wide. Pulse signals from stations *A*, *B*, *C*, etc., can be heard everywhere in this band using a receiver with a 5-kc. passband. Fig. 2B shows the same band

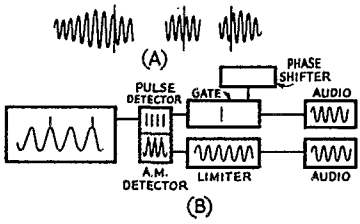

Fig. 3 — **Illustration of the separation of pulsed and audio-modulated signals in a receiver.**

allocated in 16-kc. 'phone channels and 5-kc. c.w. channels. In this case only one station will be heard at a time as the receiver is tuned across the band. Fig. 2C shows a cathode-ray tube pattern with low-frequency sweep. It is a composite picture of what would be observed with respect to regular 'phone and c.w. transmissions as the receiver is tuned across the 100-kc. band. Fig. 2D shows the 'scope picture without linear sweep with respect to pulse transmission only. A number of pulse signals will make the same vertical trace on the screen, regardless of arrival time or receiver tuning. This is another way of presenting the situation shown in Fig. 2A. If a horizontal linear sweep voltage is applied to the oscilloscope, we can see the various signals from the pulse transmitters separated in time as shown in Fig. 2E. In other words, this is what is actually happening in time. Unless we use time division, all of the pulse signals will be superimposed on each other as shown in Fig. 2D. The illustration in Fig. 2E is expressed in *time* rather than frequency. With a repetition rate of 100 cycles, the duration of each sweep is 10,000 microseconds. Figs. 2A and 2D show that any pulse in the band can be heard anywhere in the band. They can be separated visually as shown in Fig. 2E using a horizontal timing base. If a gate circuit that opens just long enough to pass the pulse of the desired signal is employed, all signals can be suppressed except the desired one. In this case only one vertical trace would appear on the screen in Fig. 2E. In Fig. 2F this is shown again, but in this instance the pulses received from the selected transmitter should be considered as electrical energy that can be converted into sound or mechanical motion, instead of visible light on a cathode-ray tube screen.

Interesting Possibilities

Fig. 3A is a representation of how pulse telegraphy appears at the output of a receiver i.f. amplifier in the presence of a.m. 'phone carriers. This is based on the assumption that the amplitude of the pulse signal exceeds that of the 'phone stations. The block diagram of Fig. 3B illustrates a conventional receiver with suitable pulse detection and separation equipment added to the normal a.m. detector. Such a receiver can be used to pick up and separate a 'phone conversation and telegraphic data which may be presented visually or be used to operate various mechanical devices.

It is unfortunate that emphasis was not placed on the application of these principles in the communications field immediately after the war. If this had been done, the problems of the 1947 Frequency Allocations Conference at Atlantic City would have been simplified to some extent. Just one of the interesting possible applications of narrow-band pulse transmission is shown in Fig. 4. If this serves as a starting point in thinking about the application of pulse techniques in the short-wave spectrum, or the creation of a long-distance network to make field tests, one of the purposes of this article will have been served. Fig. 4 shows a hypothetical network in which four stations are communicating with each other. Great-circle distances have not been calculated, the locations selected are merely illustrative. If the 100-cycle repetition rate is used, all four stations can emit pulses at exactly the same times, namely at X, $X + 10{,}000$ microseconds,

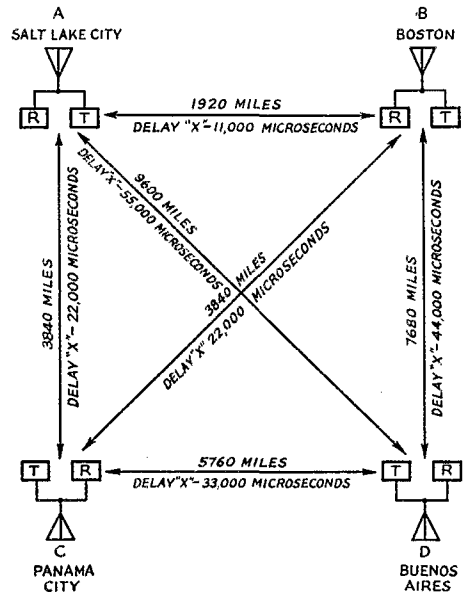

Fig. 4 — **Hypothetical communication network of four stations using pulsed transmissions.**

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$X + 20{,}000$ microseconds, and so on. The transmission delays, because of the distances between stations, are shown in the diagram.

Duplex operation using a common transmitting and receiving antenna at each station is perfectly practical. Stations A and B can operate without any possibility of interference from stations C and D who, in turn, can be operating two-way simultaneously, without interference from A or B, using simple gating circuits and a single audio output.

The gating principle can be modified so that additional intelligence can be received using only one receiver. This is accomplished by opening the gate to admit more than one transmission but at the same time switching the various signals to separate audio outputs. In the case at point, A, B and D can receive the transmissions of the other three stations simultaneously. Station C can receive only station D if the arrival time of signals from A and B is exactly the same. In practice, the timing of either station A or B could be shifted a few hundred microseconds so that the 100-microsecond gate at station C could select all three signals. We have then a long-distance network of four stations operating on one frequency, each station transmitting one message, and receiving three messages simultaneously. The number of effective networks of this type that can be set up is limited only by considerations of frequency allocation, station location, and transmitter timing.

Pulse Transmission and TVI

Another interesting subject is the possibility of reducing, not increasing, interference with respect to television receivers insofar as telegraph is concerned. Every amateur in the New York area is already on the verge of quiet hours if they are not already observing them. This situation will confront amateurs everywhere just as fast as manufacturers can produce TV transmitters and receivers. Wouldn't a little pulse c.w. be preferable to a silent 'phone transmitter during the evening?

Let us assume that our pulse transmitter uses a 100-cycle rep rate and a 50-microsecond pulse. The duration of a single line of the horizontal sweep on the TV screen is only 65 microseconds.

It is obvious that a single pulse cannot blank out more than one line or parts of two lines. If we transmit 60 pulses a second (a better-than-average rate), we will only blank out a single line in each half frame. Inasmuch as the television frame rate is 60 cycles, in general the amateur 100-cycle rep rate would be "random" with respect to the TV sync pulses. This would insure freedom from the vertical displacement of entire half frames. Interference of this nature can hardly be observed by the TV viewer. The situation would be far different than it is with the ugly-looking broad bars ordinary code produces. This is because of the relatively immense number of microseconds for which we ordinarily hold the key down in making a single dot!

The ideas presented here are not necessarily technically accurate in all respects, and unfortunately little field data can be obtained because of the dearth of suitable pulse transmitters. Some theoretical analysis is required, plus a considerable amount of empirical work in all parts of the spectrum. But there can be no question that narrow-band pulse transmissions can be used to advantage in communications. We have been working for 30 years with only two tools, frequency selection and directional antennas. Time, as an additional tool or dimension, should be added to the communications bag of tricks as quickly as possible. The possibilities of our present tools are nearly exhausted, while the potentialities of "time" have only been touched.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1BFU, Gilbert H. Ford, Hartford, Conn.
W1KB, Burton H. Taylor, Haverhill, Mass.
W2MSZ, Dexter M. Miller, Haynerville, N. Y.
W2PVA, Lewis Franchetta, Brooklawn, N. J.
W2TGA, Walter F. Howse, Rochester, N. Y.
W2VGG, Peter J. Curran, Brentwood, L. I., N. Y.
W4MAQ, Ernest C. Charles, Columbia, S. C.
W5FMZ, Grover C. Tarrance, Swenson, Texas
W5US, Ralph C. Parker, Wichita Falls, Texas
W6LYY, Bernard F. Body, San Diego, Calif.
W7KQJ, Maurice E. Yoes, Seattle, Wash.
Ex-8BRV, Charles G. Williamson, Owosso, Mich.
W8IBM, ex-KH6JW, Mario K. Garcia, Dayton, Ohio
WØGHI, Karlton G. Marquadt, Topeka, Kans.
WØGWT, Frank E. Baker, Sioux City, Iowa
WØSSV, Leon B. Garvin, Topeka, Kans.
WØWOS, Russell W. Stewart, St. Louis, Mo.
GW2BLW, Leslie W. Seager, Colwyn Bay
HB9CE, HE1CE, Franz A. Bach, Zurich
VE2KE, Capt. E. M. Rowe, Nitro, Que.
VE3BGN, ex-VE4GN, John T. Davidson, Spirit River, Alta.
VK2GR, Alexander Robinson, Sydney

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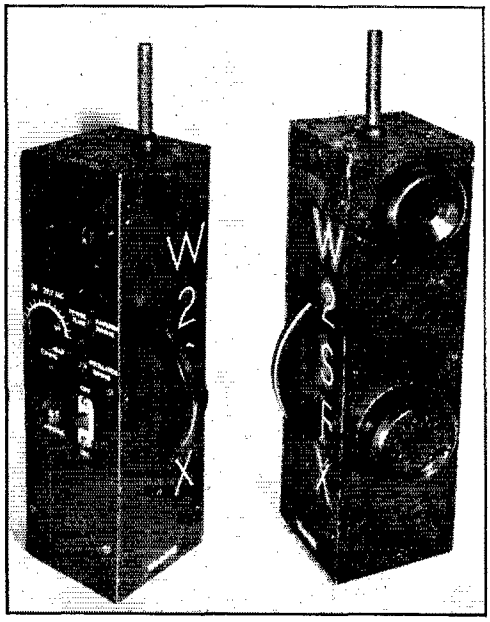
A 10-Meter Handie-Talkie

A Self-Contained Transmitter-Receiver of Many Uses

BY DONALD M. LAUNER,* W2SFX

A COMPLETE station which can be carried easily in one hand can be a source of a lot of fun at ham gatherings, or even around the home station, and may be an important link in an emergency set-up. But there is another field wherein the handie-talkie is invaluable: in TVI test work direct from the scene of the interference. Because it is designed for use in the 10-meter band, the simple little unit described herewith is ideal for this type of work.



Two views of the 10-meter handie-talkie described by W2SFX. At the left is the control side, showing the receiver tuning, on-off switch, send-receive switch, and the screwdriver adjustments for transmitter tuning. The view at the right shows the side on which the microphone and earphone are mounted.

Its coverage compares very favorably with that of similar units on other frequencies. In a recent test in conjunction with a fixed station which used only about 5 watts and a simple folded-dipole antenna, a solid QSO was maintained while the author walked twenty blocks through midtown Manhattan. Greater range could have been attained, but for fatigue and the curiosity of the passers-by!

* 31 West 11th St., New York 11, N. Y.

Considerable experimentation with tubes and circuits preceded the final form, but the unit as it appears here is easily constructed and has no critical components or adjustments. Three 3A5 tubes are used, but since they are dual triodes the result is the equivalent of a 4-tube transmitter and a 2-tube receiver. The final stage runs only 1-watt input to one half of a 3A5, and that is doubling, but the output seems entirely adequate for the purpose. Crystals in the 7-Mc. range are used, and other low-cost components are employed throughout. The receiver is the familiar superregen in its simplest possible form, which may cause some raising of eyebrows in select 10-meter circles. Nevertheless, the one-tube arrangement works very smoothly, and is capable of satisfactory reception of any signal which is S4 or better on a good communications receiver.

Mechanical Details

Since it is probable that each individual will wish to include certain changes from the form shown here, the purpose of this section will be to describe a convenient and practical method of construction, rather than to give a part-by-part construction procedure. The entire frame is made of ⅛-inch aluminum sheets, using aluminum angle stock for all right-angle connections, as shown in Fig. 1. The frame is in the form of an "H," with the receiver and filament and microphone batteries in one side and the transmitter in the other. The "B" batteries are carried in the bottom section.

All four sides are 3¼ by 11½ inches. The inner partition is 3¼ by 7¼ inches. When this is assembled, as seen in Fig. 1, the various parts may be mounted. It is unlikely that the parts will be duplicates of those used by the writer, so their placement is left to the discretion of the builder. Care should be used in the layout process, to be sure that sufficient room is left for all the batteries. The "H"-shaped chassis should contain all the parts, so that the sides may be removed readily for servicing the unit. The microphone and earphone units used were taken from an Army-surplus telephone handset. Facing these items, the transmitter is in the left side of the case and the receiver in the right.

The Transmitter Portion

The transmitter employs no trick circuits or components. The first half of the first 3A5 is a standard triode crystal oscillator on 7 Mc., the

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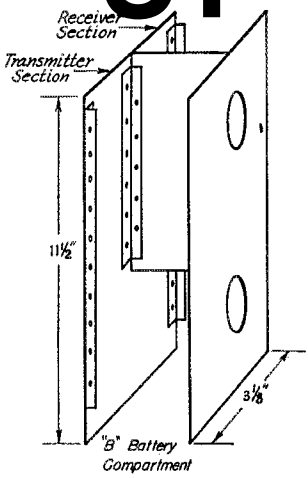


Fig. 1 — Detail drawing of the "H"-shaped chassis for the 10-meter handie-talkie.

second half doubling to 14 Mc. The final is the first half of the second tube, operating as a doubler from 14 to 28 Mc. Modulation is supplied by the second half of this tube in the familiar choke system. The modulation choke, L_8, is a midget filter choke of the type used in small broadcast receivers. As both amplifier stages are doubling, no neutralization is required.

The tuning condensers may be either the variable air type or the ceramic-padder variety, the latter requiring somewhat less space. Because it is improbable that there will be frequent need for retuning, screwdriver-adjustment trimmers are used, except for the receiver tuning control. To save space no provision was made for metering the individual stages, and this was not found necessary in practice, as it is quite satisfactory to tune up using the S-meter of a communications receiver as a resonance indicator.

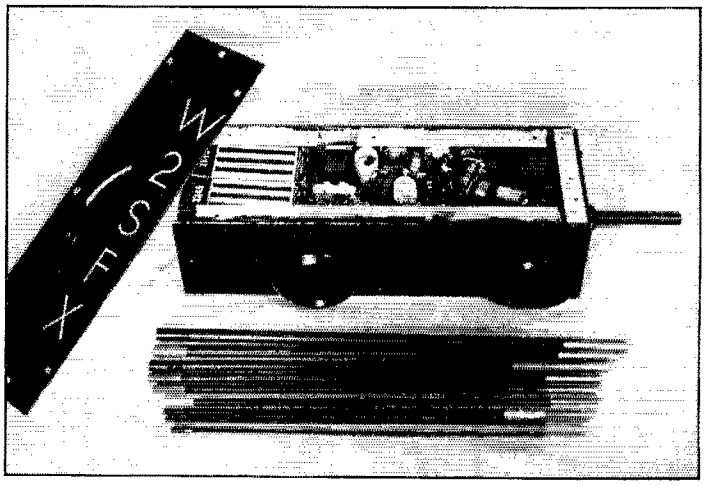
The antenna shown with the unit in the photographs is an Army-surplus 10-section whip, which can be extended to a full quarter wavelength for 10 meters, but it is often not necessary to use the full length. Particularly in TVI test work, which is usually done within a few hundred feet of the transmitter position, a single section (one foot long) may be entirely adequate. There are several types of short telescoping rods which could be mounted in such a position as to permit the antenna to slide down inside the carrying case. Where short antennas are to be used much of the time the coupling arrangement shown in the diagram should be replaced by a pi-section system, or the antenna lead may be tapped up on the tank coil.

Antenna change-over may be done in several ways. The 3-pole double-throw system shown in Fig. 2 may be used, or a miniature 3-ma. s.p.d.t. relay (surplus) may be connected in the plate circuit of the doubler, replacing R_5. The latter arrangement is now in use here.

The Receiver

Both the circuit and the mechanical details of the receiver are so simple as to require almost no explanation. It will be noted that a crystal earphone is used, but this was a matter of availability and a magnetic type would work equally well. In this case it could be connected in place of R_{11}, and C_{14} could be eliminated.

The tuned circuit may be made to cover the 10-meter band by adjusting the padder, C_{10}, and spreading or squeezing the turns of L_5. The receiver should be tuned to some constant signal source (your own transmitter low-power stages will do) and the position of the antenna coupling coil L_6 adjusted carefully for maximum signal. It may be necessary to reduce the signal intensity to get a proper setting, in which case the radiation from a superheterodyne oscillator may provide a good test signal. When the maximum signal position is found the coil may be fastened in position with a drop of household cement.



The transmitter side of the handie-talkie, with the side plate removed to show transmitter components.

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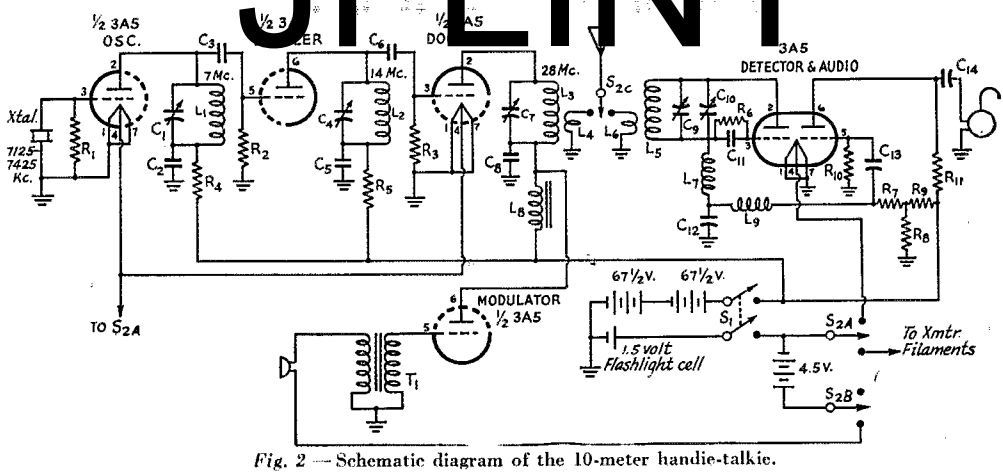


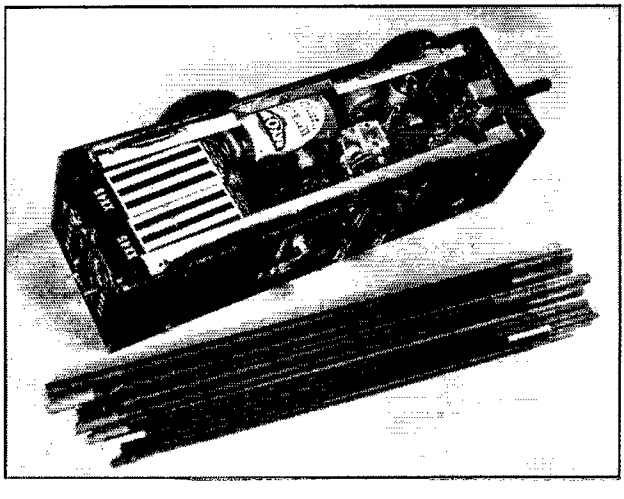
Fig. 2 — Schematic diagram of the 10-meter handie-talkie.

C_1 — 50-$\mu\mu$fd. variable.
C_2, C_5, C_8 — 0.001-μfd. midget mica.
C_3, C_6 — 30-$\mu\mu$fd. ceramic.
C_4, C_7, C_{10} — 30-$\mu\mu$fd. variable.
C_9 — 10-$\mu\mu$fd. variable.
C_{11} — 50-$\mu\mu$fd. ceramic.
C_{12}, C_{13}, C_{14} — 0.01-μfd. paper.
R_1 — 39,000 ohms.
R_2, R_3 — 56,000 ohms.
R_4, R_5 — 1000 ohms.
R_6 — 5.6 megohms.
R_7, R_9 — 27,000 ohms.
R_8 — 47,000 ohms.
R_{10} — 1 megohm.
R_{11} — 62,000 ohms.
L_1 — 35 turns, 1⅛ inches long.
L_2 — 29 turns, ¾ inch long.
L_3 — 9 turns, 5/16 inch long.
L_4 — 2 turns, close-wound.
L_5 — 7 turns, close-wound.
L_6 — 2 turns, close-wound.
All above coils No. 22 d.c.c. wire, ½-inch diameter.
L_7 — 10-meter r.f. choke.
L_8 — Midget filter choke.
L_9 — 80-mh. r.f. choke.
S_1 — D.p.s.t. slide switch.
$S_{2A,B,C}$ — 3-pole push-button type, spring return to receive position.
T_1 — Microphone transformer, miniature type.

Do not be surprised if your 250-watt rig doesn't produce an extremely strong signal. This is the result of the limiting characteristics of the superregenerative detector, a factor which also works to reduce external noise pulses of high amplitude and short duration. The superregenerative detector, as used here, has only two weaknesses. It radiates an interfering signal (which will not be particularly troublesome in this case because of the limited operating range), and it is not selective. The latter characteristic makes it unusable with narrow-band f.m. signals, which will be heard only as seemingly unmodulated carriers.

The Power Supply

Filaments are operated from a single standard flashlight cell, while three "Pen-lite" cells are used for microphone current. Two 67½-volt miniature "B" batteries provide the plate power. Economy of operation is obtained by the use of separate tubes for transmission and reception, so that only the single 3A5 is used in the latter position. The filament circuits are switched, rather than the plate circuits; thus currents of only 220 ma. from the "A" battery and 2.5 ma. from the "B" battery are drawn in receiving. The power circuits are shown in detail in Fig. 2.



Interior view of the receiver side of the portable rig.

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An Inexpensive VFO Transmitter

A Simple 20-Watt Unit for 3.5- and 7-Mc. Output

BY RICHARD M. SMITH,* W1FTX

By and large, most VFOs seem to run a bit on the complex side — special construction, multiple power supplies, and expensive parts. But for some purposes, at least, complexity and high cost are not unavoidable. One such purpose is low-power c.w. operation in the 3.5- and 7-Mc. bands. Low power sidesteps the disheartening business of having a VFO that sounds fine all by itself, but which turns into something horrible when used to drive a high-power final. And confining the output to 7 Mc. and lower makes the problem of getting satisfactory keying much less critical than it is when the transmitter has to work up to 28 Mc.

In building the transmitter described here, we started out with two main objectives. First, the VFO had to be constructed from parts that are readily available. Second, it had to be inexpensive. The latter meant, in part, that the power supply should not be elaborate, because no matter what the rig its power supply is usually the greater part of the cost.

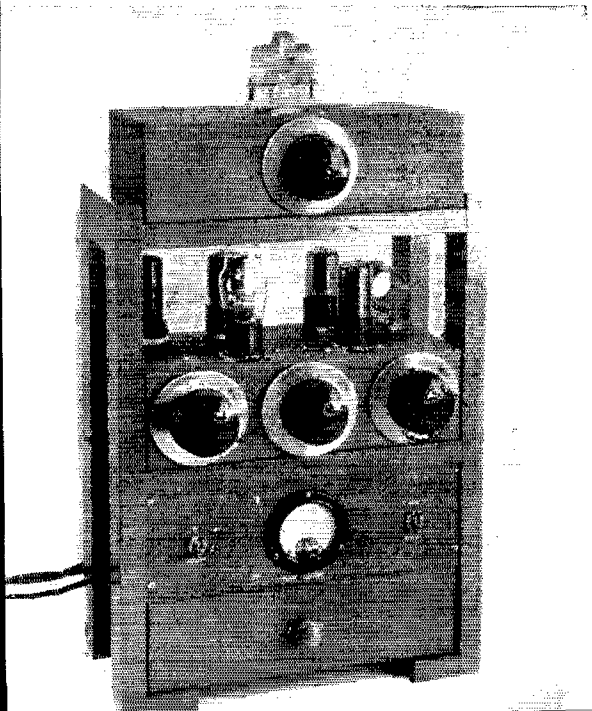
Design Considerations

To get a stable oscillator, we chose the series-tuned Colpitts circuit. This circuit, usually referred to as the "Clapp oscillator," has the great advantage of being less sensitive to voltage changes than the high-*C* ECO that most of us used in prewar days. This means that it will stand a much better chance of keying without chirp when a small amount of lag is put into the circuit to reduce key clicks. With an oscillator that is sensitive to voltage change this is impossible, because the lag causes the voltage to rise slowly when the key is closed and the frequency of the oscillator also changes slowly, resulting in an audible chirp, or yoop.

We decided to have the oscillator operate in the 1750- to 2000-kc. range, using frequency doublers to get output in the 3.5- and 7-Mc. bands. This decision was based on several sad experiences with VFOs in which the oscillator and the stages which followed it were all on the same band. Unless several Class A isolation stages are inserted between the oscillator and the output stage, there is always a slight reaction on the oscillator frequency when the final is turned on. We wanted to avoid having to use isolating stages for reasons of economy; they take quite a bit of plate current without contributing substantially to the output — and, besides, extra tubes and parts cost money. Therefore we planned to use a doubler or two to get the needed isolation.

With the oscillator design established, the next consideration was power supply. This may seem to be a little out of the usual order, and it is — but only because low cost was one of our main objectives. Usually, you design the rig, and then look around for a power supply that is husky enough to handle it. We didn't. We weighed cost *versus* output and decided that a 100-ma. replacement transformer and a matching choke would be about as painless to the pocketbook as anything, keeping in mind the fact that since we were interested in c.w. operation only, the transformer would be called upon to deliver full load only when the key was down. Purposely, therefore, we decided that we could stand a little overload without serious troubles. It began to

* Technical Assistant, *QST*.



Front view of the low-power VFO transmitter, showing construction of the simple rack. The antenna coupler rests on the top "shelf" of the rack, just above the transmitter. The power switch and the "Transmit-Tune-up" switch flank the plate meter which is mounted in the center of a Masonite panel measuring 3⅜ inches by 10 inches. Over-all dimensions of the rack are 16 inches by 11¾ inches by 6¼ inches.

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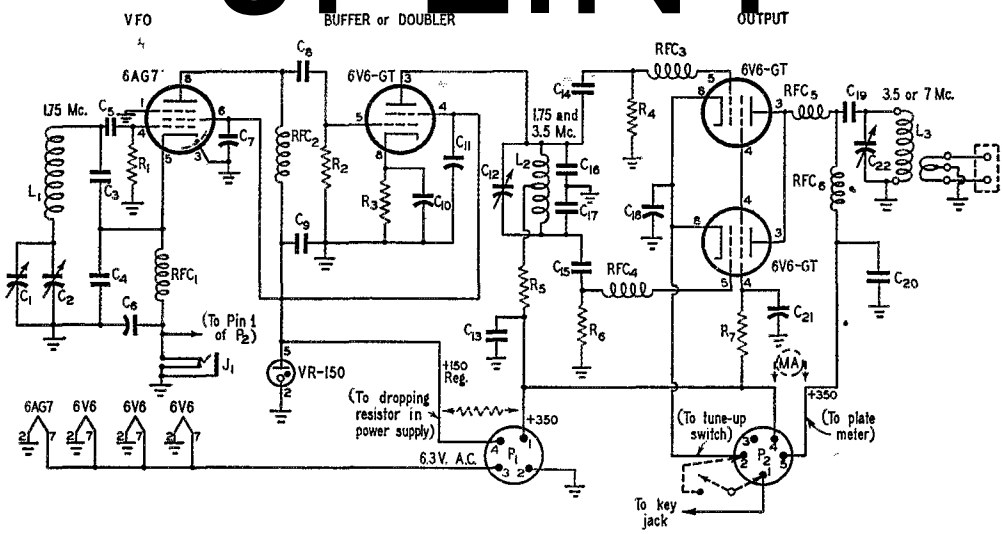

Fig. 1 — Schematic diagram of the low-power VFO transmitter.

C_1 — (Osc. tuning) Approx. 40-$\mu\mu$fd. variable (Millen 19050 with one rotor plate removed).
C_2 — (Bandset) 50-$\mu\mu$fd. max. midget variable (National PSR-50).
C_3, C_4 — 1000-$\mu\mu$fd. silver mica.
C_5, C_8, C_{14}, C_{15} — 100-$\mu\mu$fd. mica.
C_6, C_7, C_{10}, C_{11}, C_{18}, C_{21} — 0.01-μfd. paper, 600 volts.
C_9, C_{13}, C_{19}, C_{20} — 1000-$\mu\mu$fd. mica.
C_{12} — 200-$\mu\mu$fd. variable (Millen 19200).
C_{16}, C_{17} — 25-$\mu\mu$fd. mica.
C_{22} — 325-$\mu\mu$fd. variable (Millen 19325).
R_1, R_2, R_4, R_6 — 47,000 ohms, ½ watt.
R_3 — 470 ohms, 1 watt.
R_5 — 150 ohms, 1 watt.
R_7 — 10,000 ohms, 5 watts.
L_1 — 95 turns No. 32 d.s.c. close-wound on 1-inch diam. form.
L_2 — 48 turns No. 24 d.s.c. close-wound on 1-inch diam. form.
L_3 — 3.5 Mc.: 14 μh. (National AR-17-40E) 29 turns No. 20, 1¼-inch diam., spaced to occupy 1½ inches. 4-turn center-tapped link.
— 7 Mc.: 4 μh. (National AR-17-20E) 14 turns No. 18, 1¼-inch diam., spaced to occupy 1¼-inch length. 4-turn center-tapped link.
J_1 — Closed-circuit 'phone jack.
P_1 — 4-prong male connector.
P_2 — 5-prong male connector.
RFC_1, RFC_2, RFC_6 — 2.5-mh. r.f. choke (Nationa R-100-S).
RFC_3, RFC_4 — 1-μh. r.f. choke (National R-33).
RFC_5 — 16 turns No. 20 d.s.c. close-wound on ¼-inch diam. form. (A 1-watt resistor of any high value may be used as the form.)

look as though we'd be able to run the oscillator, which would draw 20 or 30 ma. at the most, and three 6V6GTs in one form or another without going too far overboard.

Next, there was the stage that was to follow the oscillator. To get to 3.5 Mc. from 1750 kc. meant doubling only once. That gave us the choice of doubling in the second stage and going straight through in the output stage, or the reverse. We chose to operate the second stage straight through, and to use a push-push doubler for the output stage. This solved two problems at once. It avoided the possibility of self-oscillation in the output stage and eliminated the need for any neutralization, because we felt sure that the first 6V6GT would operate straight through without breaking into self-oscillation if we used an untuned choke-coupled plate circuit in the oscillator. This was more than just a hunch, and it worked out very well. Admittedly the output of the push-push doubler as an output stage is not quite up to the level that could be obtained from push-pull or parallel operation. But remember what is desired is *quality*, and if the output has to suffer slightly to get it, it's a small sacrifice. The difference between a 20-watt signal and a 30-watt signal is undetectable at the other fellow's receiver, anyway.

Thus the line-up became a 6AG7 VFO, a 6V6GT buffer or doubler, and a pair of 6V6GTs in push-push for the output. For 3.5-Mc. operation, the second stage works straight through at 1750 kc. and for 7-Mc. output it doubles to 3.5 Mc. and the frequency is doubled again in the output stage.

Break-in keying is almost universal today, and our VFO could hardly be considered modern if it were without this feature. The simplest way out would be to key all three stages at the same time, thus eliminating the need for biasing the buffer/doubler and the final. We found, however, that it was extremely difficult to get chirpless keying this way, even with the entire plate supply regulated with numerous VR tubes. The trouble was in the buffer/doubler. When it is keyed, the loading on the oscillator changes

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abruptly and a chirp results. When the oscillator is keyed, and the buffer/doubler is cathode-biased and allowed to draw plate current all the time, the chirp disappears even though the supply voltage is not regulated. Therefore, cathode bias is used on the second stage, and the oscillator and the output stage are keyed simultaneously. Voltage regulation was found necessary only for the oscillator and the screen grid of the buffer-doubler. The current can be handled easily by a single VR-150, which is about as simple a solution to the chirp problem as could be desired.

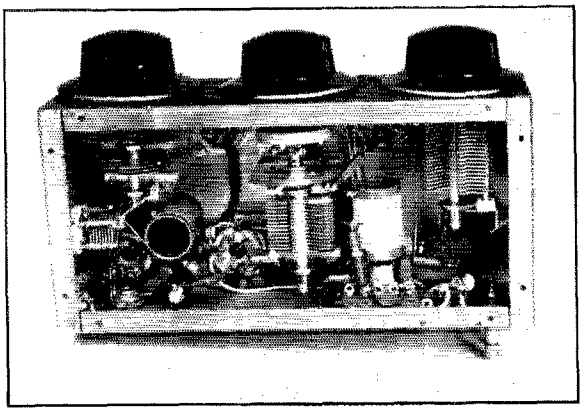
The antenna coupler included with the transmitter is a highly-essential part of the outfit. Such a coupler ought to be used with any transmitter, regardless of design, but omitting it in a set that uses a frequency multiplier as the output stage is simply inviting FCC to send you a ticket for spurious radiation. The antenna coupler is just as much a part of this transmitter as the oscillator itself.

Construction

The entire transmitter consists of four units, a power supply, the transmitter proper, an antenna coupler, and a simple wooden rack to hold them all in a neat, space-saving layout. Each of the electrical units is built on a standard 10 × 5 × 3-inch steel chassis. They mount in the rack as shown in the photograph. The parts layout for the transmitter is shown best in the bottom view. All parts with the exception of the tubes and the plug-in coil used in the output stage are mounted inside the chassis, where they don't collect dust and provide hot spots for careless fingers to brush against. The oscillator components are grouped around the tube socket, which is placed in the rear left corner of the chassis. The position of individual parts is not at all critical, with the exception of the grid coil and the tuning condenser, which are spaced as described below. The main tuning condenser is mounted on metal spacers so that its shaft will extend through the front of the chassis (which serves as a panel) 1¾ inches from the left-hand edge. The spacers are made by piling up small brass washers until the shaft reaches a point 1½ inches above the bottom surface of the chassis. This condenser is tuned by a 5-to-1 ratio vernier dial (National type AM) while the others use direct-drive dials of matching design (National type P). The shunt padder condenser C_2, used to set the tuning range of the oscillator, is mounted with its adjustment shaft extending through the left side of the chassis, centered vertically 3 inches behind the front edge. The cathode choke, RFC_1, is placed in the corner of the chassis and the grid coil, L_1, is mounted on a 1-inch ceramic stand-off insulator on the opposite side of the tube socket. This coil must be spaced from the bottom and sides of the chassis to prevent serious reduction in its Q.

The socket for the 6V6GT buffer/doubler is mounted in line with the oscillator tube along the rear edge of the chassis. The tuning condenser for this stage, C_{12}, is placed in the center of the chassis. It must be insulated from the chassis, so that it may be used to feed the grids of the output stage in push-pull. A large single-section condenser is used here in preference to a split-stator unit, because it permits coverage of both the 1750-kc. range needed for straight-through operation and the 3.5-Mc. range for doubling, without requiring coil change. This eliminates the need for a plug-in set-up — which runs into more money — and makes for greater convenience in operating. To assure balanced output from the stage, two low-capacity condensers, C_{16} and C_{17}, are connected in series across the tuning condenser as shown in the schematic diagram, Fig. 1. The tuning condenser is insulated from the chassis by being mounted on a small sheet of polystyrene that is held in place by two small angle brackets. A good grade of bakelite could be used for this mounting if desired. The condenser shaft is connected to the dial on the panel through an insulated coupling.

The plate coil for the buffer/doubler is a center-tapped unit, wound on the same type form



Bottom view of the transmitter. The oscillator is at the left. The coil for the buffer or doubler is mounted at right angles to the oscillator coil to prevent feed-back.

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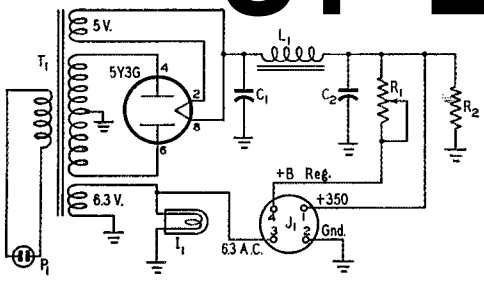

Fig. 2 — Power supply for the transmitter.
C_1, C_2 — 8-μfd. 450-volt electrolytic.
R_1 — 10,000 ohms, 50 watts, with slider.
R_2 — 50,000 ohms, 10 watts.
L_1 — 8 hy., 160 ma., 100 ohms d.c. resistance (UTC R-20).
I_1 — 6.3-volt pilot-lamp assembly.
J_1 — 4-terminal female connector.
P_1 — Male a.c. connector.
T_1 — 375-0-375 v. a.c., 100 ma., 5 v. 3 a., 6.3 v. 4 a. (UTC R-8).

(Millen 45000) as that used in the oscillator. The coil must be mounted at right angles to the oscillator coil, as shown in the photographs, to avoid undesired coupling between the two. This is important, because coupling here causes the oscillator note to become rough when the second stage is tuned to resonance, and also causes severe "pulling" of the oscillator frequency when the stage is used as a buffer. The required placement for the coil is obtained by spacing the form from the chassis with a 1⅜-inch ceramic stand-off insulator (National GS1). Don't mount the coil in position until after the wiring of the buffer and the final stages is complete, or you will find working conditions a bit crowded.

The sockets for the output tubes are centered along a line 3⅛ inches from the right edge of the chassis. The tuning condenser, which need not be insulated from the chassis, is mounted so that its shaft is symmetrical with the oscillator condenser shaft on the opposite end of the chassis. The 6-prong ceramic socket used to hold the plug-in plate coil is located 3¾ inches behind the front of the chassis, and 1¼ inches in from the right edge. Shunt feed is used in the plate circuit, thus eliminating the d.c. shock hazard. Small r.f. chokes, RFC_3, RFC_4 and RFC_5, are used to eliminate parasitic oscillations in the v.h.f. range.

The output terminal is mounted on the rear of the chassis close to the coil socket. At the opposite end of the chassis, the key jack is mounted near the oscillator socket. The socket for the VR tube is near the front of the chassis, in line with the buffer/doubler tube. The limiting resistor (R_1 in Fig. 2) for the VR tube is placed in the power-supply unit to keep the heat that it radiates away from the oscillator components.

Power is brought into the transmitter chassis through a short length of flexible 4-wire cable. This cable enters the chassis through a ⅜-inch grommet-lined hole, and is firmly anchored to a small terminal strip that is bolted to the inside of the chassis just below the buffer coil. A 4-prong plug at the end of the cable is used to connect it to the power-supply chassis. Another 4-wire cable is used to carry the B+ lead from the output stage to the plate milliammeter, which is mounted on a small Masonite control panel that is part of the rack. In addition, the cathode lead of the output stage is run through this cable to a toggle switch on the control panel. This permits the final to be turned off during tune-up and when changing frequency so that the band won't be cluttered up with a lot of swishing around when you QSY. A 5-prong plug is used on this cable, to insure against accidentally plugging the meter across the high-voltage supply.

Power Supply

The power supply is shown in the rear view of the rack, and its circuit is given in Fig. 2. Inexpensive components are used throughout, and the circuit is standard except for the inclusion of the limiting resistor R_1 as mentioned above. A 4-prong receptacle for the power plug is mounted on the rear of the chassis. A.c. power for the primary of the transformer comes through a receptacle mounted on the rear of the control panel as shown in the photograph. This permits a single-

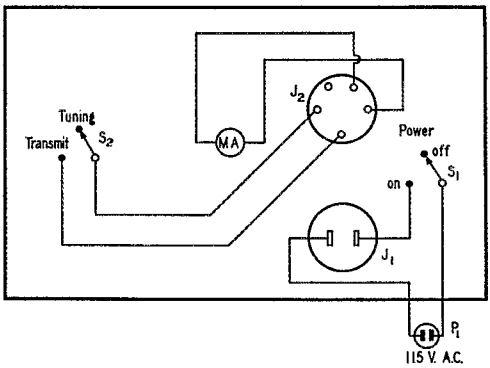

Fig. 3 — Schematic diagram of the control circuits and meter panel.
J_1 — Female a.c. receptacle.
J_2 — 5-prong female receptacle.
MA — 0–200 ma. d.c.
P_1 — Male a.c. plug.
S_1, S_2 — S.p.s.t. toggle switch.

pole switch to be inserted in the a.c. line to turn the rig on and off. The wiring of the control panel is shown in Fig. 3. In addition to the on-off switch, the panel provides a place for mounting the plate milliammeter and the tune-up switch. The panel is not fastened to the power-supply unit but is set flush with the front edge of the wooden rack, and is fastened to it by small wood screws that bite into slats tacked to the inside edges of the vertical members of the rack. The

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Rear view of the lower portion of the rack used with the transmitter. The power-supply unit rests on the bottom rails of the rack, and is not fastened to the panel. The two sockets on the rear of the panel are for a.c. input and connection of the meter and tune-up switch to the transmitter.

meter and the tune-up switch are connected to the transmitter by way of a 5-prong socket mounted on spacers on the rear of the panel.

Antenna Coupler

The antenna coupler has its input and output terminals mounted on the rear of the chassis, with the input terminals on the same side as the output terminal on the transmitter unit. A short length of Twin-Lead or twisted pair is then run up to the coupler from the transmitter. The tuning condenser is centered in the chassis and is insulated from it by the same method used to mount the buffer/doubler tuning condenser. The 6-prong socket for the plug-in antenna coil is centered on the top of the chassis. Lengths of Twin-Lead or twisted pair may be used to connect the socket to the input and output terminals. To permit either series or parallel tuning of the antenna coupler, the connections on the plug-in coil are changed as shown in the sketch of Fig. 4. Determine from the data in the *Handbook* whether your feeder length calls for series or parallel tuning, and wire the coil accordingly. The easiest method to change the original connections is to clamp a soldering iron in a vise in such position that the prongs of the coil may be held against the hot iron with one hand, while long-nosed pliers are used to work the lead up out of the prong and back down into the new location. Clean all of the resin off the prongs, after you are through, by scraping them with a knife and then wiping with a cloth dampened with alcohol or cleaning fluid.

Adjustment & Operation

The first step in adjustment of the transmitter is to set the tap on the limiting resistor in the power supply to the correct position. To do this, open the connection between the cathode (Pin 2) of the VR-150 and ground, replacing it with a milliammeter capable of reading 50 ma. or more. Adjust the tap on R_1 until the current indicated is 30 ma. *when the key is up.* This will set the current through the VR tube to the point where optimum regulation of the oscillator voltage is obtained.

Set the tuning range of the oscillator next. Turn the tune-up switch off, set the vernier dial to the maximum capacity end of its scale, and close the key. Adjust the shunt padder condenser C_2 until the oscillator frequency is on the nose at 1750 kc., as checked with a calibrated wavemeter or a calibrated receiver. From this point on all further adjustment of frequency may be made with the vernier dial and the shunt padder need not be touched again.

Check the operation of the VR tube by noting what it does when the key is opened and closed. When the key is open, a purple glow should be seen in the tube. When the key is first closed, the glow should flicker, but it should not disappear when the key is held down. If it does, recheck the adjustment of the tap in the limiting resistor.

Plug the coil used for 3.5-Mc. output in the output stage, turn the tune-up switch to "transmit," and press the key. Plate current indicated

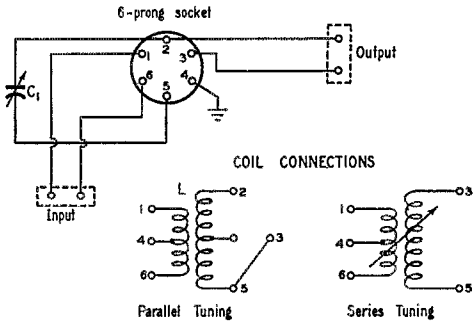

Fig. 4 — Circuit of the antenna coupler for the low-power VFO transmitter. Provisions are made for changing to either series or parallel tuning by rewiring the coils as shown in the sketches.

L — 3.5 Mc. — 22 turns No. 22, center-tapped, 1¼-inch diam., 1⅝ inches long. 6-turn center-tapped link. (National AR-17-40S).

— 7 Mc.: 12 turns No. 18 center-tapped. 1¼-inch diam., 1½ inches long. 4-turn center-tapped link (National AR-17-20S).

on the meter will be high — over 100 ma. — so don't hold the key down long until you get the buffer/doubler and the output stage tuned to resonance. To tune the buffer/doubler for 3.5-Mc. output from the transmitter, start with the tuning condenser at maximum capacity and tune slowly toward minimum, watching the plate meter at the same time. Resonance is indicated by a slight upward kick in plate current. This is because the buffer is now delivering power to the grids of the output tubes, but their plate circuit is not yet tuned to resonance.

Resonate the output circuit by tuning the

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plate condenser until a sharp dip in plate current is obtained. The current should dip to about 10 ma. or less if the circuit is tuned properly. Check with a calibrated wavemeter to be sure that you have the output stage tuned to 3.5 Mc. and not to the third harmonic of the oscillator at 5.2 Mc.!

If output in the 7-Mc. band is desired, put the 7-Mc. coil in the output stage and proceed as follows: Resonate the buffer/doubler, this time starting to tune from the *minimum*-capacity end of the dial, tuning slowly toward maximum. If you are unable to hit a resonant point before you get almost to the maximum-capacity end of the scale, the dimensions of the buffer-doubler plate coil L_2 will have to be changed. Take off a turn or two from each side of the coil (to preserve balance) and try again. It should be possible to cover both 1750 kc. and 3.5 Mc. with the same coil. The output circuit is resonated in the same manner described above.

To tune the antenna coupler, first push the swinging link out of the coil as far as possible to provide a bare minimum of coupling. Then, with the transmitter tuned up as described above, and with the feed line connected to the output terminals of the coupler, tune the antenna condenser slowly, watching for a sharp, but slight, upward kick in plate current in the amplifier stage. The peak of this kick is the resonant point. Now push the link into the coil a little bit. Plate current should increase. Recheck the tuning of the output stage to see if the loading has shifted the resonant point. It may be necessary to retune slightly to restore the dip that indicates resonance. Continue advancing the link and rechecking tuning of the output stage until the plate current is 90 to 95 ma. At this level the dip in the plate current of the output stage will be hardly noticeable because of the loading. This is as it should be, and you are ready to fire up the receiver and listen for a CQ from someone you've been looking for. Turn the tune-up switch off, and when you've spotted your prey, tune the vernier dial until you hear your oscillator harmonic falling near his frequency. When he stands by, throw the tune-up switch on, and give him a short "three-by-three" call. Lots better than being rock-bound, isn't it?

To return to the tuning of the antenna coupler for a moment, it may be that you are unable to load the output stage to the full 90 to 100 ma. This can be caused by incorrect feeder length, which you can check by reference to the *Handbook*. If you are only a few feet short, it can be made up by splicing on the required length using 300-ohm Twin-Lead, and allowing the extra length to run around the room. At low power it is perfectly permissible to use such makeshift methods to gain the required feeder length, but we wouldn't suggest that you try it if you use more than 100 watts!

Another dodge that frequently works is to add a few turns to the link winding on the output coil. Don't put more than a few more turns on it, but you can sometimes get the loading you want in this way. Consider it as a temporary measure, however, and change the feeders to the book length as soon as you can.

The harmonics in the TV range developed by this transmitter have been found by measurement to be of almost insignificant amplitude. No special provisions have been made, therefore, for their suppression. If TVI is experienced, it may be necessary to insert filters in some of the d.c. leads and to use a shielded-link type of antenna coupler, as described in recent *QST* articles.[1] The addition of the filters will not reduce the effectiveness of the transmitter. It is not believed, however, that such measures will be needed unless the TV receiver is very close and the television signals are below par.

In conclusion, a few hints about VFOs in general and this one in particular. You shouldn't have any trouble getting a good stable signal if you follow the specifications given here. If the note is rough, look for the trouble in one of the stages following the oscillator. A parasitic oscillation will roughen the note, and self-oscillation will cause it to chirp. If the note wavers slightly when the rack or the table it rests on is vibrated, place strips of sponge-rubber pad under the "feet" of the rack. This will usually cure the trouble unless you live next door to a drop-forge, or happen to have an elephant for a pet! Above, all, remember to use your wavemeter to make sure that you are tuned to produce output where you want it, not off in some other part of the spectrum.

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[1] Grammer, "Pointers on Harmonic Reduction," *QST* April, 1949. This article gives a complete list of earlier *QST* articles on TVI reduction.

Strays

On the way home from work one night W2NFU felt in the mood for a bit of portable-mobile operation. He parked his car atop a high point in Rego Park, L. I., and fired up his 30-watt 10-meter mobile rig. In short order he raised a WØ. The two hams were rag-chewing at a merry rate when NFU was startled by a stern "What goes here?" Glancing around, Sid found his car hemmed in by The Law — one on each side. Hastily explaining his predicament, NFU signed over to the WØ who now is his friend for life. The WØ came back and in no uncertain terms told the local constabulary to go about their business — that in the city where he was a police commissioner hams were never molested!

P.S.: W2NFU made several more nice contacts that night. — *W2PDH*

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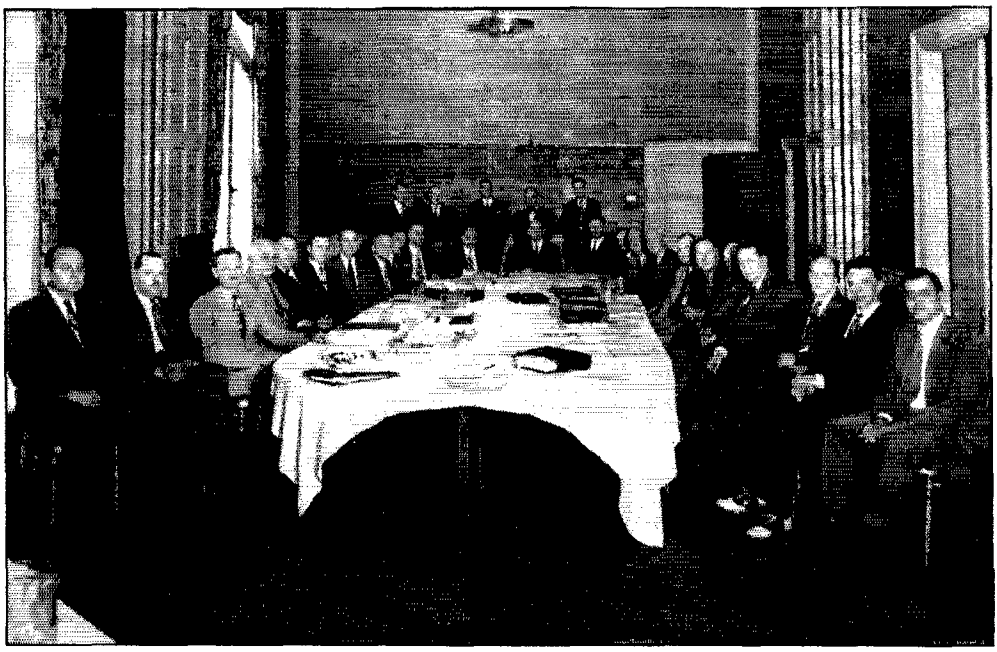
Happenings of the Month

BOARD-MEETING SUMMARY

A resolution, supported by every United States director and adopted without dissent, to oppose the proposals of the Federal Communications Commission for changes in the amateur regulations was the highlight of the 1949 annual meeting of the Board of Directors of the American Radio Relay League, held in Hartford, Conn., May 27th and 28th. For several hours the Commission's proposals were under active discussion, during the course of which each director reported that amateurs in his division found the proposed extensive changes generally unacceptable. Thus the position of the League, representing amateur radio operators, is established as opposing the "overall plan or blueprint to provide scope and direction for the immediate and long range development of the amateur radio service." The Board noted that it was in agreement with the Commission's desire that amateur radio continue its growth and development, but felt strongly this would not be achieved satisfactorily by the enactment of regulations that are so obviously unpopular. Simply to clear the decks, the Board voted to withdraw its 1948 proposals for changes in the amateur regulations.

Arthur L. Budlong, W1BUD, was appointed Secretary of the League and his salary set at $12,000 per year. While the Secretary remains the General Manager of the League under the Constitution, he was instructed to appoint a Business Manager of the League and a Managing Editor of *QST*. The Board congratulated the new Secretary on his recent achievement of 25 years' League service.

Henceforth, the results of polls of opinion in *QST* are to be binding upon the Board, providing the response to such a poll is 51 per cent or more



The ARRL Board of Directors and League officials at the annual meeting of the Board in Hartford on May 27th. Seated, *l. to r.*, Director Shelton, Southeastern Division; Dir. Dosland, Dakota; Dir. Groves, West Gulf; Dir. Canfield, Delta; Dir. Griggs, Southwestern; Alternate Dir. Hughes (acting for Dir. Ladley), Pacific; Vice-President McCargar; Dir. Roberts, Northwestern; Dir. Collett, Midwest; Communications Manager Handy; General Counsel Segal; President Bailey; Secretary Budlong; Senior Asst. Secretary Huntoon; Treasurer Houghton; Canadian General Manager Reid; Dir. Noble, New England; Dir. Matejka, Rocky Mountain; Dir. Bird, Great Lakes; Dir. Doyle, Central; Dir. Johnston, Hudson; Dir. Martin, Atlantic; Dir. Battey, Roanoke. Standing, *l. to r.*, Alternate Dir. Milius, Hudson; Alternate Dir. Gordon, New England; Quayle B. Smith, of the General Counsel's office; Asst. Secretary Waggoner; Technical Director Grammer.

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of the membership, according to a new Standing Order which the Board adopted. If the response is less than 51 per cent, the results will be binding only if the directors are unable to agree among themselves on the particular problem by a majority vote of at least 75 per cent.

A decision was made to purchase the present Headquarters property for $125,000, in accordance with the recommendations of the Building Committee. The Board established a new position in the Hq. staff to be known as "Assistant Communications Manager — 'Phone Activities," with the duty of coördinating activities especially among amateurs whose principal interest is in 'phone operation. The Board also ordered studies made of the structure and organizational problems of the Communications Department and of the advertising costs and operations of the League.

Appropriations were made to continue reimbursement to SCMs, QSL Managers and SECs for trips made to club meetings and hamfests, under certain conditions, in the interests of League organization, but set the automobile mileage rate at 7½ cents instead of the previous 10 cents and applied this rate to all such Board-authorized travel including that of directors.

The Board instructed the Headquarters to apply for a commemorative-stamp issue honoring amateur radio operators, and expressed its appreciation to W4IMJ for his work in securing the passage of a bill in the Florida legislature which commended the emergency performance of amateurs and provided call-letter marker plates for their automobiles. The Secretary was instructed to prepare an article for *QST* outlining the organizational structure of the League and depicting how control of League affairs lies in the hands of the members. The Board further decided that henceforth a copy of the Constitution and By-Laws will be sent to each affiliated club, in addition to remaining available free to members on request.

A vote of thanks was extended the Official Observers for their work, and instructions were given the Communications Manager, in accordance with the report of the Planning Committee, to expand the observer system insofar as possible. The Philippine Islands was deleted from the operating territory of the League, now that that country has achieved independence. The Board ordered a plaque at W1AW in commemoration of the late Secretary Warner, and adopted a resolution of sorrow at his passing.

Numerous other details of Board actions will be evident from the minutes, which appear at the end of this department.

EXAMINATION SCHEDULE

The Federal Communications Commission will give amateur examinations during the second half of 1949 on the following schedule. Remember this list when you need to know when and where examinations will occur. Where exact dates or places are not shown below, information may be obtained, as the date approaches, from the Engineer-in-Charge of the district. *Even stated dates are tentative and should be verified from the Engineer as the date approaches.* No examinations are given on legal holidays. All examinations begin promptly at 9 A.M. except as noted.

Albuquerque, N. M.: September 23.
Amarillo, Tex.: September 23.
Anchorage, Alaska, 53 P. O. & Courthouse: By appointment.
Atlanta, Ga., 411 Federal Annex: Tuesday & Friday at 8:30 A.M.
Bakersfield, Calif.: Sometime in August.
Baltimore 2, Md., 508 Old Town Bank Bldg.: Monday through Friday. When code test required, at 8:30 A.M.
Bangor, Me.: Sometime in October.
Beaumont, Tex., 329 P. O. Bldg.: Thursday and by appointment.
Billings, Mont.: October 3.
Birmingham, Ala.: July 8 and Oct. 7.
Bismarck, N. D.: Oct. 12.
Boise, Idaho: Sometime in Oct.
Boston, Mass., 1600 Customhouse: Monday through Friday, 8:30 A.M.
Buffalo, N. Y., 328 P. O. Bldg.: Thursday.
Butte, Mont.: Sept. 30.
Charlestown, W. Va.: Sometime in Sept. and Dec.
Chicago, 246 U. S. Courthouse: Friday.
Cincinnati: Sometime in August and November.
Cleveland, Ohio: Sometime in September and December.
Columbus, Ohio: Sometime in July and October.
Corpus Christi, Tex.: Sept. 15 and Dec. 15.
Cumberland, Md.: Oct. 13.
Dallas, Tex., 500 U. S. Terminal Annex Bldg.: Monday through Friday.
Davenport, Iowa: Sometime in July and Oct.
Denver, Colo., 521 New Customhouse: 1st and 2nd Thursdays and by appointment.
Des Moines, Iowa: July 13 and 14; Oct. 12 and 13.
Detroit, Mich., 1029 Federal Bldg.: Wednesday and Friday.
El Paso, Tex.: Oct. 3.
Ft. Wayne, Ind.: Sometime in August and November.
Fresno, Calif.: About Sept. 14 and Dec. 14.
Grand Rapids, Mich.: Sometime in July and Oct.
Hartford, Conn.: Sometime in September.
Hilo, T. H.: Oct. 4.
Honolulu, T. H., 609 Stangenwald Bldg.: Monday.
Houston, Tex., 324 U. S. Appraisers Stores Bldg.: Tues. and Fri.
Indianapolis, Ind.: Sometime in August and November.
Jacksonville, Fla.: October 8.
Juneau, Alaska, 6–7 Shattuck Bldg.: By appointment.
Kansas City, Mo., 838 U. S. Courthouse (until Aug. 1, '49); 3200 Fidelity Bldg. (after Aug. 1, '49). Friday, also by appointment.
Kaunakakai, Molokai, T. H.: Oct. 13.
Klamath Falls, Ore.: Sometime in November.
Knoxville, Tenn.: Sept. 7 and Dec. 7.
Lanai City, Lanai, T. H.: Oct. 10.
Las Vegas, Nev.: Sometime in Oct.
Lihue, Kauai, T. H.: Oct. 25.
Little Rock, Ark.: July 13 and Oct. 12.
Los Angeles, 539 U.S.P.O. & Courthouse Bldg.: Wednesday 9:00 A.M. and 1:00 P.M.
Memphis, Tenn.: July 12 and Oct. 11.
Miami, Fla., 312 Federal Bldg.: Monday and Thursday.
Milwaukee, Wis.: Sometime in July and October.
Mobile, Ala.: November 16.
Nashville, Tenn.: August 10 and November 9.
New Orleans, La., 400 Audubon Bldg.: Monday through Friday, except Monday through Wednesday at 8:30 A.M. when code test required.
New York, 748 Federal Bldg.: Monday through Friday.

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Norfolk, Va., 402 Federal Bldg.: Monday through Friday except Friday only when code test required.
Oklahoma City, Okla.: July 21–22 and Oct. 25–26.
Omaha, Nebr.: July 20–21 and Oct. 19–20.
Philadelphia, 1005 U. S. Customhouse: Monday through Friday.
Phoenix, Ariz.: Sometime in Oct.
Pittsburgh: Aug. 9, 10, 11 and Nov. 15, 16, 17.
Portland, Me.: Sometime in Oct.
Portland, Ore., 406 Central Bldg.: Friday, 8:30 A.M.
Reno, Nev.: About Oct. 12.
Roanoke, Va.: Oct. 1.
St. Louis, Mo.: August 10–11 and Nov. 16–17.
St. Paul, Minn., 208 Uptown P. O. Bldg.: Friday.
Salt Lake City, Utah: Sept. 14 and Dec. 14.
San Antonio, Tex.: Aug. 18 and Nov. 17.
San Diego, 230 U. S. Customhouse: By appointment.
San Francisco, 323-A Customhouse: Monday and Friday, 8:45 A.M. Also, Class A Monday through Friday.
San Juan, P. R., 323 Federal Bldg.: Thursday.
Savannah, Ga., 214 P. O. Bldg.: By appointment.
Schenectady, N. Y.: Sept. 14–15 and Dec. 14–15 (exams at 1:00 P.M. and 7:00 P.M.).
Seattle, 801 Federal Office Bldg.: Friday, 8 A.M.
Sioux Falls, S. D.: Sept. 14 and Dec. 14.
Spokane, Wash.: Sept. 28.
Syracuse, N. Y.: July 6–7 and Oct. 5–6.
Tampa, Fla., 410 P. O. Bldg.: By appointment.
Tucson, Ariz.: Sometime in October.
Tulsa, Okla.: July 25–26 and Oct. 20–21.
Wailuku, Maui, T. H.: Oct. 11.
Wash., D. C., 415 22nd St., N. W.: Monday through Friday.
Wichita, Kans.: Sept. 8.
Williamsport, Pa.: Sept. 7 and Dec. 6.
Wilmington, N. C.: Dec. 3.
Winston-Salem, N. C.: Aug. 6 and Nov. 5.

MINUTES OF 1949 ANNUAL MEETING OF THE BOARD OF DIRECTORS AMERICAN RADIO RELAY LEAGUE

May 27-28, 1949

1) Pursuant to due notice and the requirements of the By-Laws, the Board of Directors of the American Radio Relay League, Inc., met in regular annual session at the Hartford Club, Hartford, Conn., on May 27, 1949. The meeting was called to order at 9:47 a.m., EDST, with President George W. Bailey in the Chair and the following other directors present:

J. Lincoln McCargar, Vice-President
Alexander Reid, Canadian General Manager
Everett L. Battey, Roanoke Division
Harold C. Bird, Great Lakes Division
Victor Canfield, Delta Division
Leonard Collett, Midwest Division
Goodwin L. Dosland, Dakota Division
John G. Doyle, Central Division
John R. Griggs, Southwestern Division
Wayland M. Groves, West Gulf Division
Kenneth E. Hughes (alternate), Pacific Division
Joseph M. Johnston, Hudson Division
Walter Bradley Martin, Atlantic Division
Franklin K. Matejka, Rocky Mountain Division
Percy C. Noble, New England Division
R. Rex Roberts, Northwestern Division
William C. Shelton, Southeastern Division

Also in attendance, at the invitation of the Board as non-participating observers, were New England Division Alternate Director Clayton C. Gordon and Hudson Division Alternate Director Gay E. Milius, jr. There were also present Acting Secretary Arthur L. Budlong, Communications Manager Francis E. Handy, Treasurer David H. Houghton, Assistant Secretary John Huntoon, General Counsel Paul M. Segal and Quayle B. Smith of his office, and Assistant Secretary LeRoy T. Waggoner. The meeting was welcomed and briefly addressed by the Chair.

2) On motion of Mr. Reid, unanimously VOTED that the Acting Secretary is directed to transmit a telegram to Pacific Division Director William A. Ladley expressing the Board's regret at his inability to be present and extending its best wishes for his immediate and complete recovery.

3) The meeting stood in silent tribute to the memory of the late Secretary of the League, Kenneth B. Warner.

4) On motion of Mr. Dosland, unanimously VOTED that the minutes of the 1948 annual meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

5) On motion of Mr. Roberts, unanimously VOTED that the annual reports of the officers to the Board of Directors are accepted and the same placed on file.

6) On motion of Mr. Shelton, unanimously VOTED that the Board, having examined its mail action by which it authorized the payment of one month's salary after the death of the late Secretary, now ratifies the action taken and decides to take this action as of September 22, 1948.

7) On motion of Mr. Groves, unanimously VOTED that all acts performed and all things done by the Executive Committee since the last annual meeting of the Board, and by it reported to the Board, are ratified and confirmed by the Board as the actions of the Board.

8) On the reception of reports of committees: Upon the request of Mr. Reid, ORDERED, without objection, that the report of the Finance Committee goes over to follow consideration of the desirability of amending By-Law 6 to delete the Republic of the Philippines from the operating territory of the League. Mr. Noble read the report of the Planning Committee and Mr. McCargar presented the report of the Building Committee. The Chair noted that action on the recommendations contained in these reports was scheduled later in the agenda.

9) On motion of Mr. Collett, unanimously VOTED that the annual reports of the directors to the Board of Directors are accepted and the same placed on file.

10) At this point, supplementary oral reports were rendered by the officers of the League.

11) On motion of Mr. Dosland, VOTED, 14 votes in favor to 2 opposed, to suspend the regular order of business in accordance with By-Law 43 and take up at this time Item 17 of the definitive agenda, appointment of a new Secretary. Mr. Collett requested to be recorded as voting opposed and Mr. Griggs as abstaining. Upon the request of the Chair, Messrs. Budlong, Handy, Houghton, Huntoon and Waggoner, of the Headquarters staff, thereupon retired from the meeting. The Chair appointed Quayle B. Smith to record the proceedings of the meeting.

12) On motion of Mr. Dosland, unanimously VOTED at 10:25 a.m. that the Board does now resolve itself into a Committee of the Whole for the consideration of appointment of a new Secretary. The Chair appointed himself chairman of the Committee of the Whole. The Committee rose at 12:30 p.m. and Mr. Bailey, as chairman of the Committee, laid before the Board the recommendations of the Committee, from which the following actions ensued:

a) On motion of Mr. Martin, VOTED that Arthur L. Budlong is appointed Secretary of the League in accordance with Article III of the Constitution, to hold office at the pleasure of the Board. Messrs. Collett and Doyle requested to be recorded as voting opposed.

b) On motion of Mr. Martin, VOTED that the President is directed to undertake the negotiation of a compensation agreement with the Secretary, according to the terms discussed in the Committee of the Whole, and report back to the Board during the day. Mr. Collett requested to be recorded as voting opposed.

c) On motion of Mr. Noble, VOTED that the Board instruct the Secretary to appoint a competent person to be the Managing Editor of *QST* and another competent person to act as Business Manager of the League. Mr. Collett requested to be recorded as voting opposed.

13) At 12:45 p.m. the Board recessed for luncheon, during which the President announced that the compensation agreement providing for a salary of $12,000 per annum, effective January 1, 1949, had been accepted by the Secretary. The Board reassembled at 2:09 p.m., with all directors and other persons hereinbefore mentioned in attendance. Secretary Budlong resumed the recording of the proceedings

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of the meeting. At this time the meeting was joined by Technical Director George Grammer.

14) Proceeding to a consideration of matters to be raised by directors on their individual initiative, Mr. Griggs moved the adoption of the following resolution: that the Board of Directors order and direct the staff of League Headquarters to conduct a study and/or investigation into the feasibility of obtaining through Governmental action an international radio treaty among the countries of the North American hemisphere for the express purpose of obtaining an agreement for the identical suballocation of amateur frequencies below thirty (30) megacycles. After discussion, moved, by Mr. Collett, to amend the motion to provide that the officials of the League Headquarters be instructed by this Board to enter into informal discussions at whatever level is indicated that will result in recommendations to our respective governments realizing a more harmonious suballocation picture as regards Canada, Cuba, Mexico and the United States. But there was no second, so the motion to amend was lost. The question then being on the original motion, the same was rejected, Messrs. Collett and Griggs asking to be recorded as voting in favor.

15) Mr. Griggs moved adoption of the following resolution: that the Board of Directors do herewith order a new study made of the present television frequency allocations, particularly with respect to interference problems associated with Channel 2, for the purpose of formulating a plan suitable for submission to the Federal Communications Commission calling for such changes as may be deemed desirable for the reduction or elimination of television interference caused by amateur radio stations. But there was no second, so the motion was lost.

16) Moved, by Mr. Griggs, that a committee of three directors and an expense fund of $2000 be established for the purpose of making a study of the Constitution and By-Laws to establish recommendations to be presented 75 days prior to the next regular meeting of the Board for such modifications and/or changes as may be deemed necessary to overcome inequities in the required qualifications of the candidates for the offices of president and vice-president as compared to the qualifications required of candidates for the offices of director and alternate director and, secondly, to determine the advisability of adding regulatory provisions to cover those instances wherein election interference is alleged to have occurred in ARRL sections or divisions. But, after extended discussion, the motion was rejected, Messrs. Collett, Doyle and Griggs asking to be recorded as voting in favor.

17) Mr. Griggs moved adoption of the following resolution: that the Board of Directors do hereby order the acquisition by the League of suitable wire recording equipment for the purpose of recording verbatim the entire proceedings of any meeting of the Board of Directors, such recordings to be made available in wire record spool form to any affiliated club or similar group through the cognizance of any of the League's elected representatives such as President, Vice-President, Director, Alternate Director, or Section Communications Manager. Copies of Board proceedings so obtained shall be considered as being on loan only, and shall be returned to League Headquarters within a reasonable length of time after use. Moved, by Mr. Collett, to amend the motion to provide that the part re: mechanical transcription be changed to manual transcription and that the report be made available to members upon payment of cost of publication and mailing. But the said amendment was rejected. After discussion, the question then being on the original motion, the same was rejected, Messrs. Collett and Griggs asking to be recorded as voting in favor.

18) Mr. Griggs moved adoption of the following resolution: that the Board of Directors do hereby order and direct that all minutes or recordings made of any meetings of the Board of Directors and/or Executive Committee contain an exact listing of the votes cast, together with the names of those members so voting, on any subject voted upon, except in those cases where the vote is unanimous with no absentees. But, after discussion, the same was rejected, Messrs. Collett and Griggs asking to be recorded as voting in favor.

19) Mr. Griggs moved adoption of the following resolution: that the Board of Directors do hereby order and direct the establishment of the post of Advertising Consultant with an established salary of $7,500.00 per annum in lieu of the present post of Advertising Manager and in lieu of the commissions paid that post. After extended discussion, on motion of Mr. Dosland, unanimously VOTED that the motion is amended by striking out the text and substituting therefor the following: that the Secretary of the League be instructed to study and investigate our entire advertising costs and operations and make a report thereon to the Board within six months. The question then being on the original motion, as amended, the same was unanimously ADOPTED.

20) On motion of Mr. Groves, unanimously VOTED that the Board, having examined its 1925 action wherein it reserved for *QST* the publication rights to papers presented at ARRL conventions, and having determined that such policy is no longer general engineering practice, now rescinds that action.

21) At this point, at the request of Messrs. Groves and Shelton, Secretary Budlong discussed the possibilities of future modification of the rules pertaining to operation in the 1800–2000-kc. region, especially as they now apply to the states bordering on the Gulf of Mexico.

22) Moved, by Mr. Martin, that the Communications Manager be directed to review the various operations of the Communications Department, with a view to increasing membership services, particularly along the organizational and public service lines of effort, to the end that more definition may be given to the various Communications Department activities. It is not intended that costs be increased by so doing, but rather accomplishing, if necessary, fewer things better, particularly where long-standing practices might cause a reluctance on the part of the Communications Manager to modify or change, without consent or invitation of the Board. Moved, by Mr. Shelton, that the motion be amended by striking out the original language and substituting therefor the following: It is hereby resolved that the President shall appoint a committee of three members of the Board to study the structure and organization problems of the Communications Department and report its findings to the members of the Board not later than 75 days prior to the next regularly-scheduled meeting of the Board. The sum of two thousand dollars ($2000) is hereby appropriated to defray the expenses of this committee with any unused monies to be returned to the surplus of the League. Whereupon, Mr. Martin, unanimous consent being given, agreed to substitute the text suggested by Mr. Shelton for the original language, and the same was unanimously ADOPTED.

23) The Board was in recess from 3:39 p.m. to 3:49 p.m.

24) Mr. Dosland yielded the floor to Mr. Noble in order that the latter might present a motion sponsored jointly by them. Moved, by Mr. Noble, that whereas it is the feeling of this Board that 'phone operation is becoming an increasingly-important part of amateur radio, and whereas there is no one presently employed in the League Communications Department whose primary interest is in the 75-, 20-, 11- and 10-meter 'phone bands, the Board hereby authorizes and recommends that Communications Manager Handy immediately create in his department a new position to be known as "Assistant Communications Manager — Phone Activities." The present position of "Assistant Communications Manager" will henceforth be known as "Assistant Communications Manager — CW Activities." It is not the intent of this motion to cause a decrease in the salary of this latter-mentioned position. The holder of the newly-created "Assistant Communications Manager — Phone Activities" position shall be a well-known amateur whose main interests are in the 75-, 20-, 11- and 10-meter 'phone bands. It would also be desirable that he continue this activity after becoming the new "Assistant Communications Manager — Phone Activities." Moved, by Mr. Collett, to amend the motion to provide that in addition to the duties being confined to the addition in the above-named motion that it be the policy in keeping with the bipartisan opinions in respects both 'phone and c.w. of this Board of Directors that the Communications Department set an example to the remainder of the employees of the League that operation of both 'phone and c.w. better exemplifies the intent of the

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Board in representing [illegible] phon[illegible] and c.w. in[illegible]t after discussion, unanimous consent being given, Mr. Collett withdrew his amendment. After further discussion, the question being on the original motion, the same was thereupon ADOPTED.

25) Mr. Canfield moved the adoption of the following resolution: that to the standing orders of the Board there shall be added the following: When by authority of the Board of Directors a question or series of questions shall be published in *QST* for the purpose of ascertaining opinions or ideas of amateur radio operators, the majority opinion expressed in answers to such questions shall be binding on the Board to take proper action to give effect to the majority opinion so expressed. After discussion, Mr. Griggs moved to amend the motion by adding after the last word the following language: but only when the return is from 51% of the membership or more; where it is less than 51% the results shall be considered binding on the Board only when directors are unable to agree by a majority vote of at least 75%. Whereupon Mr. Canfield, unanimous consent being given, added this text to his original motion. After discussion, the same was thereupon ADOPTED.

26) Moved, by Mr. Bird, that each director be required to publish in *QST* at League expense a quarterly report on current affairs in the Division. After discussion, moved, by Mr. Collett, that the motion be reworded to say that "space be provided for each director to publish," and that there be added after the last word of the motion the following: "and that the space be limited to 40 lines." But there was no second, so the motion to amend was lost. The question then being on the original motion, the same was rejected, Mr. Bird asking to be recorded as voting in favor. During the course of the above action, the Board was in recess from 4:49 p.m. to 4:54 p.m.

27) Moved, by Mr. Bird, that the following clause be added to all applications for renewal of amateur licenses: I hereby certify under penalty of perjury that I will not or have not operated my amateur transmitter at a power input to the final stage greater than that authorized under the amateur regulations. But after discussion, unanimous consent being given, Mr. Bird withdrew the motion. At this point, Mr. Bird called the attention of the Board to plans for a Great Lakes Division convention May 30, 1950, and expressed the hope that the Executive Committee would give its approval to the application when received.

28) On motion of Mr. McCargar, the following resolution was unanimously ADOPTED by a rising vote:

WHEREAS, the Board of Directors of the American Radio Relay League is now convened in its first session after the unfortunate death of our beloved Secretary, Kenneth B. Warner; and

WHEREAS, Kenneth B. Warner has faithfully served amateur radio and the League for thirty years as an efficient administrator, an inspiring leader in amateur affairs and a skillful representative; and

WHEREAS, as officers and directors of the League we are deeply grieved at the loss of our colleague as an ardent amateur, as a loyal co-worker, and as a true friend,

NOW, THEREFORE, BE IT RESOLVED by the officers and directors of the American Radio Relay League, in annual meeting assembled:

That we now record for the permanent records of the League our grief and sorrow at the passing of Kenneth B. Warner, and

That we extend to his bereaved family our sincere condolence and sympathy.

29) On motion of Mr. McCargar, unanimously VOTED that the Board authorize a memorial plaque, to be placed at W1AW, in commemoration of the late Kenneth B. Warner and his work for amateur radio, the necessary arrangements to be made by the Executive Committee.

30) Moved, by Mr. Collett, that there be added to the standing orders of the Board the following: All eligible candidates for the office of Director and/or Alternate Director shall be notified by commercial telegraph on the day they are declared eligible by the Executive Committee. Mo[illegible]ed, by M[illegible] Noble, [illegible] amend the motion to strike therefrom the words "by commercial telegraph" and substitute therefor the words "by mail," and to provide for notification of ineligible candidates as well as eligible candidates. But the motion to amend was rejected. The question thereupon being on the original motion, the same was unanimously ADOPTED.

31) Moved, by Mr. Collett, that a copy of the Constitution and By-Laws of the American Radio Relay League, Inc., shall be sent to all full members as of July 1, 1949, and to all new full members that shall be accepted as full members within the above-named organization as part of their initial membership certificate or card. After discussion, on motion of Mr. Shelton, VOTED to amend the motion by striking out the original text and substituting therefor the following: that a copy of the Constitution and By-Laws of the American Radio Relay League, Inc., shall be sent to each affiliated club once each year, and that the Headquarters of the League publish in *QST* quarterly a box announcing the availability of the Constitution and By-Laws to any member of the League free upon request, and the availability of such other publications as seem appropriate. The question then being on the motion as amended, the same was unanimously ADOPTED.

32) On motion of Mr. Collett, unanimously VOTED that a duly-authorized representative of the League shall be directed to request of the United States House of Representatives' Committee on Post Office and Civil Service and to plead for the issuance of a commemorative stamp, preferably of 3¢ denomination, depicting the American radio amateur's contribution to the electronic science and its part of our public service and national defense.

33) Mr. Collett moved that the Headquarters be directed to compile and publish the past minutes of Board meetings dating from 1925. Publication shall be accomplished in format similar to that employed in the annual reports, and made available to the membership at cost of printing and mailing. But there was no second, so the motion was lost.

34) Moved, by Mr. Collett, that By-Law 23 be amended by adding thereto the following: and shall run for a period of two years. Further that no director and/or alternate shall be eligible to serve more than two terms of two-years' duration. Moved, by Mr. Canfield, to amend the motion to provide that a director or alternate director may serve not more than three consecutive terms of two years each, same to take effect January 1, 1950. But, after discussion, the motion to amend was rejected, Mr. Collett asking to be recorded as voting in favor. The question then being on the original motion, the yeas and nays being ordered, the question was decided in the negative: Whole number of votes cast, 16; necessary for adoption, 11; yeas, 4; nays, 12. Messrs. Bird, Collett, Doyle and Griggs voted in the affirmative. Those who voted opposed are Messrs. Battey, Canfield, Dosland, Groves, Hughes, Johnston, Martin, Matejka, Noble, Reid, Roberts and Shelton. The President and Vice-President abstained as required. So the proposal was rejected.

35) The Board recessed for dinner at 5:57 p.m., reconvening at 7:55 p.m., with all directors and other persons

CONSTITUTION & BY-LAWS AND OFFICERS' REPORTS AVAILABLE TO MEMBERS

In April of each year the officers of the League make comprehensive written reports to the directors. The Board has made these reports available to interested members. The cost price is 75 cents per copy, postpaid. A copy of the Constitution & By-Laws will be sent to any member free upon request. Address the Secretary at West Hartford.

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hereinbefore mentioned in a[illegible]ance.

36) Moved, by Mr. Collett, that a period of time of at least 21 days and no more than 28 days shall elapse between the meeting of the Executive Committee for the purpose of determining the eligibility of candidates for the office of director and/or alternate director and the mailing of election ballots to the divisions then holding elections for the office of director and/or alternate director. After discussion, the yeas and nays being ordered upon request, the question was decided in the negative: Whole number of votes cast, 16; necessary for adoption, 9; yeas, 3; nays, 13. Messrs. Collett, Doyle and Griggs voted in the affirmative. Those who voted opposed are Messrs. Battey, Bird, Canfield, Dosland, Groves, Hughes, Johnston, Martin, Matejka, Noble, Reid, Roberts, and Shelton. The President and Vice-President abstained. So the proposal was rejected.

37) At the request of Mr. Collett, ORDERED by the Chair: that it be recorded that in the interests of the need for unity at this time, Mr. Collett withdraws his proposal previously published to the directors relating to an additional standing order of the Board of Directors to limit discussion and voting on certain subjects to directors holding a current license issued by the Federal Communications Commission.

38) Mr. Collett moved that the salaries of W1AW attendants be increased 10%. But there was no second, so the motion was lost.

39) Mr. Collett moved that it be the sense of this Board that the bipartisan attitude of ARRL as regards 'phone and c.w. shall be our guiding principle at all times. But there was no second, so the motion was lost.

40) Mr. Shelton read to the Board a letter from Florida State Senator Lloyd F. Boyle, W4IMJ, advising of passage of Florida Senate Bill No. 142 and its subsequent signing by the Governor, as follows:

AN ACT to Provide for the Issuance by the State Motor Vehicle Commissioner of Special License Tags to Motor Vehicle Owners Who Operate Amateur Radio Stations.

WHEREAS, from the melting snows of California through the flooded valley of the Mississippi, to the hurricane lashed shores of Florida, the amateur radio operator has proven his worth in time of disaster and widespread danger to the people, and

WHEREAS, he has been directly instrumental by the dissemination of information in saving life and property at times when regular communication facilities were disrupted, and

WHEREAS, his services in locating travelers and persons whose whereabouts are unknown, and in numerous instances when disaster and storm have threatened, he has been a boon to mankind, and

WHEREAS, there are approximately fifteen hundred licensed amateur radio stations in Florida ready and alert, equipped at their own expense and prepared in any emergency, and

WHEREAS, a distinctive automobile tag would prove of great aid to the Highway Patrol, Sheriffs, Red Cross, Municipal Police officers and the National Guard in locating these amateur radio operators in time of public or private need, THEREFORE,

Be It Enacted by the Legislature of the State of Florida:

Section 1. Owners of Motor vehicles who are residents of the State of Florida, and who hold an unrevoked and unexpired official amateur radio station license issued by the Federal Communications Commission, upon application, accompanied by proof of ownership of such amateur radio station license, complying with the state motor vehicle laws relating to registration and licensing of motor vehicles, and upon the payment of the regular license fee for tags, as prescribed under Section 320.08, Florida Statutes, as amended by Section 1 of Chapter 24272, Acts of 1947, and the payment of an additional fee of $1.00, shall be issued a license plate, as prescribed by Section 320.06, Florida Statutes, 1941, for private passenger cars, upon which, in lieu of the numbers as prescribed by said section 320.06, shall be inscribed the official amateur radio call letters of such applicant as assigned by the Federal Communications Commission.

Section 2. The Motor Vehicle Commissioner shall make such rules and regulations as necessary to ascertain compliance with all state license laws relating to use and operation of a private passenger car before issuing these tags in lieu of the regular Florida license plate, and all applications for such tags shall be made to the Motor Vehicle Commissioner.

Section 3. The Motor Vehicle Commissioner shall, on or before the first day of January of each year, furnish to the sheriff of each county in the State of Florida an alphabetically arranged list of the names, addresses and license tag letters of each person to whom a license tag is issued under the provisions of this act, and it shall be the duty of the sheriffs of the state to maintain and to keep current such lists for public information and inquiry.

Section 4. This act is supplementive to the motor vehicle licensing laws of Florida and nothing herein shall be construed as abridging or amending such laws.

Section 5. This Act shall take effect July 1, A.D. 1949.

(Approved by the Governor May 12, 1949. Filed in Office Secretary of the State May 12, 1949.)

Whereupon, on motion of Mr. Shelton, the following resolution was unanimously ADOPTED:

BE IT RESOLVED by the ARRL Board of Directors that they extend to the Honorable Lloyd F. Boyle, W4IMJ, of Sanford, Florida, State Senator from the 37th District of Florida, their sincere appreciation for his success in obtaining passage of Senate Bill No. 142 by the Legislature of the State of Florida, in recognition of the value and merit of the public service rendered by the amateur to the State of Florida.

(Applause)

41) Moved, by Mr. Noble, that there is hereby appropriated from the surplus of the League, as of this date, the sum of five thousand five hundred dollars ($5,500) for the purpose of defraying the expenses of holding this meeting of the Board of Directors, any unexpended remainder of same to be restored to surplus. Moved, by Mr. Canfield, that the expenses of holding meetings of the Board of Directors shall be considered as a charge against operations rather than surplus. But, after discussion, unanimous consent being given, Mr. Canfield withdrew his proposal to amend. The question then being on the original motion, the same was ADOPTED.

42) On motion of Mr. Collett, unanimously VOTED that there is hereby appropriated from the surplus of the League, as of January 1, 1950, the sum of nine thousand one hundred and fifty dollars ($9,150) for the legitimate administrative expenses of the directors for the calendar year 1950, the said amount allocated as follows:

Canadian General Manager	$350
Atlantic Division Director	500
Central Division Director	750
Dakota Division Director	600
Delta Division Director	600
Great Lakes Division Director	400
Hudson Division Director	700
Midwest Division Director	750
New England Division Director	400
Northwestern Division Director	800
Pacific Division Director	500
Roanoke Division Director	300
Rocky Mountain Division Director	500
Southeastern Division Director	450
Southwestern Division Director	750
West Gulf Division Director	800

any unexpended remainders of these funds at the end of the year 1950 to be restored to surplus.

43) On motion of Mr. Collett, unanimously VOTED that there is hereby appropriated from the surplus of the League, as of this date, the additional sum of one hundred and fifty dollars ($150) for the legitimate administrative

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expenses of the director of the Midwest Division for the calendar year 1949, any unexpended remainder at the end of the year to be restored to surplus.

44) On motion of Mr. Roberts, unanimously VOTED that there is hereby appropriated from the surplus of the League, as of this date, the additional sum of two hundred and fifty dollars ($250) for the legitimate administrative expenses of the director of the Northwestern Division for the calendar year 1949, any unexpended remainder at the end of the year to be restored to surplus.

45) On motion of Mr. Battey, unanimously VOTED that there is hereby appropriated from the surplus of the League, as of this date, the additional sum of one hundred dollars ($100) for the legitimate administrative expenses of the director of the Roanoke Division for the calendar year 1949, any unexpended remainder at the end of the year to be restored to surplus.

46) On motion of Mr. Griggs, unanimously VOTED that there is hereby appropriated from the surplus of the League, as of this date, the additional sum of two hundred and fifty dollars ($250) for the legitimate administrative expenses of the director of the Southwestern Division for the calendar year 1949, any unexpended remainder at the end of the year to be restored to surplus.

47) On motion of Mr. Doyle, unanimously VOTED that there is hereby appropriated from the surplus of the League, as of this date, the additional sum of two hundred dollars ($200) for the legitimate administrative expenses of the director of the Central Division for the calendar year 1949, any unexpended remainder at the end of the year to be restored to surplus.

48) On motion of Mr. Johnston, unanimously VOTED that there is hereby appropriated from the surplus of the League, as of this date, the additional sum of two hundred dollars ($200) for the legitimate administrative expenses of the director of the Hudson Division for the calendar year 1949, any unexpended remainder at the end of the year to be restored to surplus.

49) On motion of Mr. Griggs, unanimously VOTED that there is hereby appropriated from the surplus of the League, as of this date, the sum of five hundred dollars ($500) for the purpose of defraying the expenses of the Finance Committee, and the sum of two thousand dollars ($2,000) for the purpose of defraying the expenses of the Planning Committee, any unexpended remainder of either on the date of the next annual meeting of the Board to be restored to surplus.

50) Moved, by Mr. Shelton, that the sum of three thousand five hundred dollars ($3,500) be hereby appropriated from the surplus of the League, as of this date, for the purpose of defraying the traveling expenses of the Section Communications Managers and QSL Managers of the League, in the period between this date and the date of the next annual meeting of the Board, as follows: (1) Within the continental limits of the United States and Canada, SCMs to attend one official ARRL convention within their respective divisions. (2) Within ARRL sections in the continental limits of the United States and Canada, SCMs to attend in their own section, in addition to the above, no more than five major ARRL organizational meetings per year, to include hamfests only if sponsors schedule an ARRL organization meeting. (3) Within the continental limits of the United States and Canada, QSL Managers of the League to attend one official ARRL convention within their respective call areas, providing such convention be held within 500 miles of the QSL Manager's residence. And it is further moved that reimbursement be made in all the above at the rate of 5 cents a mile via the shortest commonly-traveled route if personal transportation be used or in the exact amount of the fare if railroad or bus be used. In (1) and (3) expenses may include one night's hotel accommodation at actual cost but not to exceed four dollars and the convention registration fee. All allowances for expenses shall be subject to approval by the Communications Manager in the case of the SCMs, and by the Secretary in the case of QSL Managers, of a report submitted with the itemized request for reimbursement, covering the representation of ARRL accomplished, the attendance at an organization meeting discussion, questions, recommendations, or QSLs distributed, etc., by the individual attending the meeting. At the end of the designated period, any unexpended remainder of this appropriation shall be restored to surplus. Moved, by Mr. Dosland, that the motion be amended to substitute the figure of 10 cents per mile instead of 5 cents per mile. After discussion, on motion of Mr. Martin, VOTED to amend the amendment by striking out any reference to a definite rate of reimbursement in order to come to a determination of a reimbursement rate later to apply to all authorized League representatives. The question then being on the original motion as amended, the same was ADOPTED. Moved, by Mr. Martin, that this Board determine that the automobile travel mileage of directors, SCMs, SECs, and all other Communications Department field personnel be established at 6 cents per mile. But there was no second, so the motion was lost. On motion of Mr. Shelton, unanimously VOTED that a uniform rate of 7½ cents per mile for travel in personal motor vehicles be established for all travel authorized or directed by the Board of Directors. On further motion of Mr. Shelton, unanimously VOTED to amend the action of the Board making an appropriation for the purpose of defraying the traveling expenses of the Section Communications Managers and QSL Managers of the League by changing the amount specified therein to be appropriated from three thousand five hundred dollars ($3,500) to five thousand two hundred and fifty dollars ($5,250).

51) Moved, by Mr. Battey, that there be hereby appropriated from the surplus funds of the League, as of this date, the sum of three thousand dollars ($3,000) for reimbursement at the rate of 7½ cents per mile, or actual rail or bus fare, to Section Emergency Co-ordinators to a maximum of ten trips each throughout their respective sections for the purpose of organizing Emergency Co-ordinators, selling clubs and individuals on the necessity for emergency corps work, and contacting relief agencies and other local agencies to be served, subject to approval of and submission of a full report to the Communications Manager; any unexpended remainder of this sum on the date of the next annual meeting of the Board to be restored to surplus. On motion of Mr. Noble, VOTED to amend the motion to provide for a maximum of five trips per year, Messrs. Battey, Bird, Collett, Doyle and Griggs asking to be recorded as voting opposed. Moved, by Mr. Noble, that the amount of the appropriation specified in the aforesaid motion be reduced from three thousand dollars ($3,000) to two thousand dollars ($2,000) but the motion was rejected, 6 votes in favor to 8 opposed. The question then being on the original motion by Mr. Battey, the same was rejected, 6 votes in favor to 7 opposed. On motion of Mr. Collett, VOTED that there is hereby appropriated from the surplus funds of the League, as of this date, the sum of three thousand dollars ($3,000) for reimbursement, until the fund is exhausted, at the rate of 7½ cents per mile or actual rail or bus fare, to Section Emergency Co-ordinators to a maximum of seven trips each throughout their respective sections for the purpose of organizing Emergency Co-ordinators, selling clubs and individuals on the necessity for emergency corps work, and contacting relief agencies and other local agencies to be served, subject to approval of and submission of a full report to the Communications Manager; any unexpended remainder of this sum on the date of the next annual meeting of the Board to be restored to surplus.

52) Proceeding to the consideration of the report of the Planning Committee, on motion of Mr. McCargar, VOTED to adopt the recommendations of the Committee that the Official Observer system of the League be expanded along lines outlined by the Communications Manager, viz: (a) by an Observer survey card, (b) a request to Section Managers to find additional Observers in certain categories, (c) by presentation of any laudatory Observer material in *QST* as practicable through the year; and that the Committee recommends that the Board commend all members of the Official Observer system for the help given so many individual amateurs to improve amateur operating conditions, and assist members in avoiding FCC difficulties from maladjustment of station equipment.

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53) On motion of Mr. Martin, after extended discussion, VOTED, 14 votes in favor to 3 opposed, that the report of the Building Committee be accepted and its recommendations adopted and that the Committee be extended a hearty vote of thanks by the Board for its work. Mr. Griggs asked to be recorded as voting opposed. Moved, by Mr. Johnston, that in accordance with the recommendations of the Building Committee, arrangements be made to purchase the present building and land at a figure not to exceed $125,000. *After extended discussion, the yeas and nays being ordered* upon request, the question was decided in the affirmative: Whole number of votes cast, 16; necessary for adoption, 9; yeas, 12; nays, 4. Messrs. Battey, Bird, Canfield, Dosland, Groves, Hughes, Johnston, Martin, Matejka, Noble, Roberts and Shelton voted in the affirmative. Those who voted opposed are Messrs. Collett, Doyle, Griggs, and Reid. The President and Vice-President abstained. So the proposal was ADOPTED. Further moved, by Mr. Johnston, that the Treasurer of the League is authorized and instructed by and on behalf of the American Radio Relay League, Inc., acting by its Board of Directors, to make an offer of one hundred twenty-five thousand dollars ($125,000) in cash for the title to the premises now occupied by the League at 38 LaSalle Road, West Hartford, Connecticut, free and clear of all encumbrances. The yeas and nays being ordered upon request, the question was decided in the affirmative: Whole number of votes cast, 17; necessary for adoption, 9; yeas, 10; nays, 7. *Those voting in the affirmative are Messrs.* Bird, Groves, Hughes, Johnston, Martin, Matejka, Noble, Roberts, Shelton and McCargar; those who voted opposed are Messrs. Battey, Canfield, Collett, Dosland, Doyle, Griggs, and Reid. The President abstained. So the motion was ADOPTED.

54) On motion of Mr. Johnston, the Board recessed at 10:25 p.m., under order to reassemble at 9:00 a.m. on the morrow. The Board reassembled at the same place on May 28, 1949, and was called to order by the Chair at 9:03 a.m., with all directors and other persons hereinbefore mentioned in attendance.

55) Moved, by Mr. Griggs, that the Board instruct Communications Manager Handy to investigate the feasibility *of establishing an additional Headquarters station at San* Francisco, Salt Lake City or Denver. Moved, by Mr. Martin, that the motion be amended to refer this matter to the three-man committee of the Board previously authorized to study the structure and organization problems of the Communications Department, whereupon Mr. Griggs, unanimous consent being given, accepted the same as his original motion. The question then being on the motion, it was unanimously ADOPTED.

56) At this point, the Chair designated Everett L. Battey as chairman and Walter Bradley Martin and J. Lincoln McCargar as members of the committee of the Board to study the structure and organization problems of the Communications Department.

57) Moved, by Mr. Collett, that Paragraphs 2 and 3 of the recommendations contained in the report of the Building Committee be stricken and further that the Board extend to Communications Manager Handy a vote of confidence for his overall work on behalf of the League. But agreement being had among the members of the Building Committee to delete the paragraphs in question, Mr. Collett, unanimous consent being given, withdrew his motion.

58) On motion of Mr. Dosland, VOTED that the Board now proceed to a consideration of the current proposals of the Federal Communications Commission for changes in the amateur regulations in the following manner: (a) a report from the Secretary on the extent to which the Board's recommendations of 1948 are reflected in the current proposals of the Commission; (b) a discussion of general principles in connection with the Commission's proposals; and, if required, (c) an examination of the proposals in detail.

59) *Mr. Martin moved the adoption of the following* resolution:

WHEREAS, *the Federal Communications Commission has* released under date of 21 April, 1949, a set of proposals for extensive changes in the regulations for the amateur service,

WHEREAS, the American Radio Relay League has previously made proposals to the Federal Communications Commission involving relatively minor changes to the present regulations for the amateur service,

WHEREAS, the American Radio Relay League **does in fact,** and by a very large majority, represent the **radio amateurs** of the United States of America, who are **affected by these** regulations,

WHEREAS, a great number of radio amateurs have indicated their opinion, to the directors of the American Radio Relay League, and the Headquarters offices, that the proposed amendments should not be adopted, and

WHEREAS, the American Radio Relay League has never previously considered the possibility of making proposals that would increase the cost, and personnel requirements that are apparently envisioned to carry out these new FCC proposals, such conclusion based primarily on the limited extent to which such effort has been applied to present regulations,

Now, therefore be it RESOLVED that the Secretary of the American Radio Relay League be directed to withdraw the proposals of the ARRL now on file with the FCC, and to advise the FCC that it is the intention of the American Radio Relay League, in accordance with the provisions and invitation of the FCC, in Paragraph 11 of the notice in Docket No. 9295, to submit the representative opinion of the radio amateurs opposing the "overall plan or blueprint to provide scope and direction for the immediate and long range development of the amateur radio service."

The American Radio Relay League is in accord with the Commission's desire that amateur radio continue its growth and development; however, the League is of the opinion and belief that the aim cannot be achieved satisfactorily by the enactment of regulations that are so obviously unpopular, as evidenced by the overwhelming response that has been received by the individual directors and headquarters office of ARRL from members of ARRL and radio amateur licensees.

There followed discussion extending over a period of several hours, during which every United States director reported on the feeling of amateurs in his division as expressed by telegrams, telephone calls, letters and over-the-air contacts, and as secured by him additionally in the course of personal visits to club meetings called especially for the purpose. Whereupon, the yeas and nays being ordered upon request, the Board ADOPTED the aforesaid resolution without dissent: Whole number of votes cast, 16; necessary for adoption, 9; yeas, 16; nays, 0. Every director voted in the affirmative except the President and Canadian General Manager, who abstained. So the resolution was ADOPTED

60) On motion of Mr. Dosland, VOTED at 11:30 a.m., that for consideration of agenda item 15, relating to the desirability of recommending portions of the 21-Mc. band for maritime-mobile operation, the Board does now resolve itself into a Committee of the Whole. The Chair appointed himself chairman of the Committee of the Whole. The Board, sitting as a Committee of the Whole, was in recess for luncheon from 12:38 p.m. until 2:05 p.m. The Committee rose at 3:30 p.m. and Mr. Bailey, as chairman of the Committee, laid before the Board the report of the Committee.

61) Moved, by Mr. Hughes, that By-Law 6 be amended by striking therefrom the words, "Republic of the Philippines — attached to the Pacific Division," and that By-Law 8 be amended by striking therefrom the words "the Philippine Islands." The yeas and nays being ordered, the said question was decided in the affirmative: Whole number of votes cast, 16; necessary for adoption, 11; yeas, 16; nays, 0. Every director voted in the affirmative except the President and Vice-President, who abstained as required. So the By-Law was amended.

62) Pursuant to order, Mr. Reid, as chairman, presented the report of the Finance Committee. The Chair, on behalf of the Board, expressed his thanks to the Committee for its report.

63) On motion of Mr. Shelton, unanimously VOTED that the Board appoint, pursuant to the terms of the trust agreement under the pension plan, and as of May 7, 1948, *the following persons to serve on a pension committee:* George Grammer, David H. Houghton, Kenneth B. Warner.

(*Continued on page 102*)

JFLINT

It's a Dog-4's Life!

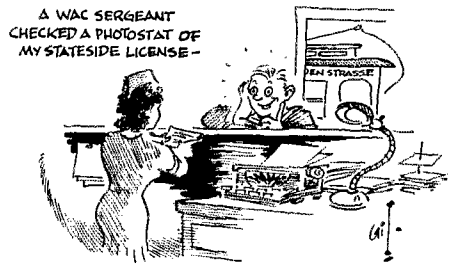
BY SGT. J. R. HERMANN,* W8TSF, EX-D4AVE

STRANGE what weird thoughts run through a ham's head when he thinks of DX! Sometimes the ideas get a little overpowering, but if the XYL will obligingly lock you in a dark, padded closet until the worst of the attack passes, you have a chance for recovery. Perhaps that is the treatment that was necessary in my case. Unfortunately, having no XYL, I was forced to bear the full brunt of the virus. This was no ordinary DX fever as you shall see. . . .

Somehow, as the delirium gripped me, I got the notion that I wanted to reverse the usual order of things. Yes, I wanted to be a DX station — there was no doubt about it. I could see myself sitting in front of a rig in a far-distant land, totaling up my country list on a handy adding machine. I seemed happier than ever before as I logged one juicy bit of DX after another. But what must I do to attain this ham's Olympus?

The idea hit me right between the eyes at the same moment I saw that recruiting poster in front of the Post Office. I had almost four years in the Army as a wartime brasspounder and could probably get my old rating back. Yessir, I could practically feel the QSL cards of AC4YN and C8YR in my grasp! That was the answer and thus it was that the recruiting sergeant had another customer. He knew a sucker when he saw one . . . and he saw one. "They need men like you in Germany," he told me cheerfully, and so I learned that I was to be a Dog-four.

The ship was far too slow in covering the distance from New York to Bremerhaven. About halfway across I had a chance to listen to a receiver. The sound of those European signals pounding in was enough to make any DX fiend drool like a hound dog near a slaughterhouse. Time dragged till finally we reached port, disembarked, and moved on to a replacement depot. After several days there, I was assigned temporarily to Frankfurt-am-Main, the headquarters city of the American zone. When hurried investigation disclosed the fact that the outfit had a ham population of one, I had the pleasure of meeting Sgt. Grover Brown, D4ATM. It was "Brownie" who gave me my first chance to say the magic words.— "Hello CQ, this is Germany calling."



From then on I could scarcely wait to get my own D4 license. Obtaining permission to leave my work one afternoon, I took the streetcar down to the Headquarters Compound and by following Brownie's directions, I found the building where the "tickets" were issued. A WAC sergeant checked a photostat of my Stateside license, noted my name, rank and serial number, and asked me to wait. A few minutes later I had the little square of cardboard that told the world I was D4AVE — an honest-to-John DX station! I floated out of the office on a small pink cloud.

Shortly thereafter, I was transferred to another base near Nurnberg in Bavaria. Here I found a kindred spirit in the person of Sgt. Bob Quenstedt, D4AWE, a genial DXer first class and top-notch maintenance man. There was a club station in the outfit to which I was assigned, which used the call D4AJP. Bob had adopted this call as his own since he had been operating the rig for some time. The layout was the usual BC-610, a tired but good HRO, and an AR-88. The antenna was a doublet for twenty meters. Nothing very fancy but we were in an ideal location and the DX was there for the taking.

The two of us decided to have a friendly contest to see who could work the most countries, each of us having his eyes firmly fixed on that postwar DXCC goal. It was about this time, along with Sgt. Bull, D4AKE, that we decided we needed some improvements in the station. Bob had already added a VHF-152 ahead of the

*414 Baldwin Drive, Lancaster, Ohio.

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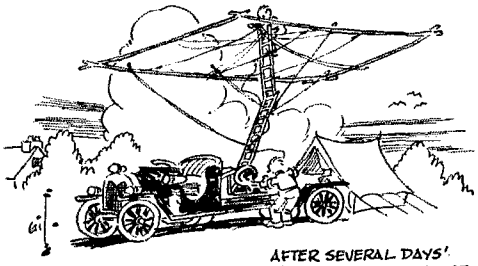
receiver but we were th[illegible] kin[illegible] for[illegible]ly of ante[illegible]as. This led directly to "The Monster."

"The Monster" was (I still insist!) an antenna. I had a pet set of dimensions for a ten-meter beam so we simply doubled them for twenty. Lacking the necessary aluminum for elements, we constructed the beam like a giant wooden kite frame. The elements were of wire and doubled in brass as support for the frame which was bowed like a kite. The whole device was over thirty feet square and made an imposing array when we raised it up about twenty feet on a mobile German fire ladder. It was rotated by turning the ladder in the desired direction. In its operating position it strongly resembled a combination of a V-2 about to be launched and the Wright brothers' first aeroplane.

After several days' work, we were ready for the trial of "The Monster." It was connected to the rig one evening and we breathlessly awaited results. It seemed excellent on receiving and when a Swiss station was heard calling CQ, we gave him a shout. He came back with a report that we were the loudest signal on the band and coming in like a local. Happily, we concluded that QSO and soon were in contact with a Portuguese station. Again we were "the loudest signal on the band." We needed no further proof of the potentialities of our handiwork which, in our estimation, was a more potent creation than the atom bomb.



AFTER SEVERAL DAYS' WORK WE WERE READY TO TRY "THE MONSTER"

Our joy was short-lived, however. At this point we decided to rotate the array but as we tugged in unison the air was split by the rending, tearing sound of splintering wood. When we uncovered our eyes, the beam was minus a reflector and generally in sad shape. Our secret DX weapon was "kaput." The next day its doom was sealed by the higher brass. It seemed that an inspecting party was due at the base and "The Monster" was the most unmilitary looking object in the whole of Germany, if not all Europe. We went back to the doublet.

Our operating pleasure (?) was enhanced by the fact that a.c. power for lights and all equipment was obtained from a motor generator which had a gas tank with a seemingly microscopic capacity. I truthfully cannot remember one single instance when it ran dry that we were *not* in QSO. One night I had snagged a VQ4 for a new country and was just exchanging reports when I heard the telltale cough of the motor. The lights gracefully

faded away and I sat in total darkness holding the microphone of a dead transmitter in my hand. I never got over that. Little children shouldn't hear such language! I developed a psychosis. I also developed callouses on my hands from emptying gas cans into the puny tank. Finally a fifty-gallon oil drum was added as a reserve tank and the gasoline phobia gradually left me.

There were many high spots in my career as a D4 that I remember with pleasure. There are some low spots I would rather forget. I had a chance to see how the other half of the ham world lives, and, frankly, I don't see how they endure the conduct of the W hams at times. The operating habits of the residents of the American 'phone bands leave a great deal to be desired. For example: I have a message from Philadelphia that requires delivery by telephone so I call "CQ Philadelphia," naïvely expecting to receive an answer from that city. I get answers all right but they always seem to be from W1s or W2s (who sign their calls at the very end of a long transmission) and want to know "if they can help me." I repress the desire to tell them how they can help me since after all they are brother hams and besides, the FCC has certain rules about using such language. So I sign and try another "CQ Philadelphia" and get the same result, only this time it's a W4 who answers. Why must some stations be so greedy for a contact with a DX station that they throw courtesy out the window?

Another type of DX Hog is the VFO-swishing expert who smothers the station you are in QSO with before your contact is concluded. The directional CQ is a waste of time in most cases and the best practice is to listen for a station in the desired locality and call him. Even by employing this procedure, you are not immune from the inroads of a QSO chiseler who has his heart set on working Germany. I have called stations in my home state on schedule, plainly stating in my call that it was "on schedule," and still have been called by thoughtless hams in other sections of the country. On the other hand, the greatest pleasure I had, aside from my DX activities, was

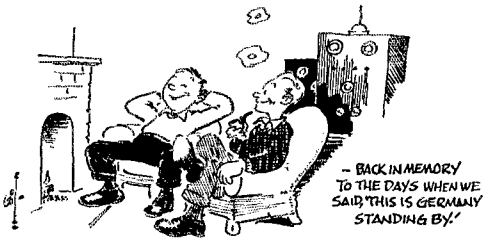
JFLINT

calling and working low-power stations in the U. S. who had never contacted a D4. I remembered too well my own many disappointments before I succeeded in working my first German station from the States.

After having the above-mentioned incidents happen time and time again, I finally decided that there was a solution. Why stay up late at night to work W stations? I'm sorry to say that my contacts with U. S. hams became less and less frequent. How many really rare DX stations have made a similar decision? On the credit side of the ledger, however, I want to thank sincerely all the stations who handled traffic for me and who by their excellent operating habits are firmly established in the foremost ranks of Hamdom. They compensated in a great degree for the thoughtless acts of our brother hams who didn't think before they threw the switch.

About this time Bob and I decided we needed a ten-meter beam. Thanks to D4AWC, we were able to get the necessary aluminum and soon had a four-element array atop a forty-foot pole. With this antenna we worked many new DX stations, one of the best being CR9AG, whom Bob was lucky enough to snag. I evened the score by working a W2 portable in Manchuria and the friendly race went on neck-and-neck, both of us being over the eighty-country mark. Unfortunately, a very strong wind ruined two elements of the beam one day and reduced our efficiency on ten greatly. The beam was lowered for repairs.

I believe the outstanding thrill of my overseas operating was my one-and-only QSO with the old hometown. It was on ten 'phone one afternoon and I had called a CQ on the high end of the band. When I heard a familiar voice calling me it was unnecessary for him to say, "This is W8SGB. What say, Jack?" The ensuing QSO, during which I talked with my mother, was a happy memory for days. I was eagerly looking forward to more contacts but it was not in the cards. I flew home shortly thereafter on an emergency leave and was subsequently reassigned to the States.



So I'm back in the good ol' U. S. A. again. When I left Dog-four land I had worked some 85 countries, which my logbook preserves as a happy memory. I don't regret missing out on the DXCC because Bob has carried on in my stead and is well over the century mark now. I often think of the hours I spent at the rig during those chilly evenings, with the smooth hum of the generator outside the shack and those DX signals pounding in. I wonder . . . was I really there or was it all just a dream? Bob is coming home soon so one of these days, in the not-too-distant future, we can sit in the shack and talk DX. And as the fire gets low, we can go back in memory to the days when we said, "This is Germany calling and standing by."

HAMFEST CALENDAR

CALIFORNIA — July 24th, at Flood Park, Menlo Park. Sponsored by the Palo Alto Amateur Radio Assn. Contests, games, free coffee planned. Get further dope from Secy. N. E. Powers, 344 So. El Monte Ave., Los Altos, Calif.

HAWAII — August 6th, at the South Seas Restaurant, McCully and Kalakaua Avenues. Auspices Honolulu Amateur Radio Club. Tickets, $3.00 per person, available from Hamfest Treas.-Chairman George Stillman, KH6AN, P.O. Box 2868, Honolulu, T. H.

ILLINOIS — July 31st, at Thatcher Woods, near Chicago (Groves 11 and 12, and Pavilion). Second Annual Midwest V.H.F. Club Picnic, starting at 11:00 A.M. Plenty of activity, with rigs on all bands. Games for the women and children. Bring the whole family, pack a picnic lunch, or purchase eats at public stand nearby. Tickets $1.00 per person, children under 12 free. Tickets available from Melvin Mendelsohn, W9OBW, 4644 W. Adams St., Chicago, Ill.

INDIANA — July 24th, at Tippecanoe River State Park, 5 miles north of Winamac on Indiana 29 or U. S. 35. Auspices Indiana Radio Club Council. Starts at 11 A.M. CST. Gala time assured all who attend. Registration 50¢ for those over 16 years of age. Full info available from Publicity Chairman Ted K. Clifton, W9SWH, Route 1, Coldwater Road, Fort Wayne 8, Ind.

MICHIGAN — July 30th, at the V.F.W. Memorial Home, First Street, Laurium. Arranged by Lake Superior Radio Club. Registration $2.50 before July 23rd, $3.00 afterward. Program will include registration at 10:00 A.M., luncheon, outing at McLean State Park, informal banquet at 6:30, entertainment. YLs and XYLs invited. Tickets and information available from Hamfest Chairman William Gilbert, W8WOV, 943 4th St., Hancock, Mich., or Club Secy. Arthur Kohn, W8TTY, 504 Iroquois St., Laurium, Mich.

ONTARIO — July 3rd, at Kingston. Sponsored by Kingston Amateur Radio Club in coöperation with the Brockville club. Excellent program being arranged, including contests, speakers, refreshment. Full information available from Secy.-Treas. E. E. Conley, VE3BDA, 568 Union St. West, Kingston, Ont.

VIRGINIA — July 17th, starting at grounds in Hampton-Newport News area to be announced. Transmitter Hunt sponsored by Peninsula Amateur Radio Club. Entrance fee: $5.00 per car (any number occupants per vehicle). Frequencies: 3.5, 28 and 144 Mc. simultaneously. Numerous equipment prizes totaling $250. Refreshments served after hunt. Registration blanks available from Secy. George N. Beaton, W4OHZ, 102 Shenandoah Road, Hampton, Va.

WASHINGTON — August 13–14th, at the International Boundary on the west shores of Lake Osoyoos, OK Valley International Hamfest for W and VE hams. Entry fee 50¢. A piece of radio gear will be sold to help defray expenses. Pot-luck lunch planned for Sunday noon. For further particulars contact Hamfest President J. Ray Brott, W7FPV, Oroville, Wash.

JFLINT

United States Naval Reserve

THE following amateur call signs for Naval Reserve units have been issued recently by FCC:

W1USN	Boston, Mass.	K6NMD	Long Beach, Calif.
K1NAR	Squantum, Mass.	K6NAW	Red Bluff, Calif.
K1NRF	Livermore Falls, Maine	K6NAX	Davis, Calif.
K1NRK	Brockton, Mass.	K6NAY	Dunsmuir, Calif.
K2NRP	Elmsford, N. Y.	K6NAZ	Winters, Calif.
K2NRW	Ramsey, N. J.	K7NAH	Las Vegas, Nev.
K3NRG	Dunmore, Penna.	K7NAI	Salem, Ore.
K3NRK	Kingston, Penna.	K8NAG	Mt. Pleasant, Mich.
K4NBA	Riviera Beach, Fla.	K8NRE	Newark, Ohio
K4NBB	Paducah, Ky.	K8NRG	Canton, Ohio
K4NBC	Durham, N. C.	K8NRK	Princeton, W. Va.
K5NBE	McAlaster, Okla.	K8NRV	Tiffin, Ohio
K5NBF	Bellville, Tex.	K8NRZ	Allegan, Mich.
K5NBG	Grand Prairie, Tex.	K9NAJ	South Bend, Ind.
K5NBH	Galveston, Tex.	K9NAK	Alton, Ill.
K5NBI	Ada, Okla.	K9NAL	Racine, Wis.
K5NBJ	Bartlesville, Okla.	K9NRW	East Peoria, Ill.
K5NBK	Amarillo, Tex.	KØNR	Dubuque, Iowa
		KØNAZ	Vermillion, S. Dak.
		KØNBA	Mankato, Minn.

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Comdr. H. Linkins of Sausalito, Calif., although now retired under the provisions of Public Law 810, is continuing his fine work in connection with Electronic Warfare Company 12-2 at Sausalito. The Electronic Warfare Facility that houses this company is located at 600 Bridgeway Blvd., on a pier in San Francisco Bay. The Facility is well equipped, having search radar, plotting facilities, radio and visual communication equipment, etc., installed. The amateur call assigned to Comdr. Linkins for EWC 12-2 is K6NRG.

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A new Electronic Warfare Company is being formed at Patuxent River, Maryland, in the Potomac River Naval Command. The commanding officer of this new organization is Lt. C. O. Allred. Those in the area interested should contact Lt. Allred at Electronics Test, NATC, Patuxent.

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Electronic Warfare Platoon 13-15, another new addition to the program, has been set up with Carlyle A. Beebe in charge. When arrangements are completed, the new Platoon will be housed at the Lewistown Airport, Lewistown, Mont.

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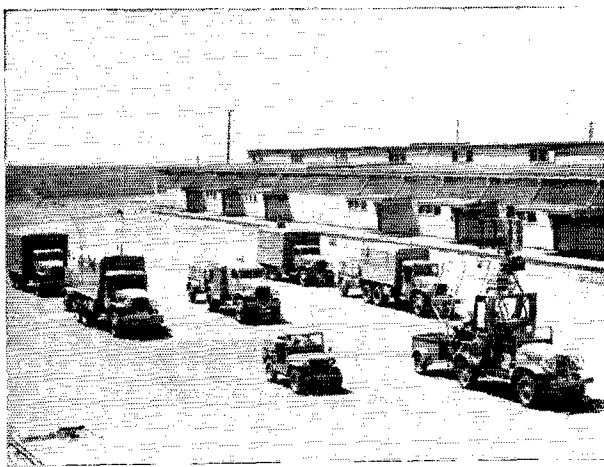
The Naval Reserve Communication System now has over 900 stations on the air, operating from the various Naval Reserve training centers, Electronic Warfare facilities, and Electronic Warfare stations. Over five hundred of these stations are also licensed for amateur operation. In addition to the 900 stations operated by the regular drilling units of the Naval Reserve, there are the individual Reservists who are amateurs and are authorized to operate on Navy frequencies using joint procedure and Naval call signs assigned by the commandant of their Naval districts.

In the near future fifty-seven U. S. Marine Corps Reserve training centers, in addition to those now jointly shared between USNR and USMCR, will be on the air in the Naval Reserve Communication System. Approximately one hundred USMCR volunteer electronic units are planned, each to be furnished with radio communication and other electronic equipment. Major C. O. Wyman, USMCR, of NN7NIC fame, is the planning officer for this program at Marine Corps headquarters in Washington. He will appreciate hearing from any ham who wears the "green."

The following Marine Corps Reservists, all vet-

(Continued on page 104)



Mobile electronic equipment used by Naval Reservists in the 11th ND. Included are a radar truck, communications jeep, receiver, transmitter, generator and communications headquarters vans. Photo taken at Camp Elliott, near San Diego, Calif.

JFLINT

Military Amateur Radio System

For an unrehearsed show, the only touch of fanfare lacking during delivery of the new MARS station certificates was the presence of the Air Force and Army bands — at attention and playing "Ruffles and Flourishes." The certificates, numbering 4300, were transported from the Bureau of Engraving by armored truck. Arriving at the Pentagon, guards with riot guns solemnly carried the sealed packages — perhaps thinking they contained a billion dollars worth of bonds — to the office of Thomas C. Coiner, chief of Publication Section, Military Training Branch, Office of the Chief Signal Officer.

Maj. General F. L. Ankenbrandt, director of communications, Department of the Air Force, starts the big job of signing station certificates for MARS-Air Force members. General "Ank" is personally monitoring the enabling legislation which will permit non-military-affiliated amateurs to participate in MARS.

While the certificates lack any pecuniary value they will, no doubt, be treasured as greatly by amateurs who receive them as though there were dollar signs sprouting in place of the crossed flags of the Signal Corps and the Wings and Propeller of the Air Force.

The little story about the certificates and the unseemly delay goes back to the print order which asked for the seal of the National Military Establishment as the focal point of the layout, to emphasize that MARS was a joint project of the Army and the Air Force. A heavy paper stock was requested, too, since the original certificate is to last for the lifetime of the amateur. (The original term of issue is for three years, but indorsements make it a permanent station fixture.)

This combination — the National Military Establishment Seal in seven colors and the special paper — proved too much for the Government Printing Office. Their best pressmen gave up after every possible combination of ink refused to behave, so the job was switched to the Bureau of Engraving. There it went through the usual engraving processes and when it came off the presses it was really a honey.

Maj. General Francis L. Ankenbrandt, director of communications, Department of the Air Force, or Brig. General Ivan L. Farman, ex-J2ATC, deputy director, will sign all Air Force station certificates. Capt. Edward L. Nielsen, chief, MARS-Army, was honeymooning at copy time and could not be reached to find out who would sign MARS certificates for Army!

Someone's wrist will need a bit of massaging before the last stroke of the pen embellishes the present stack of MARS station certificates, since the membership passed the 700 mark on 15 April and the flow of applications for membership continues at a steady pace. The once-quiet MARS frequencies are beginning to sound like "20" 'phone on a Sunday afternoon.

The member's name and amateur and MARS calls will be hand-lettered on the certificate to match the engraving. Picture-frame dealers should expect a boom in 9 by 12 frames because it is much too nice a piece of wallpaper to risk some dastardly fly leaving a speck on it!

Army Day QSO Party Leaders

The boys from the Second Army Headquarters got off to a fast start in the MARS Army Day QSO Party and they were never headed. The W3USA gang made good on at least half of their pre-Party boast of "lotsa hot coffee and messages," according to the station log which shows that the operators kept four bands hot, rolling up a total of 113 transmissions and relays plus 18 local deliveries for a total of 28,126 points. W2TSL of Long Branch, N. J., with 10,600 points, was runner-up among MARS member stations. High-scoring nonmember was W8PQK, Cincinnati, Ohio, who amassed 5696 points.

JFLINT

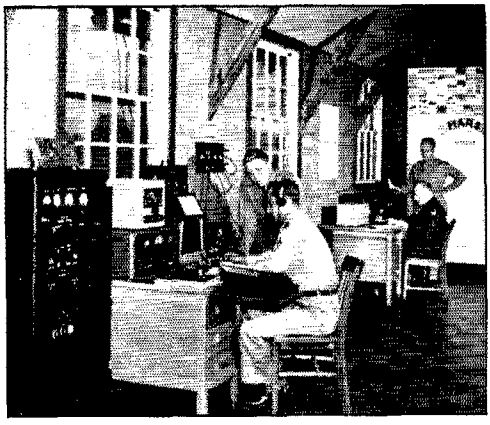
QST V WAR NR 2 A WAR 06 0501/Z
TO ALL AMATEURS GR 76

TODAY AS THE NATION RECOGNIZES THE ARMYS ROLE IN NATIONAL DEFENSE I WANT TO PAY A SPECIAL TRIBUTE TO THE RADIO AMATEURS FOR THE VALUABLE CONTRIBUTIONS THEY HAVE MADE IN THE SERVICE OF THEIR COUNTRY PD AT THE SAME TIME I WOULD LIKE TO ENCOURAGE THEIR FULLEST PARTICIPATION IN THE MILITARY AMATEUR RADIO SYSTEM DURING THIS CRITICAL PERIOD BETWEEN THE END OF THE RECENT WAR AND THE PEACE TOWARD WHICH ALL OF US ARE SO EARNESTLY WORKING PD

SIGNED KENNETH C. ROYALL
SECRETARY OF THE ARMY

Text of Army Day message from the Secretary of the Army.

Maj. General S. B. Akin, chief signal officer of the Army, has written personal letters of appreciation to the following ten top point-getters: *MARS members* — **W3USA, 28,126,** W2TSL, 10,600, W4VP, 9345, W4USA, 9000, K4WAD, 8048, W3EAX, 6545; *nonmembers* — **W8PQK, 5696,** W9CQU, 5388, W8OUR, 5124, WØTSA, 4416.



Winner in the Army Day QSO Party was MARS member station W3USA, Second Army Headquarters, Fort George G. Meade, Md. Shown, *l. to r.*, are Sgt./1c L. C. Dula, W3NOP, Lt. R. Richardson, W3NHB, M/Sgt. W. A. Shrenk, W3LYN, and Lt. W. H. Longle, jr., W3RYW. Operating the 80-, 40-, 20- and 10-meter bands simultaneously, these hams rolled up a total of 28,126 points.

Logs were received from 54 stations, and activity was heaviest east of the Big Muddy. However, California, Texas, Colorado and New Mexico stations were highly active, reporting best results on 7 Mc.

The many welcome suggestions received from operators taking part in this first MARS-sponsored QSO Party should result in improved rules and increased participation in future Army Day contests.

25 Years Ago *this month*

JULY, 1924, *QST* brings stimulating news to the habitants of sweltering attic "static rooms" — word that Argentine CB8 has worked New Zealand 2AC and United States 3BWJ, 1XW and 1XC-1ER to establish new international DX records. And midsummer doldrums are further interrupted by the exciting prospects of ARRL-arranged short-wave tests with the Navy dirigible *Shenandoah*, the Eiffel Tower station FL, the Canadian steamer *Arctic*, and Italian ACD while he is on cruise with his country's navy. Amateur communication with the MacMillan Arctic Expedition continues unreliable, however, 9ZT and 6CGS being the only stations reporting contact with the *Bowdoin*.

Recognizing the widespread interest in superheterodynes, Technical Editor Kruse continues his symposium on "Building Superheterodynes That Work." Part II in this issue considers commercial kits; shielding arrangements, intermediate frequencies, air- and iron-core transformers, coupling methods, and receiver layouts. Authorities contributing to this 14-page discussion include Hoover Cup winner for 1923, Don C. Wallace, 9ZT-9XAX, H. L. Harvey, 3XAQ-3TE-3DN, F. R. Ehle, Dr. O. S. Kelley, 5OG, Victor Greiff, Dr. E. A. White, 1XAV-1YB, A. P. MacDowell, 3AR, Stuart Ballantine, J. L. A. McLaughlin, A. J. Haynes, Capt. H. J. Adams, Glen E. West, 7ZU, O. A. Kimball, 9RY, John Magee, and R. T. Anderson.

"Dial acrobatics" during receiving are out if you use an oscillating crystal for transmitter frequency control. So proclaims H. S. Shaw of the General Radio Co., who enthusiastically describes a laboratory crystal standard and a quartz-controlled transmitter. Completing the month's technical pages are James H. Turnbull's (2XQ) "Stopping the Key Thump," N. J. Buckeye's (ex-8AJE) "A Handy Calibrated Oscillator," and I. V. Iversen's (7ADQ-7NT) "The 4-Coil Meissner Circuit."

Gleanings: Gerald M. Marcuse, British 2NM, prominent in trans-Atlantic work, has been a welcome visitor in this country and Canada. . . . Amateurs delivered *correctly* 45 out of 50 messages for the Pennsylvania Railroad during a recent emergency, reports A. L. Budlong, secretary of the ARRL Railroad Emergency Service Committee. . . . An outstanding trans-Atlantic DX and traffic station, 1BDI-1XAH, operated by F. E. Handy, student at the University of Maine, receives introduction in the station descriptions department. . . . H. W. Hetzel of Philadelphia suggests Esperanto as a language for international amateur radio.

JFLINT

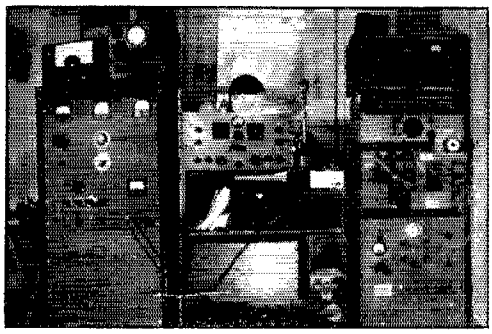
Pacific-Hurdling Teletypers

Stations Participating in the First Transoceanic TT Work

WE PRESENT on this page descriptions of the amateur stations that have been engaged in literally "writing" amateur teletype history, through their two-way f.s.k. radioteletype contacts between the Mainland and Japan. Hardly had reports of this first trans-Pacific work been recorded (page 40, May *QST*) when KH6LP and W6ITH effected, on April 27th, the first amateur TT QSOs between Hawaii and the United States.

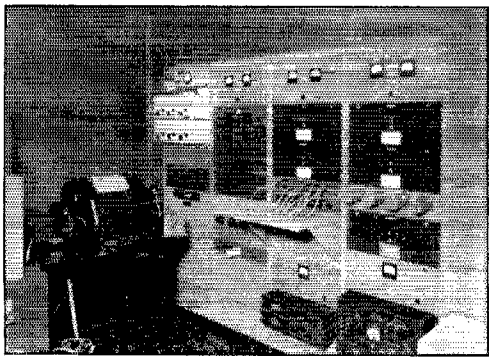
JA3RO, Nagoya, Japan

Located atop the Kanko Hotel in downtown Nagoya, JA3RO has established a formidable reputation on all DX bands — 'phone, c.w. and TT. The GI station is operated by three members of the U. S. occupation forces, Maj. M. B. "Tome" Thompson, Lt. G. S. "Stan" Wheeler, and Lt. W. C. "Doc" Wiley. The station's teletype activities have been especially guided by the latter and so — as the photo shows — we find Doc holding down the TT keyboard spot. Output of the BC-610-E transmitter in the center is fed to a 4-element rotary beam. The rack at the right contains a Navy-type f.s.k. unit and Super-Pro and HQ-120 receivers.



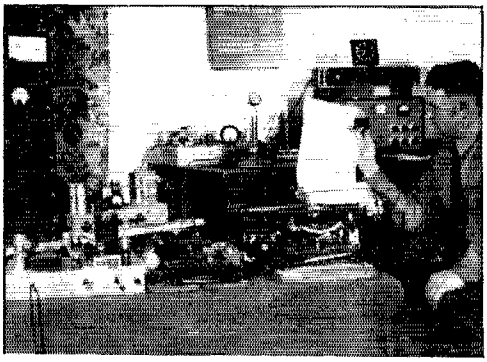
KH6LP, Schofield Barracks, T. H.

Operated by Capt. August J. "Bud" Sabel, Signal Corps, KH6LP employs a Model 15 teleprinter (not shown in photo). The transmitter is at the left, and includes a 6V6-6N7-807 exciter, p.p. 5514 final, and 5514 modulators. The Super-Pro receiver in the center is operated on 3.5 and 14 Mc. In the right-hand stack, the BC-348 at the top is used with a dialless converter to tune 10 and 11 meters; below are a monitor, audio patch panel, homemade f.s.k. converter, Navy-type f.s.k. unit, and power supplies.



W6ITH, Moraga, Calif.

One corner of D. Reginald Tibbetts' de luxe TT layout, showing receiving-equipment bays. The Model 19 teleprinter at the left connects with Bell System TWX. The racks contain Universal repeaters for connection between radio and land-wire facilities, monitoring 'speakers, Collins 706A-1 diversity frequency-shift converters, F-3 strip receivers, Collins 51N-4 receivers, a Super-Pro, a WE-124-B amplifier, switchboards for all TT machines, single-sideband terminal apparatus, and power supplies. Not shown are Model 15 and 19 teletypes, a Model 14 reperforator and tape transmitter-distributor, and a master control position.



W7JCU, Eugene, Ore.

Having procured the inner works of a Model 12 teleprinter through the assistance of W2BFD, Dale B. Schermerhorn lost no time in putting W7JCU on TT. Except for the clatter of the exposed mechanism, this experimental table-top set-up performs excellently. An SX-42 plus external i.f. strip without a.v.c. serves for receiving. The transmitter is a 6J5 ECO with 6SA7 reactance modulator for 850-cycle frequency shift, a 6SK7 isolation stage, two 807 doublers, a 4-125 tripler, and a 250TH final running 200 watts. At present the antenna is a vertical folded dipole, but installation of a rotary beam is planned for the near future.

JFLINT

A Variable-Frequency Antenna

One to Ten Meters with a Single Antenna System

BY RALPH O. WILLIAMS,* W8AJC

• Multiband transmitters and band-switching receivers make it easy for us to jump from band to band, but the antenna has not kept pace. Many of us are prevented from operating on several bands by the thoughts of the multiplicity of antennas demanded by the conventional approach to multiband work. Here, to go with the VFO, is the VF*A* — tunable to resonance from the operating position. It covers 11, 10, 6 and 2, and all the television and f.m. bands in between, with the optimum performance all along the line. Ideas for the lower frequencies are included, too.

It has been the writer's lifelong ambition as a radio amateur to have a universal antenna; one that would not only work on several bands, but also tune within a band, providing optimum operating conditions on any frequency. The memory of endless trips to the rooftop or out to the mast to lower the antenna and cut off or splice on a few inches of wire to hit a special spot in the band is still fresh in mind. The old Zepp was pretty good but it required spaced feeders and tuning at the transmitter end. The half-wave aerial split in the center for a 72-ohm transmission line required no tuning at the station end but necessitated a different antenna for every band. Often the resonant frequency of these antennas varied widely from the values indicated by the formulae because of conditions not always apparent, and under some circumstances it was difficult to get adequate loading over an entire band. As the years passed matching systems were introduced, and they, too, are usually one-band devices. With all their disadvantages the antenna systems were not too bad back in the days of crystal control, but now we have VFO and often operate anywhere within the band. It goes without saying that what we need to go with VFO is a good VF*A!*

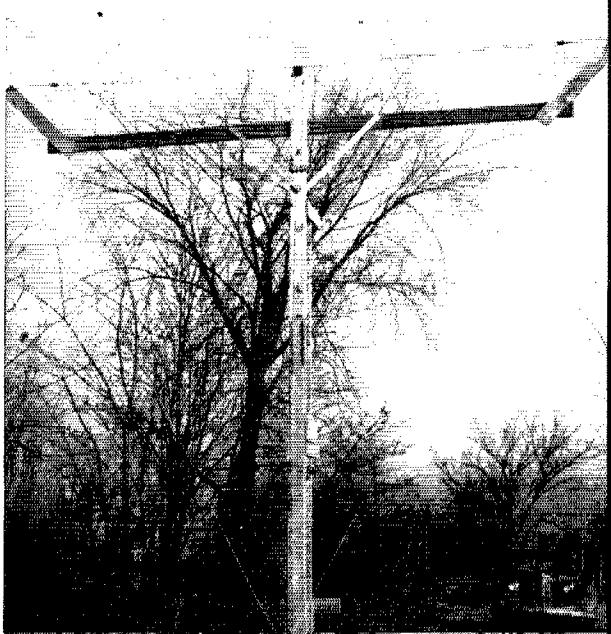
The group, other than amateur, most in need of a VFA, is that vast population trying to receive the various television and f.m. channels on a single antenna. A good half-wave dipole will outperform most of the existing elaborate receiving antennas providing, of course, it is possible to adjust the antenna accurately for each channel.

For years I have been giving thought to ways and means of feeding out and retrieving wire to make an adjustable center-fed half-wave antenna. The increased use of the VFO and the advent of television and f.m. broadcasting have made such an antenna practically a necessity. The folded dipole makes it a possibility, with rigging less complicated than the dial drives on some broadcast receivers! It is the purpose of this discussion to describe a remotely-controlled center-fed antenna capable of continuous adjustment from band to band and within the bands, using an untuned transmission line.

The Folded Dipole as a VFA

The folded dipole lends itself admirably to rigging with cords and pulleys so that the length of the flat top may be varied simply by pulling down on the feeders (see Fig. 1). If the spacing between the center pulleys is adjusted so that the characteristic impedance of the two parallel conductors is 300 ohms the feeders will match 300-ohm ribbon regardless of their length and the length of the antenna. In this way, we have a tuned antenna with a flat line for any frequency, accomplished without resorting to sliding contacts at any point in the system. Fig. 2 shows a practical hand-operated rigging that will enable

* 265 S. Harris Rd., Ypsilanti, Mich.



Practical working model of the folded-dipole VFA of Fig. 3 used at W8AJC. The system is operated by the servo motor at the base of the mast, and is controllable from the operating position.

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the experimenter to make a set-up and observe its characteristics. Antennas of this type may be made large or small but it is suggested that the beginner make up small models for 2 and 6 meters, or simply for the f.m. and television bands, to prove the merit of the antenna.

The photograph and Fig. 3 show the details of an experimental working model, made long enough to tune to 10 meters, but designed so it could be pulled down to a flat-top length of only a few inches. The tuning was fairly sharp and the results over conventional antennas for the reception of f.m. broadcasting were gratifying. A considerable improvement was noticed even within the 88–108 Mc. f.m. band when the receiver was tuned to different stations and the antenna adjusted for maximum response. It was a real thrill to couple the feeders to the 10-meter transmitter and watch the plate milliammeter go up as the antenna came into resonance, and then pass through, and return for maximum; then without changing antennas, to switch on the f.m. broadcast receiver, run the antenna down to about four and a half feet to pick up a Detroit station. It was interesting to observe the effects on the received signal strength as the antenna was shortened from resonance at 10 meters to the proper length for the f.m. band, with the receiver tuned to a station on 98.5 Mc. Reception was possible with the long antenna and became good as the flat top hit fourteen feet (three half waves), falling off to a very sharp null at 121.5 inches (critical), after which it returned to full signal strength at 56.25 inches, approximately a half wave for the received signal. This ability to tune to an extremely critical null might find application in the elimination of an undesired, strong near-by signal under certain special receiving conditions.

The uses to which a continuously-variable antenna may be put are limited only by the operator's imagination. Once the mechanical details have been worked out they may be used singly or in multiple, as antennas or reflectors, driven by common or separate servo motors and in various phase relations. Such antennas may be used for transmitting or receiving, or for special applications such as field operations covering a wide band of frequencies, signal-strength measurements, target transmitters for lining up rotary beams, and antenna studies. Their greatest commercial application will no doubt be in the f.m. and television fields where simplified versions, adjustable from the receiver, should find wide acceptance.

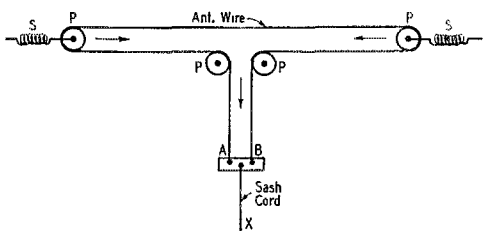

Fig. 1 — Basic principle of the adjustable folded dipole. Dipole and feeder section are made of one piece of flexible wire. Antenna length is changed by pulling down on the feeder at point *X*. Spacing of the pulleys at the center is such that the characteristic impedance of the feeder section is 300 ohms. Twin-Lead is connected at points *A* and *B*.

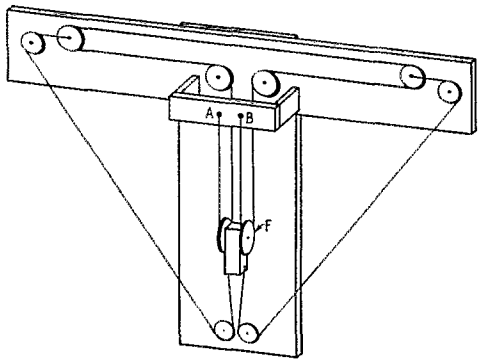

Fig. 2 — Hand-operated version of the variable-frequency antenna mounted on a wooden frame. To minimize mounting space, the feeders are folded back over ratio pulleys, *F*. The 300-ohm line connects at *A* and *B*. With this arrangement the vertical movement of pulley *F* is equal to the end movement of the antenna pulleys. The supporting fishline or sash cord must be taut.

Other Types of Adjustable Antennas

Although the folded doublet lends itself most easily to continuous adjustment it might also be desirable to have a variable center-fed half-wave antenna suitable for use with coaxial or other low-impedance feeders. This may be done by the use of pulleys, insulators and wire, but requires a sliding contact at the center where the wind-up drums are located, and unless operated frequently it is subject to all the ills of exposed slip rings. This type of antenna is shown in Fig. 4 and, although at present untried at W8AJC, it may prove worth while on the lower frequencies, filling the long-felt need for a tunable 80-meter antenna that will work on 40 and 20 also!

Folded-Dipole Design

Useful information relative to the design of folded dipoles may be found in the ARRL *Handbook* for 1948, War Department *TM11-466*, RCA's little book *A Practical Analysis of U.H.F.*,[1] and in a paper by W. Van B. Roberts appearing in the *RCA Review* for June, 1947, page 289. The article by Roberts, in which he tells of the work done by his group at Princeton during the war under Government contract for the study of the folded dipole, is very helpful in providing the

[1] Write to F. W. Smalts, Consumer Relations, RCA Service Co., Inc., Bldgs. 5 and 6, Camden, N. J.

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reader with a mechanism for analysis of the antenna. The literature indicates that spacing of the conductors composing the flat top should be close, in the order of 1/100 wavelength. Since our antenna is to have flexible conductors it is desirable to work with a type of wire that has a large diameter for low r.f. resistance, and at the same time has a high degree of flexibility. Such a conductor may be composed of insulated wire with a braided copper shield, the shield acting as the antenna and thus combining large area with good flexibility. The rest of the design is based upon available materials, with emphasis upon methods and mechanical devices for carrying out the function of varying the length of the flat top and handling the feeders. Refinements in both electrical and mechanical aspects will result from continued development.

Construction

When considering the construction of a tunable folded dipole many arrangements using springs or cords and pulleys will come to mind and it is up to the individual to select the method best suited to his particular use. In the beginning I tried a variety of springs, shock cords and weights to hold out the ends of the flexible antenna wire, but each of these methods had its own drawbacks and they all had the disadvantage of having to pull against a spring to shorten the antenna and depend upon the spring to pull it back out again. Metal springs come into resonance at certain frequencies. I tried metal-spring sash supports which would extend about 40 inches but they came into resonance in their extended positions and were not very smooth in operation.

It was finally decided to use cords and pulleys so arranged as to be in mechanical equilibrium and use the servo motor or other means only for the purpose of adjustment. This required less power in the servo and while it calls for more pulleys the result was smoother adjustment. I

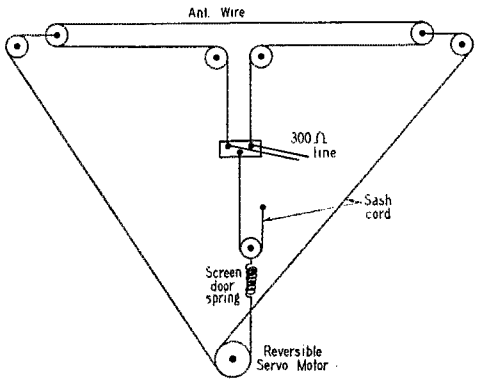

Fig. 3 — Diagram of the remotely-controlled antenna shown in the photograph. This system is now in use at W8AJC for 28 Mc. and up. It may be reduced to a flat top of a few inches.

have found it convenient to support the antenna from the ends by means of insulated pulleys on a wood or other nonconducting structure. If the dipole is to be operated in a horizontal position there is no objection to using a vertical metal support pipe, but horizontal metal rods or pipes

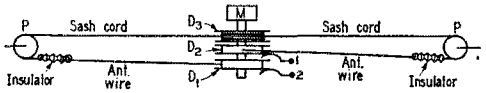

Fig. 4 — A suggested arrangement for an adjustable motor-driven dipole suitable for use on the lower amateur bands. Reels D_1 and D_2 reel in the antenna wire, while D_3 plays out braided sash cord. The assembly is made from a Signal Corps reel, Type RL-42-B, fitted with three reels, Type M-235, all available on the surplus market. The antenna reels are fastened to the cord reel by means of stand-off bushings secured to the center insulation. Brushes *1* and *2* connect to a 72-ohm line running to the transmitter. Success of this system depends upon maintenance of good contact at the brushes.

should not be used. For long antennas a center support must be provided for the feeder pulleys and the wind-up mechanism. The ends may be supported by poles, trees or buildings.

Servo Motors

The servo motor shown in the photograph is from a surplus Azon bomb tail assembly. It has plenty of power and may be reversed at will. It requires a 4-wire cable to the battery or other d.c. source. The current consumed is small and since the time of operation is also small a few dry cells will provide power for operation over a long period of time. Contained within the unit are two selenium rectifiers placed there to short circuit reverse currents to prevent sparking. They may be removed and inserted in a 30-volt a.c. line to the unit where they will provide sufficient d.c. for its operation. Reversal may be obtained at the station end by means of a double-pole double-throw toggle switch. Many other similar slow-speed servo motors are available on the surplus market, most of them reversible, and varying in size and power requirements. In some cases where d.c. is not available advantage may be taken of the gear train by connecting a universal coupling to the motor end and driving with a reversible universal fan or vacuum-cleaner motor operated from 115 volts a.c.

Sources of Materials

Antenna wire should be light, durable, flexible, of large diameter and a good conductor. For ease of adjustment it should pull around a one-inch pulley readily. Super-flexible stranded copper wire of large diameter would be quite heavy whereas an insulated stranded wire, if size 20 or so and covered by a braided tinned-copper shield, would be light in weight, adequately flexible and of sufficient diameter. Belden No. 8885 shielded grid wire having an o.d. of 0.1 inch has been found

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satisfactory. Too-stiff wire will make the system unwieldy.

Pulleys must be free-running for smooth operation and have as little friction as possible. A number of different kinds of pulleys normally available at hardware stores were tried and all had mechanical imperfections. Usually, though they seemed free-running when tried at the store, they turned out to have prohibitive friction when loaded and in the system. Since the number of pulleys required is fairly large and the accumulated friction may be excessive, ball-bearing pulleys are recommended. The first ones used here were homemade and turned out of fiber and used small ball bearings in the center. The ball bearings had ¼-inch holes and a ⅝-inch o.d. and were obtained from disassembly of surplus gear trains, bomb sights, computers and other equipment so plentiful on the surplus market. Later I found a source of one-inch aircraft pulleys (AN-210-1A) with ball-bearing centers. Air Associates sells them for $1.25 each but the surplus market offers them at a lower figure. Pulleys may be found in all sorts of surplus aircraft control equipment and sometimes it is cheaper to buy a unit containing several pulleys than to buy them separately. Homemade hardwood pulleys turned out of maple and boiled in paraffin and using ¼-inch brass axles should be satisfactory. The important thing is to have good low-friction bearings.

Twisted rope will cause the pulleys to turn over and twist and short out the aerial; therefore it is recommended that braided sash cord or clothesline be used. This, when properly fed through the pulleys, will not cause twisting. A nice size that fits available pulleys is a light braided clothesline ⅛-inch in diameter. Of course any flexible insulating line may be used such as dial cable, fishline or upholsterer's twine. Spring loading to prevent slipping because of stretching is advisable in some cases.

Limit Switches: If the antenna is not visible from the operating point Micro-Switches may be so placed that when the end of travel of the antenna is reached the circuit will be opened and the motor will stop, it being possible then to reverse it and run it to the other limit where another switch will furnish protection from overtravel. The switches should not be connected in the common lead to the motor but in the circuit controlling that direction only. (Switches and associated wiring must be placed so as not to interfere with the electrical operation of the antenna.)

Conclusion

The examples shown are but a few of many possible ways of setting up remotely-controlled variable-frequency antenna systems. It is hoped that this article will serve as a basis for further development of adjustable antennae for amateur and commercial use.

A.R.R.L. QSL BUREAU

As a service to American and Canadian amateurs, ARRL maintains a QSL Bureau to make it easy for you to get your cards from foreign stations. Here is how it works: When you work a DX ham, you ask him to QSL via ARRL, then send a stamped, self-addressed stationer's size No. 10 envelope to the QSL manager for your call area, whose address is listed below. When he has an envelope full of cards for you, he drops it in the mail. Upon its receipt, you should immediately send another such envelope so that the QSL manager always has at least one on file for you. If you are one of those rare individuals who doesn't give a hang about the cards, be a good fellow and send along an envelope anyhow. It will help your QSL manager, who performs all the work incident to the bureau on a voluntary basis, to keep his files in order.

If you've had a different call before, send an envelope to the manager for that call area; all cards are routed to the *home district* as shown in the call. Maybe some of the thousands of uncalled-for cards are for you, even though it may have been a year or more since you've used a previously-held call.

Best bet on handling cards *for* foreign amateurs is to send them to appropriate bureaus as listed on page 50, June *QST*.

W1, K1 — Frederick W. Reynolds, W1JNX, 83 Needham St., Dedham, Mass.
W2, K2 — Henry W. Yabnel, W2SN, Lake Ave., Helmetta, N. J.
W3, K3 — Jesse Bieberman, W3KT, Box 34, Philadelphia, Pa.
W4, K4 — Johnny Dortch, W4DDF, 1611 East Cahal Ave., Nashville, Tenn.
W5, K5 — L. W. May, jr., W5AJG, 9428 Hobart St., Dallas 18, Texas
W6, K6 — Horace R. Greer, W6TI, 414 Fairmount St., Oakland, Calif.
W7, K7 — Frank E. Pratt, W7DXZ, 50235 Ferry St., Tacoma, Wash.
W8, K8 — William B. Davis, W8JNF, 4228 W. 217th St., Cleveland 16, Ohio
W9, K9 — John F. Schneider, W9CFT, 311 W. Ross Ave., Wausau, Wis.
WØ, KØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minn.
VE1 — L. J. Fader, VE1FQ, 125 Henry St., Halifax, N. S.
VE2 — Austin A. W. Smith, VE2UW, 6164 Jeanne Mance, Montreal 8, Que.
VE3 — W. Bert Knowles, VE3QB, Lanark, Ont.
VE4 — Len Cuff, VE4LC, 286 Rutland St., St. James, Man.
VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Sask.
VE6 — W. R. Savage, VE6EO, 329 15th St., North, Lethbridge, Alta.
VE7 — H. R. Hough, VE7HR, 1785 Emerson St., Victoria, B. C.
VE8 — Jack Spall, VE8AS, P. O. Box 268, Whitehorse, Y. T.
KP4 — E. W. Mayer, KP4KD, P. O. Box 1061, San Juan, P. R.
KZ5 — C.Z.A.R.A., Box 407, Balboa, Canal Zone
KH6 — Andy H. Fuchikami, KH6BA, 2543 Namauu Dr., Honolulu, T. H.
KL7 — J. W. McKinley, KL7CK, Box 1533, Juneau, Alaska

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Results, 15th Sweepstakes Contest

During recent years we have come to measure individual operating performances in an SS by what might be termed the "six-digit index." In each succeeding contest more and more contestants have reached the 100,000-point bracket on c.w. and the 'phone operators have steadily approached this mark. The 1947 Sweepstakes resulted in fifty-three six-digit c.w. scores and four 'phone scores above 60,000. The Fifteenth SS final results show eighty-two c.w. scores over 100,000 — an increase of more than 50 per cent — and eight 'phone totals over 60,000, with the top contestant only about fourteen thousand short of the magic figure!

Such scores have an important significance. They demonstrate clearly that the operating skill of amateurs who take part in this annual event has grown by leaps and bounds. Plenty of operating savvy and ability is necessary to produce these high scores. The SS and other League contests have developed those qualities to a large degree. The 10,000-point operator of this year is the 25,000-point contestant of next year, and so on, until he reaches the top brackets. In this respect the Fifteenth SS was outstanding. For the facts and figures that show it was the best demonstration ever of clean, smooth, efficient operating, read on!

Award Winners

All of the League's 72 sections were active in the 1948 Sweepstakes. Entries were received from all except the Philippines. A total of 1349 logs was submitted, 1065 by c.w. participants and 284 by 'phone contestants. Competition for awards was, under the rules, among amateurs in each ARRL section. Special bronze medallions engraved with the call of individual winners are being given to the high scorer in each of the 64 sections from which 'phone entries were received and 71 such awards are going to c.w. contestants. The calls of award winners are listed at the head of each section tabulation under "Scores." We're certain all those who took part in the Fifteenth SS join us in extending a hearty "Well done" to the winners!

C.W. Highlights

Up, up, up go the SS scores each year! What is the limit? Your guess is as good as ours. In the 1947 Sweepstakes report we ventured a guess that the saturation point had been closely approached. Then along come a half dozen contestants in the '48 SS and smash to bits what we thought was very close to the highest attainable score record. W2IOP topped all c.w. entrants with a score of 183,690 points by working all 72 sections and chalking up 1025 contacts. His performance surpasses all previous records by a terrific margin! A near tie was the score of W3BES, 183,180 points, amassed from 1032 contacts and a sections-worked total of 71.

Honors for the third highest score go to W3DGM, who had 945 contacts, worked 71 sections, for a grand total of 167,560 points. Others who topped the '47 record were: W6HZT, operated by W6HJT, with 164,070 points, 922 QSOs and 72 sections; W9FOI, 160,193 points, 908 contacts, 71 sections.

The following are those who also scored in the six-digit bracket: W9RQM 156,289, W4KFC 149,100, W6IFW 144,663, W9FJB 143,288, W6AOA 140,875, W6WNI 140,613, W4KVX 139,400, W4JFE 139,060, W3DPA 136,620, W8PQK 133,480, W3GAU 131,971, W2BXA 131,794, W7KEV 131,655, W1RY 131,338, W9ERU 130,113, W2SSC 129,030, W2HEH 127,978, W7FZA 126,469, W9GRU 126,000, W3BXE 125,063, W8RSP 124,775, W6MVQ 124,425, W3HUS 124,250, W8ROX 124,034, W4NNN 123,338, W9LVR 122,820, W2PWP 122,150, W2FBA 122,130, W7GEB 121,888, W4KFT 121,193, WØJNC 121,095, WØYCR 121,028, W1JYH 120,098, W9CYU 119,560, W6KRI 119,340, W6EPZ 119,280, W3JTC 119,048, W8OYI 117,425, W2GFG 117,300, W9WFS 116,078, W9OLU 115,913, W5KC 115,500, WØFRE 114,540, W3FQZ 114,195, W1BIH 113,575, W2IMU 113,100, W1KYK 112,710, WØRYJ 112,472, W1TS 112,125, W3ARK 112,058, W9WEN 111,870, W1AYJ 111,690, W3FUF 110,160, W1MJL (W1LWA opr.) 110,055, W9NII 109,193, VE3KE 109,055, W3EIS 108,244, W1EOB 107,800, W2PIN 107,703, W7QAP 107,535, W1DHD 107,236, W8OZA 106,943, W3FQB 106,760, W3EIV (W4KXN opr.)106,420, W1EZ 106,080, W2OXX 105,273, W3KT 105,225, W3GJY 105,185, VE3VO 104,125, W4IA 103,615, W2KIR 103,515, W5MMT 102,343, WØIC 102,000, W9OAT 101,227, W4IIY 101,065, W4LUE 100,733, W2PJM 100,500.

VE3KE turned in the highest Canadian score, 109,055, earned through 645 contacts with 68 sections. QSOs with 615 stations and 68 sections gave VE3VO a 104,125-point total for the second-place VE, and VE3AM scored 89,840 for third place. The "high ten" in Canada include VE6AO 83,504, VE7ALE 86,176, VE5QZ 87,803, VE3AGX 78,987, VE3AHV 78,725, VE3EF 74,414, VE6BU 73,150.

Ten stations were in the 700-or-over contacts

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class in the previous SS. The number in that class this time was 46! Leading all contestants in number of contacts was W4KFC with an all-time record of 1067 QSOs. W3BES and W2IOP went over the thousand mark with 1032 and 1025 contacts respectively. Following, with 800-or-more contacts: W3DGM 945, W6HZT 922, W9FOI 908, W9RQM 887, W9CYU 860, W6EPZ 840, WØRYJ 833, W9FJB 830, W4JFE 821, W4KVX 820, W6IFW 817, W6WNI 808, W6AOA 805, W1DHD 800.

Sections Worked

The 'phones took the greater share of the honors in working all sections; W1ATE, W6CHV, W6QEU, W8HUD, and WØGZD talked their way through contacts with 72 sections. Brasspounders W2IOP, W6HZT and W6SN made a clean sweep of all sections on c.w. The following each missed but one section: *C.W.* — W2BXA, W2HEH, W3BES, W3DGM, W3EVW, W3GAU, W5LW, W6AM, W6EPZ, W6IFW, W6SRU, W7FZA, W8PQK, W9AND, W9FOI, W9RQM, VE7ALE. *'Phone* — W3DHM, W4LZX (W3MFM opr.).

'Phone Highlights

As in the '47 affair, the West Coast stole the show on 'phone. With a healthy lead on the competition, W6QEU tallied 85,896 points resulting from 601 contacts with all sections, to set a new 'phone-score record. Runner-up in the 'phone category, W6UBT, likewise made 601 contacts, and worked 66 sections to score 78,936. Both W6QEU and W6UBT operated in the over-100-watt class. With his transmitter operating at the 100-watt level, W6MLY, 1947 'phone leader, had 421 contacts with 69 sections and a score of 72,536 for third-high honors. Other outstanding 'phone scores: W1ATE 66,888, W6TT 65,008, W6PWR 62,160, W8HUD 61,344, WØGZD 60,000, W6CHV 56,520, W9RBI 56,000, W4LZX (W3MFM opr.) 55,380, W4JYD 54,437, WØFUH 49,939, W6WTL 48,768, WØOMG 47,110, W5FHE 46,356, WØSBE 45,126, W7IXL 45,061, W7PUM 43,283, W1BFB 39,065, W5FH 38,919, W5SMA 38,870, W6WLI 38,052, W7EYD 37,317, W1HRI 35,650, W4FLS 35,442, VE6NA 35,123, WØBIW 34,272, W3DHM 34,222, W4IWO 34,125, W6TFZ 33,840, VE3AIU 33,741, W7JGS 31,992, W4LXE 31,915, W4KCQ 31,746, W7MLJ 31,395, W2SKE 31,350, W5DDI 30,558, WØJYW 30,355.

The previous SS 'phone QSO record was 477, made in the '47 fray by W6AM. With their 601-contact totals in this SS, W6QEU and W6UBT tied in setting a new record. W6TT also topped slightly the old mark with 478 contacts. Other QSO leaders were W1ATE 465, W6PWR 455, W8HUD 427, W6MLY 421, W6WTL 382,

CLUB SCORES

Club	*Score*	*C.W. Winner*	*'Phone Winner*
Potomac Valley Radio Club	3,496,634	W4KFC	W4IWO
Frankford Radio Club (Phila.)	2,741,333	W3BES	W3DHM
Greater Cincinnati Amateur Radio Assn.	769,117	W4KVX	K9AAY
North Suburban Radio Club	606,921	W9FJB	W9QKM
Detroit Amateur Radio Assn.	573,856	W8RRP	—
El-Ray Radio Club	503,917	W1BGD	W1PKV
Northern California DX Club	490,237	W6MVQ	W6MLY
West Side Radio Club (Ont.)	396,135	VE3VO	—
Denver Radio Club	329,818	WØFRE	WØSBE
Wisconsin Valley Radio Assn.	329,396	W9RQM	W9VHA
Mid-South Amateur Radio Assn.	315,922	W4IIY	—
Queens Radio Amateurs	292,242	W2GXC	—
Northwest Amateur Radio Club	276,834	W9NII	—
Milwaukee Radio Amateurs Club (Wis.)	274,915	W9LVR	—
K B T Radio Club (N. Y.)	269,626	W2CLO	—
Narragansett Assn. of Radio Operators	269,317	—	W1BFB
Buckeye Shortwave Radio Assn. (Ohio)	264,620	W8OYI	—
Sioux City Amateur Club (Iowa)	263,432	WØFZO	—
Bridgeport Radio Amateur Club (Conn.)	262,650	W1RY	—
Rochester Amateur Radio Club (N. Y.)	259,365	W2FBA	—
Hampden County Radio Club (Mass.)	251,571	W1JYH	—
Dade Radio Club (Fla.)	247,309	W4ILE	—
Cleveland Brasspounders Assn.	239,776	W8ROX	—
Monmouth County Amateur Radio Assn. (N. J.)	239,496	W2OOC	—
Delaware Amateur Radio Club	208,187	W3DPA	—
Beaver Valley Amateur Radio Assn.	202,118	W3GJY	—
Twin City Radio Club (Conn.)	199,828	W1KQY	—
Calgary Amateur Radio Assn.	197,041	VE6AO	—
Conn. Wireless Assn.	196,207	W1NJM	—
Wesco Amateur Radio Society (Penn.)	169,409	W3GRZ	W3KQU
Worcester County Radio Assn. (Mass.)	163,093	W1KJO	—
Old Pueblo Radio Club (Ariz.)	160,831	—	W7MAW
Columbus Amateur Radio Assn. (Ohio)	151,774	W8LFE	—
Stockton Amateur Radio Club (Calif.)	133,304	W6HIP	—
West Palm Beach Radio Club (Fla.)	127,535	W4BRB	W4BRB
Inter-City Amateur Radio Club (Ohio)	121,245	W8PIH	W8TAJ
South Lyme Beer, Chowder and Propagation Society	118,523	W1LVQ	—
Northern New Jersey Radio Assn.	116,116	W2EQS	—
Case Institute of Technology Radio Club	112,943	W8YPT	—
British Columbia Amateur Radio Club	100,689	VE7VX	—
Canton Amateur Radio Club	97,374	W8ZWX	—
Cahokia Amateur Radio Club (Ill.)	88,374	W9TCK	—
Red River Radio Amateur Club (N. Dak.)	83,343	WØLHS	—
ECO Net Radio Club (Mich.)	70,501	W8MPT	—
Manchester Radio Club (Conn.)	65,562	W1NMP	—
Point Radio Amateurs (Wis.)	62,898	W9KXK	—
Black Hills Amateur Radio Club (S. Dak.)	47,552	—	WØQHX
Holy Cross College Amateur Radio Club	18,163	W1JBQ	—

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W0OMG 338, W0GZD [illegible], W[illegible]JYB 32[illegible] W0SBE 327, W4LZX (W3MFM opr.) 321, W9RBI 320, W6CHV 315, W7IXL 308, W6WLI 305, W7PUM 304, W1BFB 303, W5SMA 300.

Club Scores

In the competition for the special gavel award offered to the club whose members submit the highest aggregate score, 48 groups submitted entries. The Frankford Radio Club of Philadelphia heretofore had won every SS gavel offered; they received eight such awards, a grand long-term performance for which they deserve a big hand. The gavel award for this SS goes to a group that has been up-and-coming in the last several club competitions, the Potomac Valley Radio Club. In third place last year, they went all-out this time and turned in the highest aggregate club score — 3,496,634 points. We salute you, P.V.-R.C., on a fine demonstration of teamwork!

With their 2,741,333-point aggregate score, the Frankford Radio Club took second place easily. The Greater Cincinnati Amateur Radio Association, old hands in the matter of club competitions, earned third place with 769,117 points. Special certificate awards are being made to the leading 'phone and c.w. operators in each club that submitted the minimum number of entries required by the rules. The calls of club members who qualified for these individual awards are listed in an accompanying tabulation together with the aggregate scores of their respective clubs.

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And so we close another chapter in the history of the ARRL Sweepstakes. The 1949 SS is scheduled in the ARRL Calendar of Activities for November 19th–20th and 26th–27th. If you're a contest addict, you won't miss it for anything. If you've never taken part in this annual battle of operating skill, plan to be on hand for a real test of your ability, the opportunity to develop proficiency, and just plain fun! — *J. M.*

SCORES
Fifteenth Sweepstakes Contest

Scores are grouped by Divisions and Sections. . . . The operator of the station first-listed in each Section is award winner for that Section. . . . Asterisks denote stations not entered in contest, reporting to assure that stations they worked get credit. . . . Likewise the "power factor" used in computing points in each score is indicated by the letter A or B. . . . A indicates power up to and including 100 watts (multiplier of 1.25), B indicates over 100 watts (multiplier of 1). . . . 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 183,180–1032–71–A–40, or, final score 183,180, number of stations 1032, number of sections 71, power factor of 1.25, total operating time 40 hours. . . . Stations manned by more than one operator are grouped in order of score following single-operator station listings in each section tabulation; calls of participants at multioperator stations are listed in parentheses.

[illegible]NTIC DIVISION

E. Pennsylvania

W3BES	183,180-	1032-	71-	A-40
W3DGM	167,560-	945-	71-	A-40
W3BXE	125,063-	725-	69-	A-40
W3HUS	124,250-	725-	70-	A-40
W3ARK	112,058-	670-	67-	A-40
W3FUF	110,160-	650-	68-	A-40
W3KT	105,225-	610-	69-	A-36
W3HRD	95,550-	546-	70-	A-40
W3EYW	91,413-	515-	71-	A-37
W3CPS	88,910-	530-	68-	A-37
W3FLH	80,215-	526-	61-	A-36
W3GYV	67,856-	495-	55-	A-31
W3GQW	64,575-	410-	63-	A-32
W3EWR	62,152-	462-	68-	B-40
W3CHV	58,080-	441-	66-	B-30
W3GHM	52,448-	333-	63-	A-16
W3IXN	35,888-	261-	55-	A-18
W3KDF	29,340-	245-	48-	A-21
W3ENH	27,480-	229-	48-	A-24
W3LCV	24,278-	249-	39-	A-14
W3ADE	24,000-	250-	48-	B-20
W3HHS	19,800-	240-	33-	A-31
W3GHD	14,575-	110-	53-	A- 8
W3DFJ	12,685-	119-	43-	A-22
W3CGS	11,648-	112-	52-	B-19
W3GDI	8,084-	112-	29-	A-18
W3KEW	8,000-	128-	25-	A-19
W3BNS	6,784-	102-	27-	A-37
W3AXA	5,500-	100-	22-	A-16
W3DMQ	5,050-	101-	20-	A——
W3QS	4,125-	75-	22-	A-12
W3GRS	2,750-	50-	22-	A- 3
W3GQS	2,651-	51-	21-	A- 8
W3AGV	1,015-	29-	14-	A- 4
W3CPV (W3s CPV EKK)	118,162-	685-	69-	A-37
W3EQA (W3s EQA GYV HRD KT)	97,625-	560-	71-	A-36
W3ISE (W3s FWH ISE)	95,209-	606	63-	A-40

'Phone

W3DHM	34,222-	241-	71-	B——
W3MQC	5,220-	72-	29-	A-10
W3CPV	70-	14-	2-	A- 1
W3KT	70-	14-	2-	A- 2
W3BES	65-	13-	2-	A- 1
W3EQA	55-	11-	2-	A- 1
W3ISE	55-	11-	2-	A- 1
W3GHD	40-	8-	2-	A——
W3IXN	13-	5-	1-	A——

Md.-Del.-D. C.

W3DPA	136,620-	792-	69-	A-39
W3GAU	131,971-	744-	71-	A-38
W3JTC	119,048-	722-	66-	A-40
W3FQZ	114,195-	664-	69-	A-36
W3EIS	108,244-	628-	69-	A-40
W3FQB	106,760-	629-	68-	A-40
W3EIV	106,420-	627-	68-	A-40
W3AEL	98,312-	605-	65-	A-40
W3KDP	97,350-	590-	66-	A-40
W3FYS	89,864-	537-	67-	A-40
W3FPQ	78,557-	470-	67-	A-39
W3HQX	69,905-	451-	62-	A-39
W3EFZ	66,345-	416-	64-	A-34
W3DRD	58,560-	366-	64-	A-25
W3LVJ	55,605-	337-	66-	A-26
W3LUL	54,250-	312-	70-	A-36
W3LTW	53,040-	333-	64-	A-31
W3KZQ	52,875-	353-	60-	A-34
W3HTK	50,700-	338-	60-	A-29
W3JYS	50,490-	386-	66-	B-33
W3WV	48,983-	311-	63-	A-35
W3MCG	48,300-	345-	56-	A-37
W3JKO	47,704-	356-	67-	B-24
W3BOU	46,650-	311-	60-	A- 7
W3AWS	45,290-	332-	56-	A-40
W1MV/3	39,462-	287-	55-	A-38
W3FDJ	35,649-	350-	51-	B-31
W3KZR	31,850-	206-	49-	A-25
W3WU	27,908-	184-	61-	A-24
W3GBB	26,992-	178-	61-	A-21
W3CJS	18,379-	189-	39-	A-24
W3LZM	18,096-	189-	48-	B-17
W3OPO	16,320-	197-	34-	A-19
W3JGK	15,788-	211-	30-	A-33
W3BUB	15,756-	204-	39-	B-31
W3JZY	15,725-	170-	37-	A-19
W3MNO	15,120-	141-	54-	B-18
W3IL	14,911-	202-	37-	B-19
W3OFU	12,664-	154-	33-	A-20
W3MAQ	8,882-	105-	34-	A-16
W3MTQ	6,048-	108-	28-	B- 9
W3IYE	4,125-	50-	33-	A- 3
W3FY	3,848-	74-	26-	B- 8
W3HVM	3,645-	54-	27-	A- 7
W3GZF	3,465-	66-	21-	A-10
W3OQJ	3,063-	49-	25-	A- 9
W3SVD*	1,473-	31-	19-	A- 6
W3MSR	1,275-	30-	17-	A- 6
W3OPQ	1,160-	29-	16-	A- 4
W3OYR	717-	21-	14-	A- 4
W3NLX (W3s NLX OEJ)	37,630-	355-	53-	B-40

'Phone

W3DKT	21,204-	173-	62-	B-35
W3EQK	13,932-	129-	54-	B-30
W3LEW	13,392-	142-	48-	B-13
W3MTQ	8,256-	96-	43-	B——
W3IYE	3,136-	49-	32-	B- 8
W3BKK	1,218-	29-	21-	B- 3
W3OQM/3	450-	15-	12-	A- 1
W3FPQ	8-	3-	1-	A- 1
W3WY	5-	2-	1-	A- 1
W3MBY*	2-	1-	1-	——

So. New Jersey

W2HEH	127,978-	722-	71-	A-39
W2PWP	122,150-	698-	70-	A-38
W2IMU	113,100-	696-	65-	A-40
W2PIN	107,703-	643-	67-	A-38
W2OXX	105,273-	630-	67-	A-38
W2RDK	96,525-	585-	66-	A-26
W2QCM	91,120-	544-	67-	A-32
W2AQW	76,800-	480-	64-	A-18
W2QCL	72,400-	453-	64-	A-37
W3 [illegible]F/2	62,687-	425-	59-	A-31
W2FXN	51,675-	345-	60-	A-15
W2ZCF	48,400-	354-	55-	A-33
W2PAU	47,250-	318-	60-	A-30
W2UAP	29,375-	250-	47-	A-23
W2QED	27,300-	282-	39-	A-40
W2BWC	15,510-	188-	33-	A-32
W2YOW*	4,224-	66-	32-	—11
W2YJP	2,704-	52-	21-	A- 8
W2RFF*	1,785-	42-	17-	A- 7
W2TGC	105-	7-	6-	A- 1

'Phone

W2QKE	14,805-	126-	47-	A-10
W2YOS	8,034-	104-	39-	B-31
W2QKJ	6,068-	83-	37-	B-19
W2HEH	35-	7-	2-	A——

W. New York

W2SSC	129,030-	753-	69-	A-40
W2FBA	122,130-	708-	69-	A-40
W2PJM	100,500-	600-	67-	A-37
W2QHF	92,250-	615-	60-	A-36
W2WFU	86,080-	539-	64-	A-39
W2PPA	76,553-	522-	59-	A-40
W2PGT	66,000-	480-	55-	A-28
W2CLO	61,800-	412-	60-	A-31
W2PVL	55,800-	360-	62-	A-28
W2UVE	53,200-	335-	64-	A-28
W2RQH	48,648-	336-	58-	A-28
W2KEL	47,792-	415-	58-	A-40
W2EWT	47,712-	426-	56-	B-33
W2WZQ	43,478-	342-	51-	A-35
W2TMI	42,480-	291-	59-	A-34
W2VYX	32,450-	275-	59-	B-38
W2SO	30,525-	278-	55-	—31
W2ZFI	25,900-	185-	56-	A-24
W2QJM	25,245-	198-	51-	A-21
W2DOD	22,832-	199-	46-	A-13
W2USO	22,127-	167-	53-	A-17
W2WOE	19,992-	238-	42-	B-17
W2ADV	16,195-	158-	41-	A- 8
W2BEN	12,765-	173-	37-	B-21
W2PPL	12,064-	208-	29-	B-14
W2VXA	11,760-	113-	42-	A-27
W2UAC	10,868-	163-	27-	A-20
W2RJV	8,093-	125-	26-	A-17
W2UZN/2	7,431-	103-	29-	A-24
W2ZIE	6,400-	80-	32-	A-10
W2RSV	5,014-	96-	21-	A- 7

JFLINT

W2WIK 3,939- 69-23-A-7
W2QQ 3,920- 56-35-A- 8
W2RUK 3,083- 70-18-A- 9
W2SYC* 2,975- 60-20-A- 8
W2FYH 2,820- 48-30-B- 6
W2PYC 2,450- 52-20-A- 8
W2ZS 2,070- 35-24-A- 8
W2VUE 1,320- 33-16-A- 7
W2VBH 1,008- 31-13-A- 9
W2YBP/2 495- 18-11-A- 3

'Phone

W2ROM 25,870- 199- 6-B-35
W2PVG 25,326- 201-63-B-33
W2PDB 18,923- 131-58-A-40
W2VUE 13,650- 105-52-A-25
W2JPO* 158- 9- 7-A- 2
W2RUK 50- 5- 4-A- 1
W2WKO* 16- 4- 4-— 1

W Pennsylvania

W3GJY 105,185- 618-68-A-40
W3KWL 80,213- 465-69-A-37
W3OEW 69,913- 401-70-A-37
W3HXA 57,117- 375-62-A-38
W3MKH 56,358- 400-57-A-40
W3RWJ 54,145- 417-65-B-38
W3QZF 50,325- 330-61-A-36
W3NRE 46,475- 286-65-A-29
W3LWN 34,765- 209-68-A-21
W3POW 27,020- 193-56-A-31
W3GRZ 25,370- 215-59-B-19
W3ODB 14,300- 131-44-A-17
W3RNH 14,087- 161-35-A-29
W3AVY 13,072- 173-38-B-31
W3TTN 12,870- 134-39-A-20
W3UVD 11,440- 145-32-A-34
W3NCJ* 11,250- 150-30-A- 6
W3RJK 10,325- 147-28-A-11
W3SCH 10,246- 109-47-B-10
W3MIZ 9,555- 138-35-B-11
W3OFJ 7,388- 100-30-A-18
W3OMG 4,988- 67-30-A-19
W3CLM 2,875- 50-23-A-13
W3VK 2,368- 64-37-B-14
W3AKG* 1,980- 36-22-A- 8
W3DLI 833- 20-18-A- 5
W3KJM* 140- 10- 7-— 3
W3UHN* 123- 7- 7-A- 1
W3MMW 120- 8- 6-A- 4

'Phone

W3LQX 23,668- 195-61-B-40
W3AER 21,168- 168-63-B-21
W3KQU 18,540- 157-60-B-30
W3OIU 14,159- 121-47-A-32
W3ORP 8,050- 115-35-B-32
W3LIW 2,250- 36-25-A- 4

CENTRAL DIVISION

Illinois

W9FOI 160,193- 908-71-A-39
W9FJB 143,288- 830-69-A-40
W9ERU 130,113- 744-70-A-40
W9GRV 126,000- 720-70-A-40
W9WFS 116,078- 700-67-A-34
W9OLU 115,913- 703-66-A-40
W9NII 109,193- 633-69-A-40
W9OAT 101,227- 614-66-A-38
W9AEW 90,440- 665-68-B-38
W9JUO 89,513- 544-66-A-40
W9AGM 87,267- 521-67-A-38
W9INN 84,000- 525-64-A-30
W9IPT 80,190- 487-66-A-38
W9SBB 73,320- 564-65-B-33
W9EMJ 72,896- 544-67-B-36
W9LM 68,256- 408-67-A-27
W9PVA 67,939- 447-61-A-40
W9TMU 61,132- 375-66-A-31
W9FAU 52,731- 358 59-A-39
W9EHS 51,935- 335-62-A-36
W9AND 46,647- 329-71-B- -
W9LVD 41,600- 260-64-A-24
W9BMV 41,268- 330-63-B-21
W9TCK 40,992- 369-56-B-33
W9GQI 40,906- 299-55-A-39
W9VOQ 38,063- 262-58-A-17
W9YTV 36,506- 266-55-A-20
W9AJJ 35,625- [illegible]-67-A-27
W9ZWN 32,864- 316-52-B-25
W9SIV 30,300- 253-60-B-24
W9NJZ 29,412- 258-57-B-28
W9DRB 28,860- 222-52-A-19
W9CMC 27,378- 233-47-A-35
W9EBX 23,520- 240-49-B-28
W9NVW 21,993- 197-45-A-24
W9LP 18,910- 155-61-B-16
W9RWB 18,720- 240-39-B-14
W9RQT 17,955- 174-42-A-23
W9FWB 17,360- 124-56-A-21
W9ANY* 15,561- 200-39-—-22
W9IFM 14,620- 172-34-A-13
W9KXD 13,750- 110-50-A-20
W9QIE 12,480- 165-32-A-32
W9KDI 12,065- 108-46-A-13
W9GOQ 9,594- 117-41-B-15
W9YTS 9,576- 126-38-B-19
W9FIN 9,144- 127-36-B- 9
W9AYH 8,925- 119-30-A-16
W9ECD 8,496- 118-36-B-11
W9BGN 8,325- 74-45-A-17
W9RNL 6,900- 121-24-A-16
W9NMY 6,222- 93-34-B-12
W9ZQF 5,463- 59-38-A- 8
W9EGR 5,350- 80-27-A-17
W9MRQ 4,368- 93-24-B- 6
W9OBW 3,780- 65-24-A-10
W9CQS* 3,699- 70-27-—-7
W9TAL 2,500- 40-25-A- 3
W9BLS 2,375- 49-20-A-18
W9ZPC 2,048- 46-18-A- 6
W9JTX 1,848- 44-21-B- 7
W9LIN 1,659- 40-21-B-14
W9EBZ 1,573- 37-17-A-11
W9ZRG 1,500- 40-15-A- 5
W9DMY 1938- 25-15-A-10
W9GDI* 40- 5- 4-— -
W9AOU 20- 4- 2-A- 4
W9DCF* 2- 1- 1-—-1
W9QIE (W9s BXK CDO QIE)
71,610- 548-66-B-40
W9PRS (W2UUX W9PRS)
27,445- 250-55-B-26

'Phone

W9SKM 22,560- 188-60-B-24
W9IT 5,860- 71-40-B- 8
W9QKM 5,025- 69-30-A-17
W9SES 4,536- 81-28-B-25
W9TAL 2,250- 36-25-A- 5
W9ZWF 1,845- 41-18-A-15
W9BLZ 1,473- 31-19-A- 4
W9EBZ 1,440- 41-18-B- 7
W9KCW 1,275- 30-17-A-14
W9CQS* 1,134- 28-21-— 3
W9FRP 805- 23-14-A- 7
W9MZP 336- 14-12-B- 4
W9AOU 315- 21- 6-A-20

Indiana

W9CYU 119,560- 860-70-B-40
W9DGA 60,923- 402-61-A-26
W9QLW 55,148- 407-68-B-34
W9NZZ 54,338- 316-69-A-27
W9KYM 43,980- 368-60-B-33
W9DKV 42,120- 327-52-A-31
W9NH 41,938- 275-61-A-28
W9EY 34,886- 222-63-A-18
W9CNG 34,775- 214-65-A-32
W9APY 30,420- 255-60-B-16
W9SFR 24,246- 226-54-B-23
W9VDB 23,598- 207-57-B-15
W9MKM 21,600- 240-45-B-10
W9CLY 20,075- 147-55-A-37
W9UKT 15,180- 132-46-A- -
W9IOH 12,750- 100-51-A-14
W9TT 9,775- 115-34-A-14
W9NXU 8,400- 113-30-A-12
W9CMJ 7,661- 83-47-B-13
W9CLY 828- 23-18-B- 5
W2OSB/9 15- 3- 2-A- 1

'Phone

K9AAY 15,555- 122-51-B-20
W9ZCI 13,550- 136-50-B-25
W9DCM 4,662- 63-37-B-21
W9CLY 2,058- 49- 21-B- 9
W9NUB 1,890- 36-21-A-11
W9BKJ 1,332- 37-18-B- 6

Wisconsin

W9RQM 156,289- 887-71-A-40
W9LYR 122,820- 713-69-A-40
W9WEN 111,870- 680-66-A-40
W9UIT 87,285- 506-69-A-40
W9DJV 86,310- 549-63-A-32
W9KZZ 84,810- 519-66-A-32
W9FZC 68,005- 406-67-A-31
W9KXK 53,393- 339-63-A-33
W9ZTO 42,560- 266-64-A-29
W9CBE 41,318- 302-55-A-26
W9JBF 41,250- 300-55-A-29
W9IWT 31,138- 233-53-A-20
W9FTH 24,800- 251-50-B-25
W9MDG 24,684- 220-56-B-19
W9RKP 21,000- 175-60-B-29
W9RH 18,576- 172-54-B-17
W9DKH 15,600- 200-39-B-11
W9HMU/9 14,270- 130-44-A-27
W9WJH 11,941- 117-41-A-20
W9RLB 7,605- 78-39-A- 9
W9BBC 7,163- 99-30-A-21
W9WXD 6,784- 102-27-A-24
W9ERW 6,453- 89-29-A-20
W9DSP 6,270- 105-30-B-16
K9NRO 4,205- 73-29-B-15
W9AEY 3,575- 55-26-A-14
W9CFL 1,660- 42-16-A- 9
W9CWZ 682- 21-13-A- 5
W9EBF 665- 20-14-A- 9
W9NKK 550- 20-11-A- 1
W9LFK 512- 16- 7-— 3
W9PMS 88- 7- 5-A- 9
W9RCM* 2- 1- 1-— 1

'Phone

W9RBI 56,000- 320-70-A-37
W9BVU 23,638- 156-62-A-33
W9ZTO 5,119- 91-45-A- -
W9VHA 3,562- 57-25-A- 9
W9HEE 3,250- 65-25-B- 9
W9CYN 1,924- 42-19-A- 9
W9EWM 1,472- 46-16-B- -
W9NVJ 1,000- 25-16-A- 5
W9ESJ 350- 20- 7-A- 3
W9QJW 196- 14- 7-B- 2

DAKOTA DIVISION

North Dakota

WØEOZ 66,330- 503-66-B-34
WØHSM 66,300- 413-65-A-39
WØLHS 46,360- 309-61-A-20
WØBJG 32,258- 283-46-A-32
WØCAQ 4,725- 73-27-A-12
WØAZV 2,423- 57-17-A- 9
WØSWC 325- 13-10-A- 2
WØHSC (WØs AIU BJG BZJ HIV RRW) 31,875- 259-50-A-37

'Phone

WØGZD 60,300- 335-72-A-30
WØWFO 15,984- 151-54-B-16

So. Dakota

WØPHR 90,366- 545-67-A-39
WØYJO 34,404- 283-61-B-34
WØVOD 9,030- 105-43-B-14
WØGFG 4,800- 71-30-A-31
WØBLK 3,762- 57-33-B- 7
WØWUU 1,520- 32-19-A- 4
WØQVY* 120- 10- 6-— -

'Phone

WØQHX 16,995- 157-44-A-17
WØIWE 15,960- 153-42-A-24
WØVT 9,258- 83-46-A-22
WØJLS 6,035- 72-34-A-11
WØWUU 180- 9- 8-A- 3
WØGFG* 10- 2- 2-A- -

Minnesota

WØJNC 121,095- 702-69-A-40
WØYCR 121,028- 737-66-A-32
WØTKX 97,020- 592-66-A-39
WØPPK 78,065- 605-65-B-33
WØFID 28,571- 206-57-A-14
WØPIG 22,755- 162-56-A-17
WØBEJ 21,571- 204-53-B-16
WØGOP 20,445- 175-47-A-28
WØKPQ 10,900- 109-40-A-18
WØKYE 3,548- 53-33-A-31
WØDNY 2,220- 37-24-A-10

'Phone

WØVIP 23,800- 141-68-A-24
WØSZC 6,450- 87-30-A-15
WØBOL 2,520- 42-30-B- 5
WØOBM 2,460- 41-30-B- 3
WØHPJ 1,700- 35-20-A-12

DELTA DIVISION

Arkansas

W5LUY 71,190- 567-63-B-19
W5DRW 48,093- 350-69-B-30
W5ONL 31,174- 250-51-A-37
W5FMF 1,296- 31-17-A- 6
W5OXL 75- 6- 6-A- 4

'Phone

W5AQF 14,472- 134-54-B-20
W5DRW 4,255- 58-37-B- 4

Louisiana

W5KC 115,500- 702-66-A-39
W5WG 86,625- 525-66-A-40
W5USN 82,460- 596-70-B-35
W5MHZ 67,388- 503-68-B-39
W5BUK 65,898- 526-63-B-40
W5OM 37,855- 283-67-B-29
W5VT 29,884- 241-62-B-17
W5LUU 28,056- 253-56-B-19
W5NMS 26,688- 202-53-A-19
W5MWE 25,128- 223-46-A-37
W5BI 16,170- 154-42-A-18
W5RX 11,869- 107-45-A-20
W5LMJ/5 11,707- 113-42-A-19
W5FYS 10,998- 118-47-B- 9

'Phone

W5LDH 16,483- 162-53-B-19
W5GHF 15,157- 120-63-B-19
W5EM 10,700- 107-50-B-20
W5PBC 2,871- 51-29-B-15
W5PEA 2- 1- 1-B- -

Mississippi

W5MMT 102,343- 615-67-A-40
W5LPL 120- 8- 6-A- 4

'Phone

W5OAE 15,410- 138-46-A-22
W5IHP 14,670- 164-45-B-25
W5LPL 23- 3- 3-B- 3

Tennessee

W4IIY 101,065- 596-68-A-40
W4ERN 97,563- 563-70-A-38
W4FCF 97,160- 694-70-A-36
W4NNJ 90,025- 554-65-A-38
W4BAQ 88,492- 514-69-A-40
W4HOJ 65,423- 429-61-A-40
W4KH 53,600- 400-67-B-39
W4MRD 52,350- 350-60-A-35
W4CVM 43,050- 308-56-A-27
W4BOR 40,453- 266-61-A-32
W4BAO 29,205- 248-59-B-23
WØYDZ/4 5,680- 73-32-A-15

'Phone

W4FLS 35,442- 269-66-B-29
W4AQR 21,838- 179-61-B-62

GREAT LAKES DIVISION

Kentucky

W4KVX 139,400- 820-68-A-40
W4ZWR 75,562- 465-65-A-32
W4OMW 28,635- 251-46-A-21
W4NKM 24,339- 205-61-B-37
W4NIX 24,080- 224-43-A-35
W9BPS/4 5,950- 85-28-A-21
W4MSC 2,175- 44-20-A- 5

'Phone

W4YNQ 21,168- 168-63-B-14
W4KZF 14,700- 121-49-A-15
W4UUR 6,820- 78-44-B-14
W4IYH 1,560- 33-24-B- 6

Michigan

W9NGR/8 93,330- 549-68-A-37
W8RRP 83,912- 617-68-B-40
W8UBM 82,425- 551-60-A-40
W8GQB 78,804- 598-66-B-40
W8SCW 71,556- 535-67-B-32
W8BGY 67,600- 570-65-B-40
W8GSJ 64,998- 472-69-B-38
W8DNM 58,987- 484-61-B-35
W8TRN 58,920- 491-60-B-30
W8BXZ 53,100- 365-59-A-38

W8BDF 46,507- 351-52-A-27
W8UQR 42,466- 321-53-A-37
W8DDR 38,525- 231-67-A-30
W8GP 32,205- 226-57-A-21
W8IXJ 31,065- 327-38-A-28
W8MPT 28,600- 261-44-A-27
W8VKU 24,794- 173-58-A-29
W8CNC 24,605- 261-38-A-30
W8IHR 24,581- 264-47-B-25
W8ZWM 18,135- 203-36-A-20
W8SWA 17,448- 149-47-A-21
W8AYV 15,030- 167-36-A-24
W8BWS 14,364- 131-57-B-29
W8ARJ 14,280- 120-48-A-11
W8DM 12,780- 142-36-A-20
W8AIB 11,880- 132-36-A-20
W8QQK 9,796- 158-31-B-18
W8YCT 8,955- 100-45-B-15
W8KPL 8,700- 87-50-B- 8
W8HAN 8,415- 102-33-A-21
W8YFQ 7,210- 103-28-A-19
W8EGI 7,000- 80-35-A-16
W8FX 6,148- 106-29-B-13
W8MGQ 5,750- 100-23-A-10
W8BBK 5,200- 104-20-A-17
W8SLW 4,688- 64-30-A-16
W8CDQ 3,925- 79-25-A- 7
W8YDJ 3,188- 51-25-B- 8
W8TNO 2,590- 75-14-A-16
W8INF 2,310- 43-22-A-18
W8ZLH 1,120- 28-16-A-10
W8KWX 675- 28-10-A- 8

Phone

W8HUD 61,344- 427-72-B-37
W8SOE 6,480- 90-36-B—
W8TIC 2,750- 50-22-A- 8

Ohio

W8PQK 133,480- 760-71-A-39
W8RSP 124,775- 722-70-A-33
W8ROX 124,034- 745-67-A-38
W8OYI 117,425- 671-70-A-38
W8OZA 106,943- 680-63-A-40
W8PNY 96,730- 576-68-A-33
W8SUZ 87,763- 579-61-A-40
W8YJE 74,960- 471-64-A-39
W8OUR 69,221- 441-63-A-40
W8LHV 68,266- 594-58-B-37
W8VTF 65,122- 443-59-A-39
W8YPT 60,102- 482-63-B-31
W8DQC 59,295- 354-67-A-24
W8CVK 58,924- 420-57-A-40
W8LFE 55,552- 434-64-B-24
W8WZ 54,714- 417-66-B-21
W8ZAU 54,080- 416-52-A-34
W8LOF 53,040- 332-64-A-32
W8PBX 52,080- 375-56-A-34
W8VHJ* 45,880- 370-62-B-19
W8PIH 44,693- 303-59-A-26
W8DAE 43,020- 360-60-A-23
W8PMJ 41,325- 291-57-A-19
W8ZWX 40,920- 333-62-B-39
W8EHH 38,760- 285-68-B-35
W8YHE 38,750- 311-50-A-31
W8EXI 38,190- 268-57-A-30
W8WE 37,910- 223-68-A-26
W8EUQ 35,250- 300-47-A-26
W8YGR 35,018- 242-58-A-29
W8PCS 32,550- 263-62-B-29
W8REY 30,067- 211-57-A-21
W8AL 29,902- 222-54-A-26
W8UPB 29,475- 329-45-B-19
W8VQI 28,545- 260-44-A-31
W8NMR 28,420- 203-56-A-27
W8DNC 26,552- 247-43-A-16
W8TYX 24,897- 217-46-A-17
W8PYX 23,320- 216-44-A-29
W8DWP 23,055- 175-53-A-27
W8BKE 21,000- 250-42-B-31
W8ZYC 19,762- 244-41-B—
W8ICC 18,480- 179-42-A-22
W8HFE 18,095- 165-55-B-14
W8UNA 16,415- 134-49-A-14
W8ZQH 16,108- 206-34-A-30
W8HOX* 15,078- 180-42-B-15
W8TKS 14,204- 134-53-B- 9
W8ZQD 13,598- 134-42-A-25
W8UOD 13,493- 130-42-A- 7
W8CTP 12,000 -201-30-B-15
W8KMP 10,400- 131-32-A-17
W8MQR 10,148- 123-33-A—
W8[illegible]H 7,500- 101-[illegible]
W8BUM 7,450- 75-40-A-11
W8EYE 7,200- 75-48-B- 7
W8ZTA 7,054- 105-27-A- 9
W8DFD 6,063- 97-25-A-25
W8WRN 6,000- 81-30-A-31
W8VTP 5,250- 75-28-A—
W8PQK 3,910- 47-34-A-19
W8BEW 3,850- 70-22-A-16
W9PN/9 3,848- 57-27-A-11
W8CSY 3,360- 66-21-A-19
W8MXO 3,150- 63-20-A-11
W8YFJ 3,094- 50-25-A- 8
W8KNP 2,933- 51-23-A- 3
W8VDF 1,283- 28-19-A- 8
W8LOT 806- 22-15-A- 9
W8PBH 675- 30-18-A- 8
W8RDZ 320- 16- 8-A- 1
W8ZFX* 90- 9- 4-A- 8
W8AI 32- 4- 4-B- 2
W8URD 10- 3- 2-B- 1
W8DER 3- 1- 1-A- 1
W8WYH (W8s WYH WZK) 6,375- 102-25-A-15

Phone

W8TAJ 28,928- 235-64-B-34
W8NCV 27,279- 219-63-B-38
W8TRX 22,125- 188-59-B-24
W8ALC 20,394- 155-66-B-40
W8NPF 20,250- 165-50-A-30
W8CNY 18,060- 153-60-B-38
W8NSS 15,618- 137-57-B-21
W8PNJ 14,500- 100-58-A-16
W8MQG 12,342- 121-51-B-24
W8ATK 10,914- 109-51-B-23
W8SRF 7,600- 95-32-A-26
W8JJM 3,500- 50-35-B-10
W8HFE 2,726- 47-29-B- 7
W8BSR 1,794- 39-23-B-20
W8VPA 1,278- 36-18-B- 3
W8KNP 975- 26-15-A- 5
W8AJW* 800- 25-16-B—
W8QZD 240- 15- 8-B- 1
W8URD 180- 10- 9-B- 2
W8WRN 144- 9- 8-B- 6

HUDSON DIVISION

E. New York

W2NRW 46,613- 339-55-A-36
W2AWF 28,000- 250-56-B-20
W2VPV 22,084- 227-39-A-24
W2TER 11,018- 113-39-A-18
W2MOU 10,032- 152-33-B-10
W2CLL 8,260- 119-35-B- 6
W1KKI/2 2,993- 64-19-A-21
W2GSB (W1NLL W2s OWO PAA SGJ PIP QBR TZN VQI W3MQX W8ULH) 10,404- 155-34-B-21

Phone

W2CFY 12,285- 138-45-B-30
W2TWU 3,612- 65-28-B-14
W2CLL 2- 1- 1-A- 1
W2GSB (W2s PIP TZN VGH VQI W3MQX) 1,886- 42-23-B-18

N.Y.C.-L.I.

W2IOP 183,690-1025-72-A-40
W2AYJ 111,690- 657-68-A-37
W2KIR 103,513- 648-65-A-39
W2UFT 70,950- 431-66-A-28
W2GXC 69,915- 476-59-A-38
W2KPA 67,498- 467-58-A-39
W2LRI 45,936- 396-58-B-40
W2GTL 45,175- 348-65-B-32
W2AOD 43,791- 333-53-A-38
W2OTC 42,273- 337-63-B-23
W2VTZ 39,060- 337-60-B-39
W2HAQ 38,186- 317-61-B-30
W2OWX 36,895- 314-47-A-38
W2KTF 35,250- 385-47-B-27
W2ZV 34,980- 212-66-A-32
W2LPA 31,388- 279-45-A-35
W2LPJ 30,910- 281-44-A-25
W2VDT 27,830- 253-44-A-29
W2GGN 24,616- 210-47-A-20
W2AJI 22,472- 212-53-B-28
W2[illegible]U 22,339- [illegible]42-37-A-[illegible]
W2TUK 22,275- 270-33-A-19
W2GP 21,937- 225-39-A-25
W2ETL 21,105- 201-42-A-26
W2UNS 19,618- 212-38-A-23
W2PRE 19,579- 114-69-A-28
W2BGO 18,630- 162-46-A-17
W2YDG 17,920- 257-28-A-21
W2CKQ 17,640- 180-49-B—
KV4AF/2 16,500- 200-33-A-22
W2LQP 16,253- 197-33-A-20
W2VYY 15,180- 258-30-B-23
W2DBI 12,600- 105-48-A-28
W2LGS 9,576- 126-38-B-12
W2NQW 7,130- 92-31-A-13
W1QJU/2* 6,500- 100-26-A—
W2JBQ 5,830- 106-22-A-10
W2SEI 4,031- 70-29-B- 5
W2RQJ 3,484- 67-26-B- 4
W2ETT 3,375- 45-30-A- 8
W2MDM* 1,920- 48-20-B- 3
W2TNI 770- 22-14-A- 9
W2LGK 748- 23-13-A- 5
W2TIM 500- 20-10-A- 6
W2ZDB 200- 10- 8-A- 7
W2VNJ 158- 9- 7-A- 5

Phone

W2SKE 31,350- 245-66-B-32
W2LHQ 11,907- 122-49-B-15
W2OTC 1,216- 32-19-B- 2
W2IHE 80- 8- 5-B- 8
W2IOP 10- 2- 2-A- 1

N. New Jersey

W2BXA 131,794- 746-71-A-40
W2GFG 117,300- 680-69-A-39
W2EQS 91,410- 556-66-A-40
W2NNL 89,944- 560-65-A-38
W2CWK 85,883- 521-66-A-39
W2OOC 83,666- 505-67-A-40
W2YLS 74,725- 490-61-A-40
W2BTG 72,600- 484-60-A-40
W2MLV 71,946- 572-63-B-39
W2AUH 69,530- 414-68-A—
W2YSE 63,518- 471-54-A-35
W2TSL 56,265- 363-62-A-38
W2EWZ 55,138- 401-55-A-39
W2TUD 54,375- 385-58-A-38
W2VJN 51,767- 360-58-A-34
W2HDT 49,228- 345-58-A-33
W2VJM 31,281- 229-55-A-19
W2HYV 19,686- 199-51-B-30
W2AGU 17,292- 131-66-B-28
W2NIY 15,875- 127-50-A-20
W2KUS 14,235- 219-26-A-13
W2WJK 11,685- 145-41-B-18
W2ABL 8,505- 126-27-A-10
W2ILF 7,634- 99-31-A-22
W2CFW 7,085- 109-26-A-22
W2SOY 2,145- 39-22-A- 5
W2QJY 1,800- 36-20-A- 9
W2YOB 468- 17-11-A- 3
W2OAE 455- 14-13-A- 4
W2YCM 140- 9- 7-A- 3
W2LTP 18- 3- 3-B- 1
W2CQB (W2s AXZ CQB) 83,498- 507-67-A-39

Phone

W2MLM 24,180- 196-62-B-30
W2ORX 5,635- 81-35-B-12
W2UWK 5,376- 34-32-B-15
W2CCS 2,987- 53-29-B-11
W2KMK 1,600- 40-20-B- 6

MIDWEST DIVISION

Iowa

WØRYJ 112,472- 833-68-B-40
WØQVA 84,263- 535-63-A-40
WØSQO 83,145- 605-69-B-30
WØFZO 76,626- 601-66-B-40
WØNCS 75,225- 443-68-A-33
WØEQN 64,890- 514-63-B-40
WØGKE 42,548- 289-61-A-38
WØNYX 41,020- 293-56-A-33
WØFGW 40,556- 265-63-A-39
WØCIO 33,523- 253-53-A-26
WØRTI 26,650- 205-52-A-35
WØATA 21,010- 191-44-A-34
WØYNW 19,195- 180-44-A-18
WØSQV 14,760- 124-48-A-18
WØSCA 1,575- 30-21-A- 7
WØJJB 1,050- 30-14-A- 8

Phone

WØAXE 13,050- 133-40-A-11

Kansas

WØBQJ 97,904- 585-67-A-39
WØDYX 86,095- 520-67-A-35
WØBYV 54,840- 460-60-B-28
WØKRV 49,973- 427-59-A-33
WØVBQ 44,720- 344-65-B-29
WØTSA 30,625- 250-49-A-25
WØAWP 14,625- 130-45-A- 8
WØYRQ 13,790- 100-56-A-19
WØFDJ 11,650- 117-40-A-25
WØYFE 8,370- 94-36-A-19
WØNCV 798- 29-14-B- 2
WØAHW (WØs AHT AHW RXI TKA) 38,520- 325-60-B-40

Phone

WØBNU 29,975- 187-60-A-37
WØAHW 8,775- 101-45-B-18
WØIPI 8,628- 104-34-A-11
WØIFR 5,358- 71-38-B- 7
WØNCV 60- 6- 5-B- 1

Missouri

WØDEA 66,170- 513-65-B-39
WØJAP 8,500- 100-34-A—
WØNNH 5,735- 75-31-A-16
WØQFH 1,116- 31-18-B-10
WØKIK 625- 25-10-A-14
WØETF* 120- 8- 6-A- 1
WØEEE (WØs FWB GKT HVO JHD JMR PWR WVN) 57,344- 457-64-B—

Phone

WØOMG 47,110- 338-70-B-38
WØGUV 3,510- 65-27-B-11
WØJAH 1,892- 43-22-B-16

Nebraska

WØOYB 92,209- 552-67-A-34
WØDNW 80,356- 497-65-A-37
WØAWN 33,020- 518-52-A-26
WØCMO 25,680- 219-60-B-21
WØMZF 4,826- 59-33-A-13
WØJJK 2,616- 46-23-A- 6

Phone

WØBIW 34,272- 272-63-B-27
WØGDB 24,552- 200-62-B-22
WØRQK 22,630- 194-62-B-27
WØEHF 10,764- 141-39-B-35

NEW ENGLAND DIVISION

Connecticut

W1RY 131,338- 752-70-A-40
W1BIH 113,575- 650-70-A-40
W1TS 112,125- 650-69-A-39
W1KQY 95,550- 588-65-A—
W1QJM 79,798- 541-59-A-40
W1JMI 73,508- 447-66-A-40
W1LVQ 64,240- 403-64-A-21
W1LHE 61,625- 425-58-A-35
W1AW 57,164- 461-62-B-26
W1IKE 53,393- 339-63-A-20
W1NJM 52,633- 421-50-A-22
W1GVK 52,584- 357-59-A-34
W1FTX 50,370- 366-69-B-26
W1QMI 50,160- 352-57-A-25
W1PZN 42,900- 390-44-A-28
W1IIN 41,310- 306-54-A—
W1HV 29,070- 204-57-A-29
W1AFB 21,375- 150-57-A—
W1DJC 14,280- 170-42-B-12
W1NMP 11,649- 179-33-B-10
W1JMY 10,388- 139-30-A- 8
W1APA 10,175- 110-37-A- 7
W1JTD 7,620- 127-24-A—

JFLINT

W1QIS 5,565- 110-21-A-
W1LIG 5,220- 72-29-A- 9
W1EFW 4,900- 70-28-A 3
W1HYF 4,778- 91-21-A- 9
W1DXT 3,661- 76-21-A-10
W1JBK 3,445- 53-26-A- 5
W1CA 3,313- 53-25-A- 5
W1DX 578- 21-11-A—
W1LFK* 400- 16-10-A- 1
W1NZM 325- 13-10-A- 2
W1PEK 312- 13-12-B- 6
W1BDI* 175- 10- 7-A- 1
W1GB (W1s FMY RDQ)
24,480- 278-45-B-29

'Phone

W1ATE 66,888- 465-72-B-39
W1OND 23,838- 209-58-B-22
W1MRP 15,100- 151-50-B-32
W1AW 7,000- 88-40-B-23
W1ODY 6,230- 178-35-B-10
W1NZM 1,100- 27-20-B- 3

Maine

W1DHD 107,236- 800-68-B-39
W1NXX 86,700- 510-68-A-40
W1RMF 70,125- 554-51-A-39
W1GKJ 70,005- 538-65-B-37
W1LHK 25,863- 186-58-A-22
W1MDF 16,353- 211-31-A-30
W1NGV 4,313- 69-25-A- 9
W1LKP 3,465- 66-21-A-16

'Phone

W1LOA 15,600- 130-60-B-22
W1GKJ 448- 16-14-B- 2

E. Massachusetts

W1BOD 71,898- 521-69-B-40
W1NXY 69,750- 450-62-A-40
W1AQE 68,045- 440-62-A-34
W1IAP 52,975- 326-65-A-38
W1QMJ 49,140- 410-60-B-39
W1OMI 43,033- 309-57-A-24
W1KMY 42,210- 268-63-A-28
W1NW 26,576- 188-57-A-22
W1PH 26,015- 242-43-A-26
W1JFH 24,868- 206-49-A-37
W1PEG 21,730- 265-41-B-28
W1PWK 17,360- 154-47-A-28
W1PMW 14,784- 154-48-B-10
W1AO 8,066- 122-27-A-17
W1JDP 7,695- 114-27-A-20
W1PLJ 5,531- 89-25-A-19
W1MRQ 4,688- 75-25-A- 9
W1LYL 4,489- 69-27-A- 9
W1JYC 4,388- 65-27-A- 9
W1ORZ 4,200- 60-28-A-10
W1JCE 3,660- 61-24-A- 9
W1ICA 2,893- 45-26-A- 5
W1PMT/1 2,820- 48-24-A—
W1MQX 2,783- 61-23-B- 7
W2WSS/1 1,916- 41-21-A-12
W1DYY 1,716- 39-22-B- 5
W1QFO 1,538- 42-15-A- 8
W1MD* 1,530- 34-18-A—
W1OTH 1,530- 35-18-A-15
W1BDS 950- 27-19-B- 5
W1GXJ 484- 22-11-B- 4
W1LNX 338- 15- 9-A- 6
W1RSR 40- 4- 4-A- 2
W1AJ 32- 4- 4-B- 1

'Phone

W1PKV 25,572- 193-53-A-30
W1PLK 22,032- 216-51-B-31
W1QUT 21,700- 175-62-B-27
W1NYO 17,360- 155-56-B-27
W1PAW 10,302- 101-41-A-25
W1QJU 6,993- 95-37-B-24
W1IXJ 6,683- 82-33-A-12
W1QMD 4,860- 81-30-B-19
W1MYD 1,000- 25-16-A- 7
W1QCK 418- 19-11-B-12
W1PMZ 416- 16-13-B- 3
W1QDX 42- 14- 3-B- 2

W. Massachusetts

W1JYH 120,098- 717-67-A-37
W1EOB 107,800- 616-70-A-36
W1KJO 81,263- 495-66-A-39
W1MUN 41,076- 326-63-B-28
W[illegible]ZW 35,483- 2[illegible]57-A-22
[illegible]PQW 30,713- 3[illegible]
W1JE 24,181- 183-53-A-18
W1BKG 18,130- 185-49-B-23
W1FKI 15,540- 210-37-B—
W1PVF/1 14,768- 180-33-A-17
W1OPJ 13,644- 153-37-A-27
W1BEF 13,022- 193-34-B-22
W1RHU 8,990- 117-31-A-15
W1PGV 7,711- 105-31-A-25
W1RIM 5,280- 90-24-A-14
W1JGY 3,938- 76-21-A- 8
W1BVR 2,268- 42-27-B- 4
W1KFV* 2,240- 40-28-B—
W1GZ 2,114- 45-19-A- 9
W1RCS 1,805- 38-19-A- 4
W1IJT* 672- 21-16-B- 2
W1BDV 450- 18-10-A- 2
W1RSQ/1 2- 1- 1-A- 1
W1JBQ (W1s JBQ RJN RSQ
W9ECL) 17,681- 173-41-A-40

'Phone

W1QXE 18,285- 161-46-A-40
W1MQK 3,700- 50-37-B- 9

New Hampshire

W1AOQ 76,125- 435-70-A-24
W1CRW 75,625- 550-55-A-35
W1CVK 22,313- 180-50-A-22
W1QJY 6,960- 87-32-A- 9

'Phone

W1HRI 35,650- 230-62-A-33

Rhode Island

W1KYK 112,710- 665-68-A-36
W1MJL 110,055- 667-66-A-36
W1CJH 89,040- 554-64-A-39
W1BBN 41,071- 311-67-B-40
W1RFQ 11,690- 170-28-A-33
W1RGA 9,695- 139-28-A-27

'Phone

W1BFB 39,065- 303-65-B-38
W1OHR 22,080- 188-64-B-19
W1NCX 15,300- 154-50-B-27
W1HLK 11,880- 135-44-B-23
W1PXI 4,095- 59-35-B-13
W1LFE 3,016- 52-29-B-12
W1QNU/1 938- 27-15-A-14
W1OLW 23- 3- 3-A- 2

Vermont

W1EZ 106,080- 624-68-A-40
W1KRY 10,605- 155-35-B-14
W1NHJ 7,395- 103-29-A-15
W1RNA 2,420- 45-22-A-25
W1QXU 473- 14-14-A- 4

NORTHWESTERN DIVISION

Alaska

KL7PB 20,247- 199-51-B-25
KL7KO 81- 6- 5-A- 5

'Phone

KG6CR/KL 710,170- 118-45-B-19

Idaho

W7ZN 73,360- 462-64-A-39
W7RIM 39,240- 327-60-B—
W7GHT/7 12,558- 162-39-B-23
W7EMT 5,236- 77-34-B- 9
W7MHR 3,450- 115-12-A-33

Montana

W7KVU 77,108- 450-69-A-40
W7BSU 43,282- 324-67-B-32
W7EWR 27,068- 202-54-A-18
W7FLB 13,056- 138-48-B-21
W7GBL 5,920- 74-32-A-19
W7LER 770- 22-14-A- 7

'Phone

W7IXL 45,061- 308-59-A-38
W7JBC 13,050- 145-45-B-17
W7IVY 3,196- 49-34-B- 6
W7LRO* 2- 1- 1-B- 1

Ore[illegible]

W7FZA 126,469- 723-71-A-36
W7GEB 121,888- 700-70-A-40
W7KXU 44,224- 347-64-B-28
W7QP 28,032- 219-64-B-37
W7LNG 13,846- 164-43-B—
W7BOH 13,780- 106-52-A-19
W7AXJ 8,428- 101-43-B-12
W7DIS 7,884- 110-36-B-10
W7HBO 4,824- 67-36-B-11
W7LT 3,218- 59-22-A-17
W7GWE 844- 38- 9-A- 9

'Phone

W7MLJ 31,395- 242-65-B-33
W7HHH 24,822- 197-63-B-26

Washington

W7UTV 82,960- 504-68-A-39
W7NLI 75,905- 449-68-A-37
W7RT* 54,786- 398-69-B—
W7KIH 54,665- 423-65-B-40
W7KWC 51,026- 416-62-B-34
W7CZY 46,029- 344-67-B-36
W7JC 41,385- 267-62-A-38
W7IPX 24,304- 202-62-B-29
W7ICD 20,703- 169-49-A-34
W7ZQX 16,963- 148-46-A-18
W7ETO 10,498- 112-38-A-19
W7AMZ 5,550- 93-30-B-21
W7EAU 5,208- 84-31-B-16
W7BYK 3,836- 50-31-A- 9
W7DGN 3,255- 62-21-A- 7
W7LNQ 1,296- 31-17-A—
W7ZU 1,013- 27-15-A- 3
W7CWN 473- 21- 9-A- 5

'Phone

W7EYD 37,317- 254-59-A-32
W7BLX 24,221- 230-53-B-34
W7LEV 18,040- 164-44-A-27
W7HAD 4,640- 74-32-B-21
W7ZQX 450- 18-10-A- 3
W7DYH 288- 16- 9-B—

PACIFIC DIVISION

Hawaii

KH6IJ 77,248- 568-68-B-40
KH6PY 600- 20-15-B- 4

Nevada

W7KEV 131,655- 787-67-A-40
W2YUB/7 29,879- 227-53-A-34
W7JOS 1,080- 24-18-A- 3
W7BTJ 72- 8- 6-B- 2

'Phone

W7JUO 18,960- 158-60-B-20

Santa Clara Valley

W6WNI 140,613- 808-70-A-39
W6YHM 58,320- 366-64-A-36
W6ISQ 44,225- 290-61-A-30
W6ZGG 20,845- 194-55-B-16
W6MMG 4,550- 65-28-A-10
W6SSA 1,395- 31-18-A- 3

'Phone

W6MLY 72,536- 421-69-A-40
W6TFZ 33,840- 285-60-B-40

East Bay

W6MVQ 124,425- 711-70-A-37
W6KEK 83,470- 606-69-B-39
W6NGC 47,850- 330-58-A-39
W6IPH 45,784- 388-59-B-31
W6TI 41,676- 302-69-B-29
W6LMZ 38,412- 291-66-B-25
W6JOH 25,404- 219-58-B-22
W6WII 6,032- 116-26-B-10
W6EJA 2,550- 43-30-B- 5

'Phone

W6TT 65,008- 478-68-B-36
W6PWR 62,160- 455-70-B-37
W6YTM 11,760- 124-48-B-14

San Francisco

W6EYY 39,215- 257-62-A-30
W6ADQ 11,138- 100-45-A-14
W6II 8,047- 111-29-A-24
W6WBU 4,355- 68-26-A-20
W6DNY 700- 28-10-A- 5

'Phone

W6VER 9,030- 86-42-A- 8
W6ASL 2,968- 54-28-B-11

Sacramento Valley

W6DBP 54,400- 340-64-A-38
W6ZNU 5875- 121-25-B-25

'Phone

W6WTL 48,768- 382-64-B-40
W6WLI 38,052- 305-63-B-38
W6GVM 16,762- 146-58-B-18

San Joaquin Valley

W6SRU 94,430- 533-71-A-40
W6HIP 77,804- 466-67-A-39
W6BHI 49,410- 328-61-A-39
W6EGX 8,688- 100-35-A-16
W6EXH 6,090- 116-21-A-26
W6QXF 5,429- 51-43-A-22
W6UTU 5,256- 73-29-A- 7
W6EBS 4,805- 78-31-B-13

'Phone

W6QEU 85,896- 601-72-B-39

ROANOKE DIVISION

North Carolina

W4KTD 92,925- 621-60-A-38
W4GXB 59,616- 432-69-B-32
W4MPF 38,055- 354-43-A-34
W4JPZ 4,031- 74-29-B- 8
W4EPA 1,600- 32-20-A- 2
W4ATC (W3OYH W4s GDF ILM
IYE JGA JQO LYI MSO MWF
MZP) 82,326- 495-67-A-39

'Phone

W4IZR 14,125- 115-50-A-23

South Carolina

W4EZF 41,525- 302-55-A-35
W4LJJ 16,915- 199-34-A-34
W4FNS 12,968- 125-42-A- 9

Virginia

W4KFC 149,100-1067-70-B-40
W4JFE 139,060- 821-68-A-38
W4NNN 123,338- 716-69-A-39
W4KFT 121,193- 735-66-A-40
W4IA 103,615- 611-68-A-39
W4LUE 100,733- 611-66-A-38
W4LRI 95,370- 579-66-A-40
W4OHF 89,863- 555-65-A-40
W4VE 85,593- 511-67-A-38
W4ABY 85,150- 525-65-A-33
W4LAP 85,000- 500-68-A-33
W4JDL 82,995- 504-66-A-39
W4CC 76,500- 450-68-A-28
W4KMF 72,540- 564-65-B-40
W4FF 70,525- 434-65-A-40
W4JUY 67,725- 454-60-A-34
W4MOJ 66,650- 442-62-A-38
W4MWA 65,048- 444-59-A-40
W4NJV 64,845- 393-66-A-39
W4KVM 64,025- 396-65-A-28
W4LIQ 61,296- 495-64-B-40
W4SU 51,272- 442-58-B-24
W4IML 44,103- 385-61-B-25
W4KZQ 36,080- 328-55-B-32
W4NCR 32,493- 317-41-A-27
W4EFV 31,211- 266-59-B-18
W4WI 30,450- 290-42-A-24
W3MLP/4 25,175- 190-53-A-32

(*Continued on page 104*)

JFLINT

Audio Filters for Eliminating QRM

BY ROBERT R. BENNETT,* W6DVE

No one needs to be told that QRM is one of our toughest problems. The increased use of our already crowded amateur bands is making interference a subject worth some keen consideration. Everyone knows how many times a schedule with a long-lost pal or an elusive DX contact is lost because of QRM.

Fortunately there is a simple solution for the c.w. man. This article describes techniques and equipment that will do much to eliminate c.w. interference. Lest the word "equipment" scare away those who visualize racks full of electronic circuitry, it should be emphasized that the equipment is of the simplest and most inexpensive nature, and some of it is already available for only a couple of dollars or so.

For the 'phone enthusiast the answer is not so easy. The method to be presented for coping with 'phone interference is only a stab at a very difficult problem. While it is a help, and an inexpensive one, it is by no means a completely satisfactory remedy. Single-sideband systems, while complicated and "technical" for the average amateur, appear to offer the most promise for the 'phone man.

Nature of C.W. Interference

First let us consider the elements that make up c.w. interference. As a specific example, take a superhet receiver to be used for 40-meter c.w. Suppose the receiver is tuned to 7100 kc., the frequency of the desired signal. Assuming the receiver has a 456-kc. i.f., the local oscillator will be tuned to 7100 kc. plus (minus for some receivers) 456 kc., or 7556 kc. The desired signal will beat with the local-oscillator signal in the mixer stage, producing a resultant 456-kc. signal.

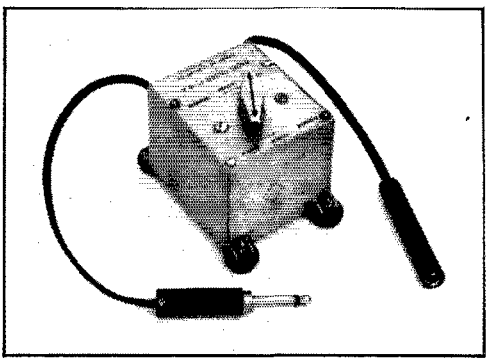
Now suppose a signal exists at 8012 kc., a commercial station, for example. This will also beat with the local oscillator, since the difference between 7556 kc. and 8012 kc. is also 456 kc., unless something is done to attenuate the 8012-kc. signal before it reaches the mixer. Such a signal is commonly called an r.f. image. By building enough selectivity into the r.f. stage of the receiver this image can be attenuated below the point where it will cause interference. This is really no problem at 7 Mc., but r.f. image considerations become important at 14 and 28 Mc. Using an i.f. considerably higher than 456 kc. (e.g., 7 Mc.) serves to eliminate r.f. image problems at the higher frequencies.

So that we can hear the desired signal that has been heterodyned to 456 kc., it is mixed with a "beat-frequency-oscillator" signal set at 457 kc., for example, producing an audible 1000-cycle note. But again there are image problems. An undesirable signal at 7098 kc. will appear as an i.f. signal of 458 kc., and this, when beat against the b.f.o., will also result in a 1000-cycle audio note. Thus we have an audio image.

Of course, the trouble does not end here. Undesirable signals existing between 7095 and 7098.7 kc. and from 7103 to 7099.3 kc. will appear as audio notes ranging from 4000 to 300 cycles respectively, and these notes will pass through the audio stage of almost any receiver.

A good receiver r.f. stage is essential to eliminate the r.f. image, but it is not practical to build an r.f. stage that restricts all but the 7100-kc. signal. This can best be done elsewhere.

I.f. selectivity can be made sharp enough to eliminate a good many of the undesirable signals. I.f. selectivity, as measured in terms of actual bandwidth, improves as the i.f. is made lower. Frequencies of 100 kc. or lower may be used as, for example, in the Q5-er. However, a low i.f. will allow r.f. images. To overcome this the so-called double-conversion system, wherein two different intermediate frequencies are used, has become popular. The first i.f. is high enough to eliminate r.f. images, and the second i.f. is low, to provide good i.f. selectivity. Even so the selectivity characteristic is not sharp enough. Crystal filters are a help. In fact, excellent i.f. selectivity can be obtained by using a number of crystals, cut to different frequencies, in a bridge arrangement. However, this scheme is expensive and critical to adjust. The crystal filters of most communications receivers leave much to be desired. Anyway, most



The Radio Filter FL-8-A is a filter available on the surplus market that gives good audio selectivity. The leads, plug and jack must be supplied by the amateur.

* 761 Lakewood Place, Pasadena 5, Calif.

JFLINT

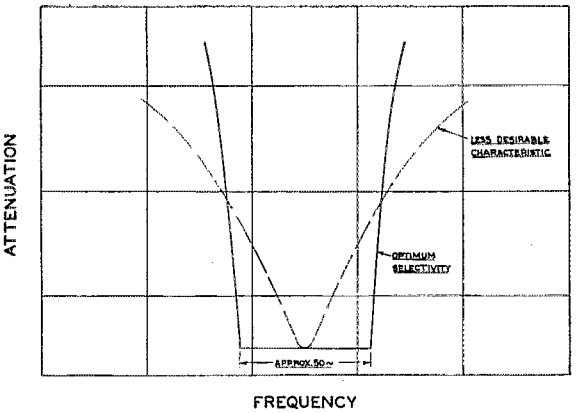


Fig. 1 — Curves showing the most desirable selectivity for c.w., and the less desirable characteristic of most selective amplifiers and crystal filters.

of us are stuck with our present receivers, and the purpose of this article is to show some simple devices that will improve selectivity without the need for a major overhaul of the receiver.

We are left now with those undesired signals that are not rejected by the r.f. and i.f. stages, and it is here that considerable improvement can be realized. By suitable filtering at audio frequencies we can get rid of almost all of the remaining interference.

Audio Selectivity

There are many approaches to audio selectivity. One scheme consists of attenuating a particular audio frequency, thus eliminating an interfering signal at that frequency. The "Hetrofil" used such a principle. It has the disadvantage of focusing the operator's attention on the undesirable rather than the wanted signal, and in addition it is helpless in the case of two or more interfering signals, unless they are quite close in frequency.

It is better to attenuate all signals except the desired one. This is again the problem of achieving sharp selectivity, only now we are working at audio frequencies. Even if it were possible to have selectivity so sharp that it would pass only one frequency this would not be desirable, for our keyed 7100-kc. signal requires a passband of 20 or 30 cycles. An optimum selectivity characteristic is that shown by the solid line in Fig. 1. A bandwidth of approximately 50 cycles will pass all the sidebands necessary for even fairly rapid keying speeds.[1] It is important that the "skirts" of the selectivity curve be as sharp as possible in order that all unnecessary signals be attenuated as much as possible.

Selective audio amplifiers employing feed-back have been used,[2] but their selectivity is, in general, like that of the dashed curve in Fig. 1, a sharp peak but skirts which are too broad. Crystal filters used in communications receivers also have this selectivity characteristic.

Practical Circuits for Audio Filters

All the circuits to be shown may be conveniently inserted between receiver and headphones. They require no source of power and no modification of present equipment.

A handy and inexpensive device for obtaining quite satisfactory audio selectivity is readily available on the surplus market for only a very few dollars. Small radio-range filters designed to pass only the 1000-cycle range signal in aircraft service have been made by a number of manufacturers. One such unit, the Radio Filter FL-8-A, is shown in one of the photographs. Selectivity curves for this and another available unit, designated by Beam Filter NAF 68304, are given in Fig. 2.

For better selectivity with sharper skirts, the circuit of Fig. 3 is suggested. The secret of the selectivity of this circuit lies wholly in the Q of the inductors used. High-Q toroidal inductors are now readily available from manufacturers at reasonable prices. The exact inductance values are not particularly critical. L_1 may be anything above 2 henrys, and L_2 should be between 0.01

[1] The *usable* selectivity is also determined by the frequency stability of the transmitted signal and of the receiver. If the receiver drifts or the tuning control has back-lash, an indefinitely-steep-sided selectivity characteristic just wide enough to pass a perfect signal would be unusable. A perfect receiver with similar selectivity would be practically unusable with a drifting or chirpy transmitter signal. — *Ed.*

[2] Hanchett, "A Peaked Audio Amplifier for Communications Receivers," *QST*, Sept., 1948.

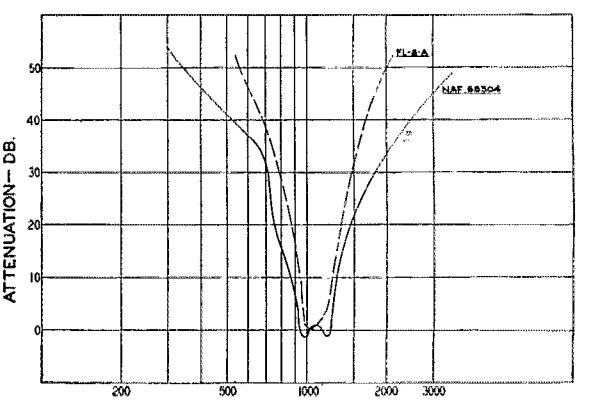


Fig. 2 — Selectivity characteristics of two surplus radio-range filters.

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and 0.05 henry. But it is necessary that

$$L_1C_1 = L_2C_2.$$

The audio frequency desired is governed by the relation

$$\textit{frequency}\ (\text{c.p.s.}) = \frac{159}{\sqrt{L_2\ (\text{henrys})\ C_2\ (\mu\text{fd.})}}$$

and the inductance and capacitance values may be selected to satisfy the above two equations. Placement of parts is not important, as the toroidal inductors are self-shielding. The impedance of the 'phones used should be at least 10,000 ohms. Switching arrangements may be added to switch the filter in or out as desired. A selectivity curve for such a filter built by the author is shown by the solid curve of Fig. 4.

Filters for 'Phone

Because of the greater bandwidth necessary to transmit voice, the audio selectivity that can be used is limited. However, most receivers pass much more than they need to. Audio frequencies above 1600 cycles may be attenuated without too much loss in speech articulation. This type of characteristic reduces the high-frequency splatter of adjacent 'phone signals and heterodynes above 1600 cycles. A typical audio filter for 'phone use is shown in Fig. 5. This circuit does not represent an optimum filter design; it was constructed with an eye to using available junk-box parts. Not all the inductors are of the high-Q type. The selectivity characteristic is given in Fig. 6. References[3] may be consulted for design features of such low-pass filters. It is desirable to include some sort of switching arrangement with this type of filter also, since somewhat better fidelity may be desired in the absence of QRM. Of course, equivalent speech filtering can be employed at the transmitter end of each QSO, but apparently the day when everyone does this is a long way off.

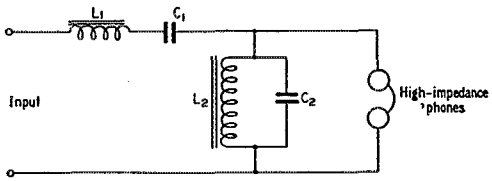
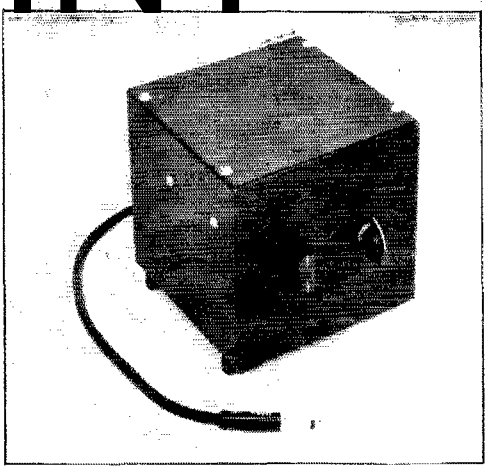


Fig. 3 — Circuit diagram of a homemade audio filter. (See Fig. 4 for selectivity curve.)
C_1 — 0.005-μfd. 200-volt paper.
C_2 — 2.7-μfd. 200-volt paper (condensers in parallel to add up to proper value).
L_1 — 5.4-hy. high-Q toroid.
L_2 — 0.01-hy. high-Q toroid.
NOTE: L_1 and L_2 can be obtained from the Hycor Co., 7116 Laurel Canyon Blvd., North Hollywood, Calif. They are known as Types EM-1 and EM-2 respectively.



A composite filter incorporating both c.w. and 'phone filters.

Composite Unit

An audio-filter unit containing a two-section c.w. filter and the speech filter of Fig. 5 is shown in one of the photographs. For c.w. the unit uses the NAF 68304 beam filter followed by the toroidal filter of Fig. 3. A switching arrangement selects the beam filter alone for tuning in stations, because of its lower selectivity. After the station is located, the toroidal filter is switched in and the two units together give the sharp selectivity shown by the dashed curve of Fig. 4. This selectivity curve is only 300 cycles wide at 40 db. (100 times down), a performance un-

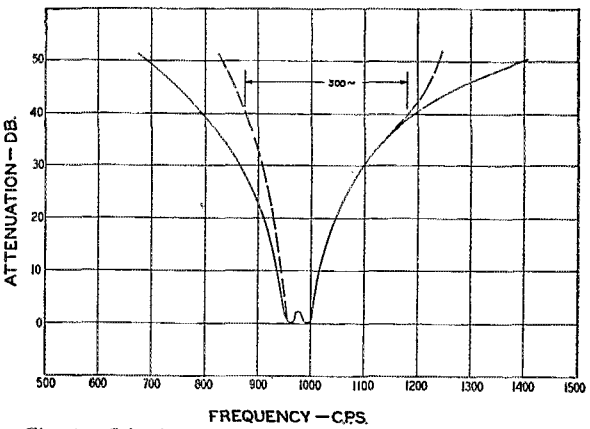


Fig. 4 — Selectivity characteristic of homemade filter by itself and when cascaded with an NAF 68304 range filter.

[3] See, e.g., Terman, *Radio Engineer's Handbook*, McGraw-Hill Book Co., first edition, pp. 228–233, or *The Radio Amateur's Handbook*, 1949 edition, page 542.

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matched by several Q[illegible]s in cascade. Some of the same inductors are used in both the toroidal unit and the speech filter, for economy reasons, and change-over is accomplished by switching.

Removal of the c.w. audio image mentioned earlier must be accomplished by using the receiver's crystal-filter unit. Tuning to a c.w. signal, the crystal-filter phasing control is adjusted until the audio image disappears, because of the sharp notch in the i.f. selectivity at this one particular frequency. When using an audio filter of the type discussed here with a receiver whose crystal-filter phasing control is properly adjusted, tuning the receiver across a signal will give a sharp peak on one side of zero beat and little or no signal on the other side where the audio image would otherwise be observed.

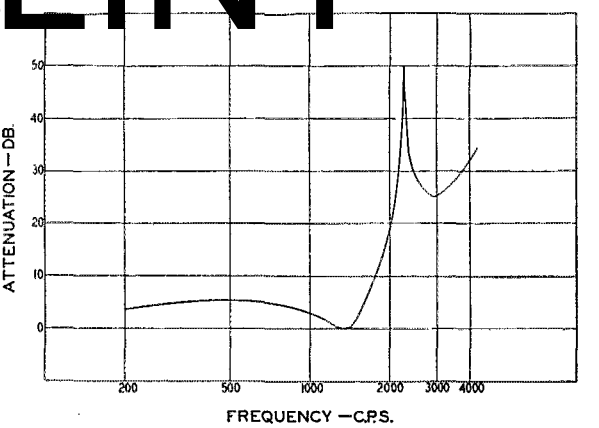


Fig. 6 — Selectivity characteristic of the filter shown in Fig. 5. The attenuation and steepness of the curve will depend upon the *Q*s of the inductances.

Details of the construction of audio-filter units may be suited to individual desires. A number of filter units may be housed in one box, as in the photograph, or a filter unit may be conveniently tucked away inside a receiver. Some may wish to build more elaborate arrangements. Placement of parts is arbitrary, and the ratings of the condensers used need not exceed 200 volts. A switching arrangement to suit the operator's fancy may be employed. The surplus range filters have a built-in switch.

Signal-to-Noise Ratio

With the reduction of bandwidth provided by audio-filter circuits there is an attendant improvement in signal-to-noise ratio that is very desirable. The units described were used in conjunction with a communications receiver of average bandwidth, and the improvement in signal-to-noise ratio was about 7 db. for each of the range filters, 16 db. for the toroidal filter, and 23 db. for the two-stage filter.

Summary

It has been shown that a *good* communications receiver has ample r.f. selectivity to reject r.f. images, and a suitable i.f. crystal filter phasing circuit to attenuate audio images. Simple audio filters will then eliminate almost all remaining c.w. interference and, in addition, will greatly improve the signal-to-noise ratio. Selectivity curves and figures of signal-to-noise ratio alone do not adequately tell the story of the resulting performance. Many hours of actual use of these filters on the low-frequency end of 40 meters have convinced the author that here is freedom from QRM and noise that is worth many times the effort expended. For a receiver that has no crystal filter, at least one of the surplus 1000-cycle range filters is a must. For a few dollars more, one can invest in a pair of high-*Q* toroidal inductors and achieve selectivity unequaled by even the best receivers. For 'phone reception, a low-pass filter that cuts off at about 1600 cycles can be built, and this will eliminate high-frequency heterodynes and part of the splatter from adjacent signals. However, one should not be too disappointed in the results obtainable with speech filters. Audio filtering is only a partial solution to eliminating 'phone QRM.

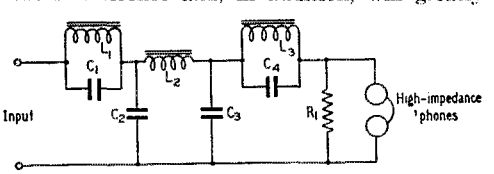


Fig. 5 — An audio filter for 'phone reception.
C_1, C_4 — 0.006-μfd. 200-volt paper.
C_2, C_3 — 0.01-μfd. 200-volt paper.
L_1, L_3 — 0.8 henry.
L_2 — 2.4 henrys.
R_1 — 20,000 ohms, ½ watt.

COMING A.R.R.L. CONVENTIONS

August 5th–6th–7th — Vanalta Division, Vancouver

August 26th–27th–28th — West Gulf Division, Dallas

September 3rd–4th–5th — Maritime Division, Halifax

September 17th — New Hampshire State, Manchester

October 7th–9th — Hudson Division, New York City

October 8th–9th — Midwest Division, Omaha

JFLINT

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

As one W8 put it recently, everybody claims to QSL 100% and yet nobody receives enough cards. Even taking time lag into consideration, the question arises as to what species of gremlin is gobbling them up ere they reach their destinations. If you're keeping envelopes on file you can be sure it's not the fault of the ARRL bureaus.

One all-important factor in deciding whether a card is going to get results or not is the manner in which it is made out. Some of the pasteboards we've seen floating around appear to have been filled out in the dark and upside down to boot! Essential data for proper confirmation include date, time (local or otherwise), frequency band, type of emission, and RST report, the latter being important for certain awards such as WBE (RSGB). Of course, the calls of the confirmer and confirmee should appear as well as the station location of the former. Since you usually can't be sure just what the other fellow is after (a 30-minute WAC, an S7 WAS, et al.) it may pay well to attend to details. As G8HH points out, you'd do well to spell out the date, too, as international numerical abbreviations do not necessarily jibe.

Rare DX stations faced with the task of making out several hundred or more cards need not overdo it, to be sure, but care should be taken that their QSLs do at least qualify for DXCC purposes.

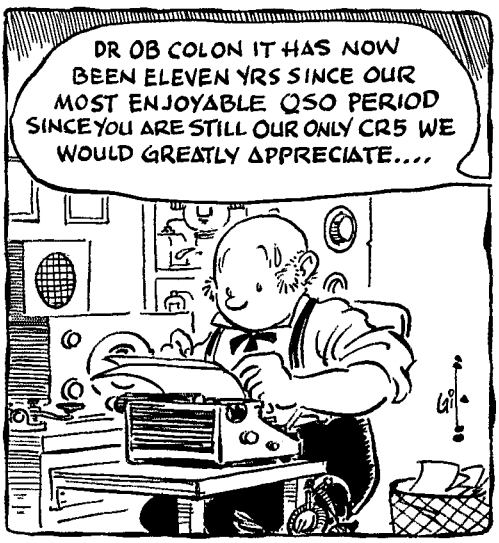
Now we'll give the dial a twist and see what the boys have been up to. . . .

What:

Not even W4BRB has much to say about *eighty* at this writing. But JA2AT has been working W/VE individuals right up into the noisy season on 75 'phone. At last reports he was still seeking W1, W2 and W3 contacts for his WACA.

Forty is nothing like it was a few short months ago, yet W7MGO managed to grab **VS2BX** (7030), **UAØFP** (7080), **JA2BT** (7185), **KP6AE** (7045) and **VR2BK** (7040) . _ . _ . _ W6DBP and others would like info on the ZC6UU that showed up on 7090 and T8 . _ . _ . _ KZ5IP found the band interesting so far as OH2UJ, OH7NF, UA3DI, UA3KAA and SM4AEE were concerned (all around 7055) . _ . _ . _ Among W2WWP's lengthy list we spot VPs 5HQ and 3DCA, EA7AR, KM6AK and VK6DS, all crowding the low edge while W3CJS nabbed **HK5CR** (7090).

Needless to say, *twenty* has been doing business at the same old stand. We wisecracked about the lack of Portuguese Timor activity some time ago and now CR10s CB and **FU** (14,055) pop up to plague us . _ . _ . _ W4FVR specifies some goodies: **MD4MHB** (14,045 t7), **M1F** (14,060 and QSL via ARI), **YK1UN** (14,020), **YT7DD** (14,035), **UO5AC** (14,075), UP2AA (VFO), **UA1KEC** in Franz Josef Land (14,055), 4X4CJ (VFO), **PK4DA** (14,060–14,090), **KC6WA** in the Palaus (14,080), **VK9WL** (14,045), **AP2F** (14,065), **AP2N** (14,130), EA8MC (VFO t7 QRH), **VS1BQ** (14,065), **VS2CH** (14,030), **ET3AM** (14,100) and **ZC4AC** (14,045) . _ . _ . _ From W2TXB there is **UF6AB** (14,060), **SVØAJ** (14,002), **AP5B** (14,030) and **VU2JP** (14,030), the two latter during the early evening . _ . _ . _ While awaiting his FF8GP card, WØUOX whiled away time with **VQ5JTW** (14,012), **LX1AS** (14,080), **HZ1HZ** (13,398) and **HB1EO/HE** (14,055) . _ . _ . _ W8YGR found **GD3UB** (14,025) and W6BIL associated with juicy **C8FP** (14,065 t6) at 7 A.M. local time and **PK5HL** (14,070) . _ . _ . _ A brand-new little YL at W9JJD inspired the working of ZB1AR, UQ2AE, GC3ZU, **YS1RA** (14,040), **TA3GVU** (14,100) and FO8AC . _ . _ . _ VE7CE adds **VR2BC** (14,165), **UAØKFD** (14,155) and **C2SC** (14,145) and W4DCW made it 100 with **VP1AA** (14,090) and **UC2CB** (14,020) . _ . _ . _ W9AND recommends VK3ASS for a unique



* DX Editor, *QST*. Please mail reports of DX activity to W9BRD's home QTH: 1517 Fargo Ave., Chicago 26, Ill.

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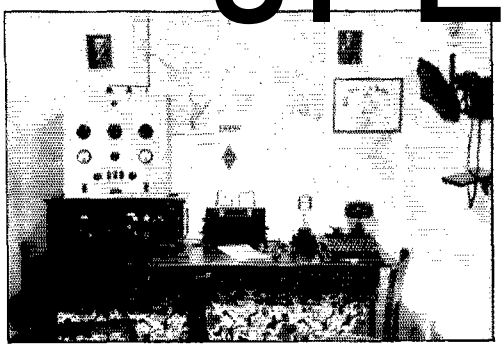

With the liberalization of amateur regulations in Spain, several active stations have blossomed forth in the Canaries to the satisfaction of the world-wide DX fraternity. One of these is EA8AN, operated by Rafael Montero at Las Palmas. (*Photo via W1JYH*)

contact inasmuch as the name is Jack . _ . _ . _ W9MDG suffered in an uninsulated attic for **YV5CZ** (14,116) and **UA6SF** (14,088 t8) and W1BOD mentions **UD6BM** (14,048) . _ . _ . _ Despite a noisy QTH like Drums, Penna., W3AFW scored a hit with **UO5AD** (14,000), **UF6AC** (14,027), **UG6KAA** (14,010), **UN1AB** (14,000), **ST2JS** (14,042), **DU1WP** (14,045), **EL5B** (14,050) and **KR6NE** (14,042) . _ . _ . _ Still refusing to give up on PX1A, W2LXI made off with **IS1FC** (14,055), **ZA5A** (14,015), **VK9NR** (14,012), **ST2RA** (14,025), **VK9GW** (14,015), **VQ1CUR** (14,005) and **WØMCF/C3** (14,045) . _ . _ . _ Since swapping the long wire for a rotary, W1JYH has collected **VP8AO** (14,000 t8), **FI8ZZ** (14,010), **PX1A** (14,010 t8), **ZC4AC** (14,060 t7), **ZK2AA** (14,125 t8), **FK8AB** (14,015), **UP2AA** (14,120), **VK4SI/VR1** (14,020 t7), **CR4AC** (14,040), **VU7DP** (14,060 t6) and **VR3A** (14,140f) . _ . _ . _ KH6PM ignored the hula gals long enough to tackle **NY4JB** (14,010 t8), ZM6AI, **ZM6AL** (14,015) but missed out on **EK1GW** (14,010), **FF8GC** (14,120), **FU8AA** (14,000 t7), **ZD4AB** (14,025) . _ . _ . _ Summer lawn-mowing chores have restricted W3NCF to stuff like **ZB1AY** (14,025), **UG6WD** (14,060), **CT2BN** (14,090), **HA4SA** (14,095), **TF3ZM** (14,105), **PZ1QM** (14,055) and **VQ3KIF** (14,075) . _ . _ . _ Though a little late to do much good, VQ2DH notified W6EBG that he expected to operate **VQ2DH/ZD6** or **ZD6AH** around the early part of June (14,150 and 28,350) . _ . _ . _ W9RBI swiped some nice 'phones in **VK4SI/VR1** (14,350), EA9AI (VFO), **VK9NR** (14,110–14,360), **UG6AB** (14,200), PK4DA (VFO) and **EK1MD** (14,380); then, on c.w., Ross found **YK1AB** (14,020) and **PK5RU** (14,025 t7) . _ . _ . _ VP5AR accounted for a 2-hour A3 WAC featuring MD1A, IS1AHL, HC1KE, VK4RW, JA2US and W8HLR. We Ws come in handy once in a while after all!

Though Ed Tilton can only see *ten* as a pretty fair i.f. for some of his plumber's delight gear, W1PWK says that W1GOU is up to 148 countries on the band. And W5ALA needs but five more cards from such as SVØWF, FO8AB, VR2BC, ZP9FA, ST2KR, VS9AH, XZ2KM and ET3AF to crash the magic circle . _ . _ . _ **SV5UN** (28,400) and **ZC1CL** (28,200) were attracted by W9RBI and WØBNU captured **PJ5KO** (28,385), **ZS3G** (28,465), **MI3LZ** (29,-818), **KH6VX/KB6** (29,125), **KW6AM** (29,440), **KM6AK** (29,440) and **KX6BB** (29,650) . _ . _ . _ W1MMV filled log space with **EK1RW** (28,412), **VS7PS** (28,116), VS6AE, VU2ET, **ZB2A** (28,486), **ZD1AS** (28,222), **ZS8A** (28,188) and **DU6IV** (28,245) . _ . _ . _ W1EKU emphasizes the unpredictability of 28-Mc. work by noting Asiatic contacts with his beam in a variety of directions. Vern is up to 129 on ten . _ . _ . _ The preceding activity was of the modulated variety but a few items represent some c.w. efforts. WØBNU hooked **UA9CC** (28,040), **UC2CB** (28,010), **UF6AC** (28,030), **4X4BX** (28,020), **XOY4F** (28,045), **FA8ZZ** (28,010) and a smattering of Ukrainians . _ . _ . _ One **PX1AC** was uprooted by W9RBI, a T7 signal on 28,035, and W4DCW adds VS4WL . _ . _ . _ OE5YL, HA4SA and GC2CNC are volunteered by W9AND.

Where:

We can now officially welcome licensed German nationals to the fraternity and the bureau address for DL1 and DL3 cards is DARC, Postbox 99, Munich 27, Germany. DL2, DL4 and DL5 prefixes belong to British, American and French nationals in their respective zones of occupation. DK7 and DK8 stations are purportedly German nationals in the Russian zone while DK9s appear to be native licensees in the French zone. A bureau address for DK stations is not yet available, but try DARC.

C4WX	Portial Bank, Changsha, China
CN8ED	Navy 214, FPO, N. Y. C., N. Y.
CR4AC	Box 61, Praia, Cape Verde Islands
ET3AM	H. C. Lindahl, Box 127, Addis Ababa, Ethiopia
FY8R	(via REF)
HA1BG	Paul Barna, Csepreghy 26, Budapest, Hungary
HA5BF	(via W2TXB)
HA6AG	A. G. Poloskey, Budapest, Kelenfol XI, Puskas-Ter 13, Hungary
KG6FH	(ex-J9SIR) Box 100, Guam
KH6VX/KB6	% CAA, Canton Island
KL7WP	USCG, APO 986, % PM, Seattle, Wash.
KW6AM	% CAA, Wake Island
ex-KZ5AX	W6WOQ/4, GMTU-3, NAOTS, Chincoteague, Va.
MD4MHB	% GPO, Hargeisa, British Somaliland
MD7WE	% RAF, Nicosia, Cyprus
MI3GH	Radio Marina, APO 843, % PM, N. Y. C., N. Y.
MT2A	(via SARL)
PK2DL	Lt. D. De Lee, Royal Signals, Tiger Brigade, Semarang, N. E. I.
PK4DA	(via W6UZX)
PK5RU	Box 25, Bandjermasin, Netherlands Borneo
PZ1QM	Box 679, Paramaribo, Surinam
ST2DD	(via GM3CYG)
SV1ZS/MM	(SVZS) SS Mariam, Triton Shipping Co., 80 Broad St., N. Y. C., N. Y.
SVØAJ	(via WØOUH)
VO2CT	Navy 103, FPO, N. Y. C., N. Y.

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VP2AJ	Wm. L. Anderson, APO 855, % PM, Miami, Fla.
VP7NU	P. O. Box 703, Nassau, Bahamas
VQ3AD	% CIR, Arusha, Tanganyika
VQ3KIF	% RSEA, Box 1313, Nairobi, Kenya
VS2CH	(via RSGB or G2CQJ)
VS4WL	QSL to Robt. Wellspring, 8 Green Lane, Ilford, Essex, England
W2EYD/KG6	APO 246, % PM, San Francisco, Calif.
W6AZA/KW6	% CAA, Wake Island
YN4SDA	Dr. C. J. McCleary, Puerto Cabezas, Nicaragua
YR5J	O. Strunsky, Str. Mitr. Torf 61, Bucharest, Roumania
YS1RR	15 L Ave., No. 4, San Salvador, El Salvador
YS1VJ	Jorge Vasquez, Jerez Telegrafos, San Salvador, El Salvador
YV5CZ	J. Rincon, Box 1247, Caracas, Venezuela
ZC1UN	(via W2NUP)
ZC6BF	BCM/QSL, London, WC 1, England
ZD1RA	APO, Freetown, Sierra Leone, B. W. A.
ZK1AK	QSL to 4 Ruapehu St., Mount Eden, S. 1, Auckland, N. Z.
ZP2KI	Box 25, Asuncion, Paraguay
ZP9FA	Casilla Postal 716, Asuncion, Paraguay
ZS3O	Otjiwarongo, Southwest Africa

The pitchers-in this trip were W1s IAP IIN IKE JYH NLM PWK, W2s CJX HAZ IYO LXI SUO TXB WC, W3s AFW PDJ, W4s CYY FVR, W5ALA, W6ZEN, W8YGR, W9s AND KA RBI, WØBNU.

Tidbits:

Prior to his migration to W6-land, Les Hill of G5WI finally caught up with his last three required states for WAS. G5WI/W6AY schedule contacts are up past the 500 mark, too . – . – . – As you probably well know, KS4AI is back on the job at Swan Island. Over 500 QSLs were made out for the first six weeks of the new session of operation. KS4AJ is sporting a TBS-50 on 10 'phone and works a bit of 20 c.w. at times. KS4AF is present and not very active but KS4AL gets around the bands a bit. Both 80 and 40 are so static-ridden that the boys probably will stick to the higher frequencies for the hot months . – . – . – W2OXR recently returned from a visit to Israel and reports ham radio in full bloom there. The 4X4 gang don't have an easy time hatching respectable gear because of shortages but they're holding their own on the air. Reub brought back a stack of cards to mail as a result of contest activity and the fast service is appreciated by all . – . – . – Watch for HE1EO from Liechtenstein again this October as Ralph has another session scheduled for that month . – . – . – W6AY and W2TXB hear that Roumanian amateur radio has undergone a reorganization. The prefix YR will shortly give way to YO and the new radio society bears the initials AAUSRPR [Hey, boss, QRS or QSZ. — *Jeeves*]

W4CYY's "QSL" from ZA5AC turned out to be merely a verification-of-reception letter from *Radio Tirana*. JB says there just ain't no justice. He further observes that VP2KS and VQ8CB draw power from gas-driven generators at 72 and 84 cents per petrol gallon respectively. What price ham radio! . – . – . – The ARI has announced that they plan some portable-MI activity around July 4th to 8th inclusive. So turn your rhombics toward lofty San Marino unless you've been lucky enough to have the country already salted away . – . – . – HA1BG (HA5BF) informed W2TXB that HA5B is the Central Station of the MRRE. All other Hungarian licensees possess two letters after the numeral and the number 5 indicates a location in or near Budapest.

From the miscellaneous file we uncork the following gossip: VK4SI/VR1 went to 'phone after fighting a losing battle with the c.w. pile-ups and there are some schools of thought taking a dim view of his legitimacy. OY3IGO is tampering with 5 meters these days. Swish! Hey, Jeeves, where did Tilton go? Nepal's VU7AF will crank up a 75A and 32V combo in the near future and the results should be interesting. VQ5JTW, UQ2AB and FI8ZZ all have A3 intentions. Rio de Oro's EA8JM was formerly EA8EDZ and EA8AO . – . – . – WØHQF used to be J9ACS and wonders if anybody is still in need of a card. The *Call Book* address is okay . – . – . – A large letter from W4FVR contains a supply of interesting data: ET3AM used to engineer at WMBI and WLS in the Windy City and is engaged in mission radio work at present. ZC1AZ mentioned that ZC1CL has left Transjordan. Allen is trying to figure out why he gets Russian SWL cards from USSR operators he works instead of a station QSL card. Log checks reveal that this is often the case . – . – . – ZS6LF told W5ALA that AC4s NC and RF are game for a crack at 10 'phone. Jack also has it that STs 2AM and 2KR are the sole Sudanese 28-Mc. enthusiasts with the latter due to QRT directly . – . – . – We haven't heard of many claims in this respect, but W4MR finds that W4GG has nailed down all Russian prefixes but still awaits some of the scarcer cards . – . – . – Word from ON4QF via WØUOX states that 2000 OQ5QF pasteboards were in the process of being made out and will be distributed via bureaus . – . – . – W1IAP and others are in favor of striking a medal for TA3GVU and his efficient handling of the pile-up situation. Another outstanding candidate is KC6EA on Truk . – . – . – A 7-Mc. QSO with EZ1MS resulted in a QSL for W2WZ. Other EZ-prefixed stations are active but we have nothing official on their status.

Here are some of the boys responsible for the wide renown of HZ1AB, their Stateside calls being W8UMQ, W7KUC, WØLDK and WØTND. Hats off to this crew, not only for the many snappy contacts they've dished out but for their conscientious QSL policy as well.

While on the subject of QSLs, here are a few pertinent notes: ZC6BF, VK4SI/VR1, ZS6DW, VP8AO, G6LX and several of the KW6 gang want it known that all QSL debts will be paid in full in due time via bureaus. VP8AK and VP8AO came through with stacks of cards, both apologizing for the quality of print. They should know that most of us will gladly settle for a confirmation scribbled on the back of an old envelope! ZB1AR points out that a reply coupon falls far short of the Maltese-to-U. S. airmail rate and regrets that he'll have to stick to bureaus strictly in all cases. And if you are expecting a card from PK4KS, a stamped, self-addressed envelope to W8SYC may expedite proceedings. Also, if you're thumbtwiddling for a CP1AT card, try a line to E. J. Donnelly, 118 Varnum St., NE, Washington, D. C., as W8WWU advises . – . – . – It's great to run up a big Test score but the price for same is often a case of writer's cramp. ZL1MB came through with *1203* cards in bulk . – . – . – Official word from the IRA (Iceland) lists the following TF calls as phonics: 2KA, 3EK, 3EL, 3M, 5OA . – . – . – W1IKE is keeping an eye on VK1 developments. VK1s VU, FE and RA are passing out Heard contacts while VK1s ADS, JT and RD handle things from MacQuarrie. VK1ADS, incidentally, has been radiating A3 around 14,360 kc.

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Terminology changes significance with trends of the times and amateur radio is no exception. A recent issue of a British publication calls attention to the fact that "DX" no longer stands for Distance as much as for Difficulty.

JFLINT

The World Above 50 Mc.

CONDUCTED BY E. P. TILTON,* W1HDQ

THE summer of 1947 was an excellent one, as v.h.f. men who were active then will bear witness. The coming solar activity peak was credited as being the cause of the unprecedented high sporadic-*E* m.u.f. and the early and frequent double-hop 50-Mc. openings. Then the high point of the 11-year solar cycle was passed in March, 1948. How would the 50-Mc. band react? Results in the spring of '48 were far from encouraging, and the season was marked up as one of the worst in modern v.h.f. experience, over most of the country.

In 1949, however, we have witnessed a startling reversal of form. It began to show in January, when aurora effect exceeding previous 50-Mc. experience developed, and South American contacts were made over much of the southern half of the country. February, March and April were also exceptionally good aurora months, and the top frequency for aurora reflection was shown to be in the 144-Mc. band, or higher.

Now, coming to the close of May, as we write, we hail this month as the best May in our experience. Obviously, sporadic-*E* ionization and solar activity peaks are not necessarily coincidental. As reported briefly last month, double-hop sporadic-*E* contacts were being made as early as May 4th, about three weeks ahead of the 1947 record. Single-hop openings were an almost daily occurrence, and of a duration and quality far superior to those of last season.

The 2-meter band has shown exceptional qualities, too. For a long time we've wondered whether 2-meter signals could be reflected by the *E* layer. A probable answer was supplied on May 4th, when W4HHK, Collierville, Tenn., heard the 2-meter signal of W7FGG, of Tucson, Ariz. This was coincident with a 50-Mc. E_s opening, and it came at a time of day (12:50 P.M. EST) when tropospheric propagation would be expected to be near minimum, so it would appear likely that E_s was involved.

Tropospheric propagation seemed to be better than normal, too, and while no new records have appeared on the 2-meter horizon, there has been a surprising amount of work done over distances once thought of as impossible at 144 Mc. The Atlantic Seaboard tropospheric season was in full swing by early May, and work between stations as widely separated as Southern Virginia and New England was being accepted as an almost normal occurrence.

* V.H.F. Editor, *QST*.

2-Meter Standings

	States	*Call Areas*	*Miles*
W8UKS	14	7	
W8WJC	14	6	
W2NGA	13	5 plus VE1	
W8WXV	13	—	
W8CYE	12	6	
WØNFM	12	6	
W3KUX	12	5	575
W3RUE	12	5	530
W1BCN	12	4 plus VE1	
W1PIV	12	4 plus VE1	
W2NLY	12	4 plus VE1	515
W4FBJ	11	5	500
W3PGV	11	5	
W2DPB	11	5	
W2QNZ	11	5	
W2BAV	11	4 plus VE1	400
W2WLS	11	4 plus VE1	400
W3GKP	10	5	400
W9JMS	10	5	
W1CTW	10	4 plus VE1	500
W4CLY	10	4	500
W1HDQ	10	4 plus VE1	480
W1JSM	10	3	
W3GV	9	6	660
WØIFB	9	6	
W3BLF	9	5	
W3HB	9	5	
W9AB	9	6	
W8WRN	9	5	
W2PJA	9	4	
W1BDF/1	9	3 plus VE1	
W1JMU	9	3	
W1OOP	9	3	
W4AJA	8	4	
W3KWU	8	4	
W4NRB	8	4	
WØHAQ	8	—	
W1QXE	8	2	
WØWGZ	7	4	660
W9NFK	7	4	
W8DIV	6	4 plus VE3	
WØRDZ	6	4 plus VE3	330
W4MKJ	6	4	355
WØBZE	6	3	
W4FQI	6	—	
WØGOK	6	—	
VE3AIB	5	4 plus VE3	
W2RPO	5	4 plus VE3	
W4KKG	5	—	
W9OBW	5	2	
WØHXY	5	2	
W9UIA	4	3	205
WØJHS	4	2	
W4LNG	4	1	
W5JLY	1	1	275

JFLINT

Here and There on 6 and 2

Arlington, Mass. — The 6-meter band does not live by DX alone. This is the belief of a group of consistently-active 50-Mc. men in the Boston area. They have no objection to DX, of course, but they insist that the primary aim of 6-meter men (or the occupants of any higher band) should be the promotion of regular activity, so that prospective users of the band will not be discouraged by the seeming lack of occupancy which results when too many fellows listen and too few transmit. This same group looks with concern on the current neglect of the frequencies above 51 Mc., particularly since use of the high part of the band helps to alleviate TVI troubles in Channel 7. To encourage regular use of the band, and particularly that part of it above 51.5 Mc., W1CTW and others have started a concerted movement to keep things rolling. Cal developed a simple rig (description soon in *QST*) which has been duplicated by several of the gang, with more coming. These fellows are using 26-Mc. crystals, to avoid most of the harmonic difficulties which arise from the use of lower frequencies in the oscillator. If you are a W1, look for them nightly; if you are within skip range of the Boston area, don't forget to tune above 51 Mc. when the band is open. There's stations in them thar megacycles!

Guayaquil, Ecuador — 6-meter DX between the Americas and over other trans-Equator routes seems to be pretty definitely an equinoctial proposition. HC2OT found that the DX ran out on April 24th, and no more DX signals were heard up to May 22nd, when Steve departed for a trip back to the States.

Paris, France — A French scientific expedition will be in Greenland during the month of September, and, according to F8OL of 50-Mc. fame, they will have a 30-watt transmitter on 50.05 Mc. daily between 1800 and 2300 GCT, using the call F9LG/OX.

Lakeview, Ontario — The boys in VE3 sometimes wonder if the 50-Mc. gang in W-land know that there is activity on 6 above the border. Frequently, says VE3ANY, the band is open, to the south, particularly, and they are not able to raise anyone. The same applies, to a degree, to stations at extended ground-wave distances. Which points up the fact that the use of a highly directive antenna carries with it a certain obligation to rotate the thing and give all directions a careful going-over at frequent intervals. Just because you've never heard anything in a given direction is no reason to assume that there is no one there. VE3ANY reports that several of the Toronto area VE3s have now worked W3BGT, Pittsburgh, nearly 250 miles to the south. Having first made the grade on aurora, they are now working via tropospheric bending on good nights.

Oil City, La. — Some long-haul schedules are being maintained on 50 Mc. by W5ML and others. Bates works W5MXI, Monroe, La., 110 miles to the east, regularly at 8 P.M., W5JTI, Jackson, Miss., 240 miles to the east, whenever conditions permit, between 8 and 9 P.M., and daily night and morning checks are made with W5MAW, Nacogdoches, Texas, 100 miles southwest. The same stations are also trying 144 Mc. when conditions appear favorable.

Buffalo, N. Y. — Stations in Western New York are looking for extended ground-wave contacts on 50 Mc. each Saturday at 8 P.M. Watch for W2s UZB, QNA, RLV and NZH at this and other times. W2NZH feels that 6 is quite a band — he got on hurriedly with 30 watts input to a doubler, and a 2-element antenna; yet he worked 12 stations in as many states in a 2½-hour period.

Cape Henry, Va. — Here's a location and antenna system that will be hard to beat. Bill Geaslen, W4CLY, of the Cape Henry Lighthouse Station, has everything he needs to work up the Atlantic Seaboard on 144 Mc. Situated on the south side of Chesapeake Bay, at its junction with the ocean, Bill has an over-water shot all the way to Cape Cod. And his antenna! Erected originally for use on 75 meters, it is a 240-foot center-fed job, with one end fastened to the lighthouse, 150 feet above ground. The "low" end is attached to a radio tower, 90 feet up. The slope is in the direction of New England, so it works nicely with either horizontal or vertical polarization, though it favors the former. On the night of May 13th the signal of W4CLY was running 70 db. above the noise at W1HDQ for several hours; louder than almost any local, yet the distance is well over 400 miles. The Virginia W4s were so loud in southern Connecticut that W1PEA heard W4OLK, Hampton, Va., clearly on his mobile receiver, while driving in the streets of Norwalk.

The big question inevitably raised by the now fairly-frequent appearance of the Virginia W4s in W1 and W2 is: "How about some activity in North Carolina? If W4CLY, W4IKZ and others can romp in S9 plus, why can't we work North Carolina, or farther?" According to word received from W4CLY, we may soon have the answer. His brother, W4DLX, of Charlotte, N. C., will soon be on 144 Mc. with a 200-watt rig. If we could find someone to set up shop somewhere in the vicinity of Kittyhawk, that would be nice, too!

Atlanta, Ga. — There is 2-meter activity farther down, in Georgia, and at least once there has been a functioning chain of stations all the way from Atlanta to New England. With W4FQI/4 operating on Frozenhead Mountain in Tennessee, as reported elsewhere, a message originated by W4LNG, Atlanta, came all the way to your conductor on 144 Mc. The routing: W4KIP, Atlanta, W4FQI/4, W8CYE, Miamisburg, Ohio, W8UKS, Burton, Ohio, W3RUE, Pittsburgh, W3GKP, Silver Spring, Md., W2NLY, Oaktree, N. J., W2RH, Port Chester, N. Y., W1JKC, Stratford, Conn., W1OKF, Wethersfield, Conn. Roundabout, to be sure, but probably a record for all-two-meter relaying.

The South, and particularly the Gulf states, should be a likely field for the setting of a new 2-meter record. (Remember that San Antonio to Jacksonville business on 117 Mc. last summer?) Now W4LNG hears that Atlanta f.m.

More than 100 feet above the ground, W3GBJ and W3FDJ operate on 420 Mc. from a fire tower near Baltimore, Md. The transmitter is the oscillator portion of an APS-13, removed so as to permit mounting it as an integral part of the antenna system. The ground-plane is a 16-inch aluminum transcription disk, with wire netting attached to half its circumference, to act as a reflector.

JFLINT

50 WAS Mc.

Standings as of May 25th

W9ZHB	48	W5AJG	46	W9ZHL	46
WØZJB	48	W5VY	43	W9PK	43
W9QUV	48	W5ML	42	W9JMS	43
WØBJV	48	W5VV	42	W9ALU	42
		W5HLD	40	W9QKM	41
W1CLS	44	W5JLY	40	W9RQM	38
W1LLL	40	W5FRD	38	W9UIA	37
W1HDQ	40	W5FSC	37	W9AB	26
W1CGY	40	W5DXB	35		
W1LSN	37	W5ZZF	34	**WØUSI**	47
W1HMS	36	W5GNQ	32	**WØQIN**	47
W1JLK	35	W5JBW	32	**WØDZM**	47
W1NF	35	W5IOP	30	WØNFM	46
W1KHL	34			WØCJS	45
W1DJ	30	**W6UXN**	47	WØINI	45
W1AF	29	W6OVK	40	WØKYF	44
W1EIO	29	W6ANN	38	WØTQK	42
W1HIL	21	W6BPT	35	WØSV	42
		W6AMD	35	WØHXY	41
W2BYM	39	W6IWS	37	WØYUQ	39
W2IDZ	39	W6FPV	31	WØJHS	38
W2AMJ	38	W6BWG	20	WØTKX	36
W2RLV	38			WØPKD	36
W2QVH	37	W7BQX	45	WØGSW	29
W2RGV	26	W7ERA	43		
		W7DYD	41	VE3ANY	33
W3OJU	39	W7HEA	40	VE1QY	28
W3OR	35	W7FDJ	36	VE1QZ	28
W3RUE	34	W7FFE	35	VE4GQ	20
W3MKL	33	W7KAD	35	VE3AET	16
W3MQU	28	W7JPA	35	HC2OT	16
		W7QAP	32	XE2C	14
W4EQM	43	W7JRG	31	VE2GT	14
W4FBH	41	W7ACD	28	XE1QE	10
W4QN	40	W7CAM	25		
W4GIY	40				
W4EID	40	W8QYD	44		
W4DRZ	38	W8NQD	31		
W4LNG	36	W8LBH	26		
W4FQI	34	W8RFW	25		
W4GMP	34	W8TDJ	22		
W4WMI	33				
W4FNR	33				

stations are received in San Antonio now and then, and that 2-meter operators in that region are aiming at Atlanta at 6:30 and 7:30 A.M. daily, in the hope of breaking down this nearly 900-mile path on 144 Mc.

Haverhill, Mass. — The 2-meter band lost one of its most active stations in this area when death claimed Burt H. Taylor, W1KB, on May 1st. A veteran of nearly 60 years in telegraphy, Burt could take code with the best of them to the end, but his primary interest in hamming was v.h.f. He was active on 56 Mc. with portable gear back in the early '30s, and had been heard regularly on 2½ and 2 meters since. His 2-meter station, in which he took great pride, was pictured in this department in April, 1949, *QST*. He had worked nearly 600 different stations on 144 Mc., and was preparing to compete in the V.H.F. Institute 2-Meter Mileage Contest, the week of April 23rd, when he was taken to the hospital. In addition to his 2-meter gear, Burt also had equipment for 220 and 420 Mc., and was getting ready to go on 50 Mc.

Los Angeles, Calif. — A common interest in v.h.f. activity is an excellent basis around which to build a live radio club, the experience of the Two Meters and Down Club of Los Angeles is any indication. In a little more than a year this club has grown to more than 100 members, and has become an important factor in developing and maintaining v.h.f. interest in the Los Angeles area. The v.h.f. radio field, both professional and amateur, is being constantly canvassed for capable speakers, and the results show in two recent meetings. One was a talk on amateur television and marine radio by W6EFE, who is engaged in both these fields. The following meeting featured the Chief Engineer for the CAA at the Los Angeles airport, who later conducted the club members on an inspection tour of the control tower, radio range station, and CAA operations room at the giant airport.

Schenectady, N. Y. — Not all the 2-meter DX is a coastal proposition. Schenectady 2-meter stations have had fairly frequent contacts with eastern New England stations recently. W1BCN and W1MNF, out on the elbow of Cape Cod, and W1PIV, East Freetown, Mass., have each had several QSOs with W2RMA and W2ACY. The Schenectady stations must work directly over the Berkshires which impose a 3000-foot barrier perpendicular to this 200-mile east-west path, at a distance of about 30 miles.

Rainier, Ore. — Observing that not much news of v.h.f. doings in this part of the country has appeared recently in *QST*, W7LHL brings us up to date on who is active, and where. He works W7EUI, Kirkland, Wash., regularly on 144 Mc., a 115-mile rugged path. His 24-element W2NLY array (Sept., '47, *QST*) is a big help in this. It is often necessary to aim it at the mountains and work by the rebound method, even on relatively short paths, such as the 45-mile hop to W7GFZ, Vancouver, Wash. Seattle is represented on 2 by W7s EOP, FIM, JKB, LYA and MIG; Tacoma by LBA and LRF. Portland, Oregon, has W7s AVV, BQD, JRZ, JVH, IE, LI, AVO, AJM, DIS, ENU, GJY, INX, JNL, KCL, KJV, LHT, LMM and LYH. W7ALO is on in Salem; OU, AGZ and FSY in Oregon; and HUY in Corvallis. The better-equipped stations in Portland and Vancouver, like W7JRZ, W7AVV and W7AVO, work into Salem, Albany and Corvallis quite nicely. Polarization is vertical throughout this area.

Oak Ridge, Tenn. — A 2-meter expedition to Frozenhead Mountain, a 3400-foot elevation near Petros, Tenn., was conducted on May 7th and 8th by the Oak Ridge Radio Operators Club. With the aid of an 800-watt generator, a 100-watt rig with an 829B in the final, and a VHF-152-A, W4FQI/4 worked W4s FBU, Fountain City, Tenn., LNB, Chattanooga, HHK, Collierville, KIP and LSX in Atlanta, Ga., JDN, Erlanger, Ky., W8CYE, Miamisburg, Ohio, W8ZUR, Columbus, Ohio, and W9FVJ, Toledo, Ill. Best DX was W9FVJ, about 350 miles, with W4HHK only slightly less. Add a new wrinkle in mountain climbing: the gang took along a television receiver, and watched the Kentucky Derby from WAVE/TV, some 160 miles distant!

Rochester, N. Y. — The v.h.f. contest sponsored by the Rochester V.H.F. Group was very successful in promoting 2-meter activity. At least 22 stations participated, and several of these were new converts to the band. Good conditions during the contest period permitted contacts with Buffalo, Toronto, Lockport and Geneva. First place was won by W2UTH, with W2RLV placing second. Only a few minutes after the contest closed the band opened to the south, and W2UTH worked W3RUE, Pittsburgh, for the season's best DX.

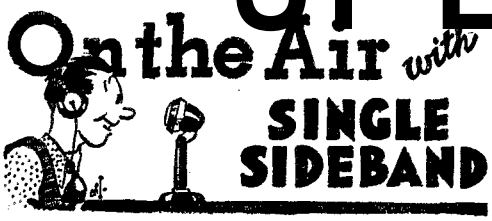
Collierville, Tenn. — The first 2-meter contacts between Tennessee and Mississippi were made on the evening of May 17th, when W4HHK worked W5JTI, Jackson, Miss., 195 miles, and W5NYH, Lexington, 141 miles. The same stations were worked again the following morning at 6:15, when they were pounding in like locals, and W5NLP, Jackson, was added. W4BYN, Memphis, has also worked W5NYH. Schedules are being kept night and morning to see how often these contacts can be duplicated.

The World Above 420 Mc.

As the summer season for tropospheric propagation develops, operating ranges on 420 Mc. are stretching out, and

(*Continued on page 108*)

JFLINT



The purpose of this column is to report schedules and operating times of active single-sideband stations, describe operating experiences and sometimes the gear in use, and possibly discuss some of the practical operating problems and suggested solutions. Contributions from active single-sideband stations will be welcomed.

We have several new stations reported this month, but we think the story of **W2UNJ** (Cortland, N. Y.) is the best, since he "snuck in the back door." Interested in phase-shift networks only from an academic standpoint, he built one and checked it on a 'scope. It worked so well he built a simple little exciter to experiment with during local contacts. That worked so well he changed his pair of 807s to Class AB_2 and put the thing on 75, using his 20-meter doublet against ground for an antenna system. Running about 65 watts peak input to the 807s, he finds the single-sideband rig gets out much better than the 100-watt a.m. rig did previously. Single-sideband DX so far is **WØMNN**.

Another new one is **W2EB** (East Bloomfield, N. Y.). He uses a phase-shift rig on 75, running about 400 watts peak to a pair of 242As. He first tried to align the rig on a receiver alone, and thought he was doing all right, as indicated by reports, until **W2KUJ** reported that his sideband elimination was about nil. (W2KUJ can check this in a hurry with his selectable-sideband receiving system.) After that W2EB used a 'scope and got the thing cleaned up. So it looks as though the phasing jobs need a 'scope for alignment, like the man said.

Right in our backyard **W1FAJ** (Hartford, Conn.) has a phasing rig going on 75. It ends up with an 810 running about 300 watts peak input, and Ed operates in the early evening and on week ends. After one of his first CQs he was answered by a station that claimed the modulation could not be understood except for the station call. Just as W1FAJ was reaching for the detonators, the telephone rang. It was W1TZ calling long distance to report that the single sideband was FB there, and that the other fellow just didn't know how to tune in the stuff! Needless to say, FAJ's faith in single sideband and real ham spirit has been completely restored.

It won't be long before a fellow can work a two-way WAC on single sideband. The first station on in Oceania is **KH6PP**, who runs 10 watts peak on 14,245 to a 2E26 and a folded dipole tacked to the side of the house. Even with this little rig, Gene is doing a good job educating the locals on how to tune in the stuff, and his best DX is W6ZV in San Diego. You have heard plenty of KH6PP before, as W7ACS/KH6 and his four continents on 50 Mc.

The first on in Europe is **DL4SS**, operated by D4AND and D4APA on 14,325 kc. The station is active at 0300 and 1500 CET, if you're looking for a "first" on single sideband. Who's next: Africa, Asia or South America? And who wants to bet we won't be more than happy to dig up a special WAC certificate for the first two-way WACs in each W call area and each continent?

The boys had better be careful about telling **WØDW** (Grand Island, Nebr.) that his "n.f.m. is out of adjustment," the usual cry of the uninitiated upon running into a single-sideband signal. Dave is with the FCC Monitoring Station, and could probably find something wrong with the other signal! His single-sideband rig is patterned after the "basic exciter" of a few issues back, and works into a 6SA7 mixer/6C4 oscillator/6AC7/807 combination, with bandswitching for the 75- and 20-meter signal circuits. With the 807 running Class AB, no startling DX has been worked, but QRO plans are in the works.

Steve of **W6UBB** sends in a report typed on his single-sideband radioteletype circuit. Seems as how he got a little fed up on fellows telling him "his n.f.m. was out of adjustment" and so he has been dabbling in teletype combined with his single sideband. Not that the 'phone stuff has been neglected entirely — OZ5DY is the best DX so far.

W3ASW found enough time off the air to talk about single sideband to the Lancaster (Pa.) Radio Club. He took along one of his filters and his exciter chassis, and some of the fellows were amazed to find that the stuff isn't as complicated as they had thought. Dick's filter hasn't been described in *QST*, but that of **W3MBY** was, in the March, 1949, issue. Better take another look at it, if you have been of the "too-complicated" school of thought. W3ASW now runs about 300 watts peak to a pair of 811s.

Ward of **WØTLE** is still plugging away with his rig on 28 Mc., mostly for the benefit of local hams interested in learning the tuning technique. He feels that one of the greatest reasons for lack of interest in single sideband is the "touchiness" of present receivers, and the necessity for switching over the receiver when going from a.m. to the reception of a single-sideband signal. As an out, he suggests the use of small signal-frequency oscillators that can be fed in at the input of a receiver set for normal a.m. reception. Many fellows use freqmeters or test oscillators for the purpose, of course, but our money is on something like the W2KUJ adapter (*GE Ham News*, Nov., 1948) which doesn't have to be changed when going from a.m. to single sideband and which locks in on any carrier — pilot or jumbo

(Continued on page 110)

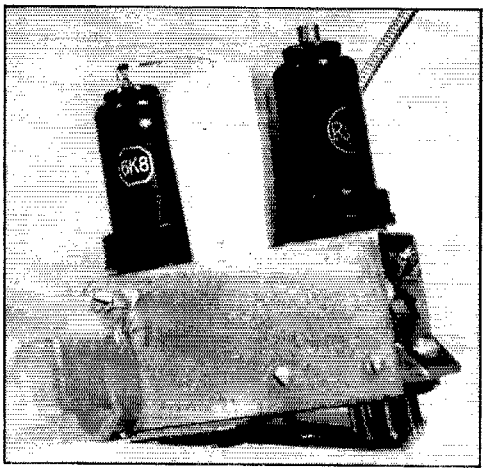
JFLINT

A Fixed-Tuned Plug-In Converter

Reducing Image Response with Double Conversion

BY JOSEPH ALETTO, JR.,* W6YCK

THE problem of image rejection and the value of a double-conversion receiver using a 1500-kc. first i.f. require little explaining to anyone who has done much operating in the 28-Mc. band. Images are probably most annoying when a choice bit of 10-meter DX has just been raised and a powerful 11-meter local decides to call a CQ, with his image falling right on top of the foreign station. Many amateurs solve this problem by connecting a conventional converter ahead of the regular receiver, or by buying a new receiver that incorporates double conversion, but neither solution was very appealing to the writer.



A plug-in crystal-controlled converter for improving the image rejection of a receiver. This unit was designed to plug into the converter-tube socket of an SX-25 receiver, but the principle can be applied to other receivers as well.

Connecting a converter ahead of the receiver didn't appear to be desirable because the calibration of the converter is dependent upon the dial setting of the receiver. Further, tunable converters add to the drift problem, because both receiver and converter drift enter the picture, although admittedly the receiver drift is small if the converter uses 1500-kc. output. Further, we don't particularly care for outboard equipment hung on the receiver and, finally, it seems wrong to have a complete receiver and use it only as a fixed-frequency i.f. channel.

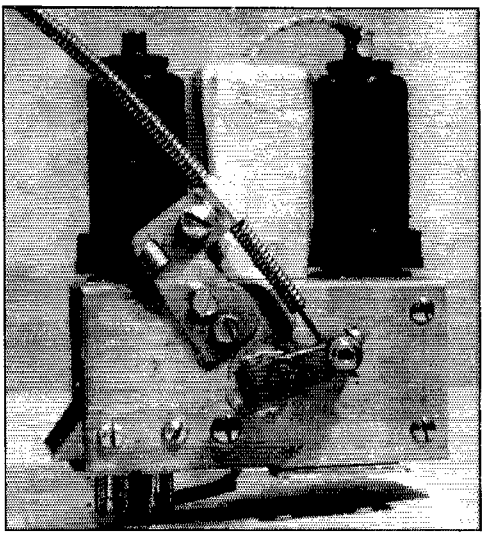
At the time of writing there is only one double-conversion receiver on the market and it is expensive, so a new receiver wasn't the answer. And, actually, the receiver on hand was satisfactory except for its lack of image rejection around 10 meters. After a lot of thought, a converter built into the present receiver appeared to be the best solution for our particular problem.

The bottom plate was removed from our SX-25 and a quick look was taken at the underside of the receiver. It didn't take long to decide that adding additional parts and another tube could become a major operation and a lengthy project, and it was finally decided that a plug-in converter would be much more desirable. In operation it has worked out quite well.

The installation of the plug-in converter requires no circuit changes in the receiver, although it does require some realignment.

The Circuit

The plug-in converter replaces the ordinary converter stage and transforms an ordinary receiver into a double-conversion affair. The receiver r.f. amplifier and converter tuned circuits are still tuned to the signal frequency, but the output of the first converter stage becomes 1505 kc. instead of the original 455 kc., by realignment of the high-frequency oscillator in the receiver. The 1505-kc. signal is then heterodyned to 455 kc. and fed into the normal receiver i.f. amplifier.



This view of the converter shows the flexible switch cable (automobile choke cable).

* 730 East 21st St., Oakland, Calif.

JFLINT

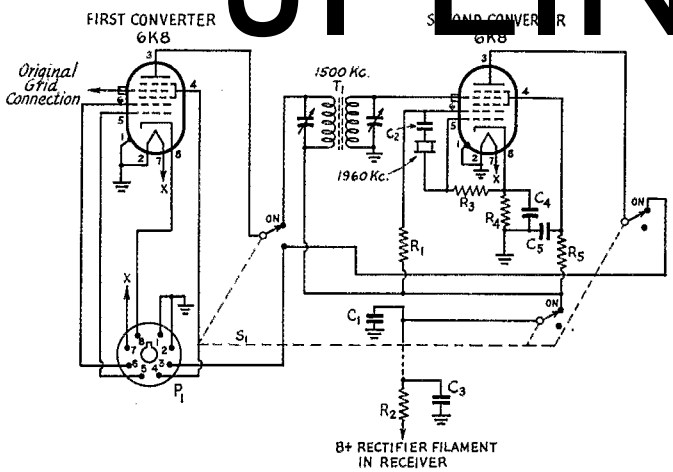
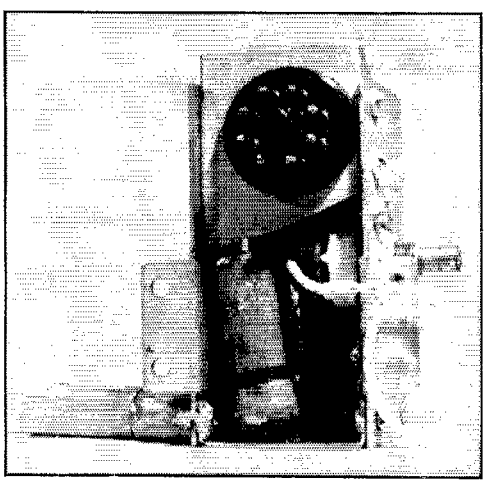


Fig. 1 — Wiring diagram of the plug-in converter.
C_1 — 0.05-μfd. 600-volt paper.
C_2 — 0.002-μfd. mica.
C_3 — 10-μfd. 450-volt electrolytic.
C_4 — 0.1-μfd. 200-volt paper.
C_5 — 0.05-μfd. 600-volt paper.
R_1 — 0.1 megohm, ½ watt.
R_2 — 5000 ohms, 5 watts.
R_3 — 0.27 megohm, ½ watt.
R_4 — 270 ohms, ½ watt.
R_5 — 47,000 ohms, ½ watt.
P_1 — Octal plug.
S_1 — 3-pole 2-position rotary (Mallory 3242J).
T_1 — 1500-kc. iron-core i.f. transformer (Miller 012-W2).

By selecting 1505 kc. for the first i.f., the high-frequency oscillator readjustment is not as great as it would be if a higher frequency were used, but the images are now 3010 kc. removed from the signal frequency, instead of the 910 kc. in a normal receiver. The images are reduced by the selectivity action of the circuits tuned to the signal frequency. If there are any strong near-by broadcast stations operating on 1500 or 1510 kc., the first i.f. should be selected to be from 15 to 25 kc. removed, to avoid a steady heterodyne riding through on all signals.

The circuit diagram is shown in Fig. 1. The first 6K8 converter is simply the receiver converter extended into the plug-in unit, working into the 1505-kc. transformer, T_1. A second 6K8 converter heterodynes the 1500-kc. signal to the normal receiver i.f. For stability and simplicity, the oscillator portion of this second converter is crystal-controlled, although a tuned circuit could be substituted, with some slight sacrifice in stability. The crystal-oscillator frequency is 1960 kc. (1505 plus 455), but it might be different for other installations, as discussed in the preceding paragraph.



A view underneath the converter, with the switch cable removed.

As shown in Fig. 1, a 3-pole switch is used to cut the converter in and out of the circuit. When the switch is in the "Off" position, the receiver mixer plate connects directly to the 455-kc. i.f. amplifier and by-passes the additional converter stage. The switch is controlled from the panel of the receiver by a short length of automobile choke cable.

Construction

Most of the constructional details are apparent in the photographs. The little chassis is made of aluminum bent into a shape that can be fitted into the set. The octal plug at the bottom plugs into the receiver converter socket, and the B+ lead is run separately into the power supply. Both R_2 and C_3 are mounted in the receiver proper, because there isn't room for them in the converter unit.

The crystal and associated oscillator circuits must be well shielded. Lacking space in the converter, the crystal was mounted on the side of the unit and covered with thin copper sheet. Poor shielding of the oscillator circuit may result in the receiver picking up the harmonics of the oscillator.

Adjustment

The converter will provide some additional gain that is advantageous if the receiver lacks gain at the higher frequencies. However, in cases where the gain of the receiver is already sufficient, a reduction in signal-to-noise ratio may result when the converter is installed, because the amplified thermal noise will operate

(*Continued on page 110*)

JFLINT

— TVI Tips

Some Suggestions for 50 Mc.

While not as tough as 28 Mc., operation on 50 Mc. poses enough of a problem so that activity on that band has fallen off in localities where television has an appreciable foothold. Just as in the 10-meter case, some of the v.h.f. fraternity tend to give up, rather than take the necessary steps to clean up the trouble. Not all, however; here are some of the ways the more enterprising have found for beating the rap:

Adjacent-Channel Interference in Channel 2

If you're running high power on 6 and the folks next door like Channel 2, you're in for trouble. The selectivity of most TV front ends is just not equal to this task, but the legal advantage you hold as a result of the trouble being due to a receiver deficiency won't help much in keeping the neighborhood peace. Reduced power and the right kind of traps often provide a better solution. W2IDZ, Westfield, N. J., uses a series trap consisting of 7 turns of No. 12 or larger wire, resonated with about 2 $\mu\mu$fd. in series across the antenna terminals of the TV receiver, as shown in Fig. 1. This is adjusted by spreading or squeezing the turns, for minimum interference.

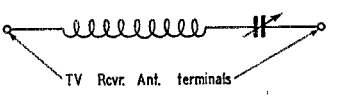


Fig. 1—Method of connecting a series trap to reduce interference in Channel 2 from 50-Mc. transmissions.

Harmonic Interference

Only Channels 11, 12, and 13 are in direct harmonic relationship with the 50-Mc. band, but harmonics from driver stages can cause trouble, particularly in Channel 7 (7 × 25 Mc.). Of course a reasonable amount of shielding and filtering should correct such a trouble, but it can be avoided in other ways. W2JPX, Larchmont, N. Y., gets around it by using a 50-Mc. line oscillator (shielded), feeding two 6AQ5 isolating stages running Class A, which in turn drive an 829B amplifier. This cured Channel 7 interference in his own receiver, and in others on either side of his home and across the street. Use of the new 50-Mc. crystals would be equally effective.

In the Boston area a group of 50-Mc. men now operate above 51.5 Mc. with simple rigs using the stable 26-Mc. crystals now supplied by most manufacturers. By going to 25.7 Mc. or higher in the oscillator, the seventh-harmonic radiation, if any, is outside Channel 7. Not the least of the merits of this approach is that it helps to occupy the otherwise almost unused territory above 51.5 Mc.

Juggling of the operating frequency can be used to avoid trouble from fourth-harmonic radiation in any of the top three channels, depending upon which may be used in your neighborhood. Of course the forthright approach, in any of these cases of harmonic interference, is to correct the trouble at its source. Since this is principally a matter of high-order harmonics, in the case of 50-Mc. operation, the techniques already covered extensively in *QST* and elsewhere should do the trick.—*E. P. T.*

Class B and Degeneration

A letter from Harry Burnett, W1LZ, again calls attention to the possibilities in reducing harmonics by operating r.f. stages in the Class B region:

"Considerable time has been devoted to experiments with Class B r.f. operation of both final and driver stages. Not only have Class B bias voltages been used on these stages but also the tubes have been run with approximately one-fifth normal grid current. Results in a television receiver across the street have been amazingly good — and the efficiency of the amplifiers is still approximately 60 per cent.

"A page has also been taken from the book of audio-amplifier practice. No particular originality is claimed for the idea, but we have never seen it referred to in print. In audio work degeneration is very commonly used to minimize harmonic output and to stabilize an amplifier; the same dodge has been applied at W1LZ to r.f. amplifiers. So far, only the simple method employing an unby-passed cathode resistor has been used. This system was found to have excellent stabilizing effects and it still further minimized harmonic output. Unby-passed 50-ohm carbon resistors are now used in all doubler and driver stages.

"Of course, a degenerative amplifier is harder to drive, but that is no problem with the doubler

JFLINT

and driver stages because of the small drive required for tubes such as the 807 and 5514. However, in the final amplifier a compromise had to be made between the available driving power and the amount of degeneration. The greater the resistance, of course, the greater the degeneration. With a single-ended HK-354 final it was found that 25 ohms was a satisfactory compromise. The writer does not have sufficient time to investigate thoroughly the potentialities of degeneration in r.f. amplifiers, but it is hoped that some of the gang will develop the idea further. For example, there are many other possible ways of obtaining controllable degeneration, some of which may be better than the unby-passed cathode resistor."

TV Antennas

The occasions when a ham can have much influence on the selection or installation of a neighboring TV antenna may be relatively few, but there are times when his advice is asked about the kind of antenna to put up. Dana Griffin, W2AOE, who has authored quite a few *QST* articles over the years, recently called our attention to the fact that TV antennas differ considerably in their ability to discriminate against signals outside the TV channels. Measurements on various systems while developing a commercial TV antenna showed, in particular, that some systems cut off rather sharply below 54 Mc. while others do not. Those that do are in a more favorable position with respect to TVI caused by the ham transmitter's fundamental, although there will be no difference if the TVI is purely from harmonics.

Incidentally, recommending an antenna that is good from the TVI standpoint is as much a favor to the TV set owner as it is self-interest on the part of the ham. An antenna system with poor response outside the TV channels will reduce i.f. interference from ISM high-frequency transmitters, and noise of all kinds in that part of the spectrum. Result — better over-all reception. Part of the story, too, is a good transmission-line installation. Much of the interference pick-up is on the line itself, not the antenna. Coax or Twinax, properly installed (which means good shielding right up to the antenna coil), will do wonders in reducing all kinds of QRM, including harmonics from near-by transmitters. — *G. G.*

SWITCH TO SAFETY!

A.R.R.L. VANALTA DIVISION CONVENTION

Vancouver, B. C., August 5th–7th

From 10:00 A.M. on August 5th, when the registration starts, until the echo of the last resounding smack of the softball game dies away Sunday, the Vanalta Division Convention program is jam-packed with events of interest to visiting hams and their ladies.

The three-day convention, sponsored by the British Columbia Amateur Radio Association, will be held on the beautiful University of British Columbia grounds. For those in-between times, there are facilities for golfing, swimming, boating and fishing within five minutes' distance from the convention headquarters.

The get-acquainted sessions of Friday, replete with visits to ham shacks and commercial communication stations, sight-seeing tours, inspection of equipment displays, and Dutch lunch, will be topped off with a general assembly for entertainment; movies, music and discussion of amateur radio topics. Technical sessions will occupy most of Saturday, with interesting talks interspersed with a code-speed contest, jobbers' displays, and films by U.B.C. An address of welcome by the Mayor of Vancouver at 7 P.M. will start off the grand banquet Saturday night, to be followed by dancing until? ? ? Sunday is family day, with a car-caravan trip to Vancouver points of interest, beginning the day at 10, and baseball, tug-of-war and other sports rounding out the program.

The whole works will cost you $5.00 per person, including the Saturday-night banquet. Excellent accommodations will be available, but reserve yours *now*. For advance registration and further information, address the Convention Chairman, R. K. Town, VE7AC, 2879 Graveley St., Vancouver, B. C., Canada.

Strays

School Daze: Overheard in Duluth at the Arrowhead Radio Club fundamentals class:

WØKYE: Bill, do you understand the uses of the three general classes of amplifiers?

WØNRV: Sure, you use a Class C with a Class C license, a Class B with a Class B license, and a Class A with a Class A license.

— *WØRA*

—··—

"Dear Ed.: I've been watching them make some h.f. crystals here and thought you'd like to know how it's done. They start by taking a small shadow and cutting it in half to make a wish. They then worry this down to, say, 51.62 Mc.!"

— *W2ZGY, Crystal Section, GE*

—··—

Having trouble with spark-plug QRM in your mobile job? Several of the gang report that the new Autolite plugs with built-in radio suppressors do a pretty complete job of eliminating spark noise — far better than the usual combination of a suppressor and the conventional plug.

—··—

It has just come to light that Joseph R. Lebo, W2OEU, is the author of the Resolution commending amateur radio which was passed by the House of Representatives recently. A FB job of public relations for ham radio, OM!

JFLINT

A Practical Operating Desk

Comfort and Convenience in the Ham Shack

BY CARY R. MANGUM,* W6WWW

CONSIDERING the amount of time most hams spend at their rigs, it is astonishing how little attention most of them give to the comfort and convenience of the operating position. Even if the appearance isn't of importance, a properly-designed operating table can add much to the efficiency of any station.

The operating desk shown in the pictures is the result of this operator's determination to rescue himself from cramped, inconvenient quarters. It

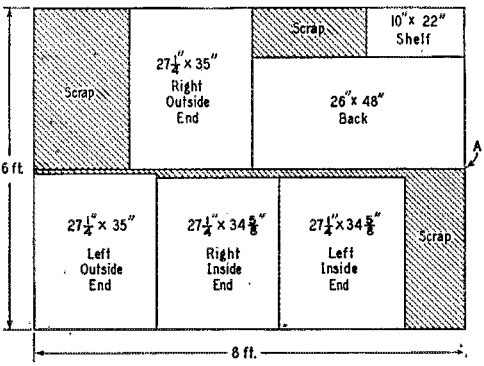


Fig. 1 — The surface pieces for the base of the operating table are cut from one large or two small sheets of ⅜-inch plywood. The scrap pieces can be used for the drawers.

has enough room for a large communications receiver, converter, bug, 'speaker, books, frequency standard and beam indicator, with more space left over than many operating tables provide at the start. The drawers are a ham's heaven — there are six of them, 32 inches in length, of three different depths. A 10 × 22-inch shelf at the back of the kneehole serves as a brace between the two sections of the base and provides room for *QST*s and books. The 28-inch height and extra-large kneehole make for an extremely comfortable and relaxing operating position. A glance at the materials list might give the impression that the desk is flimsy. But not so — in spite of its lightness, it won't rock or shake even if you dance a jig on it. One person can easily lift the whole thing when it is finished. Perhaps the best feature is that the materials cost less than $25.00, while the nearest market equivalent I could find was priced at $129.00!

* 12031 Wagner St., Culver City, Calif.

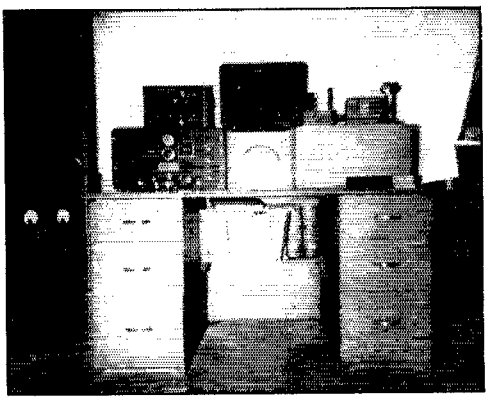
General Plan

Before starting on the construction, look over the sketches and photographs and make sure that you understand the purpose and location of each piece and how the various joints are made. If any point is not clear, study the text for the answer.

All surface pieces, except the top, are cut from a single 6 × 8-ft. sheet or two 3 × 8-ft. sheets of ⅜-inch plywood (finished on one side) selling for about 30 cents a square foot. Fig. 1 shows how the sheet is marked out for cutting. *A* is the center line of the sheet. For most-accurate work, each piece should be measured and cut separately, rather than cut along the dividing lines, eliminating the error of the saw cut. As each piece is cut off, it should be marked plainly to make the assembly less confusing. The end pieces may be cut out so as to form feet at the corners or, if it is desired to avoid this labor, separate feet can be added later.

Assembly strips and the strips supporting the drawers are cut from 1 by 2 stock (actual dimensions usually ¾ by 1⅝ inches). The lengths to which these strips should be cut and the quantity of each piece are shown in Fig. 2. Only the pieces of Fig. 2B each require a notch in one end to fit the cross-member at the front of the drawer openings shown in C.

The general plan of construction is illustrated in Fig. 3. Fig. 4 shows details of the assembly. Fig. 4A shows how the ends (both inner and outer) are fastened to the back, while B shows the joints at the front. These are top views. The



The completed operating table in service at W6WWW

JFLINT

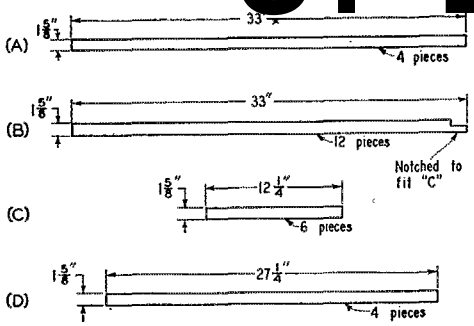


Fig. 2 — Assembly strips and drawer runners are cut from 1 by 2 stock. The quantity of each piece required is shown. See Figs. 3 and 4 for location.

lettered parts in both Figs. 3 and 4 refer to strips shown in Fig. 2. All pieces are held together with glue and stove bolts fitted with washers. Countersunk 3/16-inch bolts, 2 inches long, are used to join pieces *B* and *C*. Round-head bolts, 1/8-inch diameter, 1 1/2 inches long, are used for attaching pieces *A*, *B* and *D*. Washers should be used under both the bolt head and the nut. Contrary to expectations, the visible bolt heads add to the appearance of the job, rather than detract from it. The top, a 37 1/2 × 50 3/4-inch sheet of 3/4-inch plywood, is fastened on with 2 1/2-inch No. 6 countersunk wood screws from underneath, so that they will not show on the surface.

Preparing the Sections

After the pieces have been cut out and trimmed square and accurately to size, the various bolt holes should be marked out and drilled in the sides and back. I used five bolts along each horizontal row on the end pieces and three bolts in each vertical row for fastening the back. The assembly strips and the strips supporting the drawers should be clamped in position with "C" clamps while the bolt holes are drilled in the strips through the holes already made in the panels. Make sure that you have the strips in their proper places on the correct (unfinished) sides of the panels, and that the drawer slides on opposing panels match up exactly. Note that pieces *A* and *B*, Fig. 4, must be placed 2 inches in from the rear edge of the end panels to allow 1 5/8 inches for the upright pieces, *D*, and the 3/8-inch back panel. As the holes are drilled, the bolts should be inserted loosely so that they will not become misplaced from their proper locations. Don't forget the holes at the front ends of the *B* strips for fastening the *C* crosspieces. Two countersunk bolts are used at each lap joint. Also remember the shelf and its supporting strips.

When all holes have been drilled, a coating of good-grade glue should be spread between the strips and the panels and the bolts tightened up enough to draw the washers flush with the surface of the wood.

As soon as the glue is completely dry, the finished side of all panels should be sanded thoroughly with a sheet of No. 1 or No. 2 sandpaper wrapped around a block of wood. The better the sanding job you do, the better will be the finished job. The edges that make the corners of the desk should be rounded off with the sandpaper, too. With the pieces finished, the base of the desk can now be assembled, using glue along with the bolts.

The finish can be applied most easily after assembly. You may have some particular finish in mind, but the one I used results in a very smooth and pleasing job. First pour and spread around a heavy coat of linseed oil on one of the panels. Let it soak in for a few minutes and then wipe it off, applying the excess to the next piece. After the linseed is partially dry, sand the surface again. Now apply a second coat of linseed and after allowing the surface to soak it up, rub as much of the oil into the wood as possible and wipe dry. The latter is important, because linseed left on the surface may cause bubbles under the finishing coat later. After sanding again, allow the surfaces to dry out completely and then repeat the process once or twice more. The final drying should be done at least overnight. Now apply an even coat of shellac. When the shellac is dry, the finish can be brought up to a luster with Johnson's cream wax.

(*Continued on page 112*)

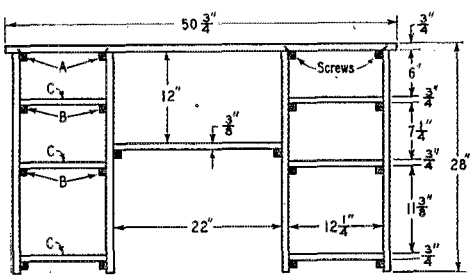


Fig. 3 — General plan of the operating table with important dimensions. The shelf is at the back of the kneehole.

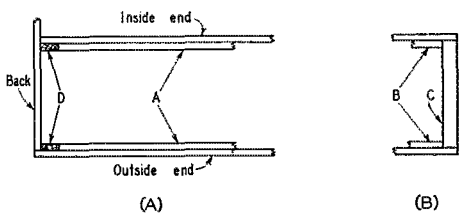


Fig. 4 — Detail sketches showing A, the joints at the rear of the drawer cavities and B, the joints at the front of the drawer openings. Both are top views.

JFLINT

• Technical Topics —

V for V.H.F.

FACED with the need for an antenna to keep us in business on 10, 6 and 2 meters until time and facilities were available for the erection of high-gain rotary arrays, the writer decided to give a backyard "V" a trial. Perhaps the results will be of interest to others in a similar predicament.

A few feints with the slide rule indicated that, so far as leg lengths were concerned, several arrays of practical size could be made to work on 10, 6 and 2 meters, even though these bands are not in direct harmonic relationship. A leg length of 68 feet, for instance, is 7 half waves on 50.5 Mc., 4 half waves on 28.8 Mc., and 20 half waves on 145 Mc. Many other combinations [1] can be worked out using approximately this ratio. Some typical examples are given in the accompanying table.

Since this was to be strictly a temporary arrangement, it was decided to do the job with but one support, a 32-foot mast made of war-surplus aluminum sections, equipped with a halyard for raising and lowering the antenna. The apex of the "V" was supported by this mast, with the far ends tied to any of the small cedar trees with which our Connecticut hillside is so plentifully supplied. This meant a sloping antenna, but by using fairly-long stay wires it was possible to keep the open end of the "V" at least 15 feet above ground. Use of the cedars, scattered at random, permitted trying various included angles. About 60 degrees, midway between the theoretical optimum for 28 and 50 Mc., was selected for the first try.

A 68-foot "V" is not much of an antenna, as most v.h.f. enthusiasts think of antennas, but if it did as well or better than separate dipoles for each band our quick-and-easy skywire would be worth at least its cost, which had reached the alarming total of two hours time, some miscellaneous insulators and antenna wire, a random length of much-used Twin-Lead, 50 feet of clothesline, and 30 cents worth of galvanized wire from the local hardware store. First check was on 10 and 11 meters, where it was seen that the system loaded nicely, without tuning, on 11 but not on 10, the degree of loading dropping off to practically zero above 29 Mc. Probably feeder length, but let's see about 6 before we make any changes.

Various frequencies in the 50-Mc. band were tried, showing loading similar to that on 10; light within the band, but increasing toward the low end. Since the system was loading too low in frequency on both bands the feed line was trimmed a few inches at a time, the question now being whether a single feeder length for resonance on the two bands could be obtained. Apparently it could, for satisfactory loading on the desired frequencies resulted after several trimmings.

Results

By then the morning had been used up, and 10 was wide open to the west. A few calls served to show that we could make contacts in almost any direction around the States, and the following morning satisfactory results were obtained with Europe and Africa. At first no particularly sharp directional pattern was observable, but after a few days and nights of listening and calling it became pretty obvious that South America and the far Pacific Islands were off our list for the present.

At night, after the band folded up, the performance of our "V" folded, too. It certainly was no ball of fire on ground wave, and when the band was in that borderline condition between open and dead we weren't setting any new records, either. In other words, not too much gain (what do you expect with 2 wavelengths on

(*Continued on page 114*)

TABLE I

Dimensions of Typical "V" Antennas for V.H.F. Use

Side Length in Feet	*"V" Angle in Degrees* 28.8 Mc.	50.5 Mc.	145 Mc.
58	—	60	37
68	70	55	35
106	—	42	33
136	52	37	30

[1] Just in case there is no ARRL *Antenna Book* handy, the leg length of small "V" and rhombic antennas can be figured from the formula:

$$Length\ (\text{feet}) = \frac{492\ (N-0.05)}{Freq.\ (\text{Mc.})}$$

As the shortening for end effect applies only to the end half wave, the formula for systems greater than about 4 wavelengths long may be simplified to:

$$Length\ (\text{feet}) = \frac{492N}{Freq.\ (\text{Mc.})}$$

N is the number of *half waves* on each leg.

JFLINT

Hints and Kinks For the Experimenter

MOBILE RECEIVER FOR 75-METER 'PHONE

WITH 75-meter 'phone open to mobile operation, the question of a receiver can be solved easily by anyone who owns a BC-454 (3 to 5 Mc.) Command receiver, and who has a broadcast set installed in his car.

The BC-454 was found to be unsatisfactory when used alone, lacking both selectivity and audio output, but when its 1425-kc. i.f. circuits were used to introduce the hamband signals to the car receiver, in "Q5-er" fashion, both of these shortcomings were overcome. In fact, it is necessary to use only the first three tubes in the BC-454. This lowers the "B"- supply drain, and results in less "hash" than when the i.f. stages of the BC-454 are used.

A d.p.d.t. switch is used to switch the BC-454 out of the circuit when it is desired to use the broadcast set for its original purpose.

— *Marion D. Conham*

ANOTHER HINT FOR BEAM BUILDERS

THE natural tendency for most of us is to use durable material when building beam antennas. Thus we think first of brass screws and hardware, because of their weather-resistant qualities. What we forget, however, is that when two dissimilar metals, such as aluminum and brass, or copper, are in contact in the presence of moisture, electrochemical action takes place, and sooner or later something has to break loose. If, therefore, you plan to use aluminum tubing for your beam elements, round up some aluminum nuts and bolts to go with it. Stainless-steel hardware may also be used with safety. Most large hardware stores have such things in stock.

— *Joseph Engels*

USEFUL TOOL FOR TVI REDUCTION

WHEN you start working on your rig to cut down harmonic radiation, you'll find the gadget illustrated in Fig. 1 a handy addition to your bag of tricks. It is a pick-up loop designed to permit easy and constant coupling to d.c. leads, feeders, tank coils, etc., to make your indicator a more useful and reliable device.

An 8-inch length of the new tubular 300-ohm Twin-Lead is used to form a hairpin loop. The wires at one end of the piece are joined, forming the loop, and a convenient length of 75- or 150-ohm Twin-Lead is connected to the other end, running to a single-turn loop that fits around the coil in your harmonic indicator. A 1/8-inch slot is cut through the side of the hollow Twin-Lead, as shown. The little notches near the ends of the slot permit you to clamp the lead you are checking within the "probe" so that the lead and the hairpin loop run parallel for several inches. This provides maximum coupling to the lead, and also insures that the degree of coupling will remain *constant* while you work on the rig to reduce the amplitude of the harmonic flowing in that lead. Thus you won't have to wonder whether the "reduction" in the harmonic was a result of the change you made, or of a difference in the degree of coupling from one measurement to another.

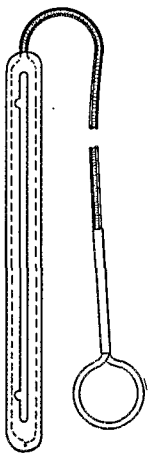


Fig. 1—Handy probe for use with a wavemeter in conducting tests to reduce TVI. The construction of the probe, which is made of the new tubular Twin-Lead, is discussed in the text.

The bare wires exposed at the joints in the probe may be insulated by melting a little of the brown dielectric from a scrap of the Twin-Lead and flowing it on over the joint, as is done in making up the center joint in Twin-Lead folded dipoles. You can then use the probe around fairly high voltages without fear of electrocution. It is also possible to push the probe through small openings in the shielding of your rig to determine how much of the harmonic is still left inside. In low-power transmitters it is even possible to place the pick-up probe right inside the tank coil.

When using the slotted probe to check an open-wire feedline, bow one side of the feeder for about six inches of its length and clamp the bowed portion inside of the probe. In this way you'll be able to check the effectiveness of your antenna

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coupler in knocking down the harmonic so that the felt begins to give. After you've gets out by way of the antenna.

The use of the pick-up loop discriminates against stray pick-up from the fundamental signal, and gives you a reading of the harmonic only. In addition, it permits you to place the indicator on the bench, freeing the hand that would otherwise hold it to make adjustments on the rig. If you've tried to maintain constant coupling to a given circuit and make adjustments on that circuit at the same time, you'll know what we mean! With this gadget it's easy.

— *W1FTX*

ANOTHER GLASS-DRILLING HINT

HERE's another way to drill glass, and it's probably the best way if you have access to a drill press. If you don't have a drill press, you will have to use another method.

Determine what diameter hole you want and obtain a piece of thin-wall brass or copper tubing of the same outside diameter. With a suitable saw notch the tubing as shown in the diagram, and mount the tubing in the drill-press chuck. If the tubing is of a larger size than the chuck capacity it will be necessary to devise some sort of a holder. One way is to shape a wooden dowel of hard wood, one end of which will fit in the chuck and the other end of which will fit inside the tubing. A screw can be run through the tubing into the wood to hold it firmly in place. It is essential that the tubing run true on the axis of rotation, with no wobble or shifting.

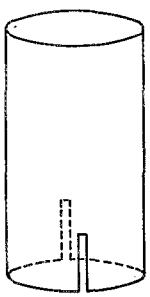

Fig. 2 — Method of notching tubing for use in drilling holes through panes of glass.

The glass through which the hole is to be drilled should have a firm foundation on the drill-press bed. When drilling thick glass sheets a wood base is often used. However, for drilling such thin panes as window glass, it is recommended that a layer of felt be placed under the glass.

A dam of putty or plaster of Paris is built up around the hole-to-be, and this is then filled with a mixture of water and Carborundum. Or, if no Carborundum is immediately available, fine valve-grinding compound may be used.

Now you're all set to drill. The watchword is "take it easy." Don't use too much pressure, don't try to go too fast, don't try to force the operation. Use very light pressure, just enough drilled through a couple of panes of glass (and have perhaps broken one) you'll get the "feel" of it. It is essential that the grinding compound stay moist and fluid. Some of the water will pass through the slots in the tubing to the inside of the spot being drilled, thus keeping that area cooled. If not, there'll be a hot spot, and a good chance that the glass will crack.

Keep plenty of water on the work and not too much pressure on the drill press, and you won't have any trouble. Coarse Carborundum will cut faster than fine powder or valve-grinding compound, but the hole won't be quite as smooth.

— *W1IKE*

UTILITY POWER SUPPLY

IN these days of surplus gear, miniature low-voltage tubes, d.c. relays, and gadgets requiring all sorts of odd values of plate voltage, a utility power pack for the experimenter really has to be versatile. The unit shown in Fig. 3 has filled the bill nicely in my shack, and I don't doubt that it will be found useful in others. It can supply a variable d.c. potential anywhere between 50 and 350 volts, 6.3 volts a.c. and 12 volts a.c.

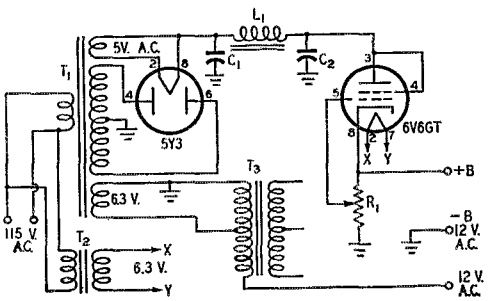

Fig. 3 — Circuit diagram of a handy utility power pack for the ham workbench.
C_1, C_2 — 10-μfd. 450-volt electrolytic.
R_1 — 0.25-megohm potentiometer.
L_1 — 100-ma. filter choke.
T_1 — 350–0–350-volt replacement-type power transformer with 6.3- and 5-volt a.c. windings.
T_2 — 6.3-volt filament transformer.
T_3 — Vibrator power transformer (secondary leads taped, half of primary used as shown).

The potentiometer, R_1, is used to set the d.c. output to whatever value is required between the limits stated above. The primary of an old 6-volt vibrator transformer is used as an auto-transformer working off the 6.3-volt winding of the regular replacement-type transformer to obtain the 12 volts a.c. required for the filaments of so many of the surplus gadgets. A separate 6.3-volt transformer is included to supply the filaments of the 6V6 and any other gadgets requiring it.

(Continued on page 118)

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Correspondence From Members-

The Publishers of *QST* assume no responsibility for statements made herein by correspondents.

THOSE F.C.C. PROPOSALS

P. O. Box 444, Texarkana, Ark.-Tex.

Editor, *QST:*

. . . We disagree with the theory that the blueprint to provide scope and direction should come from Government sources. We recognize and appreciate the fact that regulations are necessary and respect them accordingly but amateur radio is a matter of the individual's own election should he so desire to qualify and participate in a worthy public service at his own expense without thought of material gain, and for that reason we feel that the amateurs themselves should provide the blueprint for scope and direction for the advancement of the art. . . .

— *W. D. Cox, Secretary-Treasurer*
Texarkana Radio Amateurs Club

1118 Chester St., Zanesville, Ohio

Editor, *QST:*

. . . The proposals are arbitrary; one of the stated purposes is to "direct" amateur activity into those channels which a few bureaucrats think they should follow. In a socialist state this would all be very logical, but so far as I am aware we have never handed over to any Government employee the right or duty of directing our recreation into those channels he thinks it should follow. This aim, stated in plain English by FCC, is un-American. . . .

— *Richard B. Jeffrey, W8GDC*

UNITY

Sanford, N. C.

Editor, *QST:*

. . . I frankly think that the very existence of the craft is being jeopardized by this division of ranks. Ham radio has survived down through the years only through unity. I would certainly hate to see my favorite hobby destroyed because of the whims and fancies of a selfish minority of operators.

— *V. C. McIver, W4NYN*

Macomb, Ill.

Editor, *QST:*

. . . To me it seems that there is a great deal of unwarranted, loose, ill-advised talk. To put the matter more plainly, the question is in my mind as to whether, by what I take to be unintentional acts, the talk is not undermining the amateur's standing before the public and the FCC. It would appear probable that we would do better to use our wide-open democratic processes and, once having used those processes, to abide by the majority.

It is possible, even probable, that ARRL being a human agency has made some mistakes and will make mistakes. However, once I've voted for a man, it seems binding on me to support his judgment when he obviously has facts at hand that I do not have.

— *Hugh C. Crouch, W9OFU*

Wilson Ave., Chatham, N. J.

Editor, *QST:*

. . . It seems to me that for the purpose of unanimity of action it is essential that we have one large central organization which should be supported by all amateurs and amateur groups. To this end ARRL has been doing the job for many years and is probably the best fitted to carry on this work because of this experience. However this does not convey to those running ARRL the privilege of wearing little gold crowns and carrying placards reading "We can do no wrong." Let us remember that amateur radio was not made for the exclusive benefit of Hartford, Chicago or San Francisco but that it was also for the benefit of Johnny Hayseed of Hayseedville and that because he disagrees with you doesn't necessarily mean that what he thinks is wrong.

— *G. A. Diehl, W2IHA*

2008 Truman Road, Charlotte, N. C.

Editor, *QST:*

. . . I am in full agreement with all of the new FCC proposals with one exception; yet I will not petition the FCC separately, or join with any other group in doing so except the ARRL. I will make my views known to my director, and I will then abide by the majority action of the ARRL Board, whatever it is.

Let us spurn these siren songs from selfish minority groups; let us unite once again in force and in spirit and thus, by our unity and by our service, preserve for the coming generation of amateurs the joys we have known so fulsomely.

— *C. A. McKnight, W4CFL*

BASHFUL NEWCOMERS

301 E. 17th, Rolla, Mo.

Editor, *QST:*

. . . I believe you are making a serious error in not doing more to engulf the new member in League activities. Don't just let him find a place, try to force him in. A lot of bashful ones will feel honored.

— *T. R. Langston, WØFPK*

MORE ON POWER

Falls Church, Va.

Editor, *QST:*

. . . The idea of defining the possession of tubes and/or power supplies capable of supplying more power than 1 kw. as constituting *prima facie* evidence of intent to break the law is ridiculous and unfair to those of us who have purchased, say, Amertran 2-kva. 6200-volt c.t. transformers or 304-TL tubes, but who do not intend to exceed the 1-kw. limitation.

I have been considering the problem of power limitation and I find that there is a very simple solution — the overload relay available on surplus. The law requires that if we use in excess of 900 watts to the final, we must have an accurate method of measuring the power. The commonly-accepted method of measurement is to measure plate voltage and plate current. We then cause the product of the measured values to be under 1000. We may, obviously, include an overload relay which will shut off the transmitter if the current to the final exceeds 1000 divided by the plate-supply voltage.

This can be done by using, for example, one of the 220-ma. circuit breakers now available on surplus for less than two dollars. These particular units have four terminals, two for the 220-ma. d.c. winding and two for the breaker connections. It is a matter of only a few minutes to provide a shunt across the winding terminals and to adjust it to limit the current to the proper value. This would prevent breaking the law and damaging equipment.

— *Harold B. Rex, W4NBJ*

(Continued on page 118)

JFLINT Operating News

F. E. HANDY, W1BDI, Communications Mgr.
J. A. MOSKEY, W1JMY, Asst. Comm. Mgr.
ALBERT HAYES, W1IIN, Natl. Emerg. Coördinator

GEORGE HART, W1NJM, Communications Asst.
JOHN E. CANN, W1RWS, Communications Asst.
LILLIAN M. SALTER, Communications Asst.

An Appeal for Brevity. The following suggestion for newcomers to the amateur ranks comes from Al Hamel, W3ORO:

Many budding radio operators who are eager for successful QSOs realize they are not hotrocks when it comes to operating. Much has been said about the old timer — the better operator — being considerate of this new ham. *That is important* and for the most part the speed boys do carefully slow down and help their younger brothers. Now I want to appeal to the newcomers for consideration for the faster brethren. Honestly, some of the new men can be quite garrulous and at 10 words per minute will conduct their end of the conversation for as long as fifteen minutes at a stretch, this without any break while they struggle to send something intelligible. This is a suggestion that those boys keep transmissions down to a reasonable length considering the time involved for them to say a great deal at slow speeds. Now please don't get me wrong. Personally, I'll stick with these fellows to the bitter end. The fellow who gets my goat is one who sends *so* badly you wonder how he ever passed his exam.

The speed and enjoyment of any contact can be assured through condensation of subject matter to the concise words and expressions that cover a point without undue elaboration. In any event, for 'phone as well as c.w., a reasonable amount of back-and-forth guides any conversation most pleasantly — for which reason we suggest break-in arrangements such as described in the operating booklet and the *Radio Amateur's Handbook.* The above seems to us a good tip for the newcomer. It sometimes seems difficult for him to get hold of anyone to talk to in the first place, if he hears everyone rattling along at a fast clip. When he makes a contact he hardly notes that in getting off a volley of words at very slow speeds he is using up an awful lot of time. It must also be pointed out that fifteen-minute-at-a-stretch transmissions are subject to FCC citation unless they contain full identification by inserting the calls at ten-minute intervals! To sum up, more *short* comments and back-and-forth exchange will make life agreeable to both beginners and old timers.

Courtesy on Directional CQs. ZS2AT writes, "Why do many Ws ignore a directional call and barge in when not required? I feel rather sore at having my contact with KP6AB broken off after having contacted him. If I send a directional CQ TI, back come *several* Ws! What do such operators think a directional CQ is sent for?" It is indeed silly and irritating as ZS2AT points out — and it shows gross ignorance besides — to answer specific CQs when *not* sent in one's own direction. W1AW has noted the same difficulties, when having traffic for a particular state and even when engaged in QSOs and using $\overline{\text{KN}}$ (meaning *others keep out*) on the end of transmissions, too. Comment seems superfluous on this one . . . see scripture, Proverbs 10, 23rd verse.

Specifying U or D. ARRL's DX Operating Code, Operating Aid No. 5, has a point that deserves some attention. The use of U or D replaces the older practice of sending HM-ML and the like to specify band segments in broader terms. To all W/VE stations the Code reads as follows:

Observe calling instructions given by DX stations. Example: "15 U" means "call 15 kc. up from my frequency." "15 D" means "down, etc."

The information for amateurs in other countries reads this way:

Tell listeners where to call by indicating how many kilocycles *up* (U) or *down* (D) from your frequency you are listening. Examples: "CQ DX CQ DX CQ DX 15 U DE AC4YN AC4YN AC4YN 15 U K." When using voice the operator simply adds with his identification, before listening "answer 15 kilocycles up from my frequency."

Long CQs. It will not be the first time that this column has been used to plead with amateurs to "make calls short and insert identification often." That is the standing policy of experienced amateurs who commonly *listen* as much or more than they transmit in going after effective communication results. W6UJ writes as follows: "Remind some would-be DXers that most good DX stations are *not* equipped with TV yet. So how can they get interested if one calls CQ DX and never signs his call! One W the other night called CQ DX 54 times with no sign, and he had sent many calls before I started counting 'em. Afterward he called CQ DX 42 times more before signing. What about the regulation giving examples of a call *three times* and then a sign-over? I, for one, am not going to work those who send long calls and no proper sign!"

On Decency in Operating. WØOAQ (observer) reports too many stations heard lately on voice or c.w. "testing," the c.w. ones sending NST NST (repeatedly) for many minutes on end. How many amateurs are still *without* recourse to simple lamp bulb or other dummy antennas, to the discouragement of constructive amateur communications! Let's be considerate

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and efficient in our tests, gang, and keep this testing business off the air, or short and snappy if necessary. Also, we think every ham *should take pride* in having proper monitors and checking equipment. Good designs are liberally covered in *Handbook* descriptions. On the business of amateur stations that anyone has reason to believe run *over* a kilowatt (see recent *QST* editorial) WØOAQ, speaking for a whole group of amateurs in his community, allows that, *not* to become accessory after the fact, it is a *plain duty* of every amateur to report such cases of suspicion to the nearest FCC office requesting appropriate investigation or official check!

— *F. E. H.*

A.R.R.L.–AFFILIATED CLUB HONOR ROLL

It is a pleasure to present this first 1949 Honor Roll of all the affiliated clubs whose *entire membership* consists of members of the League. The listings of clubs with 100 per cent ARRL Membership are in accord with the Board policy of such special recognition, which is determined from information supplied us in the 1949 affiliated-club questionnaire or Annual Information Survey conducted as required by the Board. Some clubs report having membership drives currently. In view of this there will be an additional *QST* Honor Roll listing later this year. It will include any affiliated societies whose questionnaires did not provide the necessary complete information at this time as well as those who may qualify for the listing on completing their membership program.

Amateur Radio Club of Augusta, Augusta, Ga.
Amateur Radio Experimenters Club, Macomb, Ill.
Amateur Radio Transmitting Society, Louisville, Ky.
Astoria Amateur Radio League, Astoria, Ore.
Bartlesville Amateur Radio Club, Bartlesville, Okla.
Birmingham Amateur Radio Club, Birmingham, Ala.
Centralia Radio Club, Centralia, Ill.
Charleston Amateur Radio Club, Inc., Charleston, S. C.
Conneaut Radio Club, Inc., Conneaut, Ohio
Connecticut Wireless Association, Granby, Conn.
Detroit Amateur Radio Association, Inc., Detroit, Mich.
The 56-Mc. Minutemen, Medford, Mass.
Grumman Amateur Radio Club, Bethpage, L. I., New York
Helix Amateur Radio Club, San Diego, Calif.
Illinois Ham Club, Northbrook, Ill.
Illinois Valley Radio Association, Ottawa, Ill.
Inglewood Amateur Radio Club, Inglewood, Calif.
Jersey Shore Amateur Radio Assn., Long Branch, N. J.
The Key and Mike Radio Club, Winston-Salem, N. C.
Kickapoo Radio Operators, Bloomington, Ill.
Maui Amateur Radio Club, Maui, T. H.
Meridian Amateur Radio Club, Meridian, Miss.
Morris Radio Club, Morristown, N. J.
Mound City Radio Amateurs, St. Louis, Mo.
Muscle Shoals Amateur Radio Club, Sheffield, Ala.
Nashville Amateur Radio Club, Nashville, Tenn.
Norfolk County Radio Association, Walpole, Mass.
Northern California DX Club, Inc., Oakland, Calif.
Old York Radio Club, Elkins Park, Pa.
Order of Brass Pounders, Chap. No. 3, Kansas City, Mo.
Palo Alto Amateur Radio Association, Los Altos, Calif.
Pioneer Radio Club, Fremont, Nebr.
Providence Radio Association, Inc., Edgewood, R. I.
The Ridgewood Radio Club, Ridgewood, N. J.
San Joaquin Valley Radio Club, Fresno, Calif.
South Lyme Beer, Chowder and Propagation Society, West Hartford, Conn.
Sussex County Amateur Radio Association, Sparta, N. J.
T-9 Radio Club, Danvers, Mass.
Union County Amateur Radio Association, Elizabeth, N. J.
The United Radio Amateurs Club of Wilmington, Calif.

MEET THE SCMs

Frank E. Fisher, W5AHT/AST, began amateur operations in the fall of 1909 under the call "CF" at Tulsa, Oklahoma. During World War I he served in the Signal Corps, 15th Division, as a radio expert. In the early 1920s he received his first amateur license and the call 5AHT.

A member of the Bartlesville Radio Club, Frank served until recently as Section Emergency Coördinator, at present holds Official Relay Station and Route Manager appointments, and possesses Code Proficiency and Rag Chewers Club certificates. He has been very active in the reorganization of the Oklahoma State Traffic Net and devotes a great deal of time and energy toward editing and publishing the state net bulletin, *Relays from OLZ*. He rendered noteworthy work in the 1947 Texas-Oklahoma tornado, the Texas City disaster, and the Florida Peninsula-Gulf Coast hurricane of September, 1947.

SCM Fisher has a station at each of two locations: W5AHT at his home and W5AST at the Skelly Oil Company, where he is research director. At present W5AHT is being rebuilt for occupancy in a basement room especially constructed for its use. W5AST comprises two BC-447 transmitters with 600–800 watts input, operating on 3.5-Mc. traffic networks, a BC-325 operating VFO or crystal on 3.5 and 7 Mc. for other than network operation, a modified RMCA ET-8023 operating with up to 800 watts input on 3.5, 7, and 14 Mc., and a Hilliard 'phone rig on 3.85 Mc. with about 300 watts input. Receivers in current use are an HRO-7 and two Super-Pros. Most of the operation is on 3.5-Mc. c.w. with some work on 3.85-Mc. 'phone and 7-Mc. c.w. Antennas are a doublet and a long wire.

For portable, mobile, and emergency equipment there is available a Jefferson-Travis 'phone-c.w. rig with about 200 watts input and equipped with universal power supply for everything from 6 to 110 volts d.c. and 110/220 volts a.c. In addition, there are but two BC-654s and two SCR-583s with complete field equipment, plus two handie-talkies. A 2.5-kw. gasoline-powered generator supplements the dynamotor power supply for this equipment. Emergency power for the fixed station is provided by a 6.3-kva. gasoline-powered generator.

Frank's hobbies, other than amateur radio, include photography, big-game hunting, rifle and pistol shooting.

JFLINT

TRAFFIC TOPICS

W6DBZ writes to tell us of a message he handled which was originated on the East Coast *seven days* before he received it, and that there was obvious garbling in the text; furthermore, it was a message specifically designed as a check on relays. "What's wrong," he wants to know, "when messages are delayed like that?" Then he began looking over other traffic on his hook and found origination dates two, four, six and *fifteen* days old.

Of course all traffic is not this old, but there has been some pretty ancient stuff passing over this operator's hook, too — and we have had other complaints. There are some operators who contend that the length of time it takes a message to reach its destination has no effect on its training value to the operators handling it and that the more stations handling it the better. This is true, speaking strictly from a procedure standpoint, but it neglects the training value inherent in getting the message *quickly* and *accurately* to its destination. We would change the emphasis on the old slogan "accuracy first, *then* speed" to read "accuracy first, then *speed*."

Perhaps one of the reasons for some of the delays is that traffic too often, these days, hops from one net to another, often without getting any nearer its destination, or at least going by a roundabout route. Maybe what we need is a national plan, sponsored by ARRL, by means of which *all* section nets are tied together into a group of regional and area networks of national scope, chronologically arrayed so that most traffic goes from its place of origin to delivery point in one evening, and at the latest within two days. Such a plan is in the works if you traffickers will go for it. Hw?

—...—

On the other side of the record, W2NJF tells us of a specific instance in which amateur message relay performed a fast and valuable service. A message was originated at W8AJL informing a party in Fort Lauderdale, Florida, of the death of his mother. It was relayed via W8IW, W2LMH and W4DRH, the latter in Lakeland. Upon discovering that there was no telephone at the address, W4DRH requested the coöperation of the Fort Lauderdale police in locating the addressee. The place turned out to be a trailer camp with about 200 trailers, and the police located the addressee and delivered the message. A message sent via commercial channels, filed an hour before the amateur message, caught up with the addressee four hours later as he was on the way to the depot. Needless to say, both the originator and the addressee were well pleased with the service the amateurs had rendered.

—...—

From the Pioneer Net "Bulletin": "Back in the dear old dead days of spark we never started sending until we had first sent a Morse letter C (.. .), even if we listened first and heard no station on. The idea was that one of the boys might be copying a weak station we were not tuned to and we would bust them up. If things were clear, anyone listening would say 'K'; if someone was copying and you were busting him up, he would start up his rotary and say 'AS' (.-...) and we would stand by."

The "Bulletin" goes on to say that we might adapt this procedure to present traffic-net operation to good advantage. Many times the NCS sends two stations off the net frequency to clear their traffic, and upon returning to the net frequency they hear nothing, so proceed to give the NCS a blast — only to find that they are breaking up some traffic-passing by weaker stations on the frequency. If, upon returning to the net frequency, they simply send "di-dit dit," they are not so likely to break things up. If there is nothing going on, the NCS can give them the "go ahead" signal, either "dah-di-dah" or simply "dit dit." If the circuit is busy, a dead silence to their inquiry or a quick "di-dah-di-di-dit" will tell them to stand by. Like the idea? There are a lot of possible embellishments, but the idea has merit.

—...—

With the coming of warm weather, many traffic nets have closed up for the summer, and it will be of advantage to summertime traffic-handlers to know what nets are still active, particularly regional and cross-country nets. Our information is far from complete, but here is what we have so far: (1) ARRL Trunk Lines K and L are planning to consolidate with the QMW Net and possibly others to form a summer net

This is the operator and gear that make all that noise from W9LFK. Carl Thoms has been an active amateur for 29 years, was first licensed as 9AJM in 1920, got W9LFK in 1932. Since then he has acquired ORS, RM and OO appointments, BPL, WAS, OTC, RCC, ROWH and 35-w.p.m. CP certificates, and has been active in ARRL Trunk Lines G, J and L, to say nothing of WIN and QMW nets. Carl makes wire recordings of all stations to whom he sends OO cards for bad notes, etc., so the party in question can hear what it sounded like if he wants to. The rig: 250 watts to a pair of 811s.

JFLINT

which will operate on 7275 kc.; WØHMM will be manager, but full details are not available at this writing. (2) Traffic Outlet (3705 kc., 2100 EST) intends to continue full operation all summer, and will endeavor to provide outlets for all traffic. W1IIN is manager. (3) Swing-Shift Net (7280 kc.) will continue all summer, as usual, and expects to handle a lot of traffic which would normally flow on eighty. W2VNJ is at the helm.

APRIL CD QSO PARTY

The April CD QSO Party furnished ARRL appointees and officials with the usual lively contest-type workout. High scoring honors were earned for the third time by W6WNI, who seems determined to keep the West Coast in the limelight in these affairs. Runner-up was W3EOP, an old hand at the contest game. Many of you will remember EOP from the days when our quarterly get-togethers were known as ORS parties. He doesn't seem to have lost any of the old touch! W4KFC turned in his usual brilliant performance to take third place.

Another regular CD Party is scheduled for the week end of July 23rd–24th. Any holder of an ARRL appointment or office will be eligible to take part. If you're interested in organized operating activities, and do not already hold an appointment, look over the list of such appointments described in the booklet *Operating an Amateur Radio Station* (sent gratis to League members upon request) or the *Handbook* and decide which suits your particular interest and qualifications. Then write to your SCM or League Headquarters for complete information on how to qualify for the appointment of your choosing. Prepare during the summer months for the busy 1949–1950 operating season!

Claimed Scores

Station	*Score*	*Contacts*	*Different Stations*	*Sections*
W6WNI	659,498	304	184	54
W3EOP	652,800	401	260	60
W4KFC	511,520	361	226	52
W9BRD	491,750	343	227	54
W1JYH	466,710	325	229	53
W8ROX	438,200	306	230	50
W1OJM	405,600	323	211	53
W7BSU	393,238	223	143	51
W3HRD	381,000	295	204	50
W9LVR	379,600	292	206	54
W2GFG	376,675	298	192	55
W5IUW	352,800	246	222	58
WØIC	346,550	283	182	57
W4FBJ	331,695	273	191	52
W2CWK	317,400	270	185	45
W7KWC	311,850	175	147	51
W9VES	305,520	261	176	52
W4LRI	303,600	264	180	50
WØTKX	266,560	231	173	51
W4JLW	262,300	244	168	47
W8GSJ	255,460	234	160	52
W1LHE	254,775	231	166	49
W6NL	246,456	168	116	47
W3JHW	243,090	212	172	50
W9NH	239,990	227	156	50
W3LIW	239,760	222	167	49
W3ADE	212,175	200	155	50
W1KRV	206,910	209	151	47
WØUKT	204,370	185	161	53
W2PWP	204,370	191	166	48
W9BGC	201,960	204	151	47
W1NXX	193,545	200	144	43
W1GKJ	189,625	200	141	44
W1CEG	182,460	190	142	45
W4FF	181,160	190	149	43
W7UTM	174,270	120	111	46
W1QMJ	169,200	181	139	41
W6VAQ	161,249	128	92	45

Others with scores over 100,000: W2NIY 146,080, W1NJM 141,510, W7CZY 138,030, W8DAE 135,270, W4IQV 130,400, W4AYV 130,380, W1AQE 128,650, VE1EK 127,190, W2VJN 124,800, VE3AWE 124,775, W9EGQ 123,245, W5DRW 121,440, W5VT 120,900, W7GP 119,979, VE2GM 118,455, W2ZVW 113,960, W8EBJ 110,925, W8HOX 109,395, W2URX 108,000, W4ILE 107,965, W2VNJ 107,870, W4MXU 106,580, W2OBU 104,300.

BRASS POUNDERS LEAGUE

Winners of BPL certificates for April traffic:

Call	*Orig.*	*Del.*	*Rel.*	*Extra Del. Credit*	*Total*
W4PL	5	44	2128	37	2214
W7CZY	37	71	1553	22	1683
W7CKT	1	5	1472	5	1483
W9EBX	4	3	1372	3	1382
W6CE	10	23	1241	21	1295
W4ANK	37	45	944	36	1062
W4LJJ	5	2	1040	2	1049
W5GZU	5	104	752	102	963
W2RUF	33	104	794	16	947
W6FDR*	53	279	238	270	840
W6CZF	386	150	87	141	764
W3GZH	12	23	694	15	744
W9QIL	105	161	315	150	731
W6DDE	385	110	126	106	727
W6FDR	47	186	302	180	715
W6REB	12	20	606	16	654
KG6DI	314	159	59	120	652
K5NRJ	281	74	240	17	612
W5MBV	0	0	607	0	607
W8UUS	381	122	98	0	601
WØHMM	12	9	574	3	598
W5FOM	173	128	172	120	593
W7LFA	10	15	564	0	589
W6IOX	3	14	550	13	580
W2TYC	13	71	428	61	573
W2TYU	23	370	93	81	567
W8NOH	20	346	110	90	566
W7FRU	11	10	534	5	560
W2LRW	9	42	488	12	551
W5KDH	5	9	512	3	529
W3ECP	19	64	389	55	527
W6ITH	150	52	167	158	527
W4BQE	518	0	0	0	518
W1CRW	20	33	454	10	517
W9KQL	4	10	492	7	513
W9ESJ	66	36	372	36	510
W7UTM	5	28	455	26	504

The following made the BPL for deliveries:

W1QMJ 307	W5KTE* 163	WØQXO 118
W2VNJ 238	W7KCU 147	W1JCK 110
W7HWK 222	W7JRU 142	W2OUT 110
W9SYZ 213	W8GSJ 137	W5ARK 107
W1IIN 197	W5NMM 132	W7JZR 106
W7FIX 172	W1EMG 125	VE3WK 106
W5KTE 170	W6NL 123	WØNIY 101

A traffic count of 500 or more points, or a total of delivery and extra delivery points of 100 or more, will put *you* in line for a place in the BPL.

* March traffic.

JFLINT

A-1 OPERATOR CLUB

We are pleased to announce the following additions to the ARRL A-1 Operator Club roster:

W1BWN CRW GMR GZ IKE JTD KUO PKV RWS WX. W2CSO JN NCY PGT QBS QLO TCZ UZX WC. W3DVO GA GRP GZH JZY KZR LJQ LMB NHB OPG UF VMF VMR. W4BCS JFE KJS NNN RBQ RH VE WI. W5AHT/AST IGO. W6BES CE CG CRT DK OMR WNI. W7FRU WJ. W8ATC BOB CXN EUQ HXX KNP MPG MZV PRS PZA UDA UDB URM VDT YHE. W9BVG GDI IQW KQL SYZ. WØCFB DU DYS HSO SGG WAP. VE2BB 3BUR 3BWY 3VD 6EY. CE3DZ G3AAE G6TT HH2BL KH6PY KL7CX ON4QF PK7HA VK2NS ZL1MB ZL3AB ZS6KK.

This list, together with those published in January, June and December, 1947, *QST*, and the July, 1948, issue constitute a complete roster of members. If you were the prewar holder of an A-1 certificate and your call has not appeared in any of the postwar listings, please drop a line to Hq. and your call will be added to the active list.

The basic aim of the A-1 Operator Club is to promote good operating in the amateur bands. To become a member one must be nominated by at least two operators who already belong. Every amateur should strive to merit nomination by following standard operating practice, by observing the rules of good 'phone operating, and by making his sending as clean and accurate as possible. An attractive certificate is awarded to each amateur who qualifies for membership. Members should nominate every deserving operator after careful observation of his operating habits. The complete Club rules may be found in the booklet *Operating an Amateur Radio Station* (sent gratis to League members upon request).

COUNTRIES-LIST CHANGES

Since the adoption of the ARRL Postwar Countries List, the official standard used in connection with the annual DX Competition and the DX Century Club, several changes have been reported in this department. See page 40 of March, 1949, *QST* for the latest revised list. We are pleased to announce the addition of one more country to the list: Macquarrie Island, VK1. Make this change on your list and watch the "Operating News" department for further changes and additions.

BRIEF

We regret that the call of W6SAI was inadvertently omitted from the DXCC Honor Roll listings in two issues of *QST*. Bill's total of 187 should have appeared in April and May *QST*.

DX CENTURY CLUB AWARDS

DXCC Certificates based on postwar contacts with 100 or more countries have been issued to the amateurs listed below. The countries-worked totals indicated have been certified by examination of written evidence under the award rules as published in March, 1947, *QST*.

HONOR ROLL

W1FH	216	W2BXA	201
W6VFR	213	W6SAI	197
W3BES	205	W4BPD	196
G2PL	205	W2AQW	194
W8HGW	204	W1CH	192

RADIOTELEPHONE

W1FH	175	XE1AC	147
W6DI	157	G2PL	145
W4CYU	152	W1JCX	143
W8HGW	148	VQ4ERR	142
W2AFQ	147	W2BXA	142

From April 15 to May 15, 1949, DXCC Certificates and endorsements based on postwar contacts with 100-or-more countries have been issued to the amateurs listed below.

NEW MEMBERS

W6GRL	177	W2JVU	104
ZL1MR	129	PAØLB	104
W6SYG	129	W6MUC	104
W8EWS	124	OK2SO	103
W4ITR	118	OH2PK	103
WØEYR	112	W9FKC	102
W9UX	109	W1ODY	101
G8GP	109	W6CG	101
G2BOZ	108	W8ZMC	100
W1DQH	108	WØFFV	100
WØOUH	107	W9LNH	100
VE2WW	106	G3AKU	100
W6CUQ	105	W3RBF	100

RADIOTELEPHONE

W9BZB	114	W6TT	106
I1SM	108	G8QX	100

ENDORSEMENTS

W6VFR	213	W1TW	191
W2BXA	201	W6EBG	190
W6SAI	197	WØNUC	183
W3GHD	192	W3EVW	182
G6RH	191	W6SN	181
W6TT	174	HB9J	131
W6MX	173	JA2KG	130
W2COK	173	W2TJF	130
W4CYU	171	W9CIA	130
W2CYS	170	W3IXN	126
W6DI	170	W3EYF	125
W5ASG	163	W1PKL	124
VE3QD	160	W8SYC	123
W5FNA	160	W2CNT	122
W6OMC	160	G6RC	121
HB9CX	151	W9PSR	120
CE3AG	150	OK1CX	120
WØDAE	145	W5CEW	120
ZL2QM	142	W1OJM	120
W8CVU	142	OK1AW	118
W1LOP	140	KL7IT	111
W2PUD	140	W2GVZ	110
W1RY	138	CE3DZ	110
HB9DO	135	ZS6FN	110
W6UCX	134	W3ARK	110

RADIOTELEPHONE

W2BXA	142	W5ASG	111
W8BF	140	I1RM	110
G6RH	134	W8BIQ	110
W1MCW	132	W3LTU	110

JFLINT

NATIONAL EMERGENCY FREQUENCIES

C.W.	*'PHONE*
7100 kc. (day)	3875 kc.
3550 kc. (night)	

During periods of communications emergency these channels will be monitored by stations of the National Emergency Net for the handling of third-party personal-inquiry traffic.

WITH THE A.E.C.

"Will your station operate on the National Emergency Frequencies, 3550, 3875 and 7100 kc.? You should be able to fire up on these frequencies with the regular rig as well as with the little portable or mobile gear. Who are we to say that the day is not near at hand when we will be called upon by our families, friends and neighbors to provide communications on an emergency basis without a moment's advance notice?"

— *The Imperial Valley A.R.A. "Hamgram"*

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Tornadoes striking in at least nine different areas in Oklahoma on May 1st left two dead, many scores injured. Norman, a city of 25,000 population and the home of the Oklahoma State University, was the hardest hit. All communications except amateur radio were out of service, and all amateur operations were on emergency power. The USNR installation at Norman reported into the Oklahoma 'phone net, and traffic moved rapidly from K5NAY to W5MWT. Naval Reserve installations at Tulsa, Stillwater and other key points throughout the state joined the amateur net. W5HGC/N8NBC operated on both the amateur frequencies and the Naval Reserve 8-Mc. c.w. circuit.

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W6NL and W6SLX were commended by the Northwestern Pacific Railroad Company for services rendered in the dispatching of train orders during the March storms.

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The South Carolina 'phone group, The Palmetto State Net, is now 100 per cent AEC and operates as an emergency net under the leadership of W4BPD.

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One of the boys had a bad dream the other night. The fact that he had never gotten around to joining the AEC may or may not have had anything to do with it. In his dream the hams lost the right to all of the frequencies now held. When he woke up he was more than willing to find that lost or misplaced AEC application, fill it in, and mail it to his SEC. It seemed to him that this was little enough effort to indicate his dedication to the public interest, convenience, and necessity.

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW/WØTQD will be made on July 19th at 2130 EST. Identical texts will be sent simultaneously by automatic transmitters. Frequencies of transmission from W1AW will be 1887, 3555, 7215, 14,100, 28,060, 52,000, and 146,000 kc.; for this and the August 18th runs, WØTQD will transmit on 7068 kc., and will resume use of 3534 kc. in September. The next qualifying run *from W6OWP only* will be transmitted on July 2nd at 2100 PST on 3590 and 7248 kc. For additional dates, see the ARRL Activities Calendar elsewhere in these pages. These W6OWP-only runs will have different text from the runs sent by W1AW and WØTQD.

Send copies of *all* qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the five speeds transmitted, 15 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

Code-practice transmissions are made from W1AW each evening, Monday through Friday, at 2130 EST. References to texts used on several of the transmissions are given below. These make it possible to check your copy.

Date	Subject of Practice Text from May *QST*
July 2nd:	Qualifying Run, 2100 PST, from W6OWP only
July 5th:	*Simple Gear for the 420-Mc. Beginner*, p. 11
July 7th:	*Linear R. F. Amplifiers*, p. 15
July 13th:	*Linear R.F. Amplifiers*, p. 18
July 15th:	*Bandpass Circuits . . .* , p. 21
July 18th:	*Technical Topics*, p. 27
July 19th:	Qualifying Run, 2130 EST, W1AW/WØTQD
July 21st:	*The Additive Frequency Meter*, p. 32
July 27th:	*The Additive Frequency Meter*, p. 34
July 29th:	*High-Pass Filters for TVI Reduction*, p. 46
July 31st:	*The World Above 50 Mc.*, p. 47

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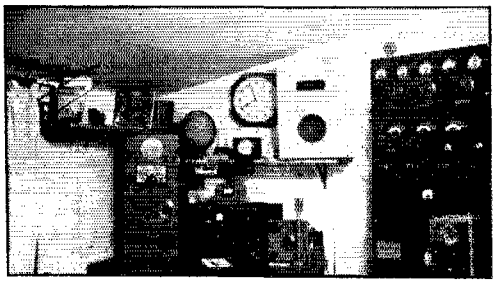

W9CIH, Ashland, Wisc. Its op, Bob Palmer, holds OO appointment, has excellent measuring gear and knows how to use it. He won a prize in the September FMT and the average accuracy of his measurements for the four 1948 tests was 2.5 parts/million! Measuring equipment, contained in the small rack at left, consists of a temperature-controlled crystal standard, r.f. and audio interpolation oscillators, and an oscilloscope.

JFLINT

W1AW SUMMER SCHEDULE

(All times given are Eastern Standard Time)

Operating-Visiting Hours:

Monday through Friday: 1730–0600 (next day)
Saturday: 1900–0230 (Sunday)
Sunday: 1530–2130

A mimeographed local map showing how to get from main state highways (or from Hq. office) to W1AW will be sent to amateurs advising their intention to visit the station.

Official ARRL Bulletin Schedule: Bulletins containing latest information on matters of general amateur interest are transmitted on regular schedules:

Frequencies: C.W. — 1887, 3555, 7215, 14,100, 28,060, 52,000, 146,000 kc.
'Phone — 1887, 3950, 14,280, 29,000, 52,000, 146,000 kc.

Frequencies may vary slightly from round figures given; they are to assist in finding the W1AW signal, not for exact calibration purposes.

Times: Sunday through Friday, 2000 by c.w., 2100 by 'phone.
Monday through Saturday, 2330 by 'phone, 2400 by c.w.

General Operation: Use the chart below for determining times during which W1AW engages in general operation on various frequencies, 'phone and c.w. Note that since the schedule is organized in EST, certain morning operation periods may fall in the evening of the previous day in Western time zones. Alternate frequencies, as indicated by footnote, will be used when conditions do not permit use of certain scheduled frequencies.

W1AW will be closed from 2130 July 3rd to 1730 July 5th. On Saturdays and Sundays during which official ARRL activities are being conducted, W1AW will forego general-contact schedules in favor of participation in the activity concerned (see Activities Calendar).

Code-Proficiency Program: Practice transmissions at 15, 20, 25, 30 and 35 w.p.m. are made on Tuesdays and Thursdays on the above-listed frequencies, starting at 2130, and on Monday, Wednesday and Friday at 9, 12, 18, 25 and 35 w.p.m. Approximately ten minutes of practice is given at each speed. Next certificate qualifying run is scheduled for Tuesday, July 19th.

A.R.R.L. ACTIVITIES CALENDAR

July 2nd: CP Qualifying Run — W6OWP
July 19th: CP Qualifying Run — W1AW, WØTQD
July 23rd–24th: CD QSO Party
Aug. 1st: CP Qualifying Run — W6OWP
Aug. 18th: CP Qualifying Run — W1AW WØTQD
Sept. 6th: CP Qualifying Run — W6OWP
Sept. 16th: Frequency-Measuring Test
Sept. 19th: CP Qualifying Run — W1AW, WØTQD
Sept. 24th–25th: V.H.F. Contest
Oct. 7th: CP Qualifying Run — W6OWP
Oct. 14th: CP Qualifying Run — W1AW, WØTQD
Oct. 15th–16th: Simulated-Emergency Test
Oct. 22nd–23rd: CD QSO Party
Nov. 2nd: CP Qualifying Run — W6OWP
Nov. 16th: CP Qualifying Run — W1AW, WØTQD
Nov. 19th–20th, 26th–27th: Sweepstakes Contest

BRIEF

Add "Father and Son" schedules: Herb, W1QUI, Portland, Maine, keeps regular schedules on "75" with son Bob, W1RKZ, who operates K1NAD at the University of Maine. Ed, W1BDI, West Hartford, Conn., works son Dick, W1RZP, Waltham, Mass., regularly on 3.5-Mc. c.w.

W1AW GENERAL-CONTACT SCHEDULE

(Effective July 1, 1949)

W1AW welcomes calls from *any* amateur station. During the months of July and August, W1AW will listen for calls in accordance with the following time-frequency chart.

EST	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0030–0100[1]	.....	.....	7215	7215	7215	7215	7215
0100–0130	.....	.....	7215	7215	14,280[2]	7215	7215
0130–0200	.....	.....	14,100[3]	.....	14,280[2]	.....	14,280[2]
0200–0230	.....	.....	14,280[2]	.....	14,280[2]	.....	14,280[2]
0230–0300	.....	.....	14,280[2]	.....	3555	.....	.....
1530–1830	29,000[4]	.....	.....	.....	.....	.....	.....
1830–1930	.....	.....	29,000[4]	.....	29,000[4]	.....	.....
1930–2000	28,060[5]	52/146 Mc.[6]	52/146 Mc.[6]	.....	28,060[5]	.....	.....
2030–2100[1]	14,100	3555	14,100	3555	7215	14,100	.....
2115–2130[1]	3950	3950	14,280	3950	14,280	3950	.....
2230–2330	.....	14,100	14,280	14,100	14,100	14,280	.....
2345–2400[1]	.....	14,280	3950	14,280	3950	14,280	14,280

[1] Starting time is approximate. General-contact period begins immediately following transmission of Official Bulletin.
[2] Alternate frequency, 3950 kc.
[3] Alternate frequency, 7215 kc.
[4] Alternate frequency, 14,280 kc.
[5] Alternate frequency, 14,100 kc.
[6] Operation will be on one of the frequencies stated, depending on propagation conditions, expediency and general activity.

JFLINT

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — Our Director, QV, spent a busy few weeks prior to the Board Meeting answering all the letters received pertaining to the new FCC regulations. It took all his spare time; he did nothing else during this period. Brad also made a tour of several radio clubs in the division, including the Lancaster, Harrisburg, Rochester, Pittsburgh, and Frankford Club of Philadelphia. New officers of the Lancaster RTS are BTP, pres.; HJ, vice-pres.; OY, secy.; FMZ, treas.; GJA and KKG, board of directors. The Club has a new transmitter and holds the call NMR. OML has been off the air because of hospitalization. AQN has rounded out twenty years of service with the Red Cross. The Penn-Harris Emergency Net is doing business on 3540 kc. DZ's activity is being curtailed by T.V.I. Another E. Pa. Net casualty is CUU, who has been ill. QEW reports that the Section Net needs more operators to keep it going. How about lending a hand on 3785 kc. at 6:30 P.M.? Two very old-time hams passed from our ranks to join the silent keys, FL and FS. Hams of the five county areas comprising the Southeastern Chapter of the Red Cross are invited to participate in the development of a comprehensive emergency communications system. Basically it will consist of a net on 3610 kc. with permanently-installed stations in major Red Cross Headquarters and such v.h.f. links and mobile units as can be mustered. Contact BXE or your EC for details as to where you can fit in. Traffic: W3OAQ 360, CUL 204, NHI 193, DZ 116, QEW 114, ADE 60, ELI 51, OML 41, ANK 21, AXA 21, AQN 17, NNV 2.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Eppa W. Darne, W3BWT — At its Apr. 7th meeting the Delaware Amateur Radio Club enjoyed a talk and demonstration on "T.V.I., Causes and Cures," by RB. The last week in April the club installed a ham station at the Hobby Show, Wilmington, which was very successful. The Baltimore Amateur Radio Communications Society held a Stag Smoker Apr. 23rd at Garby's. The Club now has 15 mobile units available. At the first April meeting, the members of the Washington Radio Club enjoyed an interesting talk and demonstration on "Amateur Microwave Equipment on 1215 and 10,000 Mc." by LFG. The second April meeting featured "movie night" and a number of interesting subjects on film were presented by MCG. The Chesapeake Amateur Radio Club, at its Apr. 19th meeting, enjoyed an interesting discussion on "Radiation Patterns of High Frequency Antennas" by LO. The Club's Field Day preparations were in charge of LMC, FLG, and PFF. The Club is offering prizes to the first members of its code class to get their tickets. The Potomac Rappahannock Valley Net continues its fine operation during the summer months. A total of nineteen stations are on the 144-Mc. roster. 3935 kc. is used every several months. IZE and LFN are stations in the section recently added to the PRVN. The MDD Section Net closed down Apr. 29th after a very successful season. Regular operation will be resumed on Sept. 19th. OPG is on 3.85-Mc. 'phone as well as 3.5- and 7-Mc. c.w., and is remodeling the shack. NNX is newly-appointed OBS and transmits on 29 Mc. Mon., Wed., and Fri. at 6:30 P.M. OSF is on 14 Mc. with 125 watts. ADO has V.F.O. with 803 final, 125 watts. Former members of USNA Radio Club will find ADO on 7280 kc. HOP has a television receiver so he can tell when not to "fire up" on 28 Mc. EQK has completed his "Club Cellar Ham Shack" and has raised his score of countries worked to 76. MYM has been busy with school and transmitter trouble. LFG has his 30-w.p.m. Code Proficiency sticker from ARRL and has been doing considerable experimenting and building on 1215 Mc. and 10 KMc. FLG and JPX made QSOs on 420 Mc. LMC has a new ten-element 144-Mc. beam. OTG has a new beam rotator. MIB is now on 29-Mc. 'phone. KRJ's 6J6 final, mobile rig, puts a solid signal across town on 144 Mc. MZA is erecting a 50-foot windmill tower. KYG is rebuilding. MQF worked IKX, the latter on a local T. V. tower using a handy-talkie. NVL is rebuilding his BC-348. ØSCQ/3 is building a mobile rig for 28 Mc. LXK, LFF, and FLG are preparing to work 'phone on 1220 Mc. CDQ worked a number of new countries on 14-Mc. c.w., and instructs in Washington Radio Club code class. OLC, on c.w., and NSM, on 'phone, are competing for most countries worked. JHW had receiver trouble but has now fixed it OK. FWP has just completed his 24th year as a licensed amateur. KCA is mobile 28 Mc. KOU has a 522 rig and the old Franklin antenna. KKH has made WAS. LFF is back on 144 Mc. AQV has a BC-645 and a converter ready for 144-Mc. work. LSX is on 7 Mc. and instructs in Washington Radio Club code class. CJS is building a new rig for 3.5 Mc.; also continues to work much DX and has been appointed ORS. Traffic: W3GZH 744, ECP 527, LFG 250, AKB 191, MJQ 132, CIQ 90, QL 51, OPG 48, ADO 45, FWP 40, BWT 14, JHW 13, CJS 9, MYM 9, MCG 2.

SOUTHERN NEW JERSEY — SCM, G. W. (Bill) Tunnell, W2OXX — Our new ORS appointee, RFF, walked away with traffic honors this month. RLY was chairman of the Hamilton Township Radio Assn. Field Day Committee, according to the club magazine, which also mentions that UM gave them a fine demonstration-explanation of 144-Mc. gear. ZVW had his antenna down twice this month. I could write an editorial about the faithful service rendered by RG but space prohibits. He has resigned his official duty as RM in charge of the SNJ Net. RPH will take his place. Please give him all possible support. Looks like the Delaware Valley gang put on another "affair of the year," Old Timers Nite was a huge success, according to ZI. ORS reports that ALA and QPC soon will be heard on the 420-Mc. band. OQS has a sixteen-element beam on 420 Mc. HAZ is busy working nights. KPO, a member of our famous New Jersey 75 Meter Amateur Emergency Net, is partially rebuilding. OXX has been DX hunting on 3.5 Mc. YSP reports that he attended the North Shore Radio Club Hamfest. More informative reports are needed to keep this column serving its proper purpose. PWP now is Emergency Coördinator for Burlington County. Traffic: (Apr.) W2RFF 65, ZVW 57, SXK 53, RG 47, RPH 44, ZI 40, YSP 26, ORS 17, HAZ 2. (Mar.) W2SXK 84.

WESTERN NEW YORK — SCM, Harding A. Clark, W2PGT — SEC: SJV. RM: FCG. New appointments: QZI as ORS; QFG, VUI, GWP, WNK, QJM, QBZ, UMK, and SWM as Asst. ECs. ZUZ is operating on 144 Mc. at an elevation of 2100 feet near Ithaca and has the whole Central New York gang chasing him. He also is Net Control Station of Tompkins County Emergency Net which holds drills each Monday at 8 P.M. UHI and VE3AIB established mobile-to-mobile contact on 144 Mc. across Lake Ontario. AGJ and UYG are new-comers to 144-Mc. band. TBD has switched code classes to 1880 kc. at 9 P.M. on Mon., Wed., and Fri. for better local coverage. FMH and PTA have new 75-A receivers and 32-V transmitters. OUJ and WHK acquired XYLs. RXM has moved to new antenna farm. VZD will guide fishing parties for ECM, OY, UZL, and others on the St. Lawrence this summer. Is there anything worse than a bunch of hams on a fishing trip? OPZ is running 5514s in new final. JPE and RAG are getting out fine on 3.85-Mc. mobile. WZQ is putting out better signal with new half-wave on 3.5 Mc. The KBT Club held a "Gismo Night" at which members showed and explained useful gadgets they had originated. QEE spoke on the "S" meter at the KBT meeting. ZOL has new BC-610 and five-element 28-Mc. rotary beam. GWY is putting good 144-Mc. signal into Albany and Schenectady. The Rochester V.H.F. group recently elected UTH as permanent chairman and ZHB, secretary-treasurer. NES has new jr. operator. TXB chases DX night and day. SO chases DX with 4 kw. — one on each band. OTW and SCI have acquired a new antenna farm. The Amsterdam Amateur Radio Club now is affiliated with ARRL. FW was elected president to replace VDQ, who is returning to school. ZLL built a Monitone and likes it FB. Glad to hear AOR back on the air after a prolonged illness. EAC is back on the air after a layoff of 11 years and is chasing DX on 14 Mc. 1RCQ/2 has new YL harmonic and is struggling with triangles and 25 cycles. VIQ

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completed WAS on 3.5 Mc. with 50 watts and indoor antenna. A radio club has been formed at Cornell University. A club station license has been applied for. Contact UUI or WLD for details. CFY has been appointed EC for Malone. RUF continues to lead the section in traffic by a wide margin and again makes BPL. The summer season is with us again and activity is running low so keep those activity reports rolling in. Traffic: W2RUF 947, PGT 354, VIQ 112, QHH 78, WZQ 75, WOE 64, FCG 63, SJV 50, QZI 22, PZC 15, USO 10, YRF 10, 1RCQ/2 4, 2EAC 2.

WESTERN PENNSYLVANIA — SCM, Ernest J. Hlinsky, W3KWL — Newly-appointed Section Emergency Coördinator is MPO, Ingomer. Give him your coöperation, gang. The Steel City Amateur Radio Club of Pittsburgh sends along its official publication. It is quite a newspaper, with DNB, LBE, RIK, TVG, and MPO doing the editing. The club beam is ready for assembly, thanks to NKM and OMY. RXT has QSYed to new location in Bellvue. In Uniontown the Fort Necessity Amateur Radio Assn. now sports club call, PIE. UUZ is club secretary and all QSLs for the club should be addressed to him. RUC finally migrated to 28-Mc. 'phone after years of pounding brass on 7-Mc. c.w. MBI is taking off the cobwebs for 14-Mc. 'phone. LAC is making big changes in his 28-Mc. rig. UUZ says his T240s have gone sour so he is rebuilding to 813 final. The Club 28-Mc. 'phone transmitter is getting a good workout since the gang leave their home rigs to avoid T.V.I. The Altoona Horseshoe Radio Club has a new batch of officers with LJQ, pres.; LJS, secy.; KQD, vice-pres.; LIV, treas. The Club shows quite a bit of activity. KJU can be heard on 28 Mc. often. LJS has a home-built bass reflex cabinet with coaxial speaker. KQD wants to try T.V. LIV finds his TBS-50 OK on 7 and 14 Mc. Congrats to the editors of *Hamateur News* for excellent editorials and circuits of interest. The ATA of Pittsburgh gives an excellent resumé of FCC proposals. LFK edits the club paper. The Mercer County Radio Assn. still maintains its club schedules on 144,160 Mc. at 9:00 P.M. each night. V.h.f. enthusiasts on 144 Mc. are urged to beam this way for good 144-Mc. QSOs. Active on 144 Mc. are GEG, NCD, CJF, MQW, LNA, KWL, QCN, and 8SFG. A newcomer is PMB, who, years ago, was 8DZR. UVD, in Jeanette, expects to try n.f.m. on 28 Mc. NCJ received his WAVE Certificate. New Erie amateurs are PIU, PIX, PIY, and PIW. DKL is trying for WAS on 7 Mc. LGM says KSP's 28-Mc. beam came down. Remember the hamfest in South Park this August sponsored by the Brass Pounders and Modulators of South Hills. Traffic: (Apr.) W3GEG 130, YA 35, GJY 22, KWL 22, NCJ 14, LSS 5, AER 3. (Mar.) W3AER 8.

CENTRAL DIVISION

ILLINOIS — SCM, Lloyd E. Hopkins, W9EVJ — The Wheaton Community Radio Amateurs and the Weldon Springs Amateur Radio Club have affiliated with ARRL. EVJ visited Waukegan hams who are interested in forming a new club. KQL is having a hard time getting on the air with present work schedule. DAX saw a flying saucer from his plane and got nationwide publicity. RBT is sporting a new car. The Hamfesters Radio Club is planning another big picnic for late summer. NN has new Collins 70E-8 PTO perking. BON is giving 160 meters a whirl and reports it is crowded. BRX had a tonsillectomy after a case of throat infection, but is improving rapidly. FKI had a 10-day leave and saw ØPTQ, who is ex-9JTX. HKA groomed his 3-kw. power plant for Field Day. CTZ reports Decatur Squadron of Civil Air Patrol is having Aviation Field Day at Decatur Airport on Sunday, July 10th. The traffic station will be on 7200 kc. FRP has new two-element beam electrically rotated and indicated on 28 Mc. SYZ made BPL for sure this month after several close calls. BUK finds homework keeps him from ILN. EBX still is burning the ether with traffic. Good work, Fred. BRD says he gets good reports on channel two! KYX now is ØKYX and operates Iowa nets from Cedar Rapids. BUD is fighting T.V.I. with no holds barred. BXC has half-wave sky wire on 20th floor of a building in Chicago and hopes to get on 144 Mc. this summer. IQC is having antenna trouble. PBY is hammering out code lessons. YBY is planning for hobby show. YNE is fighting feedback in his 522. ACJ has new rotator on his beam. ZHB polished his portable generator to power Field Day set-up. WOO is firing up on 160 meters. LHK is having rig trouble. OBB is kept busy repairing b.c. sets. DJG sends in a nice report of emergency set-up in Madison County. Your SCM wishes to report that all AEC a· plications which have been sent to this office have been s ..t to the proper EC. If you have not heard from yours, please advise QLZ, our Section Emergency Coördinator. Traffic: (Apr.) W9EBX 1382, QIL 731, KQL 513, SYZ 317, AND 84, CMC 80, LIN 75, SXL 48, RSM 43, CTZ 30, FKI 22, BUK 20, ASN 13, TZQ 10, FIN 9, HON 8, BON 4, BRY 4, FRP 3, HKA 1. (Mar.) W9BRD 34, ODT 2.

WISCONSIN — SCM, Reno W. Goetsch, W9RQM — Both the 15-w.p.m. and the regular c.w. nets will combine operations during the summer season to operate as one net at 6:30 P.M. DJV now is located in Milwaukee. In connection with OO duties, LFK makes wire recordings of signals observed with chirp, key clicks, rough note, etc., for playback to station cited. ESJ reports lots of traffic — enough for BPL! IQW has new NC-240D and HRO, and is busy coaching two prospective hams. FCF needs Rhode Island and Wyoming for WAS on 3.5 Mc. For latest Official Bulletins, copy DND on 3775-kc. c.w. at 6:25 P.M. CST or ESJ on 3950-kc. 'phone at 5:30 P.M. CST, Mon., Wed., and Fri. Warm WX and an XYL put a few bad parasitics in CWZ's operating schedule. YCV is back at traffic work. FXA is working on a new 150-watt rig after working 48 states with Meissner VFO. JBF and HEE worked LNR at Black River Falls on 144 Mc., a distance of about 85 miles. 9 P.M. CST is "2 meter time in the Valley." Look for Wausau stations at this time nightly. CGO, JBF, and RQM worked Florida, Alabama, Mississippi, Louisiana, and Texas on 50 Mc. during one of the first band openings of the season Apr. 27th. SGG has a Collins 75A-1 receiver and 32V-1 transmitter. WJH and FCF enjoyed the April CD Party. RSR built noise limiter with IN34 crystals. EIZ, new ORS at Antigo, handles WIN on Wednesdays. WEN, our OO, observed and notified quite a list of stations. LKL was a visitor at the Wausau and Madison Club meetings. VHA made his appearance on 160. Check the date on your appointment certificate and contact your SCM if renewal is needed. Applications for ORS, OPS, EC, OES, OBS, and OO appointments are invited. Newly-elected officers of WVRA are: VHA, pres.; RQM, vice pres. and act. mgr.; 8ZIB, treas.; FCF, secy.; and ESV, custodian. Traffic: W9ESJ 510, LFK 96, IQW 92, FCF 60, DND 55, CBE 54, SZL 47, CWZ 46, YCV 40, EIZ 37, ECV 20, PM 13, FXA 7, BZU 6, TOA 5, MUM 2.

DAKOTA DIVISION

SOUTH DAKOTA — SCM, J. S. Foasberg, WØNGM — DKJ has a new 28-Mc. beam. Aberdeen activity includes an active Navy unit. 160-meter operation in the State is picking up and the possibility of its use in the AEC is a good one. ORE and KQO have been heard and DB and OLB will be on soon. DBE has a Class A license and a Code Proficiency certificate for 30 w.p.m. IBP announces the arrival of a first harmonic, a boy. CRY has been assigned to the Ninth Naval District as communications officer in the USNR and will be out of Sioux Falls for a year or more. The Sioux Falls Amateur Radio Club is sponsoring a junior class of beginners, meeting weekly at the USNR Training Center, under the direction of KYZ. JLI has returned after an absence of two years and will be on the air with two transmitters, one for 3.5 and 7 Mc. and one for 14 and 28 Mc. Traffic: WØGCP 64, DBE 24, ILL 15, OLB 9, WUU 9, FJS 4.

MINNESOTA — SCM, John B. Morgan, WØRA. Asst. SCM, Jean E. Walter, KYE. SEC: BOL. Little by little the EC group is getting under way. RPT reported into the 'phone net using emergency power. NBW has a completely self-contained suitcase portable on 28 Mc. using motorcycle storage battery and vibrator supply. There are eight known mobile rigs in the Twin Cities which are not signed up in the EC. How about it, fellows? The EC now has over 100 members here and 38 mobile rigs. On April 22nd, 15 of the mobiles put on a show for the local Red Cross State Relations Officer, who was quite impressed with the demonstration, utilizing both land lines and mobiles. So far the "S" meter boys are winning the hidden transmitter hunts, but there are some efficient loop jobs coming along. In the last hunt in St. Paul the "hiders" used an unknown car, a #28 antenna wire into a nearby tree and lay on the car floor to minimize visual detection, and really had the gang guessing. GKO is off on an extended "cruise" around the country with rigs on 3.5, 3.85, 7, 14, and 28 Mc. in his aluminum trailer. IPA has his new 813 final working. FMD has a new windmill tower. GHN has a new two-element 14-Mc. beam. The Red River Radio Assn. has acquired a new 3½-kw. gas generator. PSD and RJF have moved to new locations. ZZK and IXR have new electronic keyers for 20 w.p.m. practice! BGY is winding his own filament transformers. RJF reports a lot of QRMing of 116.1 Mc. which is CAA-guarded for national and military airline use, apparently from 28-Mc. harmonics. On 116.1 Mc. it might be the difference between safety and danger. TKX delivered a message with ck 175 (a pickle recipe, of all things!). 6HLW is a newcomer to Finlayson, Minn., and is active on 14, 28, and 144 Mc. Minneapolis RC (P.O. Box 685) is looking for bulletin exchanges with other clubs. DSF is the amateur radio station operated by the Air ROTC students of the Department of Military Science and Tactics at the U. of Minn. The station has a 1-kw. transmitter and a Hammarlund Super Pro receiver. 6HJP, of California Kilowatt fame, is trustee and chief operator. Traffic: WØGHN 142, LDI

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86, RA 82, BGY 73, IXR 64, [illegible] 32, ANU 31, EHO 15, MXC 11, RXL 9, CWB 8, TSN 8, BOL 4, GKP 4, TKX 4

DELTA DIVISION

LOUISIANA — SCM, W. J. Wilkinson, jr., W5VT — Well, summer is upon us and with it comes a drop in activity, but we may be able to put together enough from those who are still on the various bands to make some kind of report this month. CEW, our PAM, still is trying to increase his standing in the DXCC while KTE, our SEC, again has hit the air on 3.5 Mc. in his new shack and QTH. ABA and LQV are on 14 Mc. for a spell and may get into the DX scramble soon. LQO is unheard from so it is presumed he still is on 28 Mc. The Caddo Amateur Radio Club of Shreveport meets the second Friday evening of each month. BSR, Delta Division Director, was with the gang just prior to his departure for the ARRL Board Meeting. The new FCC proposals were well discussed. BAF is on practically all the ham bands and the ramrod. IUW. still pounds away in ARRL operating activities. KYK goes for lots of rag-chewing on 7-Mc. but finds time for some traffic. NNH is a chess fiend and will take on all comers, we are told. Maybe someone likes dominoes too and could interest him in a game. Well, since everyone has gone fishing, guess will have to close shop early this month and try to have more next month. In the meantime, lots of pleasant operating to all. Traffic: (Apr.) W5KTE 453, KYK 2. (Mar.) W5KTE 266.

MISSISSIPPI — SCM, J. C. Wallis, W5DLA — PAM LN now has low-power rig on while remodeling his kw. rig. BZG needs 3.5-Mc. schedules with New Orleans and Baton Rouge. KUT is new Magnolia Net control station. ANP is the new alternate control. LPL is now working 14- and 7-Mc. c.w. and has a traffic schedule with Canal Zone. "All amateurs should take part in the activities of the Emergency Corps." Your SEC, JHS, is on the job. A card or letter to Box 491, Gulfport, will prove it. If eligible and you desire official appointment such as ORS, OPS, RM, etc., contact the SCM. Prompt attention is assured. Let's fill this space in future with plenty of station activity reports. Traffic: W5LPL 73, JHS 41, ANP 20, DLA 11.

TENNESSEE — SCM, Ward Buhrman, W4QT — The summer static season has pushed many of the nets into mothballs, and former devotees of the 3.5- and 3.85-Mc. bands are now concerned with such typical 28-Mc. problems as insufficient grid drive, making an 807 run cool while driving a pair of triodes to a kilowatt, and rebuilding the final so as to get a decent L/C on the higher frequencies. At this writing, however, indications are that the section 'phone net (3980 kc.) will continue its schedule throughout the summer. We hope the attendance will hold up. There is some increase in interest in the v.h.f. bands, and a number of fellows have expressed a desire for schedules or prearranged contacts to see what the possibilities are. It is suggested that club secretaries exchange information to enable those amateurs who have equipment for 144 Mc. to get together. There are probably 25 amateurs in the section known to have equipment in working order. Some very nice traffic reports have been received, but news of other activities remains almost zero. We would like to see an increase in activity on the frequencies between 3500 and 4000 in daytime. QRN and QRM are at a minimum during daylight hours. Traffic: W4PL 2214, APC 251, ETN 177, BAQ 132, NNJ 102, CZL 44, LCB 18, ONX 10, EBQ 8, HOJ 8, PBK 7, NPS 4, FLW 1.

GREAT LAKES DIVISION

KENTUCKY — SCM, W. C. Alcock, W4CDA — Kentucky's emergency organization is developing nicely. Now we need some coördination of nets and schedules so everyone knows our state and interstate coverage. VP handled 105 messages on MARS Nets. Doc went to MARS conference at Ft. Meade and surgical convention in Los Angeles. NWQ got his 80-meter antenna up with the help of local hams. OXO, OYH, OYT, and OXC are new operators. (Send SCM your names and QTH.) JQY and YPR ran up nice traffic totals. OXC has new VHF-ARC-5 rig and sixteen-element stacked array. MKJ has corner reflector under test and plans new rig for 420 Mc. On the KYX Net he has worked six states. The Blue Grass Ham Club says PDA and PDB are new in Richmond. JTL, CRI, BNP, OBG, and QLF are trying out 160. NOW and NDY have moved, but operate 28-Mc. portable. YCC is building 813 rig, all-band. MWR is a proud papa. NRH is working on new rig. MEY says Engineers Day went over fine. MWX closed slow-speed net (KYW) in April for the summer. TXC is fishing and catching 'em. OET kept active with traffic. CDA needs an eat-your-cake-and-have-it-too transmitter. FKM keeps busy on KYN, KYB, and KYP Nets. BEW will serve another year as Kentucky's EC. KFA represents Lexington on KYN Net. KKG is firing up on 144 Mc. VD seeks ORS appointment. BAZ works hard on Trunks "J" and "M." Traffic: W4BAZ 337, MEY 174, NWQ 131, VP 105, YPR 82, MWX 76, JQY 70, TXC 46, OET 34, CDA 28, JCN 26, FKM 22, VD 19, MSC 17, MKJ 16, KFA 14 KWO 14, KKG 2.

MICHIGAN — SCM, Robert B. Cooper, W8AQA — SEC: GJH. RMs: GSJ, NOH, and UKV. PAM: YNG. New appointments: ORS for ZWM, OPS for ZBT and ABQ, while ZBT is also a new OBS. The traffic totals for this month are still very good; however they show the inroads of diversification developed by outdoor weather. Nevertheless NOH and UUS make BPL. Congratulations to the peppy Port Huron group on the organization of the Thumb Area Amateur Radio Association. Best wishes to its officers; MFB, pres.; and VWY, secy. KBI and UGD have new Class A tickets and are regular participants in the BR and MEN. The new *Bulletin* from the Lake Superior Radio Club makes very interesting reading and TTY also calls your attention to a hamfest to be held at Laurium on July 30, 1949. OCC has completed a converter and now is busily engaged in working out the bugs in a Monitone. WXO reports a new ham, EEM, in the Flint area. DLZ has a 25-w.p.m. Code Proficiency certificate. RRT qualified for a 35-w.p.m. sticker. DOI is moving to a new home. UKV announces a directed QMN at 5 P.M. the entire summer. CRH is the new NCS for the 5-P.M. QMN on Friday. TRN is using low power while putting the finishing touches on a final with TELEFUNKEN RL12P35s. Openings on 144 Mc. have urged AQA and FX to make more than idle plans for some activity on this band. BLR, as AEC, reports a reactivated QMT Net on 28,800 kc. GSJ adds TA3GYU to his list of DX. FLA is on from Allegan and reports very good luck with a 815 running 50 watts. (On which rhombic, Poly?) AD reports after a five-year lapse and expects to be back in the Michigan nets soon. DPE wishes to thank all who helped to make the Lansing Conference of Clubs successful, as the meeting proved to be a real voice in Michigan. Congratulations to UFH on his graduation. OAF reports from Petoskey and has made an excellent outlet for that area. As a reminder, don't forget to send those monthly reports to me. Let me know about your activities, plans, suggestions and any information you think your fellow hams would like to have. Traffic: W8UUS 601, NOH 566, TBP 273, GSJ 198, RJC 198, TRN 172, UKV 119, SCW 113, QBO 68, WXO 66, IV 58, AQA 39, CPY 39, YMO 33, DPE 31, CRH 25, IHR 20, ATB 16, ZWM 16, HM 15, DKU 13, FX 12, BVY 10, TQP 8, DNM 7, OAF 7, TTY 7, WVL 7, TNO 6, EGI 5, ABQ 4, DOI 4, SH 4, YGI 4, YNG 4, AD 1.

OHIO — SCM, Dr. Harold E. Stricker, W8WZ — Asst. SCMs, Charles Lohner, 8RN, and C. D. Hall, 8PUN. SEC: UPB. RM: PMJ. PAM: PUN. Traffic has fallen off somewhat because of QRN but reports are gratifying nevertheless. The Falcon Amateur Radio Club is a new club at Bowling Green. Officers are QUG, pres.; BEK, vice-pres.; BZI, secy.-treas.; TEH, trustee. Our QSL Manager, JNF, has mailed 31,175 cards and 21,050 are on file. Send your envelope in and get your cards. The results of the Cuyahoga County Ground Wave Contest are as follows in order of standing. For Cuyahoga County FJX was the winner, followed by WDQ, AJH, CKU, ZQC, BVN, ADC, BAG, and QAV. For stations out of Cuyahoga County, ZO was the winner, followed by LWH, DMJ, NYG, DJZ, ALC, SRS, AMH, and CMC. From the Dayton Amateur Radio Assn. *Bulletin* we read that the club was saddened by the death of IBM. VJM is rebuilding his 28-Mc. rig and hopes to eliminate T.V.I. CUJ ditto. CCZ is building a new grid dip meter. WXA is now in New Jersey and was active in the CD Contest as WXA/2. AQT has a new Collins 32-V and 75-A. ZOL says his Quad antenna is not "quad" as good as his four-element beam. MGS has new 10-, 15-, and 20-meter beam that tunes by expanding the elements. 7FAZ and 2FV are back in Dayton. EDP is a new ham. BQB is now Class A. ZOF is conducting code practice on 27,238 kc. From the *Voice-Coil*, Youngstown: PWH, FUY, and ZEV are working on new mobile rigs. ECE is a new ham in Ashtabula. AT, at Alliance, has new 75-A. ECJ is a new ham in Niles. From the *Q-5* of the Springfield Amateur Radio Club: KL7LI now is in Springfield. OG is conducting code classes. DCJ is a new ham in Springfield. JRG is getting some nice letters from hams on his OO work. From the *Mike and Key* of the GCARA: New officers are PBX, pres.; MGP, vice-pres.; RJD secy.; NDN, treas. BHW, JIN, and FGX had very high scores in the DX Contest. BHW was national high and JIN fourth. DYD is a new ham in Cincy. UPB took a trip through Northern Ohio with respect to EC work. Officers of the Queen City Emergency Net are CDY, pres.; IDA, vice-pres.; ZZY, secy.; 4IYH, treas. TZO got his 35-w.p.m. Code Proficiency sticker. FNX has new VFO and states that T.V.I. has the Elyria and Lorain hams down; particularly the 28-Mc. boys. RLR got his 35-w.p.m. Code Proficiency sticker. TJD has new rig for 7, 14, and 28 Mc. using p.p. 811s. BBK now is located in Columbus. PQK did well in the W-VE Contest. RN has necessary parts for

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vertical antenna but needs help in putting it up. EBJ states that TLAP is through for the summer. WAB is back in Columbus. DAE is NCS for ESN. PUN has new Mon-Key. ABK and RAA are new hams in Wilmington. DGG lost his 100THs. WE says that between T.V. and hot WX activities are low. BFB is all set with his mobile rig for summer. CBI is building new shack and shop. PMJ states that BN will operate only on Mondays, Wednesdays, and Fridays at the usual time. TRX is enjoying himself on 160 meters. BIF worked 14 VKs and ZLs on a very bent indoor folded dipole. EQ and UDR sent in long OO lists. WRN states that h.f. openings to Indiana were good, and that UZ, LAK, BAX, IVC, WXM, CPA, ABO, WXY/8, ZCD, DMR, NPA, and WRN are active on the Franklin County 144-Mc. Net. New appointments for April were PQK as ORS, TRX and TJD as OPS. The QNCs must have worked. Thanks for getting your reports in early. Traffic: W8SJF 248, HOX 199, EBJ 196, CBI 158, GZ 144, RN 69, OUR 55, YFJ 54, DAE 53, WE 48, PMJ 41, EQN 37, LJH 32, RLR 25, PQK 20, QIE 13, PUN 11, WXA/2 10, LOT 9, BLI 6, IVC 5, UW 4, WZ 2, FNX 1.

HUDSON DIVISION

EASTERN NEW YORK — SCM, Fred Skinner, W2EQD — TYC and LRW are the big traffic men this month, each getting another BPL certificate. BSH finds use of a loop antenna for receiving helps reduce QRM during net drills. FVP managed to dodge his heavy power-line noise long enough to get his copy for 25-w.p.m. Code Proficiency certificate. The SARA station at YMCA Hobby Show in Schenectady was very successful, 378 messages being handled. GYV is off the air pending completion of house repairs and painting. UKA is a new station on 144 Mc. RMA is putting a 144-Mc. mobile rig in his new car. PHO now has a 3-kw. gas engine-alternator installed in the cellar and is able to change over to emergency power between words. ITX is on an extended trip to the Middle West and reports he will not be able to manage the NYS Net next season. QGH has a receiver with teletype printer monitoring continuously, even when he is away from home. He has received several messages while out working. EQD has curtailed power and operating time until he can build a T.V.I.-less rig. Traffic: W2TYC 573, LRW 551, CLL 191, PHO 138, RH 100, EQD 59, WIK 29, BSH 14, IN 9, FVP 4.

NEW YORK CITY AND LONG ISLAND — SCM, Charles Ham, jr., W2KDC — OHE, our SEC, is working so hard on organization, etc., that he is just a little shy on paperwork. CJZ left Suffolk a month late and so its AEC activities have not quite become settled under AJF's leadership. WHB carries on in Manhattan with the usual and unusual problems. UGV is rebuilding for AEC. VLQ gave an informative talk on T.V.I. at the Trylon Radio Club recently with actual equipment and measurements. JTR is doing a fine job as OBS. YYE is doing fine on 28-Mc. 'phone, having worked 18 states since April. YIR is NCS one night weekly for the E.T.A. (Eastern Teenagers Net). *Grid Leaks*, published "occasionally" by the Amateur U.H.F. Club of Jamaica, is a newsy little bulletin. It quotes DKH, calling varistors geraniums, and ends by wondering what QQQ means? YDG has just made Class A. AYJ is back on the air. SJC still is working N.L.I., N.H.N., and once in awhile into T/O WVN. WHB would like to hear all potential AEC members on 3600 kc. Wednesdays at 2000. Among others UFR calls in regularly. KV4AF/2 returned to KV Land for two weeks. TYU hated to see May come because traffic nets have slowed down and his new antenna (outdoors at that) is of less use. Pop has cleaned up T.V.I. TUK really must be busy; his Form 1 card was handwritten for the first time in years. OBU also feels the slowdown in traffic. George expects an HQ-129X soon. WHB made 1/10 of a BPL. Don't give up, Dave; radio is rugged in the canyons of Manhattan. BGO is building new final for 3.5, 7, and 14 Mc. RTZ/4 should be minus the /4 about now. Welcome back to N.L.I., Hope. LGK now is an expert on Viewtone T.V.I. Joe uses a tuned trap in series with the antenna lead. VVN, of Manhattan, seems to be reporting for North Queens AEC, whose members include LGK, FNI, LUS, WZF, PQG, TJA, WOK, WFL, OG, and VVN. They operate Monday evenings on 147.6 Mc. with inter-net transfer on 146.25 Mc. EC says that T.L.A.P. has closed down for the summer, YDG is slowing down; he had only a few hours in the CD Party. VNJ made 127 contacts in 43 sections with 12 watts during the CD Party. ZNM is QRL high school. Red reported into the N.L.I. only 5 times. YKQ, at Sperry Gyroscope, is coming along under the leadership of OBU. The 42nd Signal Company, New York National Guard, is looking for hams in the New York City area for the Radio Operations, Radio Maintenance, and Radio Relay sections of the company. Veterans who have the proper qualifications can enter the company with their old ratings. The company meets at the Jamaica Armory, 169th Street, Jamaica, N. Y., every Monday from 8 to 10 P.M. For information contact the Radio Officer, Lt. Henry Lichtenberger, W2AEX, at the Armory any Monday night. Traffic: TYU 567, VNJ 392, OUT 177, BO 135, OBU 111, EC 84, RTZ/4 76, SJC 57, WHB 50, KV4AF/2 28, W2BGO 20, ZNM 18, YIR 8, EYS 4, YDG 4, GG 2.

MIDWEST DIVISION

IOWA — SCM, William G. Davis, WØPP — The Clinton Radio Club has purchased three dozen code records and courses to loan to prospective hams. SCA had ham set-up at hobby show connected with the Iowa Dental Assn. Convention at Des Moines. They originated 168 messages. AIS is on 3.85-Mc. 'phone. MFS, ex-9DSS, called on PP. TVC has to use modulator for PA service. AHQ has been getting some of the nicer DX on 14-Mc. 'phone. AXE has new windcharger tower. FZO, after 21 years, has a fine new rig completed. AXH was elected president of the reactivated Dubuque Club. OM and CKB each have classes of 22 embryo hams. The Council Bluffs Club is all set for July 17th hamfest. The North Iowa Ham Club is making plans for its annual picnic. RTI is experimenting with bi-directional beam and doing nice DX with 40 watts. RSI commutes 20 miles to attend meetings of S.C. Club. SVS, now in Sioux City, is nearly ready to go with new rig and extra-fine antenna system. YNW just finished yearly cruise in Naval Reserve. The 14-Mc. gang will miss GWT, who passed away on April 27th of a heart attack. OM and AHX have been working 144 Mc. PTL is a new ham in Waterloo. The Clinton Club now has 42 members, 18 of them working on BA, BS, or Doctor's degrees. LKK says, "Don't rant and rave. Write your director." PP will attend the banquet to be given by Milwaukee R.R. to hams who helped them during the February blizzard, and meets with the Sioux City gang the following evening. Traffic: WØHMM 598, AUL 169, WMU 149, SCA 138, PTQ 90, SCW 88, FP 72, SRR 68, QVA 34, YI 22, AYC 21, NYX 15, JAD 12, LKK 5.

KANSAS — SCM, Earl N. Johnston, WØICV — SEC: PAH. RM: NCV. PAM: HEC. AHM, Great Bend, rebuilt rig adding 3.85-Mc. 'phone with Millen VFO exciter using double sideband suppressed carrier modulation. AHW, Kansas University station, has finished building new 'scope and ECO. OKE, formerly 4HCO, is new call in Lawrence. 3NTN, formerly of Pennsylvania, is new instructor at K.U. BNU has 93 countries on 28-Mc. 'phone since October '48 and is trying for DXCC. BPL is active on 50 Mc. and says some signals are heard regularly. DRB has had his XYL helping with deliveries from station. FDJ is on 160 meters since QKS folded up for the summer and reports NAS, DSR, JDX, IFX, QQQ, HKB, PBX, and FLZ also on the band. LIX reports flip-flop antenna successful. OAQ, Leavenworth, is active with Red Cross EC net. KVRC members UPU, KRZ, WGM, TPF, GPR, AGC, HOC, HIK, and others in Naval Reserve Unit started sending code lessons over KØNRZ on 29.5 Mc. for a ten-week period. GHI, well-known amateur and chief engineer of WIBW of Topeka and KCKN of Kansas City, died in an airplane crash 15 miles north of Hutchinson, April 27, 1949. Pug obtained his ham ticket at the Kansas State Convention at Topeka in 1931 at the age of 14. Pug was engineer at WREN while attending K.U., was assistant chief engineer at WDAF for many years, and for the past several years with Capper stations WIBW and KCKN. The Kansas gang extends to his wife, relatives, and close friends its sincere sympathy. Traffic: WØNIY 129, DRB 81, OAQ 27, OUU 20, KXL 14, ICV 10, BNU 7, AHW 6, BPL 5, FDJ 5, LIX 3.

MISSOURI — SCM, Ben H. Wendt, WØICD — In answer to several requests regarding deadline date for items intended for this column see page 6 *QST*. Reports received later than the fifth of the month must be held over for the following month's column. Can you top this? QXO has made BPL three times in the past four months. Mac holds regular morning schedules on 7.155 Mc. QMF is trying 160 meters. He finds few WØ calls but hears plenty of W9s. GEP is busy handling traffic in addition to reporting in on three nets. OUD is working on new gear. DEA visited with CGS and the South Missouri Amateur Radio Club recently. KBV is hitched to all bands with a pair of 813s. RYG and SIT are new hams in St. Joseph, while RMX is new for Poplar Bluffs. A 10-watt rig is substituting at VMI while a new modulator for the large rig is being constructed. PMI and QMF are attempting a contact on 144 Mc. NNH received a 35-w.p.m. Code Proficiency certificate. AXL received an Old Timers certificate. KSR, MFN, and 8NUU visited ØOMG. INK has QSYed to Little Rock, Ark. St. Louis seems to be a hot spot for Russian stations on 28 Mc. ARM brought his total countries worked to 96. NIP is working hard and faithfully in keeping the Missouri Emergency Net in top shape. The MON Net will maintain its regular winter schedule. The St. Joseph Club has been actively engaged in building gear for emergency work and Field Day. The Tri State Club at Joplin has started emergency planning and has an active AEC group. The South

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Missouri Amateur Radio Club was honored by a visit from the Springfield Chamber of Commerce and Western Union officials. Certificates of honor were presented to 11 amateurs for their assistance in the January ice emergency. The *Springfield Leader and Press* carried the story. Traffic: WØQXO 243, CGZ 67, OUD 39, SKA 22, CKS 20, IAC 19, KIK 19, GEP 15, PR 14, OMG 12, DEA 8, ICD 6, NMD 3, LWF 2, NNH 1, PMI 1.

NEBRASKA — SCM, William T. Gemmer, WØRQK — JDJ, YDE, and GFI are new ORS. The Nebraska C.W. Net wound up the season's operation Apr. 30th. FAM and Nebraska c.w. net members will hang around 7280 kc. for summer get-togethers. PXR is new ham at Blair. DNW worked Mexico on 50 Mc. VMP is running 750 watts to ½ of 304TL and using two halves for modulator. EUT is on 3.85-Mc. 'phone with 200 watts to HY5514s and ARC-5 VFO. LEF used BC-654 during ice-storm emergency Apr. 13th. HSO had to use emergency a.c. converter during the same storm. FYP is running a full gallon to p.p. 250THs. JED worked a PK4 and holds schedules with JA2AD on 14-Mc. 'phone. BDE and XYL were host to 47 hams and families at Columbus. VQO auctioned off surplus gear that was brought. QXR, in Omaha, heard most of the 3.85-Mc. mobiles at the picnic. ZOQ is adapting ARC-5s for 3.5- and 7-Mc. c.w. BRO, RXU, and LJO went fishing with 3.85- and 7-Mc. rigs in truck. RWV is on 3.85 Mc. with mobile rig. PB gave the SENRC an FB discussion on Naval Communications. FMW is on 160-meter 'phone and with the assistance of YLC erected a new full-wave 3.5-Mc. tuned doublet. FMW furnished Ainsworth with its only communication outlet during three storms. LRD is after DX with p.p. parallel 24Gs. HZE rebuilt to 5514 rig. EHF is on 28 Mc. with 304TH and on 160 meters with 152TL. JDJ is RCC, ORS, and needs 11 states for WAS. Traffic: (Apr.) WØHSO 195, KON 155, SAI 91, JED 73, KJP 52, KDW 40, LJO 25, THF 25, JDJ 22, FMW 21, FQB 18, GFI 17, RQK 10, AYO 8. (Mar.) WØFMW 143. (Feb.) WØKJP 47.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Walter L. Glover, W1VB — The Connecticut Net held its regular spring meeting at the club rooms of HCARA in East Hartford on May 7th. Gripes were aired fully, the summer schedule was set up, and emergency matters were discussed. VW reported a 'phone net in the works for next fall on 3.85 Mc. It was decided to change CEN to CTN (Connecticut Training Net) with speeds held down to 15 w.p.m. and no speed keys. HYF was appointed ye scribe and expects to get out regular net bulletins. IKE has installed a 20-watt mobile rig in his jeep. KUO is going to 144 Mc. APA schedules JA3AA on 14 Mc. and is building a new cubical quad antenna for 14 Mc. AW has 200 watts on 160 meters. RWS is hunting DX. LKF has a new addition to the family. DDP received Class A licenses. MVE is using a Meissner and 813 on 7 Mc. AGT bought a new house. LEI has a BC-458. BHM, CUX, and BJK are working DX on 14 and 28 Mc. QAK is home from Newington Hospital. NRR got married. MVH and KQY are rebuilding to clear T.V.I. FOU now is ØFOU. FMV is setting up the rig again after moving to a new home. GWT is rebuilding. KUK also is a proud papa. A large representation of Connecticut hams attended the Framingham Convention, and the club there is to be congratulated on its success. Traffic: W1IIN 297, RWS 150, KV 104, CTI 84, DAV 84, NJM 77, VB 76, ORP 57, BIH 43, KUO 36, BDI 34, AW 21, BVB 20, KQY 10, APA 9, RUR 7, HYF 1.

MAINE — SCM, Manley W. Haskell, W1VV — QUA is conducting EC drills on 3580 kc. weekly. Active members are JRS, LZI, RPT, EFR and VV, for Portland. QEE and QQY have received their Class A tickets. NGV uses both 3.5- and 7-Mc. bands to report into PTN, NEN, TLC, T/O, PQN, and TLS. A real traffic man, AFT's ten watts puts many a high-powered rig to shame. JAS/1 has returned to Duck Pond for good and has that 191 hot when he isn't pushing the 522 on 144 Mc. AUC and DHD will attend the hamfest in Portland. KYO leaves the U. of M. at graduation for his new job. Good luck, Dick. BDV is all set to make the trek to Maine for the summer with his very low-power rig. GE is moving both his 3.85- and 144-Mc. rigs to Duck Pond for the summer. NGV is changing to 150 watts for use next fall. PTL is getting the 144-Mc. fever. PWA's favorite game is hooking ZLs and VKs in the early hours. JVU snags 'em on 160 meters with a low-power rig that has broadcast quality, that's why. KLH is working up a new super fertilizer for his garden. Says he is going to out-Burbank Burbank. NXX is high traffic man for this month. The Pine Tree Net has done a good job in keeping traffic moving and the hooks clear. The Sea Gull Net has suspended operations for the summer. 'Phone traffic will be taken care of on 3961 kc. at 1700 any day by Maine stations. Traffic: W1NXX 85, LKP 62, NGV 62, VV 19, ROM 15, GKJ 9.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, jr., W1ALP — The following have renewed their appointments: MDV and WU as ORS; KKJ and PZ as OPS; PZ, ICO, and MCR, as EC; BGW, PXH, and AYG as OO; AAL as RM. The South Shore Amateur Radio Club elected the following officers for the coming year: PXH, pres.; KCP and JNV, vice-pres.; QMD, secy.; IVI, treas. The Norfolk County Radio Assn. held its election of officers with PDG, pres.; PCR, vice-pres.; CQN, secy.; AYI, treas. NXM got married. Now he will have more time for ham radio? SAA is a new ham in Quincy. ZE and JUL are on 160 meters. RAI, of Methuen, is on 144 Mc. IO and BVL have rigs on 1¼ meters. CLS gave a talk at the Worcester County Radio Assn. on 50 Mc. The Eastern Mass. ARA had a meeting on T.V.I. problems with Mr. Doorakian of the FCC. HSV, MQ, and CTW are giving talks on it. MCR has a 522 mobile. ALP missed his first Framingham hamfest because of work. DDO gave a talk at the South Shore Club on High Fidelity Speech Amplifiers. The T-9 Radio Club held a meeting at Harold Baker's QTH at which the following officers were elected: Stan Dunn, pres.; Ray Morrison, vice-pres.; IPK, secy.; IBF, treas. ERH is building controlled-carrier rig for 3.85-Mc. rig. MRQ will have 1-kw. rig. DMS says he is going to move. RCQ/2 writes that he has a new baby YL at his QTH. KKJ still is handling traffic and is on SGN. QMJ's beam blew down. ZR is moving to Nonquitt for the summer. The Hi-Q Radio Club had a quiz contest with BSG winning an 814; also JIX gave a talk on modulated amplifiers. ICO has QQW as assistant EC. AAL has been doing all kinds of work in his shack and will be on 160 meters. CQN got married. IXI is on 14 and 28 Mc. KBL is building a boat. PCR is on 7 and 14 Mc. and will be on 28 Mc. GDY will have 28-Mc. mobile when he is at summer place in New Hampshire. PDG is on 144 and 28-Mc. mobile. JLI is on 144-, 3.5-, and 7-Mc. c.w. HSB still is on 28 Mc. KNI is building rig for 3.5 to 50 Mc. using 814s final. Traffic: (Apr.) W1QMJ 328, EMG 194, JCK 150, LM 143, ZR 118, TY 92, DMS 84, KKJ 60, ILN 34, WU 24, PYM 15, MDU 8, MRQ 8, RBK 8, AAR 6, QJB 1. (Mar.) W1JCK 149, DMS 53, MRQ 5.

WESTERN MASSACHUSETTS — SCM, Prentiss M. Bailey, W1AZW — SEC: UD. RM: BVR. BVR spoke at meetings in Southbridge and Hartford and also at the New England Division Convention at Framingham. BVR finally worked JA3AA. I have been trying to work into JA Land for 25 years. Others in Hampden County Radio Club who have worked Tom are QWJ, APA, IJT, CJK, JYH, EOB, KFV, and PDF. EOB is building new exciter. Vic had to leave town on business during last CD Contest and left JYH to carry on alone. This broke Rog's competitive spirit so he came out with only 325 in 53 sections! JYH handled traffic from KH6IJ. BDV is on his way to York Beach, Me., and will operate portable from there. SAS is a new ham in Worcester. ODR, EFQ, and MUN are still knocking off new countries. The Worcester County Radio Assn. recently was honored by hearing HDQ and CLS. GZ leads the traffic parade this month. Nes still needs Arkansas and North Dakota for WAS. A hurried appendectomy and recuperation put a crimp in JE's radio activities. JGY got on for a few contacts in CD Contest. Warren is starting to chalk up some new countries on 14 Mc. RHU rolled up a good score in CD Contest and also participated in Army Day Contest. He had second highest traffic total this month. NY headed up Field Day activities for Hampden County Radio Club. RFU, QXV, PKI, and PHU took part in the VHF Contest. RLV reports into Western Massachusetts Net regularly. JLT finally got YK1UN after chasing for a couple of weeks, bringing his total to 139. AZW collected enough to bring his total to 98, with MD2G, ZC4AC, HZ1AB, and VP2KS as new ones. ARA is leaving WBEC and is moving to West Springfield to be with WTXL. MOK renewed an old acquaintance on the air with BVB. Twenty-five years had elapsed between QSOs. Traffic: W1GZ 160, RHU 111, NY 69, BVR 42, IHI 36, JE 30, AZW 27, RZG 12, JYH 8, JGY 6, BDV 4, MOK 4, GVJ 2.

NEW HAMPSHIRE — SCM, Gilman K. Crowell, W1AOQ — An oyster stew supper was enjoyed by the members of the Great Bay Radio Club, at which time APK, BFT, and AOQ were guest speakers. The Concord Club was heard from the summit of Mt. Kearsarge on Field Day on all bands. CDX has 94 countries toward DXCC. QJX and NMB are new ORS. POK has a new 814 final and just completed his WAS on 7 Mc. AVJ now is engaged in the poultry business. We are all pleased to hear that CRW is feeling better after his recent illness. MXP has been bitten by the 'phone bug. BYC is active on 14 Mc. with a pair of p.p. 812-Hs and need Delaware and Utah for his WAS. EWF is having his share of DX on 14 Mc. and plans to have a new beam soon. FTJ has 98 KP4s to her credit, with BFT dragging behind with only 84. Traffic: (Apr.) W1CRW 517, BWR 152, QJY 30, MXP 23, PFU 21, QJX 15, CVK 10, EWF 9, NMB 8. (Mar.) W1NMB 18, CDX 5.

VERMONT — SCM, Burtis W. Dean, W1NLO — Mem-

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bers of the BARC recently in[illegible]ected the radio communication equipment at the [illegible]val [illegible]rmo[illegible] 1IAS and [illegible]JV have spent several months [illegible]ing [illegible]ansmitters [illegible]r equipment. JEN has joined the Naval Reserve as T/3. The FCC has reassigned the call 1KOO to the Burlington Amateur Radio Club as a memorial to Paul E. Hope. AVP has had his OO appointment endorsed. PZX is OPS. GAE has joined the engineering staff at WCAX. The nets are operating on the following schedule for the summer months: C.W.-3740 kc.; Mon., Wed., & Fri. at 9:30 P.M., 'Phone -3860 kc. Sun. at 9:30 A.M., and GMTN-29 Mc. Tues., Thurs., Sat., and Sun. at 8:00 P.M. New hams in Vermont are RPK, of Windsor; RQT, of Fort Ethan Allen; RSG, of Northfield; RUG, of Pownal; and RVJ, of Springfield. 2TDG has moved to Burlington and is operating on 7 Mc. Traffic: W1KRV 82, NLO 28, PZX 28, RNZ 22, AVP 12, ELJ 12.

NORTHWESTERN DIVISION

ALASKA — SCM, Charles M. Gray, KL7IG — NK, on Adak, has been appointed OO for that area. He is equipped with a Collins 75-A, Hickok Frequency Standard, Hewitt Packard direct-reading Audio Oscillator and a Panoramic Adapter. Watch out, fellows. We now have an Emergency Coördinator for the Alaska area. BE has taken over this much-needed post. Let's give him lots of help on this. Contact BE at Anchorage or the SCM. W2OXE is coming north on the Schooner *Bowdoin* as Sparks with Commander Donald B. MacMillan's Expedition. Look for him on 3505, 3900, 7110, 14,020, and 14,210 kc. He is using an ART-13 transmitter and BC-342 receiver. He will QSL 100 per cent and is looking for net outlets. How about some dope from up north? Traffic: KL7NK 15.

IDAHO — SCM, Alan K. Ross, W7IWU — Hayden Lake: FIS is busy building cabins and overhauling his motor boat, but found time to apply for AEC membership. Kendrick: MHR is waiting for 160-meter crystal. MGL bought a portable-mobile rig in Boise. Moscow: MRL, a student at the University, is figuring on building up emergency battery-powered rigs. MVA is new ORS and meets with the Gem Net. He also is on 14 Mc. with converted BC-459A. Twin Falls: KEK has a new jr. operator. Yours truly has a new YL jr. operator. JCU, Montana, visited KEK and was introduced to IOA of Filer. JCU and IOA used to work each other on 160 meters years ago but had never met. JMX, Asst. Director, is rebuilding in cabinet. CIG has new National Receiver. Boise: Our EC, HPH, is moving to Anderson Dam. Both Boise and Twin Falls Clubs entertained Director Roberts. Traffic: W7EMT 62, GHT 54, MVA 41, BDL 30, BAA 17, IWU 8, JMX 2.

MONTANA — SCM, Fred B. Tintinger, W7EGN — CPY, our Director, has been visiting radio clubs throughout the Northwestern Division to give us first-hand information about the League and to collect our individual viewpoints to assist him in representing us at the Board Meeting. DSS reports that Great Falls has 144-Mc. net schedules and stations taking part are DSN, BUJ, GBI, MCX, MBP, NGX, CRD, DSS, and GCS. GCS is located at Sun River and comes in fine at Great Falls. FTO, NCS of Montana 'Phone Net, has put the net on summer vaction until the first Monday in September. The Lewistown gang is organizing portable activity for the summer. HBM's brother, ØLDU, has moved to Lewistown. The Montana State Net (c.w.) also is on summer vacation until the first Sunday in September. The Hellgate Radio Club's official organ, *QTQ*, is printed on the back of penny post cards and looks like a commercial job of printing in small type. JOI is editor. New calls in Missoula are NEG, NDW, NCS, and PX. HMT and EGN visited ELY in Missoula to talk over another Kalispell and Missoula miniature hamfest. KL7HL, with the FCC in Anchorage, has been visiting AFM. Traffic: W7CT 191, EGN 22, KIY 16, FTO 12.

OREGON — SCM, J. E. Roden, W7MQ — Astoria: COZ reports he is interfering with home recordings. NFC is a new station at Seaside on 28-Mc. 'phone. Baker: HAZ is mobile on 3.85-Mc. 'phone. Bend: GNJ is new OPS and JHF is new EC for Bend Area. SY reports lots of success on 3.85-Mc. mobile. Burns: FJD is keeping his locality on the map with regular OEN check-in. Eugene: KL has abandoned 3.85 Mc. for 14 Mc. for the next several months. The 1949 OARA Convention at Eugene was most successful. Northwestern Division Director Roberts and Vice-President McCargar of ARRL explained League work. UJ and his XYL, FKS, are new Oregon ORS and operate in Pacific and Oregon Emergency Nets. Klamath Falls: HVD covers American Legion Net daily at 1930 PST. JRU is correcting flaws he found in his big emergency test. LaGrande: CHN reports that it pays to go through the waste basket at times. Medford: HLF keeps the Emergency Corps activities in the State at a high level. LNG reports super DX on 14-Mc. c.w. for both himself and IRZ with 60 countries. HVR transferred to Japan. DBZ is new ORS. Oswego: WEN reports some choice DX including 47 countries using 40 watts. Portland: HDN is new PAM. DIS is keeping OEN at a high level. Many of the Dipsey Net gang now have mobiles on 3940 kc. also. Salem: IEJ is new EC for Salem area. Ranier: APD has complete new Collins station and operates on 3940 kc. Traffic: W7JRU 218, DIS 185, FKS 140, [illegible]KE[illegible] 122, [illegible] 65, AZ[illegible] 59, LT 56, II 51, GXO 49, GNJ [illegible]45, [illegible]Y 35, A[illegible]K 33, H[illegible]D 30, HLF 28, BDN 21, IIV 16, MQ[illegible]3, EZL [illegible]WEN 5.

WASHINGTON — SCM, Clifford Cavanaugh, W7ACF — SEC: GP. RM: CZY. PAM: CKT. JZR is new ORS. The Rodeo City Radio Club was formed with EGR, pres.; JPC, vice-pres.; and DRT, secy.-treas. Their strong point will be self-powered emergency gear. Both DRA and KAA have new YL Brasspounders. FXD, at Sedro-Wooley, works Victoria, B.C., and Seattle on 144 Mc. The West Seattle Radio Club stole the show at the hobby exhibit with free message service. They also did a fine job reporting the water ski race for the Sand Point Yacht Club. Those doing the operating were GHI, JGM, JMI, BCS, EOP, KGC, CDL, LWX, and MEU. KNV, at Olympia, works Seattle, Kirkland, and Tacoma on 50 Mc. Director Rex Roberts visited the Walla Walla Radio Club and all hands turned out to meet him. FWD is going to tear down the house so as to have more room for new antenna. FWR says she hopes he isn't thinking of 160 as *she* has to answer 'phone, not Tate. KWC has new Collins VFO and an HRO 7C receiver. LXP got his Class A license. JZR is trying all types of noise clippers trying to get out from under power noises. WY has fish fever. HGC is busy getting the gang to write their director on new regulations. ETO has taken a spot on the Columbia River Basin Emergency Net. EVW is busy on WARTS Net. AMZ received 25-w.p.m. Code Proficiency sticker. KAA has 1000 per cent attendance in WSNET QNI competition. CZY is changing all schedules to 7 Mc. for the summer. LVB is going up for his Class A ticket. KTL reports the Vancouver Radio Club has renewed its affiliation with ARRL. KCU made the BPL on deliveries. FRU is trying to get TLA on 7 Mc. for the summer. He also made the BPL. MCU is busy on WARTS and WSN. JC has gone into the appliance repair business. LFA made the BPL. ZU says this business of making a living is ruining his traffic totals. MCW received his Class A license. KYV blew up so won't be around for a while. HWK is converting BC-654A for AEC work. CWN had a nice time in the CD Contest with his new BC-457. KHL and JJK soon will be on 420 Mc. FIX says the ARRL wants dope on WSN QNI Contest. JDC and LJM, both good plumbers, are on 900 Mc. They say no QRM. Traffic: (Apr.) W7CZY 1683, CKT 1483, LFA 589, FRU 560, FIX 373, KCU 367, HWK 244, KYV 161, JZR 144, JJK 138, ETO 104, MCU 96, DRA 90, FWD 90, KAA 86, MCW 67, GHI 60, GR 59, AMZ 56, DGN 56, FXD 52, GEU 51, ZU 42, LVB 41, WY 38, LFN 31, HGC 22, EVW 21, FWR 20, ACF 18, JC 12, CWR 11, KTL 7, KNV 6, BBK 4, CWN 3, JDC 1, LJM 1. (Mar.) W7DRA 9.

PACIFIC DIVISION

HAWAII — SCM, Dr. Robert Y. Katsuki, KH6HJ — AEC has been reorganized, with AS functioning as SEC for T.H. and CM as EC for Oahu. We have no ECs for Kauai, Maui, and Hawaii. Interested members notify AS. BI is designated as OBS and will make OB transmissions every Friday at 7 P.M. on 3990 kc. CY took Class A exam and passed! PP reports successful QSO with W6ZV operating s.s.s.c. on 14.245 Mc. at 10 P.M. QV transferred to Kwajalein and will operate KX6BC on 28-Mc. 'phone. PHRCC now is open for all bands, either A-1 or A-3 emission. A ham school, in session Mon., Wed., and Fri., 7-9 P.M., reports class code speed up to 12 w.p.m. The 28-Mc. mobile gang now numbers 17. The HARC call has been KH6WO since Apr. 4, 1949. The HARC Hamfest will be held Aug. 6, 1949. Place: South Seas at McCully and Kalakaua Ave. Time: 6 P.M. to 12 M. $3.00 per. For tickets contact AN.

NEVADA — SCM, N. Arthur Sowle, W7CX — Asst. SCM, Carroll Short, jr., 7BVZ. SEC: JU. ECs: HJ, JVW, JLV, KSR, and TJY. OBS, 28 Mc.: JLV. NARA, Reno, elected the following new officers: KHU, pres.; GC, vice-pres.; MJP, secy-treas. NGB, sgt. at arms; Fran Chin, XYL of JLV, rec. secy. 9DVZ is located at the AAF, Las Vegas. PEC has a new Collins transmitter. JU has used his 3.85 Mc. vertical to support some horizontal antennas, also added n.f.m. BVZ is working 7- and 14-Mc. c.w. and some 14-Mc. 'phone. TKV is on 160 meters at Lake Mead. PZY and JUO are on 14-Mc. 'phone. PGD is sticking to 3.5- and 7-Mc. c.w. NCR and TZZ are working with 144-Mc. mobile and fixed. BVZ visited JLN and LVS, now at Inyokern, Calif. SXD reports a 27- and 28-Mc. mobile net with TFF, KVF, JU, JUO, KJQ, TZZ, and himself. 144 Mc. took a flareup for a while with TJY, 6AFK, JLV, CX, IPD, KTB, MAH, JTA, and UIZ participating. MRN is the proud holder of WAC. Traffic: W7JU 25, CX 20, BTJ 14.

SANTA CLARA VALLEY — SCM, Roy E. Pinkham, W6BPT — SCCARA now has a station in operation at the San Jose Chapter Red Cross Headquarters. The station will be used to check in on traffic nets on 3.85 and 28 Mc. for local contacts. The station will be on the air as many nights a week as it is possible to get operators. The purpose will be to train operators in traffic-handling and emergency communication work. Anyone wishing to help in this work should contact any of the SCCARA officers. MMG reports WNI ran up a big score in the April CD Party. QCB and

(*Continued on page 86*)

JFLINT

{Number one hundred eighty-two of a series}

HFS The National HFS receiver is an odd sort of animal, a mongrel breed among receivers, and a few reports received indicate some operators are not getting all they should out of it. The HFS was designed to replace the National 1–10 (not a bad set in its day, though hopelessly outmoded for present day use in crowded v.h.f. centers). The HFS receiver is an improvement over the 1–10, giving improved selectivity, sensitivity and operating convenience while still covering the same frequency range, including all v.h.f. bands, from 27 Mc. to 250 Mc., a frequency range seven times that covered by usual communications receivers. (This includes the Canadian 235–240 Mc. band, not usually covered by converters nor bandspread receivers.) This wide range must be covered smoothly with good tracking, sensitivity and absence of dead spots throughout.

A special design was essential for the tuning condensers, providing very low inductance stator connections and special ball bearings to eliminate the last trace of play or backlash which might appear, particularly when the HFS is used as a converter feeding a sharp communications receiver — an exacting problem with a general coverage range.

As a general utility receiver, the HFS is suitable for reception of FM broadcast stations, police, fire, aircraft, public utility stations, etc. Of course, the HFS as a complete receiver by itself is ideal for mobile or portable work, and a National vibrator type power supply is available for this purpose. If used in conjunction with a communications receiver, particularly one that has a bandspread dial, it makes a snappy v.h.f. combination. The NC-173 or NC-183 is ideal for this purpose. When using the HFS, the four available ham bands are not spread out over the entire dial so it is possible to cover the ten, six, two or one-and-one-quarter meter bands without excessive dial spinning. This range has sufficient spread to handle nicely the i.f. system built into the receiver. (Selectivity of the HFS i.f. is about 50 kc. using the super-regenerative second detector with its inherently good a.v.c. and noise limiting action.) This order of selectivity is nice to handle when tuning a band four or five Mc. wide after a CQ (Do you tune the entire 6-meter band?), allowing this range to be covered quickly without skipping over stations that would have been missed if the usual communication selectivity were used at the same tuning speed. Signal drift and less stable signals on the two and one-and-one-quarter meter bands are handled nicely with the broad i.f. Now let's look at its use as a converter. When QRM sets in, throwing the panel switch to "External" connects the i.f. signal into a communications receiver tuned to about 10.7 Mc., and immediately sharpens up the system. The tuning of the HFS, when used as a converter, does become very sharp, and here is where the bandspread dial of the NC-173, for example, comes in handy as a vernier. This vernier can cover about 50 kc. without need of retuning the HFS.

Right here we want to stress the importance of the adjustment of the antenna trimmer. If a signal is tuned in with the trimmer set incorrectly, and then the trimmer is rocked, a false setting will be made and will result in reduced sensitivity. This is due to the slight interaction between this trimmer and the oscillator frequency. To get a correct setting, the trimmer should be rocked *simultaneously* with the tuning dial until an adjustment is found that produces the strongest signal. Ignition noise can be used effectively either by picking it up with the regeneration control turned well down, or by using the HFS as a converter and turning off the noise limiter of the communications receiver. We were fooled during a recent 2-meter opening when W4's were unreadable until we got wise. After trimming up the antenna properly, three W4's were worked easily. It is an important adjustment. In addition, a good resonant antenna is very important, too.

CAL HADLOCK, W1CTW

P. S. A new use for the HFS was called to our attention the other day by W4AGD. A. W. Greeson, Jr., Greensboro, N. C., uses an HFS as a comparative field strength indicator for TV stations. When set up at a test location with standard antenna, determination from past experience can be made in short order as to whether a satisfactory TV signal could be received at the location.

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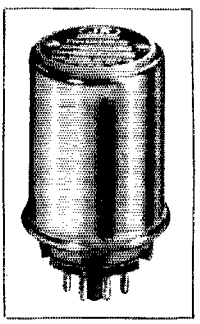

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JK CRYSTALS

CAZ has received the Class A tickets. SYW plans to work on 3.5 Mc. CIS has been QRL with his duties as alternate director speaking before several clubs in the Bay Area. RFF has raised a 4-Mc. 8JK beam and snagged six new countries with it. WJ reports a new station in San Jose, FYA. Walt has a new BC-221 frequency meter. ZRJ is organizing a 28-Mc. net for the San Jose area and hopes soon to extend it to cover the section. WJM reports a new harmonic at his QTH. WB gave a very interesting and instructive talk before the San Jose Club May 9th. DAE is experimenting with new antenna on 160 meters. CFK says he will put up some FB antennas when he moves to the country. JTE walked off with a nice prize at the last SCC-ARA dinner meeting. WGO attended the Fresno Hamfest. Traffic: W6ZGG 93, ZRJ 66, VZE 26, MMG 5, CIS 4, RFF 4, SYW 1. (Mar.) W6ZGG 63.

EAST BAY — SCM, Horace R. Greer, W6TI — Asst. SCM, Charles P. Henry, 6EJA, SEC: OBJ. ECs: AKB, EHS, NNS, IT, IDY, QDE, WGM. Asst. EC u.h.f. OJU. RMs: FDR, ZM. On May 2nd LTN passed away. His many friends will miss him. DQL has been working on 10,000-Mc. equipment along with building some frequency-measuring equipment. QXN reports that TLAP has QRT for the summer because of heavy QRN. YDI is active on 3804 and 3854 kc. FNT is using ART-13. ITH made BPL in April on teletype, all via amateur radio. This is only one of the many firsts for Reg in ham radio. FDR remodeled final with 4-250A p.p. final. ELW reports his son, DL4YO, will leave Germany in September. RRH is on 7-Mc. c.w. HSY is on 28 and 144 Mc. CWC is on 3.85-Mc. 'phone. NTU is trying 160 meters. GWD is on 3.85 and 7 Mc. ENF is on 160 meters and 144 Mc. KQA is on 3.85-Mc. 'phone Garbage Net. CUG is on 3.85 and 14 Mc. CX is looking for a GF-11. HD is on Buzzards Net. CMA got 28-Mc. beam up. FKA is on 7 and 14 Mc. IT claims 474 works at times. WJN is interested in television. ERA is building new transmitter. LGW is on 28 Mc. JUW is working on exciter. TCU had modulation trouble. DKL is QRL. 9KAV/6 can spend only a limited time on the air. OBJ sure enjoys his week-end radio outings. UPV is remodeling. IKQ is all set for European trip. TT's new beam is working FB and he says that of the total time spent on the air in the past, with a beam half of the time could have been spent with even better results. TT and DUB took in a radio show in Chicago in May. ORC meets the first and third Thursdays of each month at Red Cross Building, Oakland. MEK now has over 200 postwar countries on c.w. MVQ raised power to 1 kw. PB now has a ten-over-twenty beam set up. Some of the gang are trying out 160 meters. Even with the warmest spring we have ever had and with summer just around the corner, the bands still seem to be most active here in the East Bay section. ZM should be on 160 meters soon. IDY is on the air more often. YMO is looking for DX stuff. FMY is plugging along. MFZ is doing FB on low power. NZ is on Naval Reserve trip. LDD still is knocking them over. GEA is on project 125C. SSN is improving but has to spend much time resting. AKB is thinking about returning to c.w. WP is out of town most of the time. Don't forget, safety pays off. Be sure the big switch is off when playing around. Traffic: (Apr.) W6FDR 715, ITH 527, QXN 279, FNT 40, DQL 31, YDI 27, EJA 3, TI 2. (Mar.) W6FDR 840.

SAN FRANCISCO — SCM, Samuel C. Van Liew, W6NL — Phone JU 7-6457. SEC: DOT. CECs: BYS, SLX. FYY got on 160 meters with 'phone rig. DQA is trying to get back on the air. BBN is working 7 Mc. SLX is working hard on Emergency Corps and is doing a fine job. ZSE will be on 7175 kc. with 14 watts. FCL still is building 28-Mc. beam. QBC is working with CWR building a living room for the latter. What happens when two hams get together? Work? LE is rebuilding for c.w. BJO will be on 7 Mc. for next month or so. FBK finished building job on rig which turned out to be a three-year job. OUT is holding down Division of Highways System. ZHE is building 7-Mc. rig. AEY is mobile on 27 and 28 Mc.; he also is a 144-Mc. fan. NAO is going to telephone school. CWR now holds 2nd-class commercial ticket. VWV hurt his fist so he can't pound brass for the time being. Wish you a speedy recovery. BRZ will be working fixed portable 40 watts. He will be located at Hunter's Point Navy House M-8-B and will operate 28-Mc. n.f.m. and all c.w. bands. AEY still is working on the rig. DQA is with U.S. Forest Service. VBP will be in Eureka for the summer. EQQ is working on 3.5- and 7-Mc. c.w. PLY is revamping surplus gear. WYP is on c.w. only. BME just finished power supply for ART-13 and has it on the air now. AUB is rebuilding Clapp Colpitts oscillator. VRK is going in for long-wire antenna, 800 feet of it. BJO now is in new location in the same town and is building new rig for new ham shack. AEM has 30 watts on 27 and 28 Mc. FKP is just getting started on 3.5 Mc. with K6NRU, Naval Reserve station. YBI and CWR handled emergency traffic when Eureka was isolated for a while. SLX and NL kept Northwestern Pacific R. R. traffic and repair communications going between Eureka and San Rafael for a six-hour period during the same isolation period. The vice-president and general manager of N.W.P.R.R. turned out to be an old-timer under the call of EUD of past years. Glad to be of assistance to an ex-member of the gang. The April 22nd

(Continued on page 88)

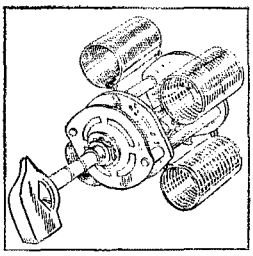
JFLINT

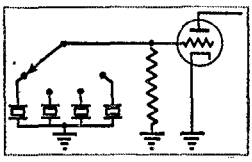
MALLORY HAM BULLETIN

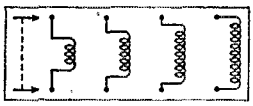
Transmitter Bandswitching With The Mallory 160C Series Ceramic Section Hamswitches

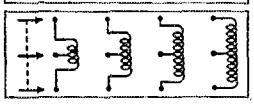
Most of us will agree that bandswitching in a transmitter is a very desirable convenience which adds infinitely to our operating enjoyment. Even so, for one reason or another, most of us still operate rigs which require a bushel basket of plug-in coils to change from one amateur band to another.

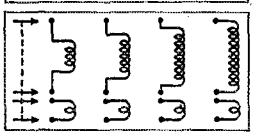
Many Hams have avoided incorporating bandswitching in their rigs simply because they believed that bandswitching was inefficient, was difficult to build, or was too costly. Actually, though, none of these things are true, if a few simple precautions are taken when planning a bandswitching transmitter. Bandswitching can be made as efficient as plug-in coils, almost as simple to build, and inexpensive in relation to the benefits derived.

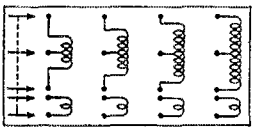












In planning a bandswitching rig, the bandswitch itself is the most important single component in the system. A little time spent in selecting the correct switch for the circuit involved will pay dividends. Be sure to get a switch with good ceramic insulation, high grade self-wiping silver contacts, and with sturdy lugs positioned so that the coils may be mounted directly on the switch. The Mallory 160C series of Hamband switches fill these qualifications to a "T" and are highly recommended for use in transmitters up to 100 watts of power. Figure 1 shows a suggested arrangement of coils on one of the Mallory Hamband switches.

There are 5 basic circuits generally used in transmitter switching, and there is a Mallory 160C Hamband switch designed especially for each of these 5 circuits.

CIRCUIT 1 is usually used for crystal switching, but may be adapted for individual stage switching. Mallory Hamswitch 161C is required.

CIRCUIT 2 requires Hamswitch 162C and is used where capacitive coupled coils must be switched.

CIRCUIT 3 incorporates Hamswitch 163C in transmitter plate circuits where neutralizing taps are found on the coils.

CIRCUIT 4 permits simultaneous switching of tuned, untapped coils and associated links. Switch 164C is required.

CIRCUIT 5 permits switching an interstage link or antenna coupling coil simultaneously with the tuned coil of a neutralized stage.

There you have it! Not much to bandswitching, when you have the Mallory 160C series of Hamband Switches. When you buy them, you'll find a complete instruction sheet packed with each switch which will elaborate on the above brief suggestions.

Your Mallory Distributor will be glad to show you any of these switches, or any of the hundreds of other precision Mallory parts you need to make your rig better.

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The American

RADIO RELAY LEAGUE

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WEST HARTFORD 7, CONNECTICUT

meeting of the San Francisco Radio Club was devoted to League affairs and the proposed changes in our regulations. QUB will give a talk on the subject, "An Inexpensive 10- and 20- Meter Pre-Selector Unorthodox Circuit" at the next monthly meeting. A very fine raffle and refreshments wound up a very busy evening. The San Francisco Naval Shipyard Club meetings for the month of April saw the installation of new officers for the coming year. Officers are UOQ, pres.; DZN, vice-pres.; BYS, secy.; JWF, treas.; Dave Benton, act. mgr. Other monthly activities included a supper dinner given at the Hunter's Point Officers Club. A swell time was enjoyed by all. Further business included a discussion on the proposed regulations. The club also proposes to give special attention to high-frequency work throughout the coming year. Traffic: KG6DI 652, W6NL 303, JWF 68, ADQ 12.

SACRAMENTO VALLEY — SCM, Ronald G. Martin, W6ZF — Asst. SCMs: Northern Area, Ray Jensen, 6REB; Central Area, Willie Van de Kamp, 6CKV. SEC: KME. EC Met. Sac. Area: BVK. RM: REB. *Northern Area:* JDN is planning emergency net for Shasta and Siskiyou Counties. REB is building portable gear for emergency use. OTL is rebuilding for 28 Mc. Mt. Shasta Amateur Radio Club met Apr. 20th with a fine turnout. *Central Area:* GHG finally made DXCC. ALQ returned to 7 Mc. after a 12-year absence from the air. WCC and SLV are on 160 meters. GERC met recently at Bidwell Park, Chico, with 23 in attendance. On Apr. 22nd from 9 P.M. to 1:30 A.M. CKV worked PIV, Sacramento, ERE, Turlock, and EXH, Rippon, on 144 Mc. using 50 watts to "J" antenna 50 feet high. *Southern Area:* The SCM visited the Placer Radio Club Apr. 14th. PXB is Club call, and was christened with a trek to Mt. Diablo to give the gang a 144-Mc. contact with 150 watts, and 350 watts on 28 Mc. CTH, ASE, YAR, GHP, ZFD, and WOW were at the mike. ZFD is NCS of Mother Lode Net on 29.2 Mc. with ASE as Acting NCS. The Eager Beaver Net is on 145.8 Mc. with ASE as NCS. SYN is starting Placer Radio Club C.W. Net on 3590 kc. NBW is on 3.85-Mc. 'phone. UNT is active on 144 and 28-Mc. 'phone but handles his share on 3.5 and 7-Mc. c.w. GHP and YAR are on 28- and 144-Mc. 'phone. FPN, ITJ, ZHZ, and ZHT are on 7-Mc. c.w. SUP is back on 3.5 and 28-Mc. 'phone. WSI deserts KH Land for Applegate. SARC met Apr. 20th with OJW from Dixon visiting. ETD put up folded dipole with 100 watts into 7 Mc. c.w. GHN has code class nightly on 28 Mc. In one day on 28 Mc., WRD contacted PA0XZ, G8GJ, DL4PN, VK2ACE, KG6CJ, JA2AK, and DL4GQ. YZV is all out on 28-Mc. Emergency Net every Thursday night. Traffic: W6REB 654, ZF 76, GVM 8.

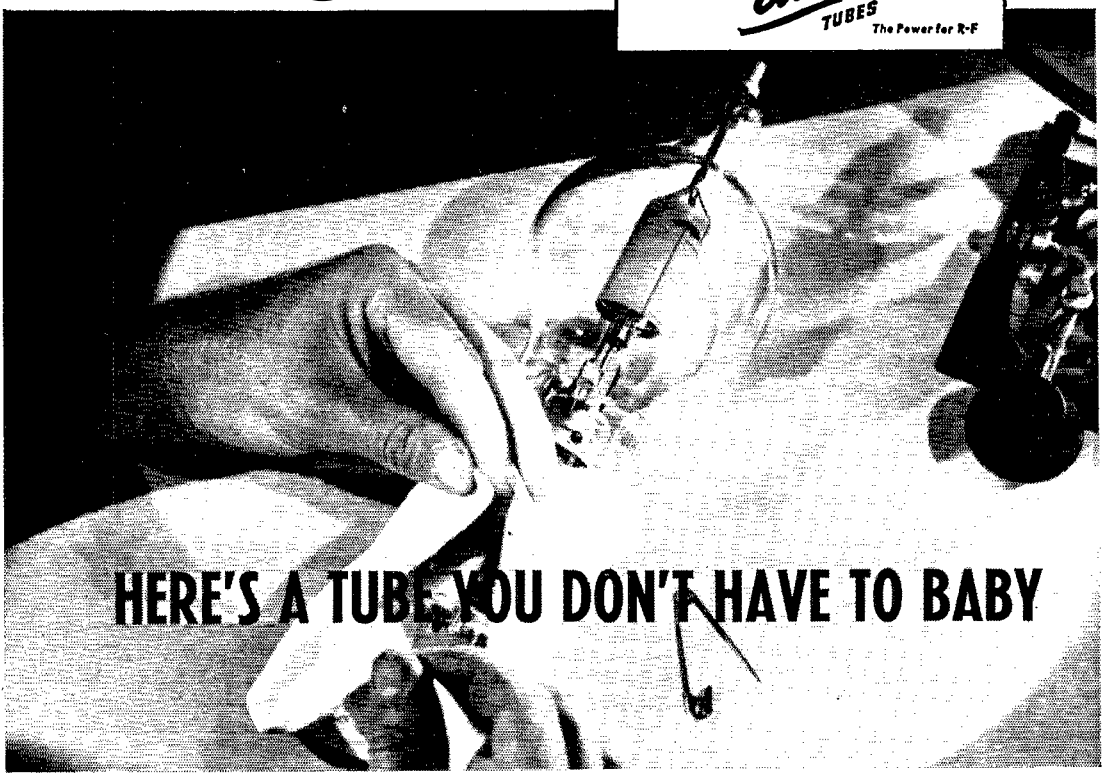
ROANOKE DIVISION

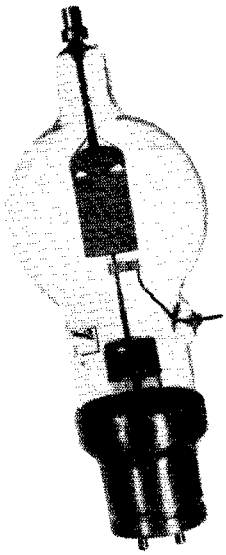
SOUTH CAROLINA — SCM, Ted Ferguson, W4BQE/ANG — EOZ now is Class A. NKA talked to PA0AD, a friend of the SCM. AUT reports activity on 3.5 and 7 Mc. BSS has his 28- and 50-Mc. beam on top of a steel tower. KMK, CPZ, and BSS have a nightly schedule on 50 Mc. From Rock Hill CXO reports 3.85- and 14-Mc. 'phone activity. MYM, Rock Hill EC, is on 3525 kc. ONJ is on 3552 kc. and 28.8 Mc. ANK, the c.w. man, hopes to have 250 watts on 'phone soon. VN operates from a trailer in Charleston. MXP is on 3.85- and 28-Mc. 'phone from the Isle of Palms. BPD and HXZ keep the Palmetto State Net going. The Net operates on 3935 kc., Wed. 7:30 P.M., Sun. 9:00 A.M. and 3:30 P.M. NWB is EC for the Travelers Rest area. JGM has a new steel tower and a new beam. GKD has the bug again. MAO, OAD, FAV, OLZ, DQY, KGX, NXG, and NZA are on 28-Mc. 'phone. NZK reports an unusual triangle between 7MBQ, KP4BY, and himself. OLZ is sporting a new pole for his beam. NJU operates 28-Mc. 'phone and c.w. DAW is on 3.5- and 7-Mc. c.w. and 160 meter 'phone. CE is on 3.85-Mc. 'phone. DFC is on 14-Mc. c.w. BIZ keeps schedules with 5KTF and 4LTW. LIK has a pair of 807s on 28 Mc. VN says it's 3.5- and 7-Mc. c.w. for him. NWY finally got 45 watts on 28-Mc. 'phone. Traffic: W4ANK 1062, LJJ 1049, BQE 518, AUT 100, DAW 71, MYM 45, NWB 9, CE 2.

VIRGINIA — SCM, Victor C. Clark, W4KFC — The Virginia Net formally yielded up 3680 kc. to the summer QRN on May 1st, terminating a most successful season. The Virginia 'Phone Net members elected to continue scheduled operations on an informal basis during the summer. Net Control Station CLD advises that traffic will be handled for delivery in Virginia but that outbound traffic will be kept to a minimum during this period. IKD, JFV, KIL, LBB, NCN, and YEJ qualified for VFN certificates. FF leads the traffic-handlers this month. IWO moved to Bailey's Crossroads. BZE's 80th country was his *first* Asian — JA3AAI NAD and CYW each have about eight watts on 160-meter 'phone. NAD moved to new QTH and is building up new rig with 812 final. JDL turned in his ORS appointment on an OES. ITA is spending six weeks in England this summer. IPC has antenna up at new QTH. KYD addressed Ocean View Club on "The ARRL Communications Dept." during April. Bus had done a praiseworthy job in editing and distributing the *Virginia Net Bulletin* this past season. FF, making the customary inquiries of T.V. neighbors, was informed by one individual that interference from FF's station was experienced "only when the wind is from the

(*Continued on page 90*)

JFLINT





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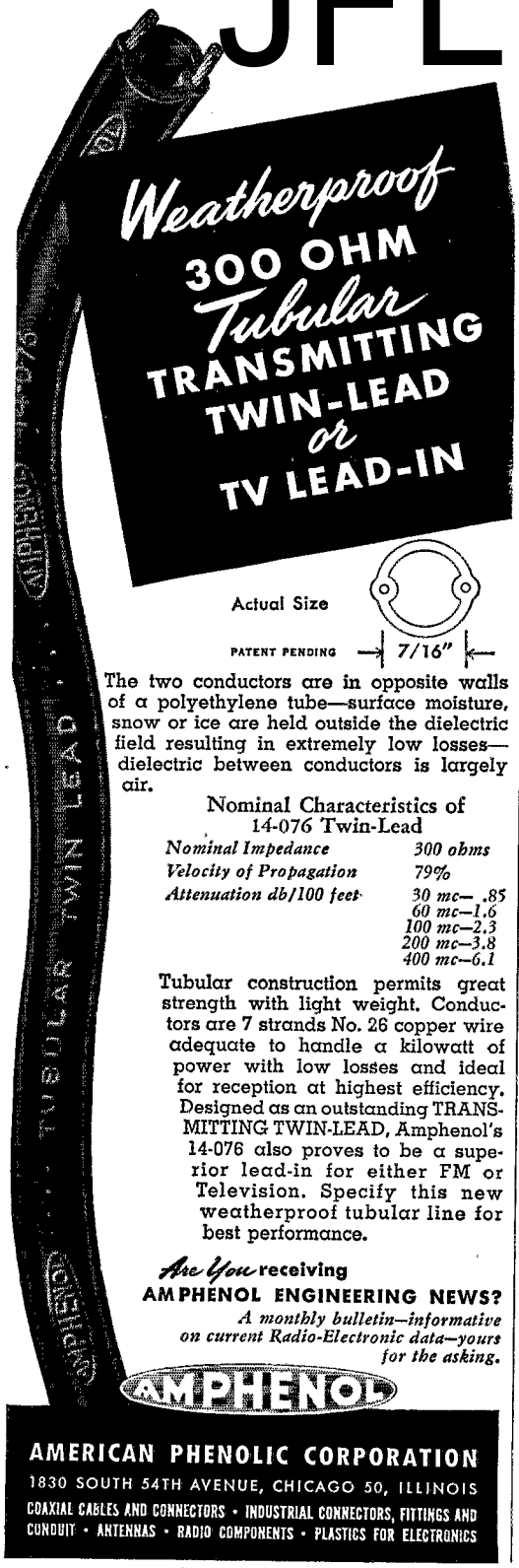

JFLINT

sou west: W[illegible]D joined AEC and is rebuilding frequency mea[illegible]uring e[illegible]ment f[illegible]OO work. BZE, FF, IA, IWO, IYE, JLW, A[illegible]C, KVM, KYD, LAP, LPP, and LRI toted the banner for Virginia in April CD Party. LAP boosted his DX to 133 countries worked. PVRC financed *QST* subscriptions for three overseas amateurs. NQV had his call on T.V. channel 4 — legally — when he demonstrated his radio-controlled model aircraft at the Science Fair in Washington, D. C. GKY is experimenting with high-power Clapp oscillators. The SCM would appreciate reports from Roanoke, Richmond, Lynchburg, Winchester, Warrenton, and the Norfolk area. Traffic (Apr.) W4FF 181, KVM 130, LAP 58, KFC 56, ITA 27, NAD 10, IWO 8. (Mar.) W4CLD 16, IWO 6.

WEST VIRGINIA — SCM, Donald B. Morris, W8JM — MARA announces that the winners in the West Va. QSO Party were JM and YBQ. Activity was high during the entire Party and stations in 28 counties are known to have been on the air. CSF has EC Net on 29.1 Mc. with several members. AUJ received recognition of his work on TLM by being NCS many times on this Net. DFC spends time on WVN, TSC, and NTL Nets. OXO, operating portable in six counties during W. Va. QSO Party, gave several amateurs new counties for their Worked All Counties in West Va. A prize and certificate is waiting for the first W. Va. amateur who works all 55 counties. KWI, VAB, OJI, DZZ, YBQ, and ESQ, all of Clarksburg, have 28-Mc. mobile rigs in their cars. 4JUR visited BOK. Congrats to GBF on his outstanding traffic work the past year. The WVN Net closed Apr. 29th and will reopen on 3770 kc. Oct. 3rd. BWD, JKN, and TDJ are running tests on 50 and 144 Mc. AEN's 28-Mc. beam fell while he was in contact with a DX station. WSL has a new bedroom 28-Mc. beam. 7HVK/3 was married in Clarksburg and invited all W. Va. amateurs to a reception after the marriage. HVK states "he will remember Clarksburg." Traffic: W8GBF 477, OXO 259, AUJ 178, CSF 45, DFC 29, JM 8, PZT 3.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, M. W. Mitchell, WØIQZ — RM: IC, SEC: KHQ. IC is new OBS. The Colorado Slow Speed Net will operate all summer on an emergency basis and will go to the high end of the 7-Mc. band, exact frequency as yet undetermined, and will meet on Monday, Wednesday, and Friday nights. EOQ is new Coffee Cup Net member. WTN now is on 160 meters and HER is champing at the bit until new 160-meter crystal arrives. SFS is new ham in Brush. DD has 3.85-Mc. mobile in operation. PQZ is going to school in Boulder. SGG and IQZ handled Engineers' Day traffic from Colorado School of Mines station, MEQ. Traffic: WØIC 289, LZY 103, SGG 103, IQZ 48, DYS 10, MOM 9, KHQ 4.

UTAH-WYOMING — SCM, Alvin M. Phillips, W7NPU — *Utah:* UTM reports that while most nets have QRT for the summer, the Pioneer Net and IUN still maintain schedules. MFU put up a 70-footer. JVA reports the UARC staged a mobile-to-portable demonstration for officials of Red Cross, police, PUC, and U. of U. visitors. BHN was portable, while JYI cruised mobile. The Ogden gang spent club meeting time discussing the new FCC proposals. LQE is on 28 Mc. RIZ enjoys rebuilding surplus gear and working rare DX. BLE just returned from KH6 Land. *Wyoming:* LLP reports that the Sheridan Radio Amateur League has been holding classes since last fall for all interested in amateur radio. Over Cheyenne way we find BCL and MWS on 160 and 10 meters. CIB, DI, NDI, and NDV share 7-Mc. c.w. while CGK and IRX cruise around with 3.85-Mc. mobile 'phone. EUZ gets 700 watts of 110 a.c. from a rewound generator mounted on car block. Recent visitors to Cheyenne were ABO and KFV. HRM added four new countries. EVH is heard on 3.85 Mc. HLA will be on c.w. with an 829. OWZ schedules WØFRQ (50 miles) on 144 Mc. with portable rig. HDS is busy teaching c.w. to CAP cadets, doing secretarial work for the Shy Wy Club, gathering Wyoming news for this column, and trying her new 4-125 final. Traffic: W7UTM 504, LKM 3, JVA 2.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Dr. Arthur W. Woods, W4GJW — From farther north than Jasper: CYL experiments with T.V. MEM answers AENP regularly. OFM, OGW, KF, JKU, and FIJ all crowd into the 7-Mc. band. Muscle Shoals is sponsoring the training of six prospective hams. EVJ is active in Naval Reserve. CDC again is trying 50 Mc. Associate stations to AENP are CLF in Georgia and GZV in Florida. Other out-of-section stations are welcome as associate members. EBZ has new YL jr. operator with GJW as the doctor. FSW returned to 3.85 Mc. after a long winter of high frequency work. DID redecorated his shack. EDR meets Trunk Line "J." AUP is being hemmed in by new housing. EW features instant bandswitch. HA continues to do well with DX. HOK has 93 confirmed. Sorry if any news was omitted, but this report was written while on vacation. Traffic: W4OBU 30, GJW 11, FYB 5.

EASTERN FLORIDA — SCM, John W. Hollister, W4FWZ — The 7290-kc. Net now is under the direction of

(*Continued on page 98*)

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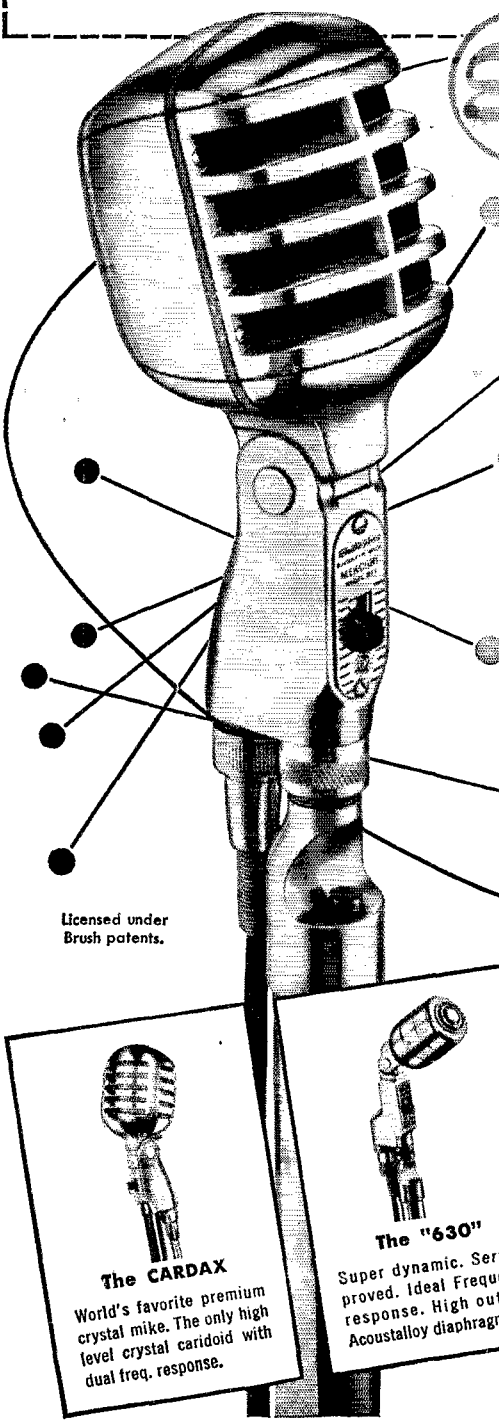

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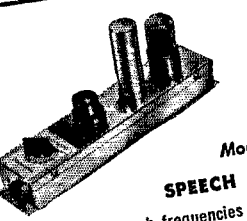

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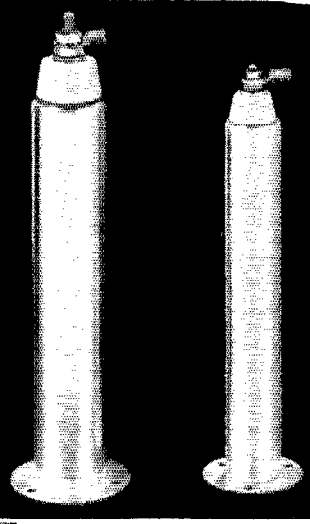

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MNT [illegible] RM. W[illegible]te him for new net information. Interested [illegible]t slow s[illegible]ed net? Write NRT or IWX in Tampa for info[illegible]tion. C[illegible]bs: Please send the SCM your plans for emer[illegible]ncy wo[illegible] this fall. ECs have received new report forms; please use them. Now is the time to overhaul the emergency gear, contact your EC, and get lined up for the emergency season. Every amateur can help in the AEC. Do you know your EC? If not, drop the SCM a card. Brookesville: MNT has a pair of 813s running 400 watts. Lake City: IQV maintains traffic schedules on 3675 and 7290 kc. during the summer. Now using 4-125A on 3.5 Mc., Al is consistent on 144 Mc. and adds outboard amplifier with 829B to other equipment. Jacksonville: EID wants 144-Mc. stations for East Coast relay net. Why not write him for information? May 8th saw 144 Mc. in Jacksonville wide open north and south. ASR told JARS about proposed FCC regulations. IQV was a visitor. Miami: GHP wants DX traffic for relay. Bill reports EAL hams include FWI, CD, AAR, GXW, GHP, IMI, FNQ, DJX, JNA, IEQ, FSJ, HN, FW, FIR, LSR, and DNJ. ILE has NC-40D and Monitone and is enjoying all contests. ES reports that OVP is new club station at Key West Naval Base. MZH is secretary. Alonzo reports OMV and ONF at Clewiston. OGI is AFO's son. BYF is rebuilding to 700 watts and is putting up three-element beam on 14 Mc. New Port Richey: KJ found time to work c.w. schedules. Stuart: NYB, high school leader, took three firsts at Tampa band festival and headed for Jacksonville to cop more laurels. West Palm Beach: 2RTZ/4 probably is back in New York City after a whirlwind traffic spree while vacationing at Palm Beach. CH set an enviable record and the net will look forward to a return visit. Traffic: W4IVQ 147, MNT 103, 2RTZ/4 76, 4ES 60, GHP 42, DES 34, KJ 20, BYF 5, FWZ 2, ILE 2.

WESTERN FLORIDA — SCM, Luther M. Holt, W4DAO — ACB visited DAO. OKD spent vacation in Mississippi. BFD moved to 14-Mc. 'phone. NBF had modulation trouble. 3LUF is a new-comer to our section. HIZ tried 14-Mc. 'phone. EGN refuses to operate at any time except during early morning hours. OWN promises 7-Mc. activity. NOX/NYZ built high-power amplifier. MUQ opened a radio store. LRX promises 160-meter activity soon. 6DRB moved to Pensacola. Welcome, OM. MUN bought T.V. receiver. NJB passed Class A exam. OCL visited Mississippi area. TL and LDT schedule Georgia stations on 144 Mc. Tallahassee's newest ham is OWR. NRL is XYL of LDT at Tallahassee. HJA works mobile exclusively. MS moved to 50 Mc. for the summer. Traffic: W4AXP 46, NGS 14, OKD 10, CNK 5.

GEORGIA — SCM, Clay Griffin, W4DXI — During the Engineers' Day (April 22nd) week-end exhibition, the Georgia Tech. Radio Club, AQL, cleared 195 messages. Messages were accepted on the campus and relayed via 144 Mc. to the club station. IRL, ITJ, and LJC did most of the operating, with assistance from DYH, GYA, IMO, KPW, LNG, NNC, NXT, CO2PH, and others. Welcome to PFA, a new ham in Macon. 2ZBX is in Valdosta, but is not on the air yet. ORR is experimenting with 7-Mc. fixed beams. Atlanta: LNG will be leaving Georgia in July and may not return. Ruddy has done a swell job as OES. He will be missed. OVT is on 50 Mc. On May 8th, LNG and KHL operated KHL/4 on 144 Mc. from Mt. Cheaha, near Anniston, Ala. They worked LRR, LSX, FBH, KIP (all in Atlanta), KPQ in Bremen, and FSW in Birmingham. KIP also worked FSW, which seems to be the first Atlanta-Birmingham 144-Mc. QSO. LSX and KIP worked FQ1/4, who was on Frozenhead Mt., Tenn. Another contact for KIP was NYM, Macon. DXI expects to be on 144 Mc. soon. Traffic: W4AQL 195, LNG 19, DXI 4.

WEST INDIES — SCM, E. W. Mayer, KP4KD — DJ and DV are the only reporters this month. New KP4s are coming on rapidly. The new Board of Directors of PRARC got off to a nice start and has swell plans for the future of the club which will require the coöperation of all club members. G6ZO applied for WPR-25 with 24 cards due to the usual complaint: laxness of many KP4s to complete the final courtesy of answering cards received, thus upholding the bad reputation of KP4s for not QSLLing. Hi. W2QHH has applied for WPR stickers for 75 and 100 KP4s (he sure had trouble getting the QSLs together). The KP4USA Friday night "Friendly Net" on 29.2 Mc. is being well attended, due probably to the fact that KP4USA plans to organize a picnic for the net. If you want to see West Indies news in *QST* you'll have to come across with reports, otherwise the space will go to some section which *will* appreciate it. Traffic: KP4KD 6, DV 4, DJ 3.

CANAL ZONE — SCM, Everett R. Kimmel, KZ5AW — SEC: GD. PAM: CG. RM: MB. ECs: MN and AY. MB schedules WØAZC five nights weekly at 2100. Vic's present negotiations will tie KZ5 Net to TLC in time for fall revival of trunk lines. WJ and RM split a schedule four times a week with W9BGF around noon. CG schedules W5LPL each Saturday, his 813 loafing along at 250 watts, driven by the new VFO. For fast emergency work SEC GD can put members of his Net in duplex contact through his station, in on 28 and out on 27 Mc. Pacific Emergency Net drills Monday at 2100 on 28.9 Mc. The Crossroads

(*Continued on page 94*)

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THE AMERICAN RADIO RELAY LEAGUE

WEST HARTFORD CONNECTICUT

et, Atlantic City, meets the same time on 28.6 Mc. Into the Crossroads Net check KZ5s, HPs, OA1s and OA4s until EC NM patrols a net nearly 1900 miles long. AX, Class 1 OO, left for a new tour of duty in the States. Leaving soon are EC AY, CJ, and NB, our only 50-Mc. DXer. KZ5 Land will miss all of them. Traffic: KZ5CG 18, GD 7, RM 1.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, Vincent J. Haggerty, W6IOX — Asst. SCMs, Irvin O. Hege, 6FYW, and William J. Schuch, 6CMN. SEC: ESR. PAM: MVK. An OO report from GTE on 14 Mc. states that operation on the whole is good but he notes a tendency by some DX men to stray a kc. or so below the low end of the band while chasing DX. However, not one of the miscreants reported was a W6. In an OES report CFL asks for someone to tell him how to run his 316A rig on 420 Mc. without blushing plates. A letter from 1QMI/6 reports removal from Riverside to Leevining. Al operates on 7 and 14 Mc. and momentarily expects to be back on 3.5 Mc. From the Sportsmen's Show in Hollywood, DDE and CZF efficiently originated a large volume of traffic. Traffic was taken in at the Coast Guard Auxiliary booth and transmitted by the above mentioned operators to the Pioneer Net for widespread distribution. Four members of the section made the BPL this month with CE again topping the section's traffic handlers. DDE is shooting for a 12-month stay in the BPL and says if he can weather the summer static he should accomplish his goal. A copy of the *Long Beach Ham Oscillator* brings word from the ARALB. The main topic of discussion was the FCC Proposals. The June meeting was held at the Rolling Hills antenna farm of AM. Every ham in the section is invited to send in reports for the Station Activities column in *QST*. Mention in this section is contingent upon the news value and appropriateness of the material submitted. The space is limited, but an honest effort to mention every reporting station is the aim of the SCM. Reports must reach the SCM prior to the 7th of the month for proper handling. From Astoria, Ore. NPN writes that he will have 50 watts on 'phone and c.w. on the air at Redondo Beach by August. Traffic reports by radio were received from CE, CMN, CZF, DDE, RXT, ZMZ, and ZQV. CMN overhauled his transmitter to eliminate T.V.I. He runs a code class twice weekly. CMN and JTN have been appointed assistant directors for the section. BHG is busy with code practice and OBS transmissions. DGA schedules 7RJN Mon. through Fri. at 8 P.M. on 3545 kc. He wants to hear from those interested in forming a slow-speed net by September. KSX schedules DDE and the SCN and is EC for the Crescent Bay AEC. KEI reports the Golden State Net held a barbecue-picnic on May 22nd at CAR's picnic grounds in Topanga Canyon. Asst. SCM FYW reports the new USNR station in Paso Robles is K6NBB. CTJ wants to get into a v.h.f. link between Los Angeles and San Francisco. YVJ finally has his rig working on 3.5 and 7 Mc. and ran up a good CD Party score. BUK vacationed in Arizona where he looked for beam antennas, and converted his YL into an XYL who doesn't object to ham radio. New officers of the Two Meter and Down Club are EFX, pres.; EUR, vice-pres.; CQJ, secy.; and Horace Bodina, treas. ZUX, past-prexy of the club, says he now will have more time for hamming on 50 and 144 Mc. YSK has been monitoring 160 meters as OO. RXT checks in on SCN and PN traffic nets. AEC News: SEC ESR compiled and distributed an information sheet on all AEC nets in the section for use by ECs and their assistants. He has set aside 147.9 Mc. as an internet frequency for exchange of messages and ideas between nets. Traffic: W6CE 1295, CZF 764, DDE 727, IOX 580, CMN 92, ZMZ 72, BHG 53, DGA 32, RXT 32, ZQV 21, KSX 17, QAE 14, Q1W 11, KEI 8, DBY 6, FYW 6, YVJ 6, FMG 4.

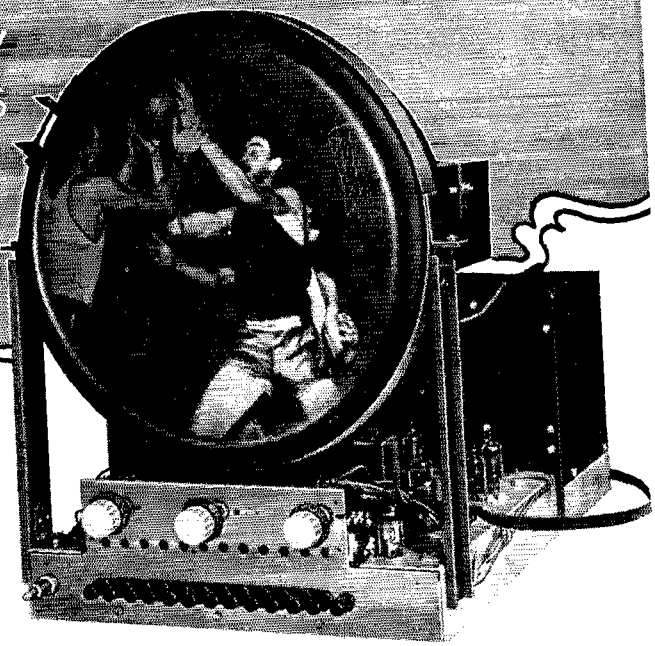
ARIZONA — SCM, Gladden C. Elliott, W7MLL — 4HHK reported hearing FGG on 144 Mc. near Memphis, Tenn., the two barely missing a 1200-mile contact on 144 Mc. LFX, operating mobile at the Nogales airport, carried on a two-way contact with FGG and other Tucson stations on 144 Mc., a 75-mile haul. LFX used a converted 522 and FGG has a pair of 127As running 500 watts. JQP is on 160-meter 'phone with a single 6L6 final. NIE, Meade, is a new ham at D-M Field. UAF has a new out-of-phase modulation system that is giving excellent results on 3.85 Mc. with even a few watts of power. QNC is working 28-Mc. mobile and reports several VKs. About 100 turned out to hear Director Griggs, 6KW, when he appeared at a special meeting in Phoenix. The Gila Valley Radio Club staged a ham picnic with prizes May 29th with JZG, QNC, UAF, UW, UMG, SBN, ROD, QNJ, and UPX acting as hosts. The Saguaro Radio Club, a new Phoenix organization, has done a lot of portable operation at South Mountain Park and reports a DL5 among its DX contacts. OWX suggests a 6L6 160-meter club. PEY reports 110 countries with 103 confirmed. RNJ reports activity very low on 3515 kc. How about getting on and giving a hand with Arizona traffic? Traffic: W7RJN 192.

SAN DIEGO — SCM, Dale S. Bose, W6BWO — Asst. SCMs: Shelley E. Trotter, 6BAM, and Gordon W. Brown, 6APG. The San Diego YLRL held its annual picnic May 22nd with KH6QI as chairman. YXI and AWW are on

(*Continued on page 96*)

TERMINAL OFFERS YOU A CLEAR-CUT TELEVISION SAVINGS

WITH THE NEW HALLICRAFTERS TV CHASSIS FOR CUSTOM INSTALLATION



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CONTROLS: (Front) Vertical Hold, Horizontal Hold, Contrast, On/Off, Volume, Brightness, 12 tuning pushbuttons, Fine Tuning; (Rear) horizontal linearity, horizontal drive, width, horizontal centering, vertical centering, vertical linearity, height, and focus.

PHYSICAL DATA: Component units mounted on reinforced wood frame to make one complete structure which can be slipped into cabinet or opening in wall, bookshelves, etc. Height overall 19½ inches; base 23 inches wide; depth front to back, not including control knobs 21¼ inches. Ship wt. 80 lbs.

CONNECTIONS: 300 ohm twin-wire lead for any standard antenna. 8 inch PM speaker included. Receiver chassis, speaker, picture tube, and rectifier chassis are connected with plug and socket connectors so their relative position could be altered slightly if desired. Power cord. For 105-125 volts 60 cycle AC.

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10-Inch TV CHASSIS . . . T-64

Dual Focus switch gives 56 or 64 sq. in. pictures. Overall size 13 in. wide, 15¼ in. high, by 20 in. deep. 19 tubes plus 3 rect. 115 V. AC. Ship. wt. 63 lbs. Complete, with tube **179.50**

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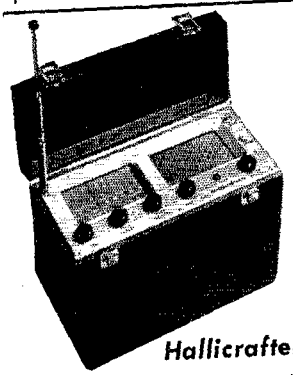
Same as 10-in. set, with 12-in. tube. 84, 95, sq. in. pictures. 17¾ in. high. 66 lbs. **199.50**



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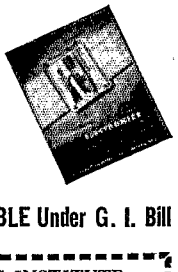

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3.85 and 4-Mc. 'phone with brand-new Class A tickets. AHI won a National 10 receiver at the March meeting. VUI now has a mobile. AD is scheduling KL7VW every Friday and Saturday at 2230 PST. FSH, JRM, and WNN are operating 50 Mc. TWO is now in La Mesa. QNM and KSE are watching T.V. FWF is a new station in San Diego. DBZ reports antenna troubles and school work keeping him off the air. PQM is reporting in on S.B.N. PN is using # 28 wire for antenna. DUP reports MRP is new EC at Huntington Beach. YXE reports the San Diego 28-Mc. Emergency Net has an average drill attendance of 85 per cent or over. The Net also has five active mobiles, three that can be activated on short notice and one self-sufficient station for net control. DEY has 3.85-Mc. mobile and soon will have v.h.f. tower 48 ft. high through the courtesy of RLQ, plus the help of LKB and NEO. NEO has new 20/10 beam. CGF, BVA, and DEY are on 420 Mc. HU has been experimenting with small gauge wire for antenna. It works as well as conventional sizes and is easier to handle. BAM still is handling the key at BWO code practice sessions. The LDJ/LHN combinations seem to be broken up because of LDJ selling his orange grove-antenna farm. Don't know how many oranges it produced but the DX crop was something to behold! Traffic: W6DBZ 36, DUP 19, FRJ 16, WNN 12, AD 8, BAM 6.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, Joe G. Buch, W5CDU — BFA has 100 watts on 50 Mc. HCR has a Collins 32V. KYR has more DX cards than W cards. PEF and PSZ are new hams in Borger. IWQ, of Pampa, is now Class A. NKV, OHN, and KYM are active on 28 Mc. LTY keeps schedules with K8AIR, ØJBO, and 5IBE in addition to spending a lot of time at Wright Field, Dayton. IZO, LGY, and LUD had a nice visit with ATG. PRN is on 28-Mc. 'phone with 35 watts and a folded dipole. OGS has new speech amplifier and is back on 28 Mc. with 250 watts. ICB, AKM, EVI, and JDZ are working 160 meters. LGY has new BC-459. LVR has new NC-183 and has "discovered" 28 Mc. ICB is moving QTH to wide open spaces with p.p. 75T into "V"s and long wire antennas. ANE keeps busy on 7 Mc. with a 459. What's happened to AJ? Our Director, NW, has fulfilled his threats and now has a high-power 'phone rig on 3.85 Mc. The Amarillo Club started its second year with WX, pres.; DCM, vice-pres.; MJD, secy.; and AVM, treas. GJG, HUU, and WB are working DX on 14 Mc. CYX is president of the 27-Mc. association. AZQ is now in W8 Land. OIE works 27 and 28 Mc. HF and HYF work 28-Mc. mobile. NYT has B.C.I. trouble. MJD has mobile rig on 3.85 and 28 Mc. LGU and LKC are having trouble getting a grounded grid amplifier working. ARK makes BPL for the first time. GZU makes BPL for the third consecutive month. See you at the West Gulf Convention in Dallas. Traffic: W5GZU 963, ARK 167, BFA 56, ASA 26, BKH 16.

OKLAHOMA — SCM, Frank E. Fisher, W5AHT/AST — SEC: HGC. RM: MBV. This is an epic month for OLZ with five net members making BPL. Our RM, MBV, also operating FOM, made a total of 1200 between the two stations. KDH, NMM, and K5NRJ were the other recipients of BPL membership. Ardmore ARC held a field meeting on a houseboat in the middle of Lake Murray with portable rigs on 3.5 and 50 Mc. The club has a 2-kw. generator. OWV is back on OLZ after curing his B.C.I. RST moved to Sulfur and will be back on 14-Mc. 'phone. BLW has two BC-645s on 420-Mc. 'phone. PAA is on 3.85-Mc. 'phone. Tulsa County AEC has opened a new emergency net on 29.6 Mc. with 15 regular members. MGK is Net Control. The Net meets alternate Thursdays at 8:00 P.M. Oklahoma County has organized the Oklahoma County emergency outlet with NLZ as NCS. The Net meets on 3.85 Mc. Sunday mornings. Each member station later reports into 3.85-Mc. nets in Oklahoma and surrounding states. HXI and NLZ work LGW regularly on 50 Mc. Norman ARC elected the following new officers: MPU, pres.; OGD, vice-pres.; MHL, secy.-treas.; NDQ, communications manager. LHP snagged three new countries for a total of 120. NHD now is working 50 Mc. with satisfactory results. Bartlesville ARC held its annual Pre-Field Day picnic with 42 attending and rigs on 3.85 and 7 Mc. Lawton-Ft. Sill Club had a wiener roast at Quannah Parker Lake. Traffic: K5NRJ 612, W5MBV 607, FOM 593, KDH 529, NMM 277, PA 136, AST 52, GVS 52, OWV 47, ADB 45, LHP 42, EHC 3.

NEW MEXICO — SCM, Lawrence R. Walsh, W5SMA — SEC: ZU. RM: NXE. PAM: FAG. The Sandia Radio Club elected new officers this month with the following results: PTF, pres.; CA, vice-pres.; OUE, secy.; DEN, treas. Congratulations, fellows! The Sandia Club also has started a news letter which certainly appears to be headed in the right direction. Those responsible for its birth are OUE, GGX, and C. Washburn. MSG, Class I OO, has been checking stations on 14-Mc. c.w. KWP says his backyard work is holding up work on his emergency rig. ZU reports that MARS now has fourteen members in New Mexico. NJR now has his Class A ticket. JYW tells us that CEE, ISW, and IJW have received Western Union certificates for recent public service during the emergency in Hobbs.

(*Continued on page 98*)

JELINT

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Complete $87.50

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DS-400 POWER SUPPLY

Designed expressly to operate the MT-15X at maximum power. Incorporates quiet, dependable, conservatively rated dynamotor, heavy duty starting relay. HV cut-off relay (for clean, crisp, break-in), ungrounded receiver control contact, hash and ripple filter, etc. Makes a complete push-to-talk station. Input 5.6 Volts DC, Output 400 Volts at 175 MA. 4¾" wide (plus ⅝" mounting flange) x 7" x 7" high. Cat. DS-400 $59.95

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New "3-30" features continuous tuning from 3 to 30 MC. Vernier dial.	$39.95
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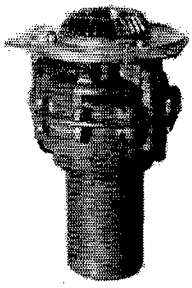
BEAM ROTATOR MOTORS



We were fortunate in locating another supply of these desirable, SMALL, propeller pitch motors. Brand new spares, never used in any way—clean, perfect. Continuous rotation in either direction at approximately 1 RPM – instantly reversible with SPDT switch. 9000 to 1 gear reduction gives tremendous power and eliminates free swing – even in highest winds. Lightweight enough to mount on the top of your tower – only 42 pounds. Operate on 24-30 volts AC or DC (3 amps will do). Buy it now (Even if only for future use)

Small Prop Pitch Motor Brand New — Item RO-9 $15.95

Also available fully converted – ready to use. ALL THE HARD WORK HAS BEEN DONE! Just apply 24-30 volts to the plainly marked leads and away she goes!!!

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COMPLETE BEAM ROTATOR AND DIRECTION INDICATOR

Includes brand new, fully converted prop pitch motor, completely assembled de-luxe direction indicator and control unit in sloping desk cabinet, transformer, special gear and selsyn transmitter, mechanical coupling to attach beam to rotator, etc. EVERYTHING except the cable.

Item No. AN-1 COMPLETE $47.50

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Step down transformer for PP motor (30 volts)	$5.95
Neutral center, SPDT Momentary switch.	.49
BEAM CABLE – Shielded 8 conductor: 2 - No. 14, 6 - No. 20, all shielded and color coded. 1/16" rubber jacket.	
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JOHNSON Rotomatic Beams and Kits	3 for $2.50 Write for details.

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96" Stainless Steel Police Type Whip AS-196	$3.53
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KENYON, Ken-O-Tap, Universal Modulation Transformer. Conservatively rated 600 watts audio, 1200 watts Class C! Matches any load – Primary range: 500 to 18,000 ohms. Secondary range: 200 to 19,000 ohms. "T" line case, 7¾"x6⅝"x7-3/16" – mounts upright or inverted. Weight 45 pounds. Item T-442. A real buy! $41.46

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MO[illegible] work[illegible] VR/4 [illegible]ile Larry was in Florida on his [illegible]ca[illegible]on. T[illegible] Los Ala[illegible]os Radio Club and the Sandia Rad[illegible] Club w[illegible] in the [illegible]field" on Field Day, with transmitters on all bands. NXE completed an emergency power rig for Field Day use. FAG was on Sandia Crest operating from his car on all bands — 3.5 through 420 Mc! Traffic: W5ZU 182, NXE 45, A5ZU 24, W5KWP 10, MMX 6, JYW 2, NJR 2.

CANADA

ONTARIO DIVISION

ONTARIO — SCM, Thomas Hunter, jr., VE3CP — Asst. SCM, M. J. McMonagle, 3AWJ. SEC: KM. RMs: ATR, AWE, BUR, GI, TM, WX. PAMs: DD, FQ, RG. QD had a very fine score in the last DX Contest. BNQ, EC for Hamilton 28-Mc. Net, has 102 countries. BHM and AGN were ushers at a wedding in Windsor and DE was the best man, while WD and CP were in the audience. Ex-G2UA is on from Windsor with new call, BMV. VD wants more CD Parties. BMG is aiming for RM appointment. IA works QON and SSN. KM is NCS for AFARS 144-Mc. Net. BOW, AOR, BVN, BGQ, AQG, AKW, and ABP are on 3.5 Mc. BDE, BQZ, and BUG are new calls in Windsor. The latter is being coached in traffic by BUR. ABP runs the Hock Shop for the Hamilton Club. CJ has a pair of new 60-footers. KM, DF, AYW, VJ, BMG, and QT have 4290 privileges with the AFARS. AZW now is located in Stevens. BTG and AJN are new members of the Ontario 7-Mc. Net. ATR reports 7-Mc. net going very fine and new members continually coming in. KM has 16 watts on 160 meters. The gang from the Nortown Club visited the Hamilton Club. This seems to be something for other clubs to do where travel distance permits. BWK has his Class A ticket. RU is operating n.f.m. and worked WAC within six weeks after installing f.m. BLU can be heard on 7 Mc. and AEL on 14-Mc. 'phone. AJR has left for the West Coast. APS, CP, RH, and WX are your new officers for CAROA and ZE is the publication manager of *XTAL*. There still are a number of clubs that are not affiliated with the ARRL. Where there is unity there is strength and amateur radio is going to be in need of strength in the years to come. ASL and BBM are new-comers to the Beaver Net. GI is back on from new QTH in Ottawa. Traffic: VE3ATR 264, IA 261, BUR 208, APS 158, WK 135, DU 84, NI 82, WY 79, AIL 63, AZW 50, RG 38, BMG 36, DH 28, AZZ 25, BQL 24, YS 16, YJ 15, DD 12, HK 11, FQ 10, CP 9, PH 8, VD 8, ASL 6.

QUEBEC DIVISION

QUEBEC — SCM, Gordon A. Lynn, VE2GL — SEC: SA. EC reports continued activity of Quebec 'Phone Net with ADF, JAM, ACD, RM, EV, OD, ZG, ABJ, AIM, VH, LZ, and himself taking part on 3812 kc. and 146.812 Mc. ZG worked 300 miles on 3.8 Mc. with 60 watts and antenna in cellar. LO maintained schedule with PQN three nights weekly and handled quite a bunch of traffic. BB continues to hold his place on SSN and QON daily on 7 Mc., has new BC-453 for Q-5er and hopes to be able to hear some DX now. XB is getting new 811 final together. AAK, new in Montreal, is 15 years old and is having exciting results with single 6F6 on 3.5 Mc. GM reports PQN has closed for the summer but will reopen in the fall. The QEN, on 3570 kc. at 1030 each Sunday morning, is to continue. NM is new in Ville la Salle with 807 on 3.5 and 7 Mc. RI is on 28-Mc. 'phone. He is new to the amateur ranks but is an old-time commercial operator. His call indicates his present occupation. SA is endeavoring to expand AEC throughout the province and is desirous of hearing from those who can and will take part. ECs are desired for various outlying centers such as Three Rivers and Quebec. XR is now ORS and TA has renewed ORS appointment. His certificate originally was issued to him Feb. 21, 1924. Traffic: VE2LO 149, BB 111, EC 55, AAK 1.

VANALTA DIVISION

ALBERTA — SCM, Sydney T. Jones, VE6MJ — SEC: MJ. Don't forget the Alberta Hamfest at Edmonton July 30–31. Requests for accommodation should be in the hands of the Hamfest Committee immediately. Bring your portable gear. A real bang-up program has been arranged which will be of interest to both the OM and the XYL. LA was heard working ID with a portable rig on 3.8 Mc. with XX at the mike. NB is building a new modulation indicator. MJ has installed a speech clipper. SE has changed call to VA. KN was host to members of NARC at his shack and expressed interest in OPS appointment. BN won first prize in recent AFARS contest. Nice going, Bill. PV, president of NARC, has accepted a position with the Government at Lethbridge and VJ, his XYL, hopes to join him as soon as suitable QTH can be arranged. The Edmonton gang will miss you, Charles and Villa Jean. LI is new contact on Alberta 'phone net. RF puts out an FB signal from Grande Prairie. IX and CR are the only two stations heard on

(Continued on page 100)

122 Tube Bargains

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RECEIVING

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TRANSMITTING

RADIO SHACK price-cutters made a grand tour of our five-floor building . . . unearthed an amazing variety of 122 *receiving, transmitting, rectifying, switching, photo* and *cathode ray* tubes . . . went to work and cut our old (low) prices to *smithereens!* All are guaranteed new unused Jan Specs, inspected for mechanical breakage before shipment. *Limited quantities* of some types, so don't delay — ORDER TODAY. Discount 5% if your order totals $50.00 or more!

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CK501LX	.90
CK1089	1.10
DG1295	9.70
DG1605	9.70
ELC6A	8.10
F660	35.00
FG17	3.10
FG27	4.45
GL434A	3.50
HY615	.35
VR90	.75
VR105	.60
VR150	.60
QK60	49.50
QK61	65.00
QK72	75.00
RK25	2.90
RK60	.40
RK65	20.00
RK72	1.00
RX21	3.25
WL653B	75.00
WL681/686	12.00
X111	40.00
ZP653	75.00
605	18.00
ZP679	60.00
1B22	5.00
1B34	5.50
1B27	7.00
1G21	1.25
1P23	1.45
2AP1	3.50
2B22	2.50
2C22	.23
2C26A	.30
2C33	2.50
2C40	2.50
2C46	4.50
2D21	1.25
2E22	1.50
2J26	15.00
2J27	30.00
2J34	22.50
2J36	100.00
2J50	50.00
2J54	50.00
2J55	36.00
2J61A	110.00
2J62	47.50

TYPE	PRICE
2K33	$40.00
2x2/879	.35
2x2A	.75
3AP1	5.00
3B24	.90
3B26	1.45
3C23	2.40
3C24	.29
3DP1	4.50
3EP1	4.50
3E29	3.29
3FP7	2.25
3GP1	4.75
3JP12	14.00
4J36	36.00
4J37	36.00
5BP1	2.40
5BP4	4.95
5CP1	4.75
5FP7	2.00
5JP2	14.00
5JP4	12.50
7BP7	7.50
10 Spec.	.60
10	.35
15R	.75
23D4	.27
45 Spec.	.27
53A	17.50
211	.49
VT127A	2.50
227A	3.50
250TH	19.00
274B	1.15
304TH	3.00
304TL	3.00
316A	.49
350A	2.25
359A	.90
371B	1 50
388A	3.50
394A	3.50
417A	24.00
446A	2.40
450TL	24.00
464A	7.00
532A	2.25
562	37.50
615	.45
705A	2.75
710A	$3.50
721A	4.00
723A/B	10.95
724B	1.70
725A (2J53)	17.50
726A	12.95
750TL	45.00
800	2.00
801A	.48
802	2.90
803	3.50
804	6.50
805	3.50
807	1.15
808	1.90
809	1.50
810	6.15
811	1.29
813	5.20
814	1.95
815	1.39
816	.95
822	8.00
826	.45
828	6.50
829B	4.85
830B	3.00
832	2.75
836	.75
837	2.45
838	2.85
845	3.15
864	.25
865	4.00
866A	.80

TYPE	PRICE
869B	45.00
872A	1.20
902	7.50
954	.35
955	.35
957	.25
958	.35
959	.40
1613	.80
1616	.65
1619	.25
1624	.80
1625	.15
1626	.25
1632	.75
1645	$1.50
1655	.65
1672	2.00
1809P1	14.50
1851	.85
2051	.75
7193	.25
8013	1.50
8014A	17.50
8020	2.75
8025	5.75
9001	.49
9002	.49
9003	.49
9004	.25
9006	.49
1A3	.39
1A5GT	.49
1A7	.59
1T4	.59
2A3	1.05
3A4	.39
3B7/1291	.36
3D6	.36
5T4	.76
5U4G	.60
5Z3	.60
6AC7/1852	.70
6AG5	.79
6AG7	.89
6AJ5	.79
6AJ6	.79
6AK5	.89
6AK6	.89
6C4	.25
6C6	.45
6C8G	.75
6H6	.45
6J5	.49
6J6	1.08
6K7	.50
6K8	1.00
6L6	1.25
6SA7	.50
6SC7	.50
6SH7	.40
6SJ7	.50
6SK7	.50
6V6	.75
6X5	.60
7C4	.35
7C7	.80
7E5/1201	.60
7E6	.60
12A6	.24
12C8	$.35
12H6	.35
12J5GT	.39
12SF7	.60
12SJ7	.50
12SK7	.50
14H7	.75
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33	.40
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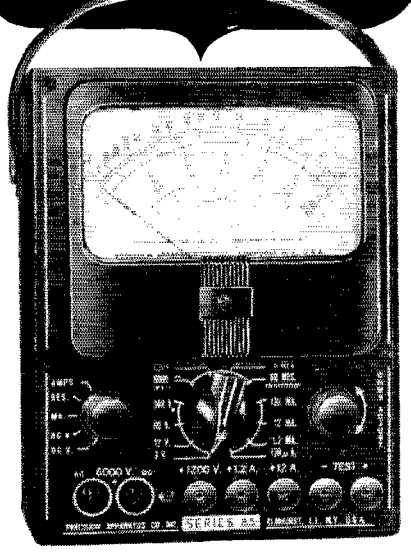

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60 meters. [illegible] has rebuilt his rig. EA made a trip to Red Deer and tested portable gear with CC, DC, and UP. We are pleased to see EW and NI out of the hospital. Traffic: VE6NA 74, KN 43, MJ 10.

BRITISH COLUMBIA — Acting SCM, Ralph O. Norman, VE7ID — SEC. ID. ECs: ACW, BJ, CN, LK, TG, US. We regret to have to report the recent passing of a would-be ham who was long a member of the Victoria Short Wave Club, Dr. K. N. G. Bailey, ex-captain, RAMC. Penticton ARC: US gave lectures to civic organizations on amateur activities. New Officers: YE, pres.; NH, vice-pres.; T. Hepple, secy.; Fraser Valley ARC: AFB is training new hams. New officers: DQ, pres.; ADZ, vice-pres.; FQ, secy. Collingwood ARC: UU has Hammond beam. AIG is receiving KRSC-T.V. sync pulse that controls his optical sweep. New officers: AZ, pres.; KC, vice-pres.; ABP, secy. Royal City ARC: Training of new hams is being seriously undertaken. Totem ARC: Members importing or seeking to import uncensored pictures via T.V. channel are AEC, ES, EN, NM, OE, BQ, EO, NT. The club has 350-watt gas-driven generator. Vancouver ARC: Members are training resident students of Provincial School for the Blind where station NI operates. SJ got AT-12. AAX is making 1952 exciter. LQ wins tube-hunting contests using "little hunters." British Columbia ARA: President AC is chairman of Vanalta Division Convention to be held Aug. 4-5-6 at University of B.C. The BCARA is entering a hobby display at Pacific National Exhibition. Among the DXers, ADB snagged ST2; OJ got FO8, ZK1, and VK3A; US got JA2AT on 3.8-Mc. 'phone. AEC: US got medical advice for PH in 5 minutes. WI has ¾-kw. auxiliary power. CN, US, and LK are mobile and portable. TG had another successful "Disaster Day" in Victoria. Traffic: VE7US 20, ID 17, ALE 4.

PRAIRIE DIVISION

MANITOBA — SCM, A. W. Morley, VE4AM — QSL Manager VE4LC has sent me a list of 221 calls of fellows for whom there are cards in the Bureau but no envelopes. For a section this size, it's a disgrace, so get your envelope in or tell Len you're not interested as he can use the space for other things. Yes, I sent mine in. Len reports HB back on with a new VFO and 807 in the final. FJ finally got going on 14 Mc. with 6V6. GM is converting an 1154 for 3.5- and 7-Mc. c.w. FS moved to Forest. SW and EN were both posted from Rivers. GQ has s.s.s.c. receiver going and gave me a demonstration. It's the thing to lick QRM. RX is rebuilding to p.p. 813s and is including all the latest to prevent T.V.I. just in case. MW has been transferred to Brandon. DN is on course in W5 Land for a short while. He has appointed GV his Assistant EC. SO was on in VE-W Contest and it was like old times to hear Graham again. Hope you stay in the section for a long time. FU, GQ, BE, KX, NT, and EK are all heard on 144 Mc. W1KHW was in Winnipeg and joined the ranks of the benedicts. A lot more traffic was reported this month. Is yours included? Traffic: VE4AM 127, LF 16, JO 15, GY 8, DN 6, HS 6, AX 4, GQ 2, WF 2.

SASKATCHEWAN — SCM, J. H. Goodridge, VE5DW — At the May meeting of the NSARC held in Prince Albert, GI, on behalf of the amateurs of Saskatchewan and Western Canada, officially presented HS, whose station was destroyed by fire last winter, with a 130-watt all-band 'phone transmitter and a Howard 450A receiver. Accessory station equipment, such as mike and key, etc., was contributed by well-known dealers in amateur equipment. AW is building a smaller all-band rig with an 807 final. GI brought HS and MA to the NSARC meeting. HG brought BV and got a ticket for not having his name on his truck. PA appeared in court. CA and HG and many others lost their antennas in April dust storm. RV has returned to the air at Cudworth after about four months of silence. Santa brought him a wire recorder so be careful what you say, fellows. HI has new antenna and gets favorable reports. It is one of those folded efforts which can be used on 3.8 Mc. and up. HI worked his first G on 14-Mc. c.w. PA is fully equipped for the fishing season with mobile job in the making. IC and VB talk fishing and are going mobile. FL now is on 3.8-Mc. 'phone and is operating on the net. If you are interested in this column, how about some news? GC has an SX-28A now.

Strays

A score of San Diego, Calif., "hamvets" have joined forces to form Hiram Percy Maxim V.F.W. Post 9968. Also included in the membership of the post bearing the name of the esteemed founder of ARRL is an equal number of embryo hams — vets who got their first taste of radio on the fighting fronts. James J. Carr, W6FAY, has been installed as first commander of the post.

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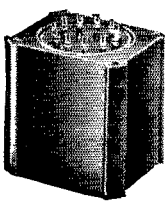

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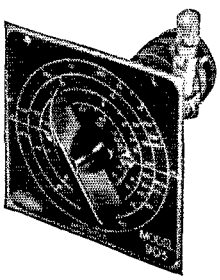

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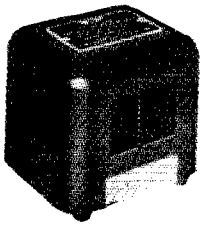

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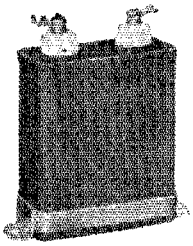

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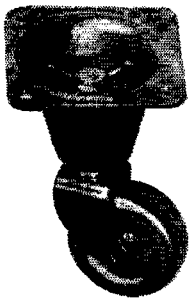

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Happenings

(Continued from page 38)

64) On motion of Mr. Noble, unanimously VOTED that the Board appoint, pursuant to the terms of the trust agreement under the pension plan, the following persons to serve as a pension committee from this date until the next annual meeting of the Board: Arthur L. Budlong, George Grammer, David H. Houghton.

65) On motion of Mr. Dosland, unanimously VOTED that the Board offers a sincere vote of thanks to General Counsel Paul M. Segal for his invaluable services to the Board during the course of this meeting.

66) On motion of Mr. Griggs, unanimously VOTED that the Secretary is instructed to prepare an article for *QST* outlining the organizational structure of the League and the mechanism provided for the control of the League by the membership.

67) Moved, by Mr. Collett, that this Board instruct the Secretary that where a person is mentioned in an editorial outlining a policy of that person or his organization that he receive a copy in advance of publication. But there was no second, so the motion was lost.

68) On motion of Mr. Collett, unanimously VOTED that the Secretary institute a study on the advisability of republishing the book "Two Hundred Meters and Down," by Clinton B. DeSoto, and that a report on this study be made to the Board by January 1, 1950.

69) On motion of Mr. Hughes, VOTED that it is the sense of this Board that the application of the Nevada Amateur Radio Association to hold a Pacific Division convention in October, 1949, is approved, provided that the usual requirements of the By-Laws are complied with and the approval of the director secured.

70) On motion of Mr. Johnston, the following resolution was unanimously ADOPTED by rising vote:

WHEREAS, on February 11, 1949, Arthur L. Budlong completed twenty-five years of continuous service to the American Radio Relay League, as Senior Assistant Secretary and, more recently, as Acting Secretary, be it

RESOLVED, that the Board of Directors, meeting at Hartford, Conn., on May 28, 1949, in recognition of Arthur Budlong's untiring efforts on behalf of the League, does hereby express its deep appreciation of his loyalty, fidelity and intelligent devotion to the best interests of the institution of amateur radio.

71) Whereupon, on motion of Mr. Johnston, the Board adjourned, sine die, at 4:17 p.m.

72) (In the course of its deliberations the Board, either as a Board or as a Committee of the Whole, also discussed, without formal action, the Fourth Inter-American Conference, the 21-Mc. band, the possibility of exclusive assignments for mobile and maritime-mobile, television interference, 'phone on 7 Mc., life insurance for the Secretary, the 1952 International Telecommunications Conference. Time in session, as a Board, 10 hours, 10 minutes; as a Committee of the Whole, 4 hours, 38 minutes; total time, 14 hours, 48 minutes. Total appropriations, $28,550.)

A. L. BUDLONG
QUAYLE B. SMITH
Secretaries

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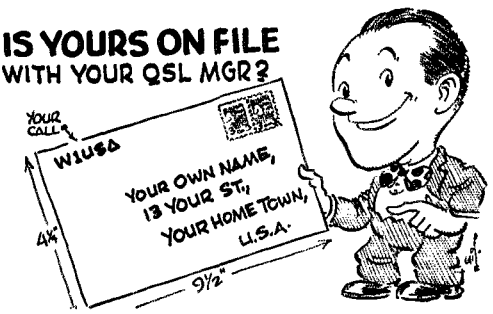

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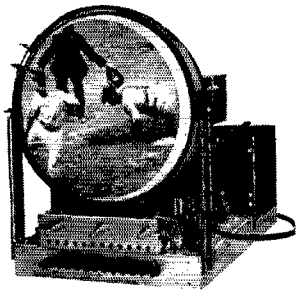

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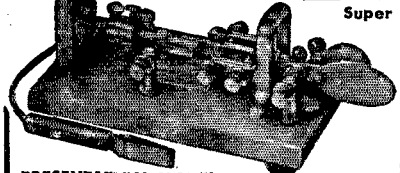

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(*Continued from page 37*)

ers of the Pacific campaigns where their "ham" experience really paid off, will be active in this USMCR Electronic Warfare Program:

1st Lt. R. D. Stout, W1OII, Capt. James L. Spates, W1ARA, Capt. X. Rudenauer, W1GFW, 1st Lt. Robert L. Hammond, W2TNJ, Capt. Frank E. Placek, W2LHD, Capt. Edward J. Spasek, W2ULI, Capt. Morris A. Mayers, W2SQR, 1st Lt. Wm. F. Holland, jr., W3JOL, WO Ronald M. Sinclair, W3HDM, 1st Lt. Gustave F. Johnson, W4INH, 1st Lt. Wm. J. White, W5JYY, Capt. Johnny B. Joiner, W5KPJ, 1st Lt. Robert E. Barrington, W6JDD, Major Reid H. Burrows, W9JWT, CWO John Wesley Hanson, jr., W9NRV, Capt. James N. Barclay, W5CT, Capt. Chas. S. Newman, W4GGX, Capt. Walter W. Smith, W6BCX, 1st Lt. Wilson V. Rogers, W6EOM, 1st Lt. Britton A. Garlow, W6PEU, Capt. Harold C. Kapp, W6WLU, Capt. Bennett Black, W6RDT, 1st Lt. Stanley R. Radom, W6KBY, SWO John J. Wade, W6SHX, WO Lester L. Mills, W6YBN, Major Lester B. Holmes, W7JRS, 2d Lt. Del F. Kahan, W7JWP, S/Sgt. John Misic, W8VRJ, 1st Lt. Herbert H. Blackschleger, W8PPE, Capt. James F. Sears, W9DFD, 1st Lt. William H. Ellison, W5NKN, Capt. Wade W. Larkin, WØGCN, 1st Lt. John G. Grimp, W9ILQ.

Sweepstakes Results

(*Continued from page 50*)

W4QWM	24,616-	210-47-A—
W4GKY	22,550-	221-41-A-27
W4KJH	20,416-	176-58-B-22
W4JAT	20,272-	181-56-A-19
W4RH	18,585-	177-42-A-23
W4GFW	15,650-	157-40-A-17
W4IRZ	15,520-	149-40-A-13
W4EMJ	15,225-	175-35-A-26
W4KYC	12,920-	154-34-A-26
W4LUV	12,710-	155-41-B-30
W4HZZ	7,000-	100-28-A-13
W4NND	6,565-	101-26-A-15
W4RQR	4,950-	85-24-A-40
W4KYD	2,665-	41-26-A- 6
W4FV	1,360-	32-17-A- 4
W4NIH	550-	20-11-A- 3
W4IWO	90-	9- 4-A- 3
W4IFA	18-	3- 3-B- 1
W4LYL(W4LYL W8YMT)	788-	23-14-A- 4

'Phone

W4IWO	34,125-	265-65-B-36
W4IUO	17,400-	150-58-A-20
W4KMS	17,080-	122-56-A-25
W4FV	14,872-	143-52-B-19
W4QY	3,055-	47-26-A-20
W4OHF	469-	17-11-A- 2
W4MOJ	220-	12- 8-A- 1
W4KVM	100-	8- 5-A- 1
W4KFC	4-	2- 1-A- 1

West Virginia

W8UMR	23,500-	188-50-A-19

'Phone

W8UYR	16,830-	156-55-B-28
W8QHG (W8s QHG SFT UEB)	15,938-	128-50-A-23

ROCKY MOUNTAIN DIVISION

Colorado

WØFRE	114,540-	671-69-A-37
WØIC	102,000-	600-68-A-38
WØADV/Ø	60,543-	397-61-A-31
WØCDP	58,500-	360-65-A-28
WØGKW	41,005-	280-59-A-31
WØSGG	13,118-	123-43-A—
WØKV	10,890-	100-44-A-14
WØOTR	10,132-	121-46-B—
WØJBK	9,135-	91-42-A- 9
WØIXF	8,288-	85-39-A-16
WØTW	7,500-	75-40-A-11
WØFZI	1,215-	27-18-A-10
WØSYA	988-	27-19-B- 7
WØIQZ	377-	15-13-B- 2

'Phone

WØFUH	49,939-	290-69-A-3
WØSBE	45,126-	327-69-B-2
WØJYW	30,355-	234-65-B-3
WØCBU	11,660-	110-53-B-1
WØAZT	8,888-	79-45-A-1
WØMYV	7,750-	80-40-A-1
WØCDP	3,690-	62-30-B-
WØENV	464-	29- 8-B-
WØKHQ	6-	3- 1-B-

Utah-Wyoming

W7HRM	79,926-	606-66-B-3
W7OWZ	61,115-	362-68-A-3
W7PJS	57,360-	359-64-A-3
W7LE	54,438-	407-67-B-2
W7JQU	20,140-	152-53-A-1

'Phone

W7JGS	31,992-	261-62-B-3
W7LKQ	15,975-	181-36-A-2

SOUTHEASTERN DIVISION

Alabama

W4FIJ	57,285-	428-67-B-2
W4IKK	47,702-	391-61-B-3
W4LSQ	42,969-	314-55-A-2
W4FLD	25,358-	205-62-B-1
W4EDR	19,294-	158-49-A-1
W4NLB	880-	24-16-A-

'Phone

W4LZX/4	55,380-	321-71-A-3
W4JYB	54,437-	329-67-A-3
W4KCQ	31,746-	241-66-B-2
W4CYC	25,025-	193-65-B-2
W4HA	23,606-	205-58-B-1
W4LEN	7,955-	93-43-B-1
W4IQN	6,232-	84-38-B-

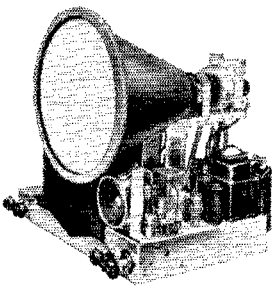
E. Florida

W4ILE	93,549-	564-67-A-4
W4FOY	78,907-	501-63-A-4
W4BRB	76,720-	482-64-A-3
W4FFF	74,693-	433-69-A-3
W4LVV	61,676-	455-68-B-3
W4TH	22,914-	201-57-B-3
W4IKU	19,743-	149-53-A-1
W4LQN	16,391-	141-47-A-1
W4AKV	14,400-	160-45-B-1
W4FZW	9,120-	114-40-B-1
W4MVJ	5,670-	81-35-B-
W4AAR	3,564-	66-27-B-
W4MNT	2,284-	46-21-A-

(*Continued on page 106*)

HARVEY for variety for bargains

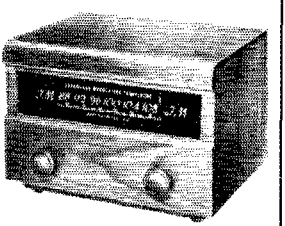
TECHMASTER SUPER-16 KIT



31-tube kit with components for use with up to 20-inch tube. Don't confuse with cheaper kits. Pre-wired and aligned RCA front end, all major parts mounted, adjustable kine mounting brackets. Complete *manual* with service notes, all RCA. Ultra-simplified wiring instructions. Wire it over a week-end.

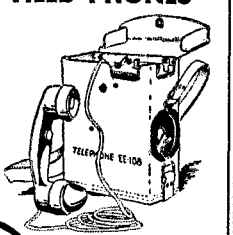
Complete, less kine tube.....$184.00
16" kine tube (sold separately)..$63.50

GE FM TUNER



Only a few left of this unusual buy. Covers 88-108 mc range, uses guillotine tuning. Designed for export and tropicalized, has power inputs for 110 to 250 volts 60 cyc. *Shpg. Wt. 30 lbs.*
HARVEY SPECIAL PRICE
$49.50

SOUND-POWERED FIELD PHONES



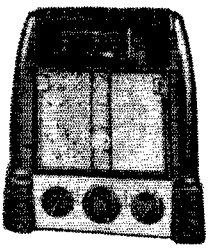
Army type EE-108. Any number can be hooked together on any 2-wire or grounded line. Max. range 12-15 miles. No batteries needed, simple, few parts. Complete instruction manual. Genuine leather case with strap. Each..... **$24.50**

COLLINS

COLLINS 32V-2 XMTTR

Brand New. We take great pleasure in announcing this new and improved xmttr with built-in TVI features. In addition, the 32V-2 features front panel switch for adding capacity for antenna loading. Tune-Operate switch permits operator to resonate final using low power, thereby prolonging life of final amplifier tube. Output terminals changed to a coaxial fitting and an L section has been added to antenna network which offers greater reduction of harmonic energy.... **$575.00**

RCA WIRE RECORDER



Compact, portable, self-contained unit. Just plug in mike and 110 and record or play back. 15 or 30 minutes recording time. Built-in handle for carrying.

***Special* $89.50**

HAMMARLUND FS-135C FREQUENCY STANDARD

Makes your receiver an accurate frequency standard with marker signals every 100kc. *Includes low drift 100kc crystal, 6AU6G tube, complete instructions.* Brand New. Only a few left.....**$6.95**

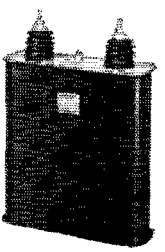
Order one or more spare tubes, 6AU6G.....**each 65c**

QUANTITY LIMITED

TV PICTURE TUBES at new low prices

5TP4	$59.40	12FP4	$58.75
7JP4	22.08	12KP4	50.60
7EP4	22.08	12LP4	48.50
10BP4	31.13	12JP4	45.25
10FP4	33.25	15AP4	73.75
20BP4	$222.75		

GENERAL ELECTRIC 1 MFD CONDENSER



15,000 working volts DC. Pyranol filled. Brand New. *Shpg. Wt. 35 lbs.*..... **$14.95**

½ MFD. Condenser, 25,000 working v. D.C. Pyranol. Brand New. *Shpg. Wt. 35 lbs.*..... **$18.95**

Cornell-Dubilier TJ-20040 oil-filled condenser. Rated 4 mfd. at 2000 V. D.C. working. *Shpg. Wt. 3 lbs.*..... **$3.75**

24 VOLT POWER SUPPLY

DC supply, 5 amp. rating, consists of 36 V, 10 amp transformer; filter choke; 2400 mfd, 50 V condenser; 5 amp full-wave rectifier.....net, **$18.74**

Output may be raised to 10 amp by adding rectifier in parallel at $8.95.
Transformer only **$5.95**

All in stock for immediate delivery.

Telephone: LUxemburg 2-1500

HARVEY RADIO COMPANY INC.
103 West 43rd St., New York 18, N. Y.

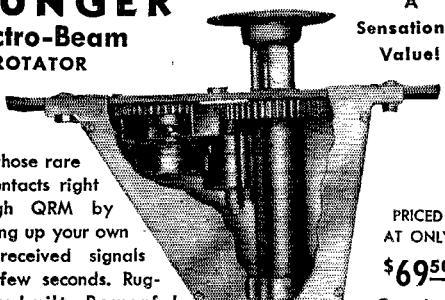
NOTE: All prices are Net, F.O.B. N.Y.C. and are subject to change without notice.

JELINT

Don't Lose those Good DSO's While Turning Your Beam by Hand

MUNGER
Electro-Beam
ROTATOR

A Sensational Value!



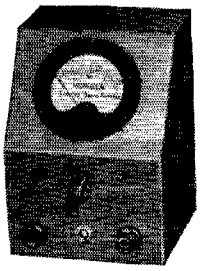
Hold those rare DX contacts right through QRM by peaking up your own and received signals in a few seconds. Ruggedly built. Powerful reversible motor. 115V—60 cycles. Swings your beam at 1 r.p.m.

- **Price Includes Reversible Electro-Beam Rotator and Accurate Direction Indicator.**
- **Foolproof Potentiometer and Meter Circuit. Calibrations in Both Degrees and Directions.**

PRICED AT ONLY **$69.50** Complete

Illustrated Bulletin on Request

Time Payment Plan



Free Inspection Offer!

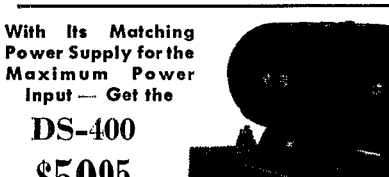
Order today. If not satisfied, return rotator within 10 days for refund. (Control-power cable supplied at 10c per ft. in 50' or 100' lengths.)

MANUFACTURED AND SOLD EXCLUSIVELY BY

REX L. MUNGER COMPANY
4701 Sheridan Road, Chicago 40, Ill.

FOR THE BEST IN MOBILE GET SUBRACO

MT-15X



TRANS-MITTER 10–11

$79.95 Less Tubes

$87.50 Complete with Tubes

30 WATTS INPUT — PHONE CLASS 'B' MOD.

With Its Matching Power Supply for the Maximum Power Input — Get the

DS-400

$59.95 COMPLETE

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SUBURBAN RADIO COMPANY
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W4[illegible]WI	330-	3[illegible]9-B- 5
W4[illegible]YF	000-	2[illegible]0-B- 2
W4[illegible]KY	5-	2[illegible]1-A—
'Phone		
W4CPG	24,060-	205-60-B-22
W4KRV	21,060-	176-48-A-27
W4BRB	18,169-	145-51-A-15
W4LXY	4,060-	58-28-A—
W4AKV	780-	30-13-B- 2
W4AYX	613-	18-14-A- 7
W4AAP	2-	1- 1-B—
W. Florida		
W4TL	47,680-	374-64-B-37
W4NAA	37,635-	293-52-A-33
W4QB	29,081-	214-55-A-25
W4AXP	10,300-	104-50-B-24
'Phone		
W4NN	18,144-	162-56-B-28
Georgia		
W4DXI	61,506-	461-67-B-32
W4GGD	39,168-	306-64-B-31
W4KSZ	16,080-	135-48-A—
'Phone		
W4LXE	31,915-	250-65-B-23
West Indies		
CM2SW	47,804-	352-68-B-25
KP4FH	8,543-	102-34-A- 8
'Phone		
KP4EZ*	32-	4- 4-B—
Canal Zone		
KZ5XJ	47,644-	305-63-A-29
KZ5AX	38,905-	253-62-A-36
'Phone		
KZ5WG	26,950-	197-56-A-27

SOUTHWESTERN DIVISION

Los Angeles		
W6HZT	164,070-	922-72-A-40
W6IFW	144,663-	817-71-A-40
W6AOA	140,875-	805-70-A-34
W6KRI	119,340-	702-68-A-36
W6JFJ	80,520-	490-66-A-39
W6MUO	69,285-	447-62-A-21
W6WIR	64,080-	403-64-A-32
W6SBR	46,545-	329-58-A-39
W6NKR	44,472-	327-68-B-21
W6VAQ	37,456-	231-65-A-36
W6AM	30,743-	217-71-B-28
W6SN	25,128-	175-72-B-12
W6TGY	21,930-	177-51-A-20
W7AIB/6	13,932-	131-54-B-16
W6OC	10,535-	98-43-A-19
W6LON	8,453-	82-42-A-13
W6WEG*	4,760-	68-35-B—
W6YNR	4,050-	63-27-A- 8
W6LVQ	3,990-	114-35-A-10
W6GTE	2,940-	49-30-B- 7
W6JWL	2,400-	40-30-B-10
W6AUG	1,410-	49-12-A- 5
W6LTM	250-	11-10-A- 4
W6BYT	30-	4- 3-A- 3
'Phone		
W6UBT	78,936-	601-66-B-39
W6BUK	1,536-	32-24-B- 8
W6UAI*	144-	11- 9-B- 2
Arizona		
W7QAP	107,535-	647-67-A-38
W7MLL	20,000-	201-50-B-28
W7RJN	120-	8- 6-A- 1
'Phone		
W7PUM	43,283-	304-58-A-29
W7ENA	29,175-	196-60-A-26
W7MAW	26,831-	208-53-A-25
W7LOJ	21,700-	221-50-A-27
W7KRW	8,658-	117-39-B-15
W7LAD	2,892-	46-26-A- 4
W7LHI	2,173-	42-22-A- 8
W7LVR	1,400-	35-20-B- 5
W7LYF*	1,024-	34-16-B—
W7RJN	10-	2- 2-A- 1
San Diego		
W6EPZ	119,280-	840-71-B-39
W6MI	77,010-	453-68-A-39
W6AMO	72,191-	420-69-A-37
W6GTM	34,255-	202-68-A-18
W6NEC	23,084-	202-58-B-29
W6KSS	17,490-	132-53-A-33
K6AM*	15,000-	150-50-B—
W6UWL	10,200-	122-34-A-27
W6DBZ	1,600-	40-16-A- 9
'Phone		
W6CHV	56,520-	315-72-A-39
K6NMC	26,944-	211-64-B-36
W6WSS	615-	21-12-A- 3

WEST GULF DIVISION

Northern Texas		
W5BLU	96,731-	582-67-A-40
W5JD	56,306-	358-63-A-38
W5GDH	38,400-	320-60-B-32
W5BXM	32,832-	258-64-B-24
W5AWT	24,806-	204-49-A-20
W5PS	6,165-	70-36-A- 5
'Phone		
W5HOF	5,280-	65-33-A-24
Oklahoma		
W5LW	89,247-	629-71-B-40
K5NRJ	51,150-	403-66-B—
W5EGO	39,648-	340-59-B-32
'Phone		
W5EHR	27,153-	216-63-B-26
W5ERY	15,456-	162-48-B-25
W5GCM	7,920-	88-45-B-18
W5EIO	2,760-	48-23-A- 9
Southern Texas		
W5HLK	72,080-	425-68-A-26
W5FNA	56,718-	412-69-B-37
W5MCT	47,325-	317-60-A-39
W5HBH	45,369-	301-61-A-23
W5NPT	28,531-	209-55-A-37
W5CXS	14,605-	131-46-A-13
W5AIR	12,699-	125-51-B-16
W5NNR	2,345-	34-28-A-11
'Phone		
W5FH	38,919-	240-65-A-35
W5BDI	30,558-	233-66-B-37
W5LMH	29,382-	254-59-B-32
W5IHD	12,932-	125-53-B-40
W5MJB	1,283-	29-18-A- 5
W5NQN*	8-	2- 2-B—
New Mexico		
W5NXE	50,752-	403-64-B-38
W5FEA	38,659-	254-61-A-26
W5NTM	26,800-	180-64-A-25
W5NRL	17,978-	160-47-A-32
W5CJP	9,733-	89-39-A-22
W5KWP	7,169-	79-37-A-14
'Phone		
W5FAG	46,356-	295-66-A-38
W5SMA	38,870-	300-65-B-36

CANADA

Maritime		
VE1PA	41,890-	356-59-B-33
VE1CU	26,394-	250-53-B-31
VE1IM	21,420-	169-51-A-31
VE1EK	19,189-	183-43-A-30
VE1TF	17,209-	183-39-A-35
VE1DB	16,660-	171-49-B-27
VE1MK	15,725-	171-37-A-27
VE1HT	5,190-	87-24-A-10
VE1BK	4,016-	78-21-A-10
VE1EV	2,350-	47-25-B- 5
'Phone		
VE1ME	10,434-	111-47-B-12
VE1NH*	50-	5- 5-B—
VE1KU*	2-	1- 1-B- 1
Ontario		
VE3KE	109,055-	645-68-A-40
VE3VO	104,125-	613-68-A-38
VE3AEM	89,840-	565-64-A-40
VE3AGX	78,987-	502-63-A-40
VE3AHV	78,725-	591-67-B-37
VE3EF	74,414-	506-59-A-33

(*Continued on page 108*)

JFLINT

HENRY

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COLLINS

Henry Radio stores in Butler, Missouri and 11240 West Olympic Blvd., Los Angeles, California have complete stocks of all Collins amateur equipment for immediate delivery. Also complete stocks of all other amateur receivers, transmitters, and parts. I promise you that you can find nowhere else lower prices, more complete stocks, quicker delivery, easier terms or more generous trade-ins. I give you 10-day free trial and 90-day free service. I promise that you will be satisfied on every detail. Write, wire, phone or visit either store today.

Bob Henry
WØARA

A FEW ITEMS I STOCK ARE:

National NC-33	*$ 57.50*
National NC-57	*89.50*
National NC-173	*189.50*
National NC-183	*268.00*
National HRO-7	*292.50*
National HRO-7C	*372.45*
National HFS	*142.00*
Hallicrafters S38	*39.95*
Hallicrafters S72 portable	*79.95*
Hallicrafters S40A	*79.95*
Hallicrafters SX71	*179.50*
Hallicrafters SX43	*159.50*
Hallicrafters SX42	*275.00*
Hallicrafters SX62	*269.50*
Hallicrafters HT18	*110.00*
Hallicrafters HT19	*359.50*
RME HF-10-20	*77.00*
RME VHF-152A	*86.60*
RME DB22A	*71.00*
Hammarlund HQ-129X	*177.30*
Signal Shifter EX kit	*49.75*
Telvar T60-2	*150.00*
Harvey-Wells TBS-50	*99.50*
Harvey-Wells TBS-50A	*121.25*
Hunter 20A Cyclemaster	*169.50*
Subraco MT-15X	*79.95*
Hallicrafter & National TV sets	

Gonset, Silver, Meissner, Milen, Sonar, Stancor, Bud, Mon-Key, Vibroplex, B & W, Johnson, RCA, Gordon, Amphenol, Hy-Lite, Elincor, Workshop, Premax; I have everything for the amateur.

Some prices higher on west coast

FOR EXAMPLE:

Collins 75A-1 receiver	$ 375.00
Collins 32V-2	575.00
Collins 30K-1	1450.00
Collins 70E-8	40.00
Collins 310C-1	85.00
Collins 310C-2	100.00
Collins 210B-1	190.00
Collins 310B-3	215.00

COMPLETE STOCKS

Henry has *everything* in the ham field.

QUICK DELIVERY

Shipments *4 hours* after receipt of order. Send $5.00 with order and shipment will be made at once C.O.D.

TRADE-INS

You can't beat Bob Henry for trade-ins. Write, wire or phone today about your equipment and Bob Henry will make you a better offer than you can get anywhere else.

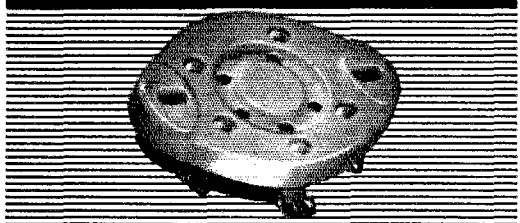
TIME PAYMENT

Because Bob Henry finances the terms himself you get a better break. Save time and money, deal with Bob Henry on his personal, profitable time payment plan.

Butler 1, Missouri **HENRY RADIO STORES** 11240 Olympic Blvd. LOS ANGELES 25 CALIF.

"WORLD'S LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS"

JOHNSON SOCKETS ..



always a perfect choice!

The JOHNSON 122-225 wafer pictured above is insulated with glazed grade L-4 steatite. Contacts are brass with steel spring, cadmium plated. Mounted against phenolic washers in molded recesses to prevent movement. Rivets countersunk, mounting holes bossed to permit subpanel mounting. Locating grooves facilitate tube insertion. Available also in 4, 6 and 7 contact as well as octal.

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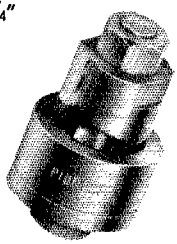
Cut ROUND • SQUARE • ANGULAR • KEYED HOLES

MODEL CKR 117 — Keyed 1 11/64"
FOR NON-ROTATING LOCKED MOUNTING OF AMPHENOL "S", MILLEN NOS. 33054-5-6 & 8, SOCKETS AND PLUGS, PERMITS USE OF SPRING WASHER MOUNTINGS. ELIMINATES SCREWS.



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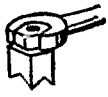
For mounting IF's, Terminal Strips, Sockets, Plugs, Meters, Controls, Xfrmers, Switches, Panel Lites, Etc.

SQUARES		ROUNDS		Simple Hand Wrench Screw Action	
5/8	$2.95	1/2, 5/8, 11/16, 3/4, 7/8	$1.95	1 11/64, 1 3/16, 1 1/4	$2.30
11/16	$3.25	1	$2.15	1 3/8	$2.65
3/4	$3.50	1 1/16, 1 1/8, 1 5/32	$2.30	1 1/2	$2.95
7/8	$3.95			2 1/4	$5.95
KEYED					
1 11/64	$3.50				



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PIONEER BROACH COMPANY
LOS ANGELES 15, CALIF.

VE3BR	6,275-	410-[illegible]-A-40
VE3[illegible]E	6,[illegible]90-	520-[illegible]-A-39
VE3[illegible]WE	[illegible]15-	427-[illegible]-A-27
VE3[illegible]Y	[illegible]28-	369-[illegible]-A-40
VE3MI	41,280-	354-[illegible]-A-39
VE3ACB	39,669-	290-55-A-32
VE3PE	36,081-	320-57-B-30
VE3BL	32,063-	288-45-A-34
VE3BBQ	31,350-	211-60-A-35
VE3AIL	28,688-	255-45-A-37
VE3APF	21,140-	151-56-A-24
VE3ACR	20,250-	225-36-A-19
VE3GI*	13,724-	146-47-B-—
VE3AWJ	10,815-	155-28-A-14
VE3ASD	9,600-	128-30-A-19
VE3FT	5,250-	76-28-A- 9
VE3BLY	5,118-	89-23-A-13
VE3DH	3,772-	83-23-B- 8
VE3QT	3,264-	51-32-B-12
VE3JX*	660-	22-12-A- 6
VE3AMK*	240-	15- 8-B- 2
VE3BAJ[illegible]	200-	10- 8-A- 7
VE3BCA(VE3s BCA BSA)	15,938-	213-30-A-37
'Phone		
VE3AIU	33,741-	247-69-B-32
VE3RM	29,051-	191-61-A-34
VE3BPE	18,135-	205-45-B-22
VE3AUQ	16,957-	135-51-A-34
VE3AQB	14,840-	140-53-B-22
VE3AMK*	1,144-	26-22-B- 7
VE3BDB*	50-	5- 5-B-—
VE3ATU	38-	5- 3-A- 1
Quebec		
VE2OL	31,080-	222-56-A-18
VE2MO	16,100-	162-40-A-26
VE2GLI	15,100-	151-50-B- 9
VE2GM	4,198-	73-23-A- 7
VE2AFT	3,118-	45-29-A- 7
VE2WZ	2,145-	40-22-A-12
VE2CD	1,120-	32-14-A- 4
VE2AHL	570-	20-12-A- 5
VE2LI*	30-	4- 3-A-—
'Phone		
VE2ID*	2-	1- 1-B-—
Alberta		
VE6AO	83,504-	621-68-B-39
VE6BU	73,150-	534-70-B-—
VE6EO	49,184-	428-58-B-38
VE6EE	43,952-	331-67-B-37
VE6DK	29,295-	217-54-A-25
VE6BO	15,375-	156-41-A-—
VE6GD	11,092-	120-47-B-12
VE6MA	3,630-	62-24-A-11
'Phone		
VE6NA	35,123-	230-63-A-31
British Columbia		
VE7ALE	86,176-	490-71-A-40
VE7EH	69,306-	431-65-A-39
VE7AEC	65,380-	467-70-B-40
VE7EO	49,300-	365-68-B-31
VE7VX	40,200-	268-60-A-33
VE7AC	29,760-	240-62-B-36
VE7XW	27,503-	194-57-A-33
VE7KL	20,018-	157-51-A-27
VE7JO	16,940-	154-44-A-30
VE7ACS	16,072-	167-49-B-38
VE7AFJ	14,280-	136-42-A-27
VE7LP	13,983-	119-47-A-27
VE7OK	13,407-	164-41-B-31
VE7AFI	12,513-	144-35-A-34
VE7ABQ	7,035-	104-35-B-22
VE7BX	3,800-	81-19-A-—
VE7XA	1,900-	48-16-A- 4
VE7RU	1,035-	23-18-A- 4
VE7ID	949-	35-11-A-12
VE7AKY(J. Betrose and VE7AKY)	21,492-	200-54-B-28
VE7UA(VE7s UA WV)	1,610-	46-14-A-19
Yukon		
VE8NS	9,270-	105-36-A-26
VE8MA	1,120-	28-20-B- 4
Manitoba		
VE4YZ	31,122-	250-63-B-29
VE4AM	910-	28-13-A- 8
'Phone		
VE4AYO	16,588-	143-58-B-37
VE4RP	11,825-	108-44-A-30
Saskatchewan		
VE5QZ	87,803-	509-69-A-38
VE5MQ	52,158-	339-62-A-32
VE5CO	35,560-	256-56-A-34
VE5HR	17,595-	138-51-A-—
VE5UN	4,785-	44-44-A-14
VE5LV	4,752-	66-36-B-21
VE5DW	3,063-	49-25-A- 6
VE5PK	225-	10- 9-A- 4

50 Mc.

(*Continued from page 60*)

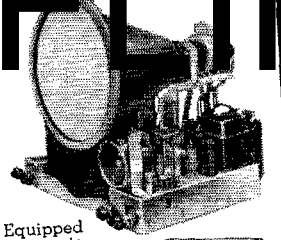
interest in the band is increasing accordingly. During a 2-meter QSO on the evening of May 16th, W1PBB, Stratford, Conn., and W2NPJ, Elizabeth, N. J., changed to 420 Mc., carrying on on that band with S8 signals each way. The distance is about 60 miles. While this was going on, W1IYO, Milford, Conn., hooked W2HWX, Little Silver, N. J., and W1PBB worked him soon after. These are hops of about 75 miles, and far beyond line of sight. Other contacts reported for that evening were W2BLF, Newark, N. J.–W1PBB; W2HWX–W2JND, Syosset, L. I.; and W1IYO–W2NPJ. A schedule has been set up for tries at 9:30 P.M. nightly, for the gang in Southern Connecticut, New York and New Jersey. Polarization is vertical.

W2BAV, operating from his 870-foot elevation in Bedford, N. Y., has worked 13 different stations on 420, including W2HWX, who is 65 miles distant. On the night of May 17th, when conditions appeared to be no better than normal on 144 Mc., a crossband check was made by W2BAV and W1HDQ, with your conductor changing to 420 and swinging the indoor 16-element array over to a vertical position. The signal from our 703-As was heard by W2BAV, though only partially readable on m.c.w. The distance is about 60 miles, and, though both locations are much better than average, the path is indirect and mountainous, all the way.

Tests on 420 Mc. from various forest-fire lookout towers in the vicinity of Baltimore, Md., have been conducted by W3GBJ, W3FDJ and W3FAB. Using 10-meter gear for crossband work they have operated from Hollofield tower, 5 miles west of Baltimore, Burtonsville tower, near Laurel, Md., Hillmeade tower, midway between Annapolis and

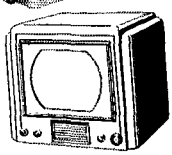
(*Continued on page 110*)

NEW TECH-MASTER 630TK—DL16 TV KIT



America's Finest DeLuxe 630-Type TV Kit. Original RCA 630 Circuit . . . Now Especially Improved with Voltage Doubler Circuit Using Additional 1B3 Tube for Maximum Performance with 15, 16 or 20" Video Tube.

$184 Complete with RCA 13-Channel Tuner, Step-by-Step Instructions and 30 RCA Tubes. Less Kinescope.



95% of Components Mounted in Place! Equipped with Mounting Brackets for Video Tubes up to 16". The Last Word in Performance . . . Simplicity! America's Outstanding TV Receiver with new simplified step-by-step instructions, large-scale 2-color pictorial diagrams and RCA Service Manual. Absolutely foolproof! Factory-wired and aligned RCA 13-Channel Tuner. Video and Sound IF Coils aligned and checked to ± 1%. No instruments required for alignment! The Greatest Value and Best Performance you can get!

Tech-Master 630TK-DL16, DeLuxe Kit as described. 75 lbs.
No. A19766, **Cash Price** **$184.00**
$18.40 Down—12 Mos. at $14.63

Tech-Master 630TK DeLuxe Kit. 95% of parts mounted. RCA tuner, 29 RCA tubes, Pictorial Diagrams, RCA Service Manual. Less Kinescope. **$168.50**
No. A19757
$16.85 Down—12 Mos. at $13.40

Tech-Master 630TK Standard Kit. Similar but unassembled. RCA tubes and Service Manual. Less pict. diagrams, misc. hdwre., and kine. 70 lbs.
No. A19762 **Cash Price** **$149.50**
$14.95 Down—12 Mos. at $11.89

10" Mahogany Cabinet. Table Model, with 10" Tube brackets and safety glass. 25x20x15" H. 20 lbs. **$42.50**
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15"-16" Mahogany Cabinet. Handsome Table Model with safety glass. 25¼H x 26¾W x 24"D. 30 lbs. **$54.50**
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NEW LOW CREDIT TERMS
Only 10 Down—1 Year to Pay!

Immediate Delivery from Stock of All Amateur, TV, and Test Equipment.

Description		Cash Price	Send Us
COLLINS			
75A	Receiver	$375.00	$37.50
30K-1	Xmitter	1450.00	145.00
32V-1	Xmitter	475.00	47.50
32V-2	Xmitter	575.00	57.50
310B-1	Exciter	190.00	19.00
310B-3	Exciter	215.00	21.50
310C-1	Exciter	85.00	8.50
310C-2	Exciter	100.00	10.00
70E-8A	Exciter	40.00	4.00
HALLICRAFTERS			
S-40A	Receiver	79.95	8.00
S-47	Receiver	229.50	22.95
S-51	Receiver	149.50	14.95
S-53	Receiver	69.95	7.00
SX-42	Receiver	275.00	27.50
SX-43	Receiver	159.50	15.95
HT-19	Xmitter	359.50	35.95
HT-18	Xmitter	110.00	11.00
T-69 TV (w/ 15" tube)		259.50	25.95
T-64 TV (w/ 10" tube)		179.50	17.95
T-64 TV (w/ 12" tube)		199.50	19.95
NATIONAL			
NC-33	Receiver	57.50	5.75
NC-57	Receiver	89.50	8.95
NC-173 Rcvr. (less spkr.)		189.50	18.95
NC-183 Rcvr. (less spkr.)		268.00	26.80
NC-240D Rcvr. (less spkr.)		236.25	23.63
HRO-7 Rcvr. (less spkr.)		279.00	27.90
TV-7M	7" TV Rcvr.	189.50	18.95
HAMMARLUND			
HQ129X Rcvr. (with spkr.)		189.15	18.92
RME			
HF-10-20	Receiver	77.00	7.70
VHF-152A	Receiver	86.60	8.66
DB-22A	Receiver	71.00	7.10
RME-84	Receiver	98.70	9.87
RME-45 Rcvr. (less spkr.)		198.70	19.87
MILLEN			
90800		42.50	4.25
90881		89.50	8.95
90281		84.50	8.45
90651		55.00	5.50

BRAND NEW BC-645 RCVR—XMITTER

$9.95 Complete with 15 Tubes

A few left! Easy to convert for voice or CW on 420 mc. Full instructions. Less power supply.
No. S-588, 25 lbs. **$9.95**

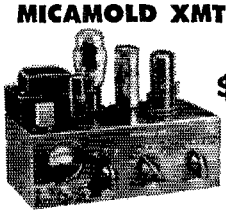
HALLICRAFTERS HT-17 TRANSMITTER

Regular $71.50 Value

$39.50 Complete with All Coils for 10, 15, 20, 40, 80 Meters

S-38 RECEIVER Formerly $49.95, Now **$39.95**

Price Slashed... FAMOUS MICAMOLD XMTR KIT



Now **$19.95**
Reg. $34.00
Model XTR-1
SAVE $14.05

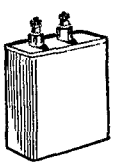
Smashing Reduction on this Popular 45 Watt Telegraph Xmitter Kit! Complete from power supply to antenna matching network. A flip of the switch puts you on 3.5, 7, or 14 mc, with suitable crystal. No Coils to Plug in . . . No Extra Coils to Buy! The 6AG7 crystal oscillator is extremely stable and easy on the crystal, resulting in a clean-cut signal. Band switch controls both broad-tuned oscillator plate coil and final output circuit. Pi-network final will match any antenna. Uses 6AG7, 83 and 6L6. Less tubes, crystal, key. 10 lbs. **No. S-1132, $19.95**

H-23U HANDSET. Brand New. High impedance phone, low resistance carbon mike. Butterfly switch. PL-55 and PL-68 plugs. 6 ft. rubber cord. 3 lbs.
No. S-674 ..... Only **$3.95**

T-17B HANDMIKE. Brand New. Single button carbon mike. 200 ohms. Press-to-talk switch. PL-68 plug, 5 ft. cord and dust cover. 1 lb.
No. S-467 ..... Special **$1.49**

S. C. KEY. Signal Corps Type J-38.
No. S-143 ..... Only **49¢**

OIL-FILLED TRANSMITTING CONDENSERS



All Brand New—First Quality—GE, Aerovox, C-D, etc. Some have mounting brackets. Rectangular cans. Limited Quantities!

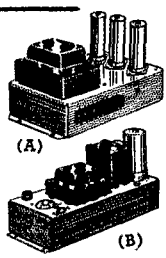
No.	Cap. Mfd.	WV DC	Size H x W x D	SALE PRICE
S-378	2	400	3¾x1¾x1	$0.29
S-379	2	600	3¾x1¾x1	.34
S-516	10	600	3¾x4¾x1⅜	.69
S-861	8	1000	4x5x1¾	1.69
S-288	13	1000	3½x3½x1¾	1.05
S-858	2	2000	4x1¼x1	1.50
S-859	8	2000	3¾x3½x1¾	2.75
S-860	4	3000	3½x3¾x1¾	3.75

RCA POWER SUPPLY BARGAINS

They're Going Fast! 2 Big Buys! Completely assembled power units—ready to operate from 110 V, 60 cycles AC. Made for high quality use!

(A) Delivers 250 V @ 50 ma, 100 V @ 15 ma, 6.3 V @ 2.5 amps, and —24 V bias. Hum level is 94 db below 250 V, and 57 db below 100 V 4¾ x 8 x 2" Less 5Y3 rect. 8 lbs.
No. S-977 ..... Special **$6.95**

(B) Output: 250-300 V @ 2-8 ma, or 280-320 V @ 8-16 ma. Filament: 6.0-6.3 V, adj. @ 1.5 amps. 3½x10¼x6" Less 80 rect. 6 lbs.
No. S-978 ..... Special **$4.95**



(A) (B)

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for minimum line loss...

Extra high efficiency in antenna switching makes ADVANCE small Coaxial Relays ideal for mobile and other low power transmitters. Designed for 50 ohm RG cable, these ADVANCE Relays maintain a VSWR ranging from 1.04 : 1.00 at 80 mc, to 1.40 : 1.00 at 300 mc, with max. rating of 250 watts. A variety of terminal positions are available.

Write for descriptive folder on all ADVANCE Radio Relays

ADVANCE RELAYS

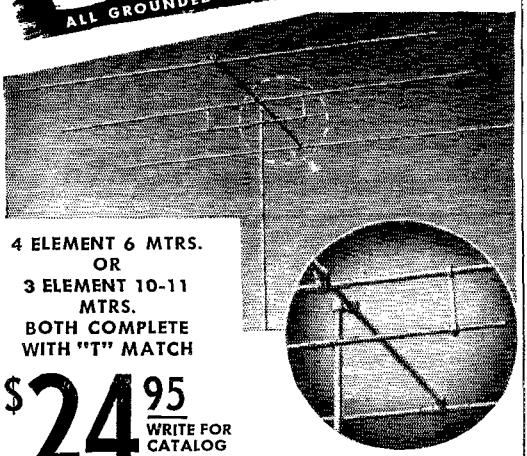
ADVANCE ELECTRIC & RELAY CO.

1260 WEST SECOND STREET ★ LOS ANGELES 26, CALIFORNIA

HY-LITE'S NEW

SKY-LITE

ALL GROUNDED ARRAY FOR 10-11 METERS



4 ELEMENT 6 MTRS. OR 3 ELEMENT 10-11 MTRS. BOTH COMPLETE WITH "T" MATCH

$24.95

WRITE FOR CATALOG Q-7

HY-LITE Antennae INC.

Makers of Fine Antennas for AMATEUR · FM · TELEVISION

528 TIFFANY ST., BRONX 59, N.Y.

Washington, D. C., the roof of the transmitter building of WFBR-FM, Stoney Tower at Aberdeen. Equipment here included an oscillator unit from an APT-2 jammer, an APS-13, and the transmitter portion of an APS-13 converted for use as a pole oscillator. This arrangement is shown in the accompanying photograph. Distances up to 38 miles were covered with extremely strong signals, indicating that this frequency would be a good one for fire-tower communication, where line-of-sight paths are nearly always involved.

One way to find out how much interest there is in a *QST* story is to omit some small but vital detail. Such an omission (accidental, we hasten to assure you) was the missing R_{12} in our 420-Mc. superregenerative receiver, Fig. 2, page 13, of May *QST*. It should have been 1.5 megohms, in case you were wondering.

Various methods, including a demonstration of gear for 420, 1200 and 10,000 Mc. before the Washington Radio Club, have been tried by W3LFG in an effort to promote activity on these bands in the Nation's Capitol. On 420 Paul has a 368A oscillator, a converted BC-645, and a 6J6 regenerative detector with a 2C40 coaxial r.f. stage. On 1215 he has a 2C46 in an end-to-end cavity, delivering about 5 watts output, and a 707B parallel-line oscillator. A 723A/B is used on 10,000 Mc. He feels that the 1215-Mc. record might be broken by working with a station situated on Skyline Drive, from which point there is a 100-mile line-of-sight path into Washington.

—•••—

This being the report of v.h.f. activities in May, one of the busiest months on the v.h.f. calendar, we find ourselves with more reports than we can use in this issue. In addition to those reporters already credited above, we wish to acknowledge, with thanks, the coöperation of the following in reporting their work in detail:

W1s RUP, BCN, PYO, JSM, EIO; W2WLS; W3s RUE, EYX, MQU; W4s EID, MS, FNR, NRB; W5s AJG, VV, VY, PTV; W6s CFL, BWG, PIV, VDG, BHI; W7s CAM, FGG; W8LBH; W9s RQM, JBF; WØs TKX, JRP, INI; VE3BNZ and XE1PZ.

Single Sideband

(*Continued from page 61*)

type — thus removing the "touchiness" of tuning.

W9DOD was heard on single sideband with a nice signal, but details of his rig are lacking.

We haven't as yet found a manufacturer who will make up pretested phasing networks, which would reduce the need for the 'scope in aligning a phasing job, but we are informed that W5KVE, Temple, Texas, is offering 3% resistors and condensers for the networks.

—*B. G.*

Plug-In Converter

(*Continued from page 63*)

the a.v.c. and reduce the gain of the first r.f. stage at all times. In such cases, the value of R_4 should be increased until the gain of the converter is approximately 1.

This converter is installed in an SX-25 receiver, and at present is used only for the 10-meter band. It is planned to use it for the 15-meter band, when that band becomes available. In a receiver capable of tuning to 50 Mc., it could be used on that band as well. The oscillator of the SX-25 is tuned to the low-frequency side of the signal, and it was therefore necessary to shift the oscillator to a still lower frequency. Some difficulty was experienced in getting the oscillator to track properly, although the tracking error was very slight. Another approach to the tracking prob-

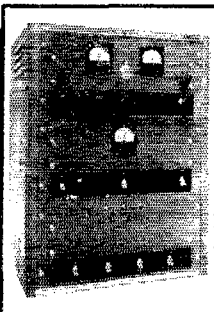
(*Continued on page 112*)

WORLD FAMOUS WRL TRANSMITTERS *deliver* MORE WATTS *per* DOLLAR!

"Deal with the World's Most Personalized Radio Supply House"

I FINANCE MY OWN PAPER — MAKING IT EASIER AND CHEAPER FOR YOU TO BUY FROM ME — LIBERAL TRADE-IN ALLOWANCE ON YOUR PRESENT EQUIPMENT. LET'S GET ACQUAINTED!

LEO I. MEYERSON
W0GFQ



THE NEW WRL "400" GLOBE KING

350 Watt Phone — 400 Watt CW

An outstanding value—for the first time a transmitter at less than $1.00 per watt! Unconditionally guaranteed! A versatile, advanced design transmitter that will give you efficient performance on all bands from 10 to 160 on phone and CW. 350 watt phone 100% modulated, and 400 watt CW make this XMTR the outstanding buy on the market. Provisions for ECO. Complete with one set of coils.

$399.45 WIRED $379.45 KIT FORM

GIANT RADIO REFERENCE MAP

Just right for your control room wall. Approximately 28"x42". Contains time zones, amateur zones, leading short-wave stations, monitoring stations. Mail Coupon Today and **25c**

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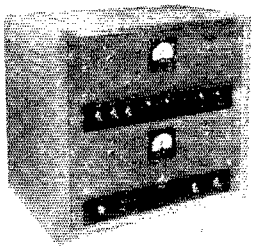


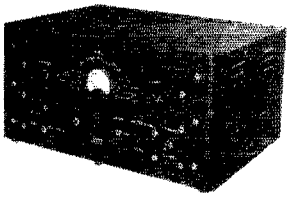
WRL 175 WATT GLOBE CHAMPION

R.F. Section a complete 175 watt XMTR—provisions for ECO—Automatic Bias on Final and Buffer—voltage regulated Oscillator and Buffer—class B Speech Modulator—175 watt input from 10 thru the 160 meter band—complete with tubes and meters including 1 set of coils — specially crated for safe shipment.

$289.00 WIRED $269.00 KIT FORM

WRL 40 WATT GLOBE TROTTER

Capable of 25 watt input on phone and 40 watt input on CW on all bands from 1500 KC through 28 megacycles. Band switching for any 3 bands. A proven rig. Thousands in operation throughout the world.



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EVERYTHING IN RADIO
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Please send me:

- ☐ New Catalog
- ☐ Radio Map
- ☐ List of Used Equipment
- ☐ "400" Globe King
- ☐ 175 Watt Globe Champion
- ☐ 40 Watt Globe Trotter

Name.....

Address.....

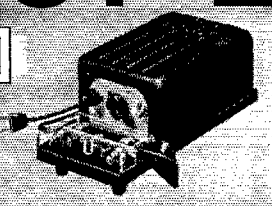
City..... State.....

JFL INT

THE KEY TO PERFECT CW

MON-KEY

Electronic Monitor and Key



Flawless CW — smooth, rhythmic as a tape — can be quickly achieved by anyone who uses the new MON-KEY.

FEATURES

- Automatic dots and dashes
- Dashes equal to three dots in duration
- Speed approx. 8 to 45 words per minute
- No weights to adjust
- Monitor with volume control
- Operation 115 v AC or DC

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EXPORT: Rocke International Corp., 13 E. 40th St., New York 16, New York

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THE NEW

VIDI-MASTER

MODEL 73 TV ANTENNA
with "Built-in"
High Pass Filter Characteristics
No Insertion Loss at TV Frequencies

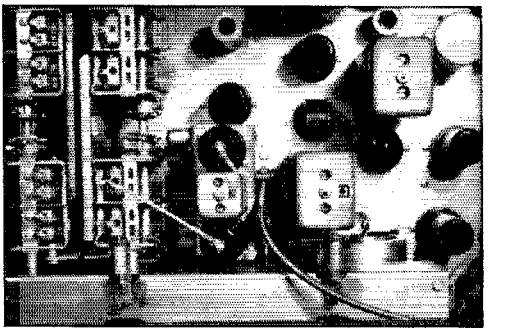
CML's contribution to the elimination of a current and important radio amateur's problem . . . TVI. With the new VIDI-MASTER Model 73, shock excitation from 28 MC transmitters is reduced 17 DB below the level obtained with conventional TV antennas.

Free technical bulletin with complete proof of VIDI-MASTER performance is yours for the asking. If your dealer cannot supply you, write direct.

COMMUNICATION MEASUREMENTS LABORATORY, INC.
120 Greenwich St. New York 6, N. Y.
Cable Address: "COMMUNILAB" NEW YORK

m would be to tune the oscillator to the high-frequency side of the signal. In some cases a series padding condenser in the oscillator might be required.

The installation of this converter in a receiver should not be attempted by anyone who is not familiar with superheterodyne alignment procedure, since it is necessary to realign the oscillator circuit and check if it is tracking properly. However, once the realignment is completed, the tuning of the receiver is the same as before the installation of the converter, and the dial calibrations will be the same.



The converter installed in an SX-25 receiver.

This converter has been in use at W6YCK for about a year and has performed very satisfactorily. It has removed the images 910 kc. from the desired signal. It can be adapted for use with many other types of receivers, if one understands the problems involved. However, for best results it should be used with receivers having at least one r.f. stage.

Operating Desk

(*Continued from page 67*)

The final operation is cutting and fitting the top on the base. Select a clean spot to place the top with its finished side down. Then invert the base and move it around on the top until it is centered. I fastened the top on with long countersunk screws diagonally upward from the upper corners of the top-drawer opening, front and back, as indicated in Fig. 3. The job must be done carefully to prevent piercing the surface of the top with the points of the screws. After the top has been fastened on, it must be given the same finish as the rest of the table, adding a second coat of shellac after the first has had an opportunity to dry thoroughly.

Drawers

A suggested construction for the drawers is shown in Fig. 5. They should be about ⅛ inch narrower than the openings in the table and the depth in each case should be such that there is about ¼-inch clearance between the top edges of the drawer and the slide strips above. Leftover

(*Continued on page 114*)

LEEDS

The Home of RADIO

Our 27th Year

QUALITY—PRICE DEPENDABILITY

GRID DIP METER LYSCO "DIPMASTER"

3 Mc to 150 Mc frequency range; calibrated dial. Ideal for Signal generator, 3.4 to 300 Mc range phone monitor, F.S. meter, or absorption wavemeter. Complete power supply and tubes. Really a good buy at **$33.50**

CONVERTERS

Mobile or Fixed. RF Gain control. Simple installation. Size 2" x 6" x 5".

Model 210—
27 to 30 Mc-10 meters $25.50

Model 202—
144 to 148 Mc-2 meters 25.50
3 tubes for converter 3.49

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Mobile or Emergency, 8 watt output crystal control, push to talk. Power requirements 6.3V. at 2 Amp; 350V. at 110 Ma. without dynamotor.

Model 129—
27 to 29.7 Mc (10 meters) $23.95

Model 175—
3750 to 4000 Kc (75 meters) 23.95
3 tubes for transmitter 4.98

Noise Limiter—Model NXL—adjustable threshold control. Power 6.3V—150 Ma. 100V. 6Ma. D.C. $4.50
6AL5 tube 1.11

BIAS TRANSFORMER TYPE KS8779

Completely shielded, Insulator Terminals. Primary: 115 Volts 60 cycle @ 500 Ma.
Secondaries
180 V. @ 20 Ma.
300 V. @ 20 Ma.
6.3 V. @ 1.2 amps.
5.1 V. @ 7 amps. C.T.

Special **95c**

STEEL CHASSIS 16 GAUGE

4 x 17 x 3 Black Crackle ..$1.05
4 x 17 x 3 Cadmium 1.17
10 x 14 x 3 Black Crackle .. 1.44
11 x 17 x 3 Black Crackle .. 1.94
13 x 17 x 3 Black Crackle .. 2.35
13 x 17 x 4 Black Crackle .. 2.70

Complete stock of steel & aluminum chassis & panels on hand.

ALUMINUM CHASSIS—

Heavy Duty

7 x 7 x 2 ..... 94c
7 x 9 x 2 ..... $1.06
5 x 10 x 3 ..... $1.00
7 x 11 x 2 ..... $1.15
7 x 13 x 2 ..... $1.23
10 x 17 x 3 ..... $1.88

ISOLATION TRANSFORMERS

All 117 Volts to 117 Volts 60 Cy.
P-96, 40 watts $3.60 P-98, 100 watts $9.30
P-97, 80 watts $5.10 P-99, 250 watts $17.70

ITEMS YOU MAY BE LOOKING FOR

Multiple Contact Telephone Type Relay
No. A2-2—
Windings 125 ohms. Each ..... $ .29
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Single winding 12,500 ohms ..... .49
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Sockets for 813, 829 ..... .73
¼ watt Neons bayonet base ..... .20
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6 Gang 3 position Isolantite Deck Switch ..... .69
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3BP1 Cathode Ray Tubes 1.45
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10 for 3.50

GREENLEE PUNCHES—

Cuts to ⅛" thick metal.
½" $1.94
⅝" $1.94
1" $2.12
1⅛" $2.25
1-3/16" $2.25
1½" $2.88

We carry a complete line of all sizes of punches up to 3½" diameter.

CHOKES

SMOOTHING TYPE	Hy	SWINGING TYPE	Hy	PRICE EACH MA	Price
C-80	10	C-87	4—16	150	$3.09
C-81	10	C-88	4—16	200	$3.82
C-82	10	C-89	4—16	250	$5.29
C-83	8	C-90	3—14	300	$5.59

All above 3000 Volts Insulation

SUPERIOR POWERSTATS

Smooth, efficient voltage control. 0 to 135V. output from 115V. AC line.
Type 20 (illustrated 3 amps $12.50
116 for table mtg 7.5 amps 23.00
116U for panel mtg 7.5 amps .. 19.00
1126 15 amps 46.00
1156 45 amps 118.00

Also available for 230 volt input. Write for descriptive literature.

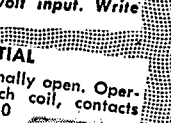
TRANSFORMER SPECIAL

870 volt CT @250Ma with 80V bias tap
5 volts @ 3 amps
2½ volts CT @ 10 amps
2½ volts @ 3 amps
6.3 volts @ 1.5 amps
115V. 60 cycle primary

$5.88

RELAYS CS DIFFERENTIAL

Dual coil with armature pivoted normally open. Operates 220-250 Volts. 8000 ohms each coil, contacts S.P.D.T. Controls rated 2 amps. at 110 VAC. Ideally suited for balanced or bridge type circuits where limited current or power is available .. **88c**



SELSYN MOTORS

115 V.A.C. 60 cycle #C-78248. Can be used to turn small antennas or as indicators. Size 3½" x 5½".
Price per pair **$6.95**

GENERAL ELECTRIC PYRANOL CONDENSER

1 Mfd 15000 V.D.C. Brand New. Shipping Weight 35 lbs.
A Terrific Value **$10.95**

RAYTHEON VOLTAGE STABILIZERS

Positive Stabilization ±½%

Input 95-130 volts, 60 cycles single phase; output 115 volts stabilized to ±½%. *Output 6.0 or 7.5 volts stabilized ±½%.

Catalog No.	Output Watts	Net Cap.	wgt. lbs.	Net Price
VR-6110	15	4		$15.00
VR-6101*	30	5		$17.00
VR-6111	30	5		$17.00
VR-6112	60	8		$24.00
VR-6113	120	14		$31.00
VR-6114	250	25		$48.00
VR-6115	500	45		$75.00
VR-6116	1000	92		$125.00

PLATE TRANSFORMERS

For Small Transmitters. DC Voltage Ratings are Approx. Values Obtained at Output of a 2 section Choke input Filter. Using Mercury Vapor Rectifier Tubes Pri. is for 115 V. 60 cy.

Type No.	Sec. Rms. Volts	Sec. DC Volts	Sec. DC MA.	Dimensions H.	W.	D.	Price Each
P 57	660—660†	500	250	4⅝	3 13/16	4⅜	$ 6.76
	550—550	400					
P 58	1080—1080	1000*	125	4⅝	3 13/16	5	8.23
	500—500	400	150				
P 59	900—900	750	225	4⅝	3 13/16	5⅛	7.94
	800—800	600					
P 67	1450—1450	1200	300	5¾	6⅛	4	19.84
	1175—1175	1000					
P 68	2100—2100	1750	300	5¾	6⅛	4¼	24.99
	1800—1800	1500					

* For dual operation with simultaneous use of both sec ratings.
† Has 40-volt bias tap.

FILAMENT TRANSFORMERS

Type 940 2.5VCT @ 10 Amps. 7500V Ins $2.79
Type 040 5. VCT @ 3 Amps. 2500V Ins $2.06
Type 941 5 VCT @ 6 Amps. 2500V Ins $3.38
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Type 947 6.3VCT @ 6 Amps. 2500V Ins $2.79
Type 948 6.3VCT @ 10 Amps. 2500V Ins $3.67
Type 960 7.5VCT @ 4 Amps. 2500V Ins $2.35
Type 143 7.5VCT @ 8 Amps. 2500V Ins $4.12
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6.3VCT @ 3.6 Amps.

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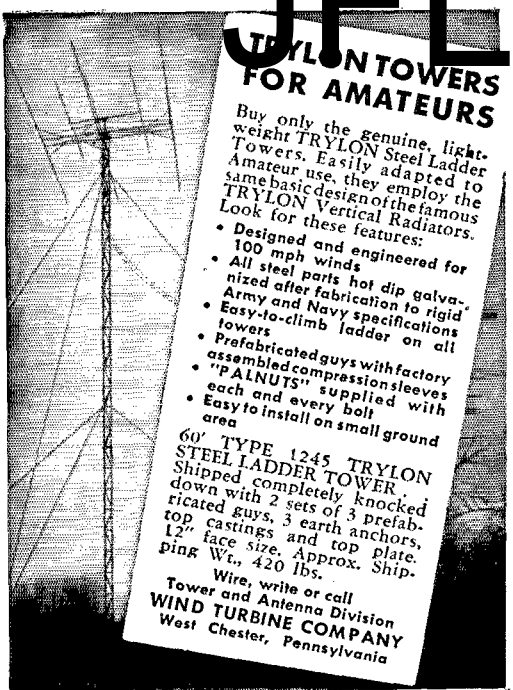

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crates of plywood or other wood may be used for the drawers. Be sure, however, to save enough of the plywood for the fronts so that they will all match the rest of the desk. You can make the fronts wide enough to come flush with the outside edges of the end panels, or leave a small border, as you choose. Be sure to leave enough

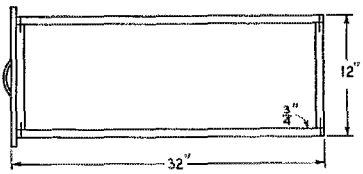

Fig. 5 — General plan of the drawers. The depth of the drawer varies in accordance with the different size openings. The joints are nailed and glued.

space between adjacent fronts so that they will not interfere. If preferred, the bottoms can be made of tempered presdwood which is cheaper than plywood. The fronts can be sanded and given the same finish as the other surfaces. A single application of linseed oil and a coat of shellac is sufficient for the wood parts of the interior. The drawers can be fitted with harmonizing plastic or metal handles. Most hardware stores carry an assortment.

With a little thought, careful preparations and some hard work, anyone who is handy with tools can provide himself with an attractive, substantial and, above all, a comfortable operating position at a fraction of the cost of one purchased on the market — which often enough does not fit the requirements.

Technical Topics

(Continued from page 68)

a side?) and probably some stuff at vertical angles which were just about right for wide-open band conditions. Obviously, it was just a little improvement over a good dipole, so far as 10 meters was concerned. Still, we did get answers, plenty of them, and it appeared that our backyard "V" was good enough to provide a lot of fun on 10.

On 50 Mc. results were all that could be expected. Our previous efforts on 6 at the new location had been made with an indoor folded dipole, which had been an awful comedown from our former 4-element rotary. It had provided a few local contacts, but the gang up around Boston simply didn't exist, so far as our receiver was concerned. On the "V" things were better; fairly good signals from all the old reliables in Eastern Massachusetts and New Hampshire 100 miles or more away, and a dividend — W2s coming through from similar distances in the opposite direction, with no beam rotating involved. The signals weren't terrific, and it must be admitted that the 4-element boys had an edge on us, but the "V" was more than meeting the specifications — it was definitely *much* better than a 6-meter dipole.

(Continued on page 116)

SUN RADIOS ANNUAL CLEARANCE!

CRYSTALS!

All crystals have Army MC harmonic ratings but Sun encloses directions for deriving the correct fundamental frequency in kilocycles.

JUST ARRIVED!

NEW FREQUENCY CRYSTALS FOR HAM AND GENERAL USE

—FT-243 Holders, ½" pin spacing

(Fractions Omitted)

HAM USE—2, 6, 10, 11, 20, 40 METERS

5305	5873	6340	6673	7340	7506	7606	7706
5677	5875	6373	6706	7373	7540	7640	8173
5706	5900	6406	6740	7406	7573	7673	8340
5725	5906	6440	6806	7440			
5740	5925	6506	7040	7473			
5760	5940	6540	7073				
5773	5973	6573	7106				
5806	6000	6606	7140				
5840	6273	6640	7306				

99¢ EACH
10 for $9.00

GENERAL USE

6006	6140	6773	6973	7840	7906	7973	8273
6040	6150	6873	7740	7873	7940	8240	8306
6073	6206	6906	7773				
6106	6208	6940	7806				

49¢ EACH
10 for $4.50

CRYSTALS WITH A MILLION USES

Fractions Omitted

kc	kc	kc	kc	kc	kc	kc	kc	kc	kc	kc	kc
412	422	433	442	462	477	490	498	504	508	515	519
413	423	434	443	466	479	491	501	505	509	516	522
414	424	435	444	468	481	492	502	506	511	518	523
415	425	436	445	470	483	493	503	507	512		
416	426	437	446	472	484	494					
418	427	438	447	473	485	495					
419	429	440	448	474	487	496					
420	431	441	451	475	488	497					

49¢ each

Crystal Frequency Standards 98.356Kc

Easily altered for 100kc Standard. Mounted in low loss 3 prong holder.

$3.89 each

For Crystal Controlled Signal Generators 525kc

526,388	533,333	537,500
527,777	534,722	538,888
529,166	536,111	
530,555		
531,944		

99c each

I.F. Frequency Standards

kc	kc
450	461,111
451,388	464,815
452,777	465,277

99c each

200 KC CRYSTALS

Without Holders 21/32" x 23/32". Each **69c**
3 for $2.00

Assorted Miscellaneous Crystals
Fractions Omitted

370kc	377kc	384kc	387kc
372	379	386	388
374	380		
375	381		
376	383		

39c Each

priced at a fraction of the cost of their holders alone.

For Ham and General Use
Fractions Omitted

390kc	396kc	403kc	408kc
391	397	404	409
392	398	405	411
393	400	407	
394	401		
395	402		

79c each

CRYSTALS FOR SCR 522

5910kc	7480
6370	7580
6450	7810
6610	7930
7350	

$1.29 each

CRYSTALS FOR HAM USE

Fit 243 Holder ½" Spacing

ea.
3735 KC...69c
4190 KC...39c
5030 KC...39c
5485 KC...39c

Crystals from BC 610 Spacing—2 Banana Plugs

2045	2305	3202	3550
2105	2320	3215	3570
2125	2360	3237	3580
2145	2390	3250	3945
2155	2415	3322	3955
2220	2435	3510	3995
2258	2442	3520	
2260	2532		
2282	2545		
2300	2557		

$1.29 Each

• Payments must accompany order. Enclose 20c for postage and handling. Minimum order — $2.00 plus postage.

Crystals are shipped packed in cloth bags inasmuch as they are shock mounted. All shipments guaranteed.

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Show slight signs of use

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Hallicrafters—S 47	$229.50	$174.00
Hammerlund—HQ 129X	$177.30	$139.00
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National—NC-240	$252.69	$195.00
Bud—VFO-21	$ 52.50	$ 34.95
Triplett 3296 Modulation monitor	$109.75	$ 79.95

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LONG PLAYING RECORD PLAYER—33⅓ RPM on wood base, with LP arm and permanent needle, new. Reduced to.....**$9.88**

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PROFESSIONAL RECORDING—TURNTABLE, 16", 33⅓ and 78 RPM, Aluminum alloy casting table famous make. Reg. $165.44 net. **only $118.00**

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REGAL TALKFONE, 20 watt PA amplifier. Reg. $65.00, reduced to.....**$24.95**

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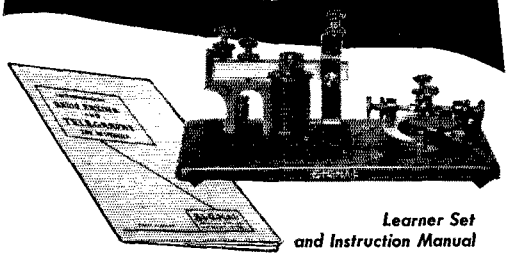
Learning Telegraphy & Wireless is EASY



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DEPT. TN Valparaiso, Ind.

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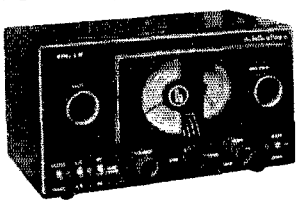
HALLICRAFTERS

S-38

$39.95



Famous Hallicrafters S-38 at a new low price! Features excellent reception on the Standard Broadcast band as well as 3 short wave bands. Continuous AM reception from 540 Kc to 33 Mc. Controls are: speaker/phones, AM/CW, and noise limiter switches. AF Gain, Receive/Standby, 4 band switches.

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On 2 meters our "V" was large enough so that it showed marked frequency characteristics. We suspected that this might be the result of losses in the feed line, but some probing with a fluorescent light on the end of a long stick dispelled this thought; there was r.f. in the end of the "V." With a side length of 10 wavelengths and an included angle set for a much lower frequency, the pattern had pronounced lobes on 144 Mc. It did well in receiving vertically-polarized signals from stations in the general direction of its sides, showing as much as 15 db. gain over a vertical dipole in some instances.

How To Feed It

Since the legs are multiples of a half wave on both 6 and 10, it is obvious that the antenna is fed at a high-impedance point. This was borne out by the high standing-wave ratio in evidence on both bands, and the critical condition as to feeder length. But standing waves on a feeder system are not necessarily bad, provided that the system is tuned to resonance, and the line is not too long. With a relatively-short feeder the losses will not be excessive, even at 50 Mc., with a close-spaced line having good electrical characteristics. Even the Twin-Lead we employed for the initial tests showed up well with a feeder length of some 60 feet, *until* it rained. An open-wire line, preferably spaced less than two inches, is the answer.

Conditions are quite different on 144 Mc. Here, the system becomes so long, in terms of wavelength, that there are no marked resonance characteristics. The standing-wave ratio is very low, without any matching devices. This is not attributable to high losses tending to make the line self-terminating; a line of the same length was attached to a nonresonant antenna, and the s.w.r. was plenty high. The 300-ohm line will be OK on 144 Mc., but a close-spaced open line is preferable.

What Makes the "V" Tick?

The idea in back of the "V" is, of course, that of two long-wire antennas, positioned so that the major lobes of each combine to form two big ones down the middle. Thus the longer the sides the more critical becomes the included angle, for maximum gain, and the greater that gain. With arrays of the dimensions we're talking about, the included angles are not critical, unless the system is to be adjusted for optimum performance at 144 Mc. Unless the array is high in the clear, and over flat ground, it will almost certainly have some peculiar lobal characteristics, and changing the included angle by small amounts will not result in changes in coverage which will be easily discernible. Careful checks in several directions, with a fixed comparison antenna, were necessary to disclose any change in field pattern on 50 Mc., when the angle was changed from 70 to 40 degrees. If operation on three bands is contemplated, it is best to set the angle at about the optimum for the middle band, unless one of the others is a particular favorite.

(*Continued on page 118*)

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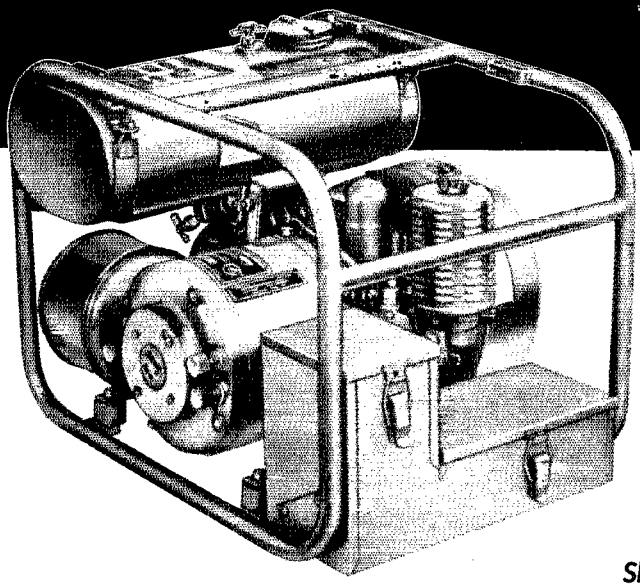

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You don't have better to use up the available space with a terminated rhombic? Undoubtedly, so far as unidirectional work is concerned. We have no arguments on that score, but a rhombic requires four masts, not one, and unless it is terminated it is little more than a folded-up "V." We are not attempting to make out a case for long-wire arrays of any sort; we wouldn't trade good rotary arrays for any *single* long-wire system, let alone a small one.

But if you want to get on 10, 6 and 2, quick-and-easy, with one antenna, and not a very big one at that, you could do worse than to try a small "V." If you have neighbor trouble, you might even incorporate the technique of W6ZMZ, in February *QST*. Chances are you'll come up with something quite a bit better than three separate dipoles, and it will be easy to try, in any case. — *E.P.T.*

Hints & Kinks

(Continued from page 70)

The whole thing can be constructed from junk-box parts, thus keeping cost low, and it can be kept on the work bench where it will be ready to give almost any gadget you can think of a workout. — *Ralph C. Renfro, WØKUZ*

Correspondence

(Continued from page 71)

Rt. 4, Box 451, Fresno, Calif.

Editor, *QST:*

Your editorial in the May issue of *QST* about high power missed the boat, to put it mildly! This latest blast seems to have hit me! Your remarks relative to ". . . some super-watted surplus-silly local . . . thinking in terms of push-pull 304TLs . . . shows up mostly in the more competitive activities, like certain contests. . . ." Well, W6QEU does have push-pull 304TLs and according to *QST*, he scored highest in the 1948 'phone Sweepstakes Contest! I feel like a little boy with a toy water pistol in a bank that was just robbed!

Your only suggestion for keeping some hams down to the power limit is that we ". . . adopt a healthy contempt, openly expressed . . . ," to those in our bands who run super power. My suggestion is education of these super-silly super power boys. I do not know of any engineering-wise ham who runs super power. You've pegged the type of character that does violate our amateur power limit — the type of ham who undoubtedly does not understand the S-meter gain he'll get by doubling his power (3 db.). This joker doesn't know that if he runs his input up from 750 watts to 7500 watts, the receiver at the other end will run the S-meter from perhaps the S9 (with 750 watts) to the 10-db. mark above S9! The difference on any ham band isn't even worth the trouble to throw the low-high power switch!

Let's start a campaign to notify the FCC of suspected cases of super power. Let's have some of the FCC's representatives walk in on some of our super-power boys. In 14 hard, QRM-ed years of hamming, I've never heard of one amateur cited by the FCC for power-limit violations. Has the FCC revoked the section of its Rules requiring the minimum power necessary be used to carry a QSO?

My power in SS contests has never exceeded 500 watts, which proves it doesn't take power to make contacts!

More power — to *QST!*

— *Peter K. Onnigian, W6QEU*

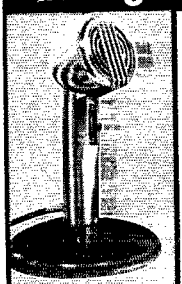
Route 68, Box 345, El Paso, Texas

Editor, *QST:*

My hat's off to you for your editorial in May issue by A. L. Budlong on the subject of power. Let's have more of

(Continued on page 120)

Astatic Microphones with CERAMIC ELEMENTS are gaining WIDE, ENTHUSIASTIC PREFERENCE



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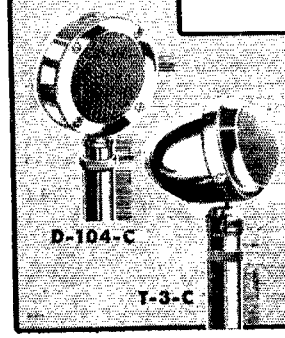
JT-30-C	7'	—62 db.	30 to 10,000	Substantially flat
JT-40-C	7'	—62 db.	30 to 10,000	Rising 1,000 to 4,000 c.p.s.
T-3-C	7'	—62 db.	30 to 10,000	Substantially flat
VC	7'	—62 db.	30 to 10,000	Substantially flat
VC-1	7'	—62 db.	30 to 10,000	Rising 1,500 to 5,000 c.p.s.
CC	7'	—62 db.	30 to 10,000	Substantially flat
CC-1	7'	—62 db.	30 to 10,000	Rising 1,500 to 5,000 c.p.s.

*0 Reference Level = 1 volt per bar



D-104-C

T-3-C

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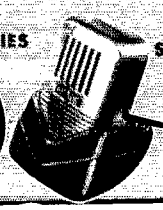

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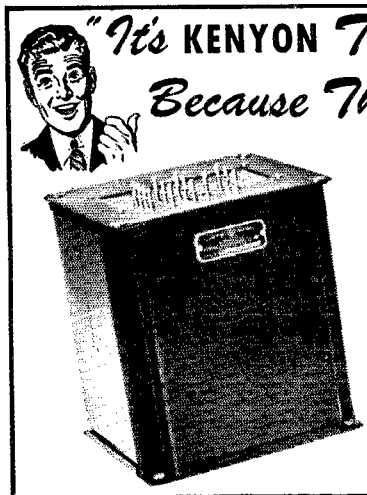

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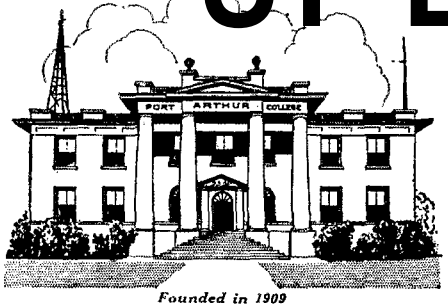

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em. I have been using that policy (suggested in the editorial) for the last year. . .

— *George W. Copping, W5OFK*

---

507 Haverford Ave., Narberth, Pa.

Editor, *QST:*

Your editorial in the May issue of *QST* rings the bell. Quite true, legislation alone will not correct the situation of running over power, any more than it will prevent other abuses practiced by selfish amateurs. The correction must come from within our own ranks, and it is with this thinking that at our meeting last week, the Frankford Radio Club appointed a committee to determine practical corrective measures that could be applied to discourage amateur operation beyond the prescribed power range.

The committee consists of W3FUF, chairman, W2SAI, and W3HRD. How effective we can be in this respect remains to be seen, but we are optimistic enough to feel that if enough organizations put their shoulders to the wheel, the results will be gratifyingly effective.

— *Frank McEnanem, W3IXN, Secretary*
Frankford Radio Club

Box 335, Boulder, Colo.

Editor, *QST:*

May I congratulate you on your stand toward cleaning up illegal operation in amateur bands, as stated in your editorial in the May issue of *QST*?

However I think your stand much too mild. These scoundrels should be reported to the FCC by any ham knowing the facts for that ham's own protection and the protection of all amateur radio. . . .

— *Eugene M. Link, WØIA*

4615 Lemona Ave., Sherman Oaks, Calif.

Editor, *QST:*

Thanks for your editorial on the rapidly-spreading "super hi-power" fad sweeping the country. This "hi-power" craze is like a malignant growth — it spreads swiftly. As a start in curing it, I would suggest an approach similar to the OO program. Let's police our own ranks and discipline offenders ourselves. We operators know who they are — and probably you do too. How about appointing local committees to investigate reported "cheats"? A "Cheater's Column" could then be included in *QST*, listing *black* calls and advising all DX and otherwise to give the calls listed a big fat *silent* treatment as long as they appear on the list.

How about it?

— *Ernest Erwin, W6KQY*

FOUND: A SECOND SPECTRUM

219 Foster Ave., Elyria, Ohio

Editor, *QST:*

I suggest that the Q signal "QRM" be deleted, since it is no longer necessary. After a few minutes of computation, I find we have too many frequencies for our own use. My slide rule sez:

According to statistics, we have about 75,000 hams in the U. S. At any one time:

(*Continued on page 122*)

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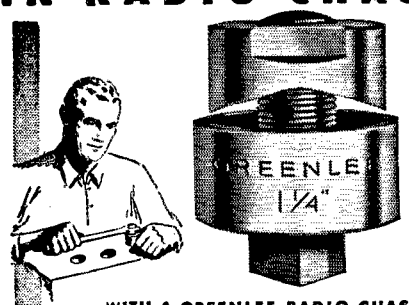

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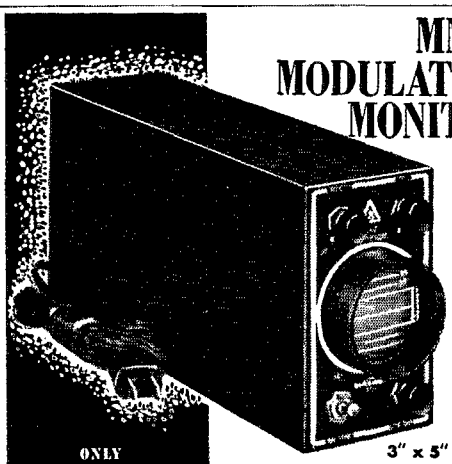

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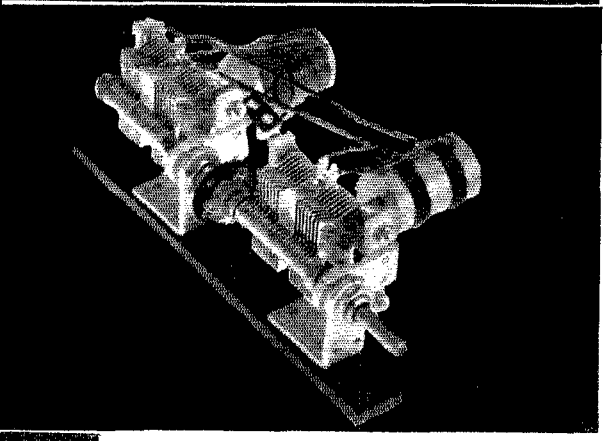

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[illegible]%	can[illegible] expect[illegible] to be sick or disabled	2250
[illegible]%	are [illegible].f. or experimenters, not interfering with normal h.f. ham communication	2250
9%	are rebuilding, or off due to TVI or BCI	6750
8%	are away from home on business or vacation or for other reasons	6000
	Total	17,250

Subtracting these from the 75,000 active group we find we have only 57,750 active at any one time.

But with all on the bands at once, and in QSO, we can eliminate 50%. Half of them will be listening to the other half who are sending. This brings the total down to 28,875 in QSO.

But this number can't possibly be in contact 24 hours per day; in fact, if they average 6 hours per day they are supermen. So 25% of the total would leave 7,218.75 operating 6 hours per day, seven days per week.

However, only a wild-eyed hermit could possibly keep up such a schedule 365 days per year. The average breadwinning ham can only hope to spend half his spare time on the band. So 50% of 7218.75 would leave 3609.375 hams on at any one time.

Of these, ⅓ or 33% run such low power that the big boys don't even have to consider them as QRM. They are just so much background hash. Knock off this ⅓ and we now have only 2472.916. But if you take into account the fact that skip causes at least 50% of the signals to fall anywhere but around the home QTH, we find that we may only expect interference from 1286.458 amateurs.

With VFOs in so many shacks, we can expect that at least 10% of the balance to be occupied with net operation, sharing frequencies, zero beat on a buddy's frequency for a sked, or piled up 40 deep on a foreigner just to make the local boys think they are working rare DX. So if we knock off that bit we have 1157.813 left.

Of these, about 60% will be on 'phone and 40% on c.w. Now if you gentlemen have listened on any of the bands for any length of time, you will realize that poor signals are a thing of the past. With modern engineering, everybody is T9xx today, and no one ever has splatter or key clicks. Of the past 1622 QSOs I have monitored, I have failed to hear anyone being given anything below a T8, and then, probably, only through prejudice. So if we knock out one sideband on 'phone with the xtal filter, and use our Q5-ers, peaked audio filters and similar gear on c.w., we can get by nicely with 3 kc. on 'phone and 1 kc. on c.w.

771.875 'phones with 3 kc. separation take	2215.625 kc.
385.938 c.w. sigs with 1 kc. separation take	385.938 kc.
	2601.563 kc.

Our allocations below 30 Mc. at present give us about 3170 kc., so we have an excess of 568.437 kc. for future expansion, and this completely disregards the new 15- and 160-meter allocations.

Don't you think it would be a nice gesture to give this excess 568.437 kc. back to the commercials till we need it more badly?

— *Bill Wildenhein, W8YFB*

P.S.: In all seriousness, I just felt like putting a "bee in your bonnet," so to speak. I don't have access to any figures or statistics on band-usage or occupancy, but I think it would be rather enlightening to consider what could be done if our frequencies were utilized with maximum effectiveness. Even under ideal circumstances, pile-ups would still be prevalent, but I'll bet that a serious breakdown or analysis such as the preceding would make a lot of chronic squawkers think twice. I know it was quite a jolt to me when I completed a good peaked audio filter recently and discovered how many holes did exist on the c.w. bands.

— *W. W.*

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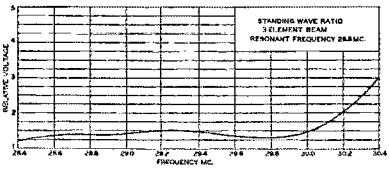
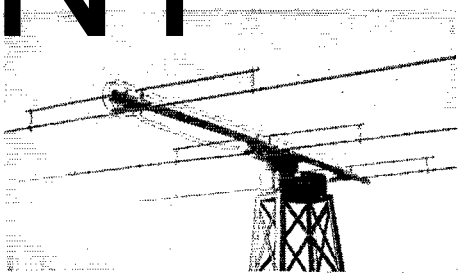
JFLINT

BEAM ADJUSTMENT MADE EASY with ROTOMATIC PHASED DRIVEN ELEMENTS . . .

The new JOHNSON ROTOMATIC has many features marking its superiority. When equipped with the new Rotomatic unidirectional, phased driven elements, the usual laborious element adjusting and tuning is largely eliminated. The beam is symmetrical. Element lengths, "T" match settings and spacing between elements are the same for each element. Under nearly all conditions, these values will be very close to theoretical values. In fact, the elements can be set up on the ground to the lengths and spacing given in the instruction manual and the beam used without further adjustment. It's much less affected by the proximity of surrounding objects and height above ground than the parasitic array. For this reason, it will frequently be more efficient than the parasitic array that can't always be "tuned on the nose" because of its inaccessibility at the top of a tower.



The broad band characteristic of the "T" match, for instance, permits use of the entire 10 meter band without significant change in SWR.



Three element 10 meter unidirectional phased array with open wire feed line connecting all elements.

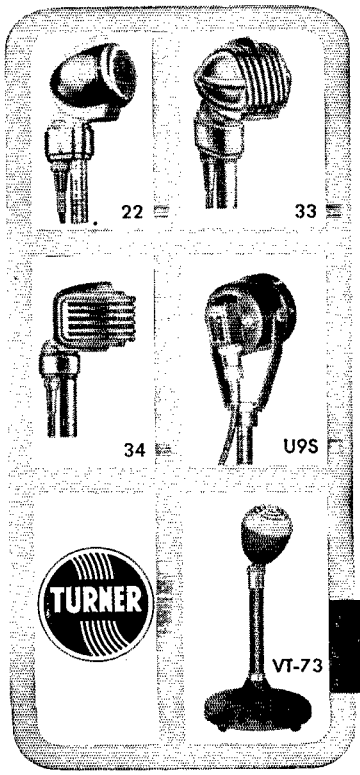
Features Galore

- High Gain
- Excellent Front To Back Ratio
- Light Weight
- Efficient "T" Match
- New "Tippable" Rotomatic Rotator
- All Components Available Separately
- All Weather Construction
- Easy To Erect
- Available With Parasitic or Unidirectional Driven Elements
- Rugged Strength
- New Selsyn Direction Indicator
- Will Safely Handle 2½ KW

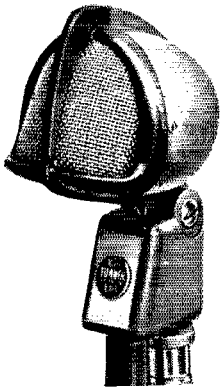
Write for Rotomatic Brochure

JOHNSON

E. F. JOHNSON CO. WASECA, MINN.



AIM AT CLEARER REPORTS WITH A TURNER 25X–25D



Smooth and sharp with high output and fidelity—that's the new Turner 25X-25D, crystal or dynamic. Finished in two tone umber gray with chrome plated grill or bright chrome. Complete with 20 ft. removable cable set and 90° tilting head. Get one for your rig. You'll like its style and praise its performance. Ask your dealer.

25X CRYSTAL—50–9000 c.p.s. 52 db below 1 volt/dyne/sq. cm. List.....**$27.50**

25D DYNAMIC—50–10,000 c.p.s. 54 db below 1 volt/dyne/sq. cm. at high imp. 30, 200, 500 ohms.....**$40.00**
High impedance.**$40.00**

All models—Bright chrome finish $2.50 List Additional. Push-to-talk switch $2.50 List Additional.

IN CANADA: Canadian Marconi Co. Ltd., Montreal, P. Q., and branches

EXPORT: Ad. Auriema, Inc., 89 Broad St., New York 4, N. Y.

THE TURNER COMPANY

917 17th Street, N. E. Cedar Rapids, Iowa

Microphones by **TURNER**

Microphones licensed under U. S. patents of the American Telephone and Telegraph Company, and Western Electric Company, Incorporated. Crystals licensed under patents of the Brush Development Company.

JELINT

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 30¢ 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 7¢ 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 7¢ 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 30¢ rate. Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested signature and address be printed plainly.

(8) No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.

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 or services advertised.

Please note the 7¢ rate on hamads is available to ARRL members only.

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.

QSLs. 100, $1.50 up. Stamp for samples. Griffeth, W3FSW, 1042 Pine Heights Ave., Baltimore 29, Md.

AMATEUR radio licenses. Complete theory preparation for passing amateur radio examinations. Home study and resident courses. American Radio Institute, 101 West 63rd Street, New York City.

QSL'S. SWL'S. Finest stock. Fairest prices. Fastest service. Dossett, W9BHV QSL Factory, 857 Burlington, Frankfort, Ind.

WANTED: Wireless equipment and literature prior to 1925; List ARRL Member Stations. Pink Sheet Supplement "Ban off" Oct. 1919 QST. Franklin Wingard, Rock Island, Illinois.

QSL's. Samples 10¢. Albertson, W4HUD, Box 322, High Point, N. C.

WANTED: AN/ART-13, BC-348, RTA-1B, AN/APN-9, R5A/ARN-7, AN/ARC-1, AN/ARC-3, BC-788-C, I-152, MN-26, Test sets with TS- or I-prefix, Dynamotors, control boxes, transmitters, receivers, power Supplies, etc. State quantity, condition and best price, first letter. Hi-Mu Electronics, Box 105, New Haven, Conn.

ALUMINUM tubing: 11 ft. lengths, ⅝" OD, .035" wall, 24ST: $1.50 per length, Metalcraft Toy Co., Paul Brown Building, St. Louis 15, Mo.

CANADIAN QSLS! Supergloss kromekote. Catalog in preparation, samples on request. Write for yours. W. John Chivers, Box 38, Grimsby, Ontario.

WANTED: 300-1000 megacycle or 500-900 megacycle equipment, ASB and APR receivers, LAE signal generators, Slotted lines, UHF tuning units, etc. Give details and price. W6LWP, John Poole, 2140 Ocean Blvd., Balboa, California.

ELEMENT One revision complete, Elements Five and Six newly released questions only, with answers for radio-telegraph exams. $1.00. McKenzie, W2SOU, 245 Poplar, Hackensack, N. J.

QSLS! Kromkote cards at a fair price. Dauphinee, W1KMP, Box 219, Cambridge 39, Mass.

QSL Quality cards priced right. Samples. Ferris, W9UTL, 1768 Fruitdale, Indianapolis, Ind.

SURPLUS: Deluxe crystal finishing kits containing holders, quartz blanks, abrasive, etching fluid, complete instructions. $2.00 each postpaid. Formerly sold $8.75. Vesto Company, Parkville, Missouri.

SUBSCRIPTIONS. Radio publications a specialty. Earl Mead, Huntley, Montana. W7LCM.

DON's QSL's. "The finest". Samples. 2106 South Sixteenth Avenue, Maywood, Illinois.

CRYSTALS: Precision low drift units. Type 100A in 80, 40, and 20 meter bands. Two units plug in one octal socket. Plus or minus 5 Kc. One dollar each. Exact frequency. $1.95 ea. Rex Bassett, Inc., Ft. Lauderdale, Fla.

CRYSTALS for all commercial services at economical prices. Over thirteen years of satisfaction and fast service! Eidson Electronic Co., phone 3901, Temple, Texas.

MEISSNER recorder, radio, phono; two speeds. Portable. Two double inputs with separate controls. $65.00 or best offer. Herbert Spitz, 30 Hosmer, Boston 26, Mass. BLuehills 8-7319.

BC-348R receiver; internal 110v powerpack, tech manual, new spare tubes, in perfect condition: $58.00. BC-453 Q5er with FT260A front control adapter, $5.00. F.o.b. Calabro, W6COS, 93 Patton Court, Riverside, Calif.

SALE: Hallicrafters SX-43 and R44 speaker, new condition, $135.00. A.C. Instructograph, 10 tapes, instructions, McElroy oscillatone (case cracked), both for $25.00. Simpson multitester, Model 240, $15.00. Thordarson dual plate transformer, new, 1000 and 750 V.D.C., $10. Must sell, will pack carefully. Kenneth D. Johnson, Hazelton, Iowa.

SELL: New Sonar VFX680 $60.00, new Super-Pro 550 Kc. to 30 Mc., $250.00; new K-8 Presto professional recorder, $225.00. W3BES, Box 34, Phila. 5, Penna.

FOR Sale: Collins ART-13 transmitter. Used about 50 hours. New condition. $125.00. postpaid. Elmer A. Searle, W7IKV, 1737 11th Ave., Helena, Montana.

FOR Sale: BC-348R with internal power supply for 110 V.A.C. and 20 meter bandspread. In good condition. $115.00. Also 1000 v. 300 Ma. power supply with several filament voltages and regulated drop. Practically new with switches, relay, and panel mounting, $55.00 F.o.b. Mt. Kisco, N. Y. C. C. Selby, W2VPV, 36 Beverly Road, Mt. Kisco, N. Y.

MON-KEY and beautiful miniature tube VFO, both new. Must sacrifice. WØSGG, 535 Platte, Colorado Springs, Colorado.

METERS repaired. Springfield Testing Laboratory, 815 North 12th St., Springfield, Ill.

WILL trade a BC-348 converted or unconverted in excellent shape for AN/ART-13 in similar condition. Also Abbott TR-4 for Gon-Set or similar converter. John Sherman, W9KRD/6, Box 40, Stanford, Calif.

DISTINCTIVE SWLS-QSLS. McEachron, 1408 Brentwood, Austin, Texas.

SELL: SP-400-X Super-Pro, used less than 15 total hours. $375.00. Includes speaker and power supply. W6FJQ, M. E. Brown, 10801 Lochard St., Oakland, Calif.

QSL's. Snappy new line! Stamp for samples. Larry's QSL Shop, Opportunity, Wash.

I need an S-meter for Hallicrafters S-40-A rcvr. Please quote price. Tnx. W. A. Roberts, SWL, 1407 E. 98th St., Brooklyn 12, N. Y.

GUARANTEED not always the best deal, but always a fair one at northern New England's largest amateur radio parts store. Evans Radio, Concord, N. H.

SELL or trade Meck T-60 transmitter, BC-459A, factory wired ST-203A Stancor, mobile rig with xtals, tubes, meter, shock mounts, T-17B mike, PE-105-A dynamotor, instructions. Want: relay rack cabinet 6 ft. high, standard width, Panadaptor, comm. receiver, volt-ohmeter, 10 over 20 beam, Harold Herman, W6FXU, 906 Florida Ave., Huntington Beach, Calif.

WANTED: APR-4 receiver, spare tuning units. Send for surplus list. Littell, 222 Lonsdale, Dayton 9, Ohio.

SX-43 Hallicrafters R-44 speaker and antenna one year old, perfect condition, $150 delivered. Ralph R. Harvestine, Lutheran Sanatorium, Wheat Ridge, Colorado.

USED portable mobile units: one 10-watt and 4-8 w. Karr Eng. Co. Type PTS-10X, PT-SX and PT-8X, A-3 emission; 30.58 Mc; 1-2 2½ in. Triplett meters, volt-meters; one ea. 1000-1200 volts Ma. power transformer, swinging choke and smoothing choke 500 Ma.; modulation transformer, input transformer, filament transformer and related equipment. Mail bids or inquiries to Room 203, Municipal Building, Muskogee, Okla.

QSL's-SWL's. Outstandingly better quality. C. Fritz, 1213 Briargate, Joliet, Ill.

SELL: HRO-5 with full coil set, Stancor 110-CM transmitter, also complete two-meter 100-watt station including superhet receiver. Send for the complete list. R. W. Houghton, Littleton, Mass.

SELL 32V1 Collins $395; 75A1, $295.00; VH152A, $47.00; BC-455B, $5.00. W8RWZ, C. H. Buchanan, Vale Rd. Rt. 1, Springfield, Ohio. Phone 2-5671.

FOR SALE: BC-375 100 watt transmitter complete, all seven tuning units. Instruction books. New factory cartons. Price $60.00. Fred Bell, 1436 West Ave., Burlington, Iowa.

SALE: Collins 30K-1, in perfect condition. Best offer over $1000. W4JUR, 803 Sylvania Ave., Fredericksburg, Va.

32-V-1 Collins transmitter, used ten hours, $375.00. HRO-7-T receiver, complete, used only 2 months, $245.00. W4WL, T. T. Freck, 54 Hunt Hill Place, Asheville, N. Car.

MICRO-match antenna meter-model 908, $21.50 used 2 months. RME-84 receiver, used 6 months, $59.95; Millen R-9er, $17.50, type 92101. Will trade or sell 16 mm kolograph sound on film projector for receiver and balance cash. Cost originally $585.00. Used 3 months. Make me an offer. Radio W4BC, Harry W. Robinson, 81 Ora St., Asheville, N. C.

SELL: Sonar XE-10 modulator, $25.00; PCA-2 Panadaptor, $25.00; Bogen PH-10 10-watt amplifier with G-E pre-amplifier, $25.00; General Industries record-changer, recorder, $25.00; Robert B. Springer, 5740 Maple, Wichita, Kansas.

COLLINS 30K 310A, best offer over $750.00. 75A, $250.00. BC312, $50.00. H. D. Faaborg, WØADQ, 1924 Mt. Vernon Road, Cedar Rapids, Iowa.

10-watt mobile transmitter and receiver, each with built-in six-volt supply; crystal controlled; covers 2-3.5 megacycles, suitable for 80. $55.00. f.o.b. Wellesley. Herbert W. Gordon, W1IBY, 12 Sunnyside Ave., Wellesley, Mass.

SELL: XE-10 $25.00; VFO21, $35; TR4B, $25; Millen exciter, $30. Complete, and in excellent condx. Al. Martin, W1ORN, Whitefield, N. H.

SELLING out: RME-45 and speaker with 50-watt transmitter 10 thru 80. Parts for 1 Kw, $300.00. F.o.b. Louisville, Ky. Write for list. Robert Kell, 2410 Clarendon Ave., Louisville, Ky.

HAMMARLUND 4-20 transmitter, like new. Home wired, with 10-meter coil. $42.50 or with complete set of coils, tuning crystals, instruction book, $47.50. Hammarlund four-11 modulator, home-wired, like new, $32.50. Howard 437-A receiver with crystal, good condx. $29.50. Teleplex late model fair condition, with recorded and blank tapes, $25.00. W5PCW, Rt. 2, Box 114X, Port Arthur, Texas.

QSLS? SWLS? America's finest! What's your desire? Samples 3¢. QSL printer Sakkers, W8DED, Holland, Michigan. "Made-to-order QSL Cards".

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QUART crystals: without holders, highly active, assorted frequencies 5600 to 8400 kilocycles, 6 for $1.00 [illegible] T-24 holders. Hold[illegible] and mounted crystals available. Breon Laboratories, Williamsport, Penna.

QSL-SWL quality cards. Jaggi, W5FAV, 6118 Goliad, Dallas, Texas.

SELL: National HFS receiver, less power supply, used 10 hours. Perfect. $110.00. W5BRR, 1018 Camelia Ave., Baton Rouge, La.

QSLS-SWLS. Meade, WØKXL, 1507 Central Ave., Kansas City, Kans.

ALUMINUM tubing, etc. Beams for amateurs. TV, FM. Write for lists. Willard Radcliff, Fostoria, Ohio.

MEISSNER 150-B with model EX shifter and all coils 10-80 meters. In excellent condition, $160.00. W2YZA, Box 403, Dansville, N. Y.

FOR sale: TEMCO 500GA transmitter and Collins 75A1 receiver like new. Will sell together or separate. Best cash offer will take. B. O. Reynolds, Lake Geneva, Wisconsin.

WØKUT needs cash. Send for list of parts and equipment. No reasonable offer refused. 6280 Reber Place, St. Louis 9, Mo.

WANTED: An RME-69 or SX-25. N. K. Remley, USMH, Ft. Stanton, New Mexico.

COLLINS 75A-1 receiver, in excellent condition, $280.00. Astatic T-3 microphone with push-to-talk stand $15.00, cost $28.00. Alliance Tenna-rotator, never used, with 100 ft. control cable, $20.00. Cost $31.00. Six-meter rig, Clapp ECO. NBFM with power supplies, 829-B final, cost $125.00, sell for $40.00 cost of supplies alone. Junior Voltohmyst, $25.00. Dr. M. L. Redman, WØENK, Fargo, No. Dakota.

SALE: DB-22A new condition. Used few hours, $50.00. Telrad frequency meter, $20.00. Irv. Fishelberg, W2ZLD, 223 Pacific Ave., Atlantic City, N. J.

HALLICRAFTERS SX-43 with R-44 speaker, three months from new. In top condition, first $140.00 takes it. Samuel Cloud, Grant City, Mo.

BC-22 Walkie-talkie, complete, $25.00. Parts, 750 volt supply, $10. Stolberg, 1024 E. Knapp, Milwaukee 2, Wis.

BARGAINS! 1.2 Ma. DC miniature dipper meter, $3.49! UHF coaxial mobile antenna with mounting hardware 49¢, three for $1.00! FL-5 filter, 98¢! Selsyns GE2J1G1, used tested pair, $1.49! Free bargain list. "TAB", 107 Liberty Street, N. Y. C.

FOR Sale: Exceptional BC-610E, new when purchased, perfect condition; complete 614 E speech amplifier, manuals, tubes, coils and vacuum condenser 10, 20, 40, and 80 and factory converted for 10. Price $625. Walk Kohlhagen, W9EWB, 752 Oakley, Elgin, Ill.

SELL: VHF-152 $55.00; VFO Meissner Model EX, factory-assembled, $65.00; SCR-522 receiver, partially converted $10.00. F.o.b. West Hartford. W1IKE, 38 LaSalle Rd., West Hartford 7, Conn.

FOR sale: ART-13 converted to A.c. NC120, bug, many extras, $250.00. W. F. Corbett, USCG Air Station, Port Angeles, Wash.

SELL: BC412-A 5 inch 'scope, with tubes, $45.00. BC-375D xmttr, with tubes and 3-4 Mc. tuning unit $25.00; BC-457 xmttr. 4–5.3 Mc. new, with tubes BC-458 xmttr, 5.3–7 Mc. new, with tubes. W5FST, P.O. Box 671, Seguin, Texas.

GEIGER-Mueller counter tubes. Threshold 900 volts, audio amplification unnecessary. Metal encased. $15.00 postpaid. Radio Specialists Co., 417 West 12th Ave., Denver, Colorado.

SELL: New Eimac 4-125-A, $20.00. Part list on request. Wanted: Mallory VP-540, VP-554 Vibrapak. W5OER, Box 262, Velasco, Texas.

50 Kc IF transformers, powdered iron cores and shells, pair $7.00; three for $10.00. Pair 282A's, $3.00; BC453, $11.00; Valpey 1000 Kc xtal, $3.00. Want miniature 200 microampere meter. W8MGQ, 1745 W. Boston, Detroit 6, Mich.

SALE: All in perfect condition. Best offer. Complete 300-watt 10–20 fone with VFO. RCA CR91 12″ speaker. 4 element 20 beam, 15 ft. tower, rotator. Converted 522 with power supply. Roy Hinkel, W3GIB, 228 Heather, Upper Darby, Penna.

BARGAINS: New and used transmitters, receivers, parts: Globe King, $299.00; new 150-watt 'phone, $199.00; 60-watt 'phone, $99.00; Globe Trotter, $57.50; R9'R, $15.00; Millen Exciter and VFO, $25.00; TR-4 $19.95; HT-9, $295.00; MB-611, $39.00; Silver 701, 800, 801, 802, $29.50; NC-173, SX-28, $149.00; NC-240C, HQ-129X, HRO, $139.00; RME-45, SX-25, $99.00; DB-22A, $49.00; S-38, $29.95; S-41, $25.00, and many others. Large stocks, trade-ins. Free trial. Terms financed by Leo, WØGFQ. Write for catalog and best deal to World Radio Labs, Council Bluffs, Iowa.

QSLS? Colortone QSLS! Snappy! Bright! Different! Beautiful samples free! No junk. Colortone Press, Tupelo, Miss.

SELL NC-240D, used 4 months, plus BC-453 Q5'er and 24 v. filament transformer. Best offer over $175.00. Don Savin, WØQFK, McCook, Nebr.

SAVE $40.00. Sacrifice 2 months old 75A-1 in absolutely perfect condition with speaker and in original carton. $335.00. Going to sea. Dick Kiaser, W7LRN, 1022 Elrod Ave., Coos Bay, Oregon.

SURPLUS: L.M. freq. meters, less books, used, $25.00; vacuum condensers, 50 mmfd 7.5 Kv. at 10 amps, $1.00; R.F. amp meter 0–10, $3.00; Z.B. receivers, 4-stage R.F. 234 to 258 Mc. can convert to 2 meter or 420 Mc. $10.00; headset type HS30, $1.00; also ART-13s and ARC-1s. G. J. Schultz, Inc., 639 W. 24th St. Norfolk 8, Va.

FOR sale: 1 Kw. cw/fone xmttr. L. A. Gagne, Carlisle, Penna.

COMPLETE station for sale: NC-240 D, HT-9, 1 xtal mike; 1 key; 1 bug; 1 3-element 10-meter beam; 1 boomerang monitor, assorted small parts, sacrifice $450.00 F.o.b. Manhattan, Kansas. Mrs. Oliver Ward, WØZZL, 427 Colorado St., Manhattan, Kans.

SWAP: Three 4D32's for two 4-65A's. Many spare parts half-price. Send stamp for list. WØSUG, Kearny, Nebr.

SWAP or sell one Thordarson 300-watt multi-match, 10-meter mobile unit complete, BC459A, ARC-5-3 to 5.3 rcvr, beam motors, filters, condensers, and what have you for a VHF-152A or Mon-Key. W8NOH, 1546 Fuller N. E., Grand Rapids 5, Mich.

SELL; Gon-Set 6-meter converter, in excellent condition. Make offer. W1JUL.

COLLINS ART-13 transmitter, excellent condition, complete with tubes. Not converted. $85.00. W8OEL, 2287 Lalemant Rd., University Heights, O.

QSLS: Original designs priced to fit hams' pocketbooks. Stamps for samples. Leonard's Print Shop, 85[illegible] View, Hagerstown, Md.

FOR Sale: New BC-459A converted with new parts. W9IHG, Schwark, 193 West 12th St., Fond du Lac, Wis.

FREE QSL-SWL samples! Reasonable prices. W1HJI, Box 32A, Manchester, N. H.

FOR Sale: Two complete stations and receiver. RME-45 with 10m–20m 40DB booster (2-6AC7's and own power). 75W V.F.O. Driver: Clapp reg. 6V6, 6V6 doubler to two 807's par. Own power, meter and cabinet. Rack: 6V6 Tritet-807, two 8005's P.P. Separate power and meters. 160-M, 80-M, 40-M, 20-M, 10-M. Class "B" modulator P.P. 811's, meter and own power. Complete with extra filters and tubes. First $675.00 takes it. Frederick (W4KQU) 3005 Harrison Ave., Louisville, Ky.

ESTATE of Capt. Lee, USNR, has for disposal: One RCA shortwave receiver ACR-155 (range 520 Kc to 22 Meg.). In good condition: one S-40 Hallicrafters (range .55 to 44 Meg.); one marine radio telephone (ship-to-shore) made by Islip Radio Mfg., Model MRT 10-1 25A (10-watt output, bands 2670 Kc to 2738 Kc). All gear in good condition. Write: L. Lee, 53 Elm St., Rocky Hill, Conn.

OUR business: buying and selling amateur radio transmitters. Transmitter Exchange, Wakefield, Rhode Island.

HQ-129-X, with speaker, $150.00. Purchased Oct. 1947. Can prove. Morrison, 5515 Wissahickon, Germantown, Penna.

LUCITE, Plexiglas. Any size sheets, masked. Square foot (12 x 12) cost, 1/16″, 95¢; 1/8″, $1.25; 3/16″, $1.50; 1/4″, $1.80. 5 lbs. off-cuts, $1.25. Colors: add 10%. Include 10% postage. Almac Plastics, 230 Fifth Ave., New York 1, N. Y.

NEW tubes: 2C22, 18¢; 10Y, 14¢; RK-34, 28¢; 24G, 44¢; VT-127A, $2.40; 304TL, 89¢; 807, $1.15; 811, $1.71; 815, $1.72; 1625, 19¢; IN34 xtals, $1.19. Request free monthly bargain bulletin. Lectronic Research Laboratories, 1025 Callowhill Street, Philadelphia, Penna.

WANTED: New 250THs for spares, guaranteed delivery in good shape. Write WØAEZ, Brunswick, Missouri.

BC-348-0 receiver for sale. Converted AC, $65.00. Forrest Adams, W1FN, White River Junction, Vt.

SWAP BC-610, complete, with all coils, tubes and speech ampf. Converted for ten and on air for 32VI — best cash offer. Reason: being transferred. Prefer local deal Chicago area. Lt. R. B. Harris, Nattu, NAS, Glenview, Illinois.

WANTED: AN/ARC5, in good condition. First letter best price. John Fillmore, 139 Forest St., So. Weymouth, Mass.

BC-348-0 receiver, converted for AC operation; shock mounted, and in a like-new condition: $65.00. Broadcast modulation transformer 810s Class B to 810s Class C new, $35.00; multimatch Kw modulator stage, rack mounting with Class B tubes and filament transformer, $45.00. Meissner Model EX Signal Shifter with FM and power supply, new, $50.00. Pair 8 henry 500 Ma. smoothing chokes 3500 VRMS insulation cased and potted, $12.50 each. Several 2/12 henry 1.0/.100 ampere swing chokes 3500 VRMS insulation cased and potted, never used, $10.00 each. Trying to raise the cash for a Collins 310A. W1IAP, 75 Simonds Road, Lexington, Mass. Tel. 9–2768–R.

NEED money? Cash in on your un-needed gear. Advise the Overbrook Co., Overbrook, Mass.

RADIOTELETYPE converters for FSK reception. New circuit. 7″x 19″ panel. 20 Ma. output. $485.00 F.o.b. Sacramento, California. George J. Maki, W6BE, Route 7, Box 1198.

BARGAINS: New and reconditioned Collins, National, Hallicrafters, Hammarlund, RME, Millen, Meissner, Meck, other receivers, transmitters, etc. Reconditioned S-38 $29.00; S-40A, $69.00; SX-42, $199.00; NC-57, $69.00; HQ-129-X, $129.00; DB22A, $49.00; RME-45, $99.00; HFS, NC-173, NC-183, HRO7, NC-101X, HF-10–20, VHF-152A, RME-69, S-20R, SX-25, SX-43, Temco, 75GA, $249.00; BC-610, etc. Shipped on approval. Terms. List free. Henry Radio, Butler, Mo.

WANTED: Wheatstone perforated code tape keying head, good condition. State make and price. P. K. Church, Oswego, Oregon.

SELL: 200 QSTs: 1929 to 1939. 15 ea. '40–'49 10 ea. F.o.b. W1KX.

FOR Sale: Hunter Cyclemaster, and RME-45, to the highest bidder. E. J. Hoover, WØUUC, 223½ E. 2nd St., Muscatine, Iowa.

FOR Sale: SX-25, in good condition, less speaker, $50.00. R. H. Collins, W4CSC, Christiansburg, Va.

SELL: HQ-120 with speaker, 140 watt transmitter-variac, Sonar XE10, twelve crystals, D104 mike, three element beam, loads of spare tubes and parts, first $150.00 gets it. Jensen, W2GYH, 38–17 147th St., Flushing, L. I., N. Y. Telephone Flushing 3–8384.

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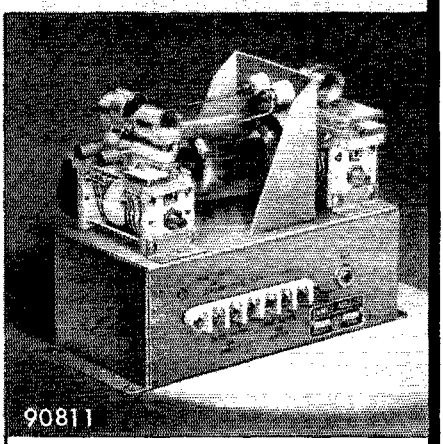

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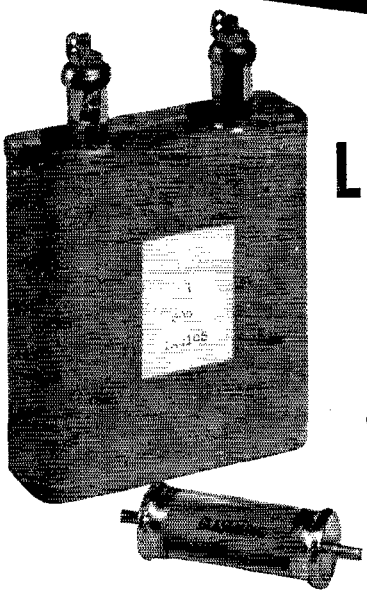

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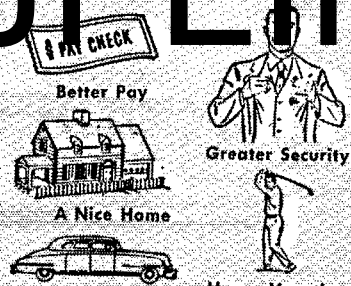

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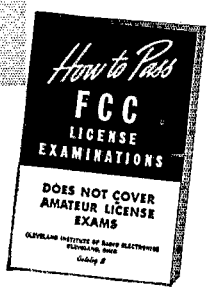

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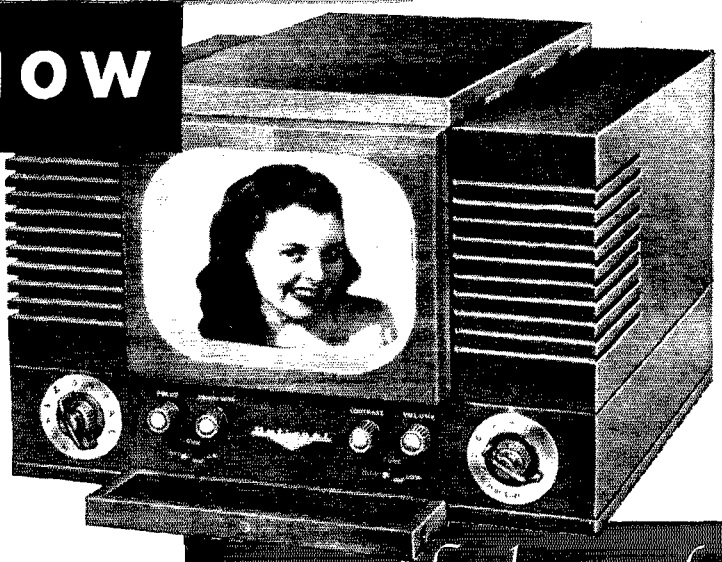

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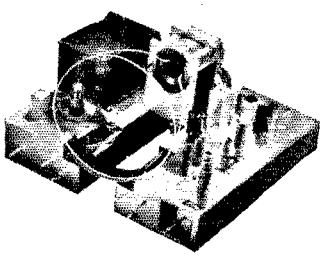

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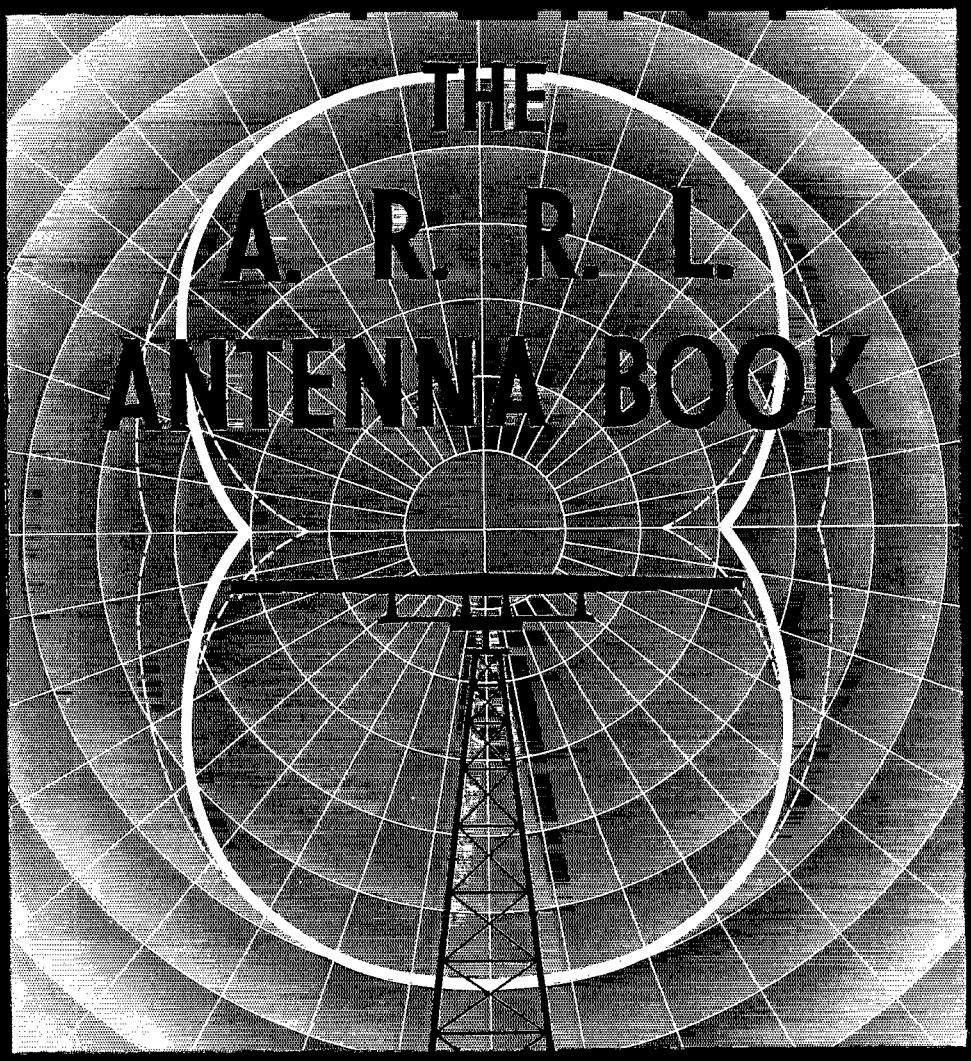

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