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Want to find out more about fm repeaters? See page 11 and 16 for articles on the subject.
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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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* Member Executive Committee
"It Seems to Us..."

CAMILLE

Section 97.1(a) of FCC rules, stating the basis for existence of amateur radio, reads as follows:

"Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications."

This language, adopted in 1951, only recognized a situation which had long existed; in the 50 years since 1919, amateur radio has been a principal—if not the only—communications link following a hundred major and a much greater number of less consequential disasters.

Despite lessons learned and improvements made in the official warning systems and other preparations for hurricanes, Camille wreaked death and heavy destruction along the Gulf coast as well as to its northeast. Despite lessons learned and improvements made in the preparations for disaster communications among various other radio services, it is still amateur radio which fills the gap when plans go awry. As a prime example, the adjacent letter from the New Orleans Chapter of The American Red Cross makes quite plain the extent to which amateurs are fulfilling their responsibilities.

In recent years there has been a tendency among a segment of amateurs—fortunately a small one—to feel that our usefulness in emergency is more and more limited. They argue that modern planning and sophisticated communications systems make us obsolete. They point to the growth of land mobile (taxi, utility company, etc.) and citizens radio as supplanting the traditional role of the amateur in disaster.

Let us hear no more of this kind of talk. And, through enrollment in AREC, NTS, RACES, or other organized amateur group, let more of us dedicate ourselves to preparedness in continuing to successfully fill our role as emergency communicators.

NEW ORLEANS CHAPTER
THE AMERICAN NATIONAL RED CROSS

August 28, 1969
American Radio Relay League
Newington, Conn. 06111

Gentlemen:

The American Red Cross wishes to commend the excellent work done by Amateur Radio Operators during and after the disaster created by Hurricane Camille.

Amateur Radio was the only communication that the American Red Cross had for 10 days following this disaster with four of our disaster centers on the southeast Mississippi Gulf Coast.

The American Red Cross through these Amateur Radio Operators’ facilities were able to supply these disaster centers with their medical, nursing, personnel, drugs, food and shelter requirements.

It was by amateur communication also that we were able to inform hurricane victims of time and locations of mass evacuations through local broadcast stations.

Because of the great number of ARRL members and Radio Clubs whose services and skills were used in this connection, it is impossible to thank them individually.

We request that the American Radio Relay League express our appreciation to them.

Only through the dedication of volunteers such as these make the work of the American Red Cross possible in times of disaster.

Yours very truly,

NEW ORLEANS CHAPTER, THE AMERICAN NATIONAL RED CROSS

John B. Smallpage, Chairman
League Lines . . .

As this issue goes to press in early September, Amsat has not yet received a final launch commitment for Australis-Oscar 5. We do know, though, that a launch will not occur before October 15. So, if you're not yet ready to listen to the next amateur satellite, you still have time! An article on tracking starts on page 54 of this issue. In the meantime, listen to WIAW bulletins for possible late info on the launch.

Which reminds us that FCC continues to develop preliminary views on what the U.S. position should be at the space conference scheduled for Geneva in June of 1971. Still in the documents, with strong ARRL support, is a proposal to add to the international definition of amateur radio a broad authorization for space activity (of course within the limits of the allocations table).

HQ. Awards Committee mostly disagree but bows to the recommendation of the Contest Advisory Committee to drop power multipliers in this year's SS for one-time trial. In any event, with your score this year let us know whether the new rule should continue for 1970.

We had long contemplated a tear-out chart in this issue showing the final incentive-licensing band segments. But repeated FCC statements of their intentions to make a last-minute full review raises the possibility that our chart might be wrong, even if only in minor respects. So we'll have to put it off a couple of months and rely on WIAW and other routes for spreading the word on any FCC announcement of change.

FCC has clarified the call-sign identification requirements under its "tail-ending" rule change, and its interpretation avoids some of the hardships in rapid-contact (contest) operation. See page 90.

Old and creaky though it may make us (and some of you!) feel, this month we're starting a 50-years-ago column (page 112). These were some of the most exciting times in ham radio, and we hope you enjoy reading the brief summaries.

Except for continued rumblings about a west-coast case, reports on obscene and profane on-the-air conversations by amateurs have pretty much subsided since a crack-down earlier this year by FCC. Let us hope the trend continues toward a more responsible exercise of our rights to free speech.

Quote-of-the-month, from ARRL Director W4KFC: "In ham radio we have the ultimate hobby, one that offers us another world to escape to, but with the advantage of strengthening, rather than abandoning, our real world involvements. The world is filled with lonely people, but it is hardly possible to be a lonely ham."

Novices/Techs/Conditionals: when taking the General, the same $4 fee will cover the Advanced, too, if applied for at the same time. If you pass the General you get that class, even if you fail the Advanced. Why not try both?

We understand the hams in Phoenix were so enthusiastic after seeing K7UGA's copy of the new ARRL film that they arranged for showing it during intermission at a local movie house -- where it also received acclaim.
AMATEUR FM
and
REPEATERS

BY LES COBE, W6TEE,*
and JAY O'BRIEN, W6GDO**

ALTHOUGH amateur fm has been the subject of a number of theory and construction articles in QST and other publications since before WWII, it didn't get off the ground until recently. The claimed advantages of fm couldn't outweigh the additional receiver complexity required to fully obtain these improved results. The picture was changed, however, as large quantities of used commercial fm mobile equipment became available to the amateur.

This older equipment, some of it madeobsolete for commercial service by changes in FCC requirements and by newer solid-state equipment, has become the new "surplus" equipment for hams. The ham tinkering instinct, long fueled by military surplus equipment, has been frustrated recently by the lack of such equipment suitable for modern amateur communications. Fmers, however, have rediscovered the old fun associated with adaptation and modification of inexpensive equipment. But it should not be inferred that fm equipment normally requires extensive conversion for amateur use. With many units, slight padding of certain tuned circuits and retuning to the amateur band is all that is required. Once the rig is on the air, though, much innovation is possible.

Fam Characteristics

What are the technical advantages of fm? Many misconceptions exist on this subject due to popular oversimplification of fm theory. Fm has a noise advantage over a-m as long as the received signal is above the threshold of receiver sensitivity. The amount of fm noise improvement is proportional to the deviation or bandwidth occupied by the signal. A wide-band fm signal will have a greater quieting effect than a narrow-band fm signal of the same strength. As the deviation is lowered (assuming the receiver bandwidth is narrowed at the same time) the signal characteristics will become more like a-m. An fm signal with +2-kHz deviation (nbfm) and an nbfm receiver will have a signal-to-noise ratio and threshold similar to a-m. The point usually missed is that the quieting effect of the wide-band signal is at the expense of receiver threshold. In other words, a-m has a greater range in weak-signal work, but fm will provide greater noise suppression in local work.

If this is true, why do amateur fm mobiles have a greater range than the average a-m mobile? The answer to that is simple. Typical 2-meter fm mobile transmitters, for example, are rated at 30 to 60 watts rf output power (50-100 watts input), or about 10 dB more output than most 2-meter a-m mobile rigs. Some writers have also claimed better receiver sensitivity for fm equipment. This is not exactly true, as the pentode rf stage in many vintage fm rigs can

The recent upsurge in fm activity in amateur operating has brought with it new techniques, procedures and standards that provide a perpetual source of questions for the fm newcomer. This article discusses fm operating practices and the closely related subject of amateur repeaters.

October 1969
Most FM mobile work is done with trunk-mounted equipment. This means that only the control head, speaker, and tone-signaling box (if used) are mounted in the driver’s compartment. In this view of the W6TEE mobile installation one can see the FM controls, plus an HF transceiver for use on other amateur bands.

stand some improvement in noise figure. But, in general, the least sensitive FM receivers are still better than many of the simpler a-m receivers in common use.

Part of the unique nature of amateur FM operating is due to the effect of the equipment capabilities on operating practices. FM equipment, as obtained from commercial users, is designed for fixed-frequency operation (but not necessarily single-frequency operation) with both the transmitter and receiver crystal controlled. When first faced with this unfamiliar configuration, the early operators, rather than trying to modify the equipment to fit a preconceived mold of tunable receivers and random frequency operation, developed new techniques to better use the equipment and the mode. They found that channelized operation with squelched receivers permitted continuous monitoring of the active frequencies. They found that long, time-consuming calls and CQs were no longer necessary to establish communications, as all receivers on the channel came alive with their first word. Mobile operation became possible for those with only a short time to spend.

**FM Operating**

What operating procedures are followed on an FM channel? Only one generalization can be made. Long transmissions are out. Natural, short transmissions, such as practiced by the better sideband operators, are usually encouraged. The old monopoly switch routine, where the operator gabs to himself for 10 minutes at a time, should have disappeared from ham radio with the antenna knife switch, but still clutters up the VHF bands on a.m. Other than that, operating procedures are a matter to be determined by the local channel users. Some channels are calling channels on which extended rag-chewing is discouraged, whereas other channels, or the same channel in another area, may be alive with chit-chat. This is a matter of local determination, influenced by the amount of activity, and should be respected by the new operator and the transient mobile operator alike.

One question that always comes up in connection with amateur FM involves the use of the “10 code”. Some groups, having members who are in the two-way radio repair or law enforcement business, have carried the use of this code over into their amateur operating. However, many feel that this code offers little or no communications enhancement to amateur operating and that its use is an affectation. Plain language in many cases is as fast and requires no clarification or explanation to anyone.

FM, more than a-m, requires precise frequency setting and high-quality crystals for best results. An off-frequency signal will be received with distortion and will not have full noise rejection. For this reason, FM transmitters and receivers have oscillator adjustments to permit an exact setting of the crystal in each.

Standard channel frequencies have been fixed upon to permit orderly growth and to permit communications from one area to another. On 2 meters, it has been agreed that any frequency used will fall on increments of 60 kHz, beginning at 146.040 MHz. The national calling frequency is 146.940 MHz (or “nine-four”). On 6 meters, the national calling frequency is 52.525 MHz, with other channels having 10-kHz spacing beginning at 52.560 MHz. Ten-meter FM activity can be found on 29.600 MHz. Recommendations for 10 meters and 220 MHz are for 40-kHz channel spacing starting at 29.010 and 220.020 MHz. Usage of the 420-MHz band varies from area to area, as it is used for control channels, repeaters, and remote bases, as will be discussed later. As an example, in California activity begins at 449.950 MHz and progresses down to below 435 MHz in 50-kHz increments.

**Deviation**

Now that you have read all of these facts about FM, you should know that it is not strictly FM that we have been talking about, but actually PM or phase modulation. The equipment available for amateur use, originally used on commercial VHF “FM” uses pm, not fm. Both fm and pm are forms of angular modulation, but through usage, fm has become the generic term covering both. Since both are easily generated, our only real concern is in the difference in signal characteristics. A phase-modulated signal will have a rising audio response at the higher frequencies when detected by an FM discriminator. For this reason, a simple RC circuit is placed on the discriminator output to roll off the higher frequencies to achieve a flat response. A true FM-generated signal must then have a high frequency boost to sound natural on a receiver designed to receive pm. It should be noted that this frequency slope is completely across the

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audio bandpass (at least 300 to 3000 Hz) and should not be confused with pre-emphasis in broadcast FM which applies only to a portion of the audio range.

Commercial equipment frequently has speech clipping in the transmitted audio. This not only permits the commercial user to meet FCC deviation requirements, it also permits the amateur to maintain a high audio level without deviating outside the receiver passband. When deviation is excessive, the receiver will actually lose the signal on modulation peaks and the squelch will close. Complementary RC circuits are employed before and after the clipper to overcome the rising modulation characteristic of PM to produce a constant peak frequency deviation without altering the basic frequency response. When the audio level is lower than the preset maximum, the clipper and its associated RC circuits will have no net effect.

Two deviation standards are commonly found. The older standard — "wide-band" — calls for a maximum deviation of 15 kHz. The newer standard — "narrow-band" — imposed on commercial users by the splitting of their assigned channels, is 5 kHz. The deviation to be employed by amateurs on frequencies where FM (other than NBFM) is permitted is not limited to a specific value by the FCC, but it is limited by the excellent bandpass filters found in FM receivers. In general, a receiver with a filter for 5-kHz deviation will not intelligibly copy a signal with 15-kHz deviation. Although some work is being done with 5-kHz deviation, most amateur work is with 15-kHz deviation. In some areas, a compromise deviation of 7 or 8 kHz is used with some success with both wide and narrow receivers. When necessary, receiver filters can be exchanged to change the bandpass.

**Repeaters**

A repeater is a device which retransmits received signals in order to provide improved communications range and coverage. This communications enhancement is possible because the repeater can be located at an elevated site which has coverage superior to that obtained by most stations. A major improvement is usually found when a repeater is used between VHF mobile stations, which normally are severely limited by their low antenna heights and resulting short communications range.

Although a-m repeaters are in use in some parts of the country, the recent upsurge in repeater interest was brought about by amateur FM. Proximity effects encountered between a repeater receiver and transmitter are quite troublesome with a-m, but are present to a much lesser degree with FM. Also, a-m repeater performance is degraded by off-frequency operation by some users through the use of inexpensive crystals in oscillators having widely varying characteristics. FM equipment, however, is designed for spot-frequency operation, minimizing this problem. Although some of the following information will apply to a-m repeaters, much of it is based directly on FM techniques.

The simplest repeater consists of a receiver with its audio output directly connected to the audio input of an associated transmitter tuned to a second frequency. In this way, everything received on the first frequency is retransmitted on the second frequency. As a practical matter, certain additional features will be required to produce a workable repeater. These are shown in Fig. 1A. The COR or carrier-operated relay is a device connected to the receiver squelch circuit which provides a relay-contact closure to key the transmitter, when an input signal of adequate strength is present. As all amateur transmissions require a licensed operator to control the emissions, a "control" switch is provided in the keying path so that the operator may exercise his duties. This repeater, as shown, is suitable for installation where an operator is present, such as the home of a local amateur with a superior location, and would require no special licensing under existing rules.

Unfortunately, most groups intending to install a repeater do not have a suitable location that has a licensed operator on hand. In this instance, a special license for remote-control operation must be obtained and provisions made to control the equipment over a telephone line, or a radio circuit, 220 MHz or higher. The licensed operator must then be on hand at an authorized control point. Fig. 1B shows the simplest system of this type. The control decoder may be variously designed to respond to simple audio tones, dial-pulsed tones, or even "touch-tone" signals. If a leased telephone line is so specified, dc control voltages may be sent directly, requiring no decoder. A 3-minute timer to disable the repeater transmitter is provided for...
fail-safe operation. This timer resets during pauses between transmissions and does not interfere with normal communications. The system just outlined is suitable where all operation is to be through the repeater and where the frequencies to be used have no other activity.

**Remote Base**

Before we can discuss more sophisticated repeaters, we must explain the "remote-base" type of operation. The remote base, like the repeater, utilizes a superior location for transmission and reception, but it is basically a simplex device. That is, it transmits and receives on a single frequency in order to communicate with other stations also operating on that frequency. The operator of the remote base listens to his hilltop receiver and keys his hilltop transmitter over his 220-MHz or higher control channels (or telephone line). Fig. 2A shows such a system. Control and keying features have been omitted for clarity. In some areas of high activity, notably Los Angeles, repeaters have all but disappeared in favor of remote base, due to the interference to simplex activity caused by repeaters unable to monitor their output frequency from the transmitter location.

Fig. 2B shows a repeater that combines the best features of the simple repeater and the remote base. Again, necessary control and keying features have not been shown, in order to simplify the drawing. This repeater is compatible with simplex operation on the output frequency because the operator in control monitors the output frequency from a receiver at the repeater site between transmissions. The control operator may also operate the system as a remote base. This type of system is almost mandatory for operation on one of the national calling frequencies, such as 146.940 MHz, because it minimizes interference to simplex operation and permits simplex communications through the system with passing mobiles who may not have facilities for the repeater input frequency.

This photo shows the Wolf Mountain repeater equipment which is rack mounted and neatly placed inside the shared vault. This equipment is a complete working system of the type described in the text. The local control and test panel is mounted on the open door.
The audio interface between the repeater transmitter and receiver can, with some equipment, consist of a direct connection bridging the transmitter mike input across the receiver speaker output. This is not recommended, however, due to the degradation of the audio quality in the receiver output stage. A cathode follower connected to the discriminator after the \( RC \) compensator provides the best results. A repeater should maintain a flat response across its audio passband to maintain the repeater intelligibility at the same level as direct transmissions. The intelligibility of some repeaters suffers because of improper level settings which cause excessive clipping distortion. The clipper in the repeater transmitter should be set for the maximum system deviation — for example, 10 kHz. Then the receiver level driving the transmitter should be set by applying an input signal of known deviation below the maximum, such as 5 kHz, and adjusting the receiver audio gain to produce the same deviation at the repeater output. Signals will then be repeated linearly up to the maximum desired deviation. The only incoming signal that should be clipped in a properly adjusted repeater is an over-deviated signal.

**Channel Frequencies**

The choice of repeater input and output frequencies must be made carefully. On 2 meters, 600-kHz spacing between the input and output frequencies is common. Closer spacing makes possible interference problems between the repeater transmitter and receiver more severe. Greater spacing is not recommended if the user’s transmitters must be switched between the two frequencies, as happens when the output frequency is also used for simplex operation, either for short range communications, or to maintain communications when the repeater is not functioning. Careful consideration of other activity in the area should be made to prevent interference to or from the repeater. Many "open" or general-use repeaters have been installed on one of the national calling frequencies. On two meters, a 146.940-MHz output is usually paired with a 146.340-MHz input, and many travelers have made good use of this combination where it is found. Where 146.940 MHz simplex activity has not permitted a repeater on this frequency, 146.760 MHz has been used as an alternative. On 6 meters, several choices of input frequency have been paired with 52.525 MHz and no real standard has emerged. Again, the choice and usage is a matter for local agreement. All that can be done here is to report general trends.

In some cases where there is overlapping geographical coverage of repeaters using the same frequencies, special methods for selecting the desired repeater have been employed. One of the most common techniques requires the user to automatically transmit a ¾-second burst of a specific audio tone at the start of each transmission. Different tones are used to select different repeaters. Standard tone frequencies are 1800, 1950, 2100, 2250, and 2400 Hz.

Where there is to be much repeater activity in a given geographical area, a coordinating committee or council may be established to resolve problems of common interest. An example is the California Amateur Relay Council (CARC) which originated in the San Francisco area and now has 32 repeater and remote-base operators in California, Nevada, and Hawaii as members. The CARC, as one of its functions, coordinates frequencies for council members and other users. As an example, the CARC has listed 137 440-MHz control and repeater frequencies in use in Northern California.

Although it is impossible to cover specific details of each subject that has been mentioned here without writing a book on the subject, it is hoped that the organization of the material presented here will help to put relationships in perspective so that a better overall picture of amateur FM and repeater operation can be obtained. We would like to thank the other members of the Mt. Vaca Radio Club that made this article possible, notably W6FRE and WA6DBL.
Diode Switching for V.H.F. F.M. Channel Selection

Convenient and Quiet Remote-Control Crystal Switching in Fixed-Frequency Transmitters and Receivers

BY H. D. JOHNSON,* VE4HJ

Many f.m. units currently available from surplus sources are single-channel models. Others provide 2-channel operation by switching between two first-oscillator crystals with a s.p.d.t. relay. In some, a d.p.d.t. relay is employed, so that the unused crystal and its netting capacitor are grounded. Most often, separate oscillators are used for each channel, selection being made by grounding the cathode of the appropriate oscillator stage.

A convenient solution to the crystal-switching problem lies in the use of diodes, changing the bias on the diode in the desired channel so that it goes from an open-circuit to a conducting condition. This is particularly convenient for remote control of the channel selection in a mobile installation, as up to four crystals can be used, and the system works quietly and with very low current drain. It is most readily applied to equipment in which one side of the crystal is grounded (Marconi transmitters and receivers: Motorola transmitters). The need for more than one or two channels is becoming more acute, as the use of fixed-frequency f.m. by amateurs expands, and the number of v.h.f. repeaters planned or in use increases accordingly.

How It Works

The basic circuit for diode switching of crystals is shown in Fig. 1. With the switch $S_1$ in the position shown, current flows from the 12-volt source through $RFC_4$, $CR_2$, $RFC_2$ and $R_3$ to ground. With the diode $CR_3$ thus forward-biased, the crystal $Y_2$ is effectively connected to the oscillator grid, for r.f. The chokes $RFC_4$ and $RFC_2$ provide r.f. isolation, and $RFC_2$ and $R_2$ the d.c. path to ground. With no voltage applied to the other two positions, crystals $Y_1$ and $Y_2$ are isolated from the oscillator grid by the non-conducting diodes, $CR_1$ and $CR_2$. The resistors limit the current flow, only some 5 to 10 ma. being needed to make germanium diodes function as r.f. switches in this way. The 0.3-volt drop across the diode does not affect the operation of the circuit.

The system requires a source of 12 to 14 volts d.c. This poses no problem in mobile installations, except that vibrator hash or generator whine must be filtered out in some instances. This is easy to do in a circuit of such low current drain. Any low-resistance audio choke, with a 40-uf. or larger electrolytic on the input side, should do. Many different diodes will work: 1N270 and 1N34A are recommended. The capacitor $C_1$ provides d.c. isolation for the oscillator grid. Be sure that it is inserted in any oscillator circuit that may not already have such isolation.

The circuit of Fig. 1 is not satisfactory for f.m. gear in which “netting” capacitors are used across each crystal. Where this is done it is necessary to forward-bias the diode that is switched on, and reverse-bias the others. (Reverse-biasing lowers the junction capacitance of the diode.)

A modified circuit for this, for use in any equipment where one side of the crystal is grounded, is given in Fig. 2. An example is the Marconi DT45. Three circuits are shown, but up to four have been used. The d.c. is shown here being obtained from the 12-volt a.c. line in the receiver, with $CR_4$, $R_7$ and $C_6$ comprising the rectifier-filter circuit. The isolation capacitor $C_4$ should be added if one is not already in the circuit. The grid-to-ground capacitor, $C_4$, usually about 10 pf., should be removed if there is a capacitor of this type in the circuit.

The 12 to 14 volts d.c. from the supply is fed through $R_9$ and $RFC_4$ to the anodes of $CR_1$, $CR_3$ and $CR_4$. One diode, in this instance $CR_1$, will conduct, its circuit to ground being completed through $S_1$, $R_1$ and $RFC_1$. Its current, approximately 5 ma., and the resultant voltage drop across $R_9$, brings the voltage on the diode cathodes to 8 to 9 volts positive. The full supply

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Fig. 2—Diode-switching of crystals having paralleled "netting" capacitors, in circuits where one side of the crystal is grounded. Three positions are shown, but up to four have been used. The d.c. source and the switching circuit can be used for the crystals in the companion unit of a transceiver. Power is shown here taken from the 12-volt a.c. line in one of the units, though an external d.c. source can be used.

Fig. 3—Crystal switching of two positions with a single control wire. Values of the r.f. chokes RFC1 and RFC3 can be set up by experiment, though 2.5 mh. is satisfactory.

Fig. 4—Switching circuit for oscillators in which the crystal is above ground on both sides. Filtering in the 12-volt leads may be dispensed with if the voltage source is free of hum or other objectionable modulation.

Voltage is used to reverse-bias the diodes not selected. (There will be no voltage drop across $R_3 - R_4$ and $R_5 - R_6$, as the only current flow in these essentially-open circuits is the minute leakage current through $C_{R_2}$ and $C_{R_3}$.) The diodes being reverse-biased, their junction capacitances are quite low. The switch does two things: it grounds $R_4$, removing the supply voltage from the cathode of $C_{R_1}$, and it completes the forward-bias circuit from $R_3$ through RFC1, $C_{R_1}$, RFC1 and $R_4$ to ground.

The same power source and switching may be used for both transmitter and receiver, if it is desired to switch both simultaneously. Only separate 1000-ohm isolating resistors, $R_5$ and $R_6$ in Fig. 2, are required.

The arrangements discussed thus far require one control wire between the operating position and the equipment, for each channel to be switched. A two-channel system using but one control wire is shown in Fig. 3. It requires that

(Continued on page 188)
A Junk Box Transistor Checker

BY HOWARD J. HANSON, W7MRX

The transistor checker shown in the photographs and in Fig. 2 was devised to be an adjunct to my junk box, which is continually falling heir to miscellaneous transistors of uncertain quality, ancestry and type. Basically the gadget consists of three different circuits:

1) A type test circuit to determine if a transistor is npn or pnp.
2) A beta test circuit to determine if a transistor has a dc current gain.
3) A battery test circuit to check the condition of the batteries used in the tester.

**Type Test Circuit**

A simplified version of the type test circuit is shown in Fig. 1A. It is based on the fact that when the collector lead is left open the base-to-emitter junction of a pnp transistor will conduct current only if the base is negative with respect to the emitter, whereas the base-to-emitter junction of an npn transistor will conduct current only if the base is positive with respect to the emitter. The type of a transistor is determined by plugging in the semiconductor and finding out whether the npn or the pnp position of S2 results in a meter reading. Of course, if the same indication is obtained in both switch positions, the transistor is no good. R1 limits the current so that the transistor will not be damaged.

**Beta Test Circuit**

A simplified beta test circuit (set up for npn transistors) is shown in Fig. 1B. It is based on the fact that a transistor will not conduct in the forward direction as long as the base voltage is essentially the same as that of the emitter, whereas it will pass current once the base is biased with sufficient voltage of the same polarity (negative for pnp and positive for npn) as the collector. A transistor is checked for gain by plugging in the semiconductor and observing the meter while S3 is operated. A good transistor will cause no meter reading when S3 is open, and it will result in some meter indication when S3 is closed (closign S2 applies a base bias of the proper polarity to cause the transistor to draw collector current through the meter).

**Battery Test Circuit**

The battery test circuit is the simplest of the three circuits. As shown in Fig. 1C, S4 connects flashlight bulb I1 across battery BT1. Since the bulb draws about thirty times as much current as the other circuits (300 mA as compared to about 10 mA), whenever there’s enough juice in the battery to light the bulb there’s surely enough juice in the battery to operate the transistor tester.

**Combination Circuit**

Putting the three basic circuits together with a few auxiliary parts, I came up with the transistor checker shown in Fig. 2 and the photographs. Although the tester was constructed in a 3 × 5 × 7-inch Minibox, any similar enclosure will do. The 350-ohm resistance of the meter used by the author limits the maximum current a transistor can draw from the 3-volt battery to about 8.6 mA. — Editor.
closure can be used. The transistor socket is one of the standard types found in electronic stores, and it is capable of accepting just about any bipolar transistor having wire leads. To take care of those transistors that don’t have wire leads, I wired a three-conductor microphone jack, $J_1$, in parallel with the transistor socket. Contact to a transistor is made via a three-conductor plug and alligator clips at the end of three short flexible leads.

Power for the tester comes from two D cells mounted in clips inside the box. Other arrangements can be made, of course, but I don’t advise going much above 3 volts. $M_1$ is an inexpensive 0–10–mA unit, and a substitution can be made for it too. 2 The part I’m least proud of is the job I did with one of those sticky-tape labelmakers. Although the labels adequately identify the various functions on the tester, they don’t do anything for the looks of the instrument. Decals are more attractive, and they are recommended for those concerned with the outward appearance of the tester.

(Continued on page 188)

2 The resistance of the meter chosen for $M_1$ determines whether or not $R_2$ will be needed. To prevent pining any meter in this circuit, the resistance of the meter plus the resistance of $R_2$ should be equal to 300 ohms or more. — Editor.

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![Diagram of the transistor tester](image)

**Fig. 2**—Schematic diagram of the transistor tester. Resistances are in ohms, resistors are ½-watt composition. BT1—Two 1.5-volt flashlight cells (size D) in series. $L_1$—2.5-volt, 300-mA flashlight bulb (No. 14). $J_1$—Three-conductor open-circuit phone jack. $M_1$—0-10-mA dc meter (Emico 2326). $R_1$—For test reference. $R_2$—Sufficient resistance to prevent $M_1$ from being pined if the emitter and collector connections are shorted together. No resistor is needed if the Emico 2326 meter is used at $M_1$; see footnotes 1 and 2. $S_1$—Spst slide switch. $S_2$—Dpdt slide switch. $S_3$, $S_4$—Miniature spst push-button switch, normally open. $S_5$—One-pole, three-position rotary. $S_6$—Spdt slide switch.

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![Interior view of the transistor tester](image)

Interior view of the transistor tester. Because the author used available materials from his junk box, several resistors shown here have a larger wattage rating than that specified in Fig. 2 and several of the switches have more sections than are actually needed.

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October 1969
The Transistor Giant

A High-Power Transistor Transmitter from India

BY R. JAYARAMAN,* VU2JN

This compact, high-power transistorized transmitter runs with an input power of 75 watts on c.w. and 25 watts on a.m., in the 7-, 14-, and 21-MHz amateur bands. It features a 28-volt regulated power supply, a stable FET v.f.o., and a 2N3950 power amplifier in the final feeding a T network.

The complete transmitter is built inside a 15 × 8 × 8-inch veneer cabinet with a 2½-inch high aluminum chassis and a ½-inch thick aluminum front panel. The front panel doubles as the heat sink for the audio power transistors.

In order to maintain a neat circuit configuration, n-p-n silicon transistors have been used throughout the r.f. section while p-n-p germanium transistors have been used throughout the audio section. The r.f. section works with the negative bus as common, while the audio section works with the positive bus as common. The schematic of the transmitter is shown in Fig. 1.

**Power Supply**

The fully regulated power supply furnishes four d.c. voltages. A completely shielded power transformer supplies 30 volts r.m.s. to a molded bridge rectifier. The output is smoothed by a 3500-μF, 75-volt capacitor to provide about 42 volts at no load and about 33 volts at a load current of 3 amp. The output voltage is then regulated at 28 volts by a two-stage transistor regulator. Regulation is applied to the negative side of the supply voltage. The regulator is followed by another 3500-μF capacitor.

The regulator, an improved version of the conventional series regulator, gives good regulation and enables the regulator power transistor to be bolted directly to the chassis. The regulator employs a 29-volt Zener (formed by a 16-volt and a 13-volt Zener in series), a 2N600 p-n-p high-gain germanium transistor as the reference amplifier, and a 2N3716 150-watt n-p-n silicon power transistor as the power regulator. The 2N3716 is mounted on a small heat sink bolted to the chassis.

The power supply features good regulation, the output voltage beyond the ammeter being 28.8 volts at no load, 28.7 volts at 1 amp, 28.5 volts at 2 amp, and 28.0 volts at 3 amp. A scope test showed the ripple voltage to be 0.1 volt peak at a load current of 2 amp. Two 5-amp. fuses have been provided, one on the transformer secondary and another at the regulator, but in the event of a dead short the fuses do not offer much protection to the regulator transistor. The transistor can be protected against a short only by a transistor switch or limiter, which could not be incorporated since the d.c. input voltage under load is not high enough to accommodate the additional drop across a current sensor.

It is no pleasure operating a rig while being haunted by the fear of a short or a transistor burning out, especially when the d.c. voltage goes directly to the final tuning and loading capacitors. Spurred by an irrepressible urge to

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1 Adapted from "A High-power Transistor Transmitter," by Jayaraman, Parts I to IV, The Indian Radio Amateur, June, August, October, and December, 1968.

This article presents a fully transistorized transmitter capable of handling 75 watts input on c.w. In addition to complete construction data, the author presents problems encountered when using solid-state devices at this r.f. power level, and the solutions to these problems.
dispose of an SCR, which happened to be lying in the writer’s “treasure box” for an unusually long time, the writer added an “emergency fuse-blower” circuit, incorporating a GE C30B SCR and a 18-volt 1-watt Zener diode. Under normal conditions the Zener blocks the positive gate signal and the SCR remains in the off state. When a short occurs in the output, the voltage across the 2N3716 transistor momentarily rises to more than 80 volts. Immediately, the Zener starts conducting and triggers the SCR into the on state. The SCR behaves like a short circuit, combining the dangerous voltage-current combination from the 2N3716 and maintains a short until the fuse blows. Since the C20B has a peak surge rating of 80 amperes, it is hoped that the SCR will be able to bear the brunt of a short until the fuse blows. The writer did not want to lose a fuse (and possibly more!) by testing this protective circuit.

Subsidiary regulated voltages of 6.8 volts and 16 volts power the v.f.o and frequency-multiplying stages, respectively. Another regulated supply of −7 volts with respect to the positive bus powers the speech-amplifier stages.

When used with a power supply operated from 230-volt mains, a solid-state v.f.o is susceptible to hum pickup. To avoid this trouble, the writer has observed the following precautions, in addition to good power-supply filtering:

a) The main power transformer is completely enclosed in a cadmium-plated steel box.

b) The power transformer is provided with an electrostatic shield between the primary and the low-voltage winding.

c) The power-line leads in the chassis are run throughout as twin-core shielded wire.

d) The v.f.o is built inside a 3 ¾ × 3 × 3 ½-inch rigid cadmium-plated steel box. All these precautions may not be essential, but the writer did not want to take any chances when building transistorized equipment!

The V.F.O.

The v.f.o employs a Motorola 2N4416 n-channel JFET as a 3.5-MHz Colpitts oscillator, followed by a two-stage untuned buffer amplifier utilizing a pair of 2N2360 n-p-n silicon transistors. The similarity of the oscillator circuit with that of a corresponding vacuum-tube version is striking. When the JFET oscillates, it automatically develops a negative gate bias. This is because of the gate current that flows through the high-value gate-leak resistor when the oscillating gate voltage swings positive with respect to the source.

To eliminate pulling of the oscillator, the output is taken from a low-impedance point (the source) and light resistive coupling is used to the next stage. The two-stage buffer amplifier is similar to the circuit that appeared in an earlier article in QST, except for the difference in biasing. Because of the direct coupling and d.c. negative feedback employed in the circuit, the performance of the buffer amplifier is critically dependent on the bias level.

The 6-µh. v.f.o tank coil, L1, is close-wound on a ¾-inch diameter ceramic form and is reinforced with four longitudinal strips of Araldite epoxy resin, a polystyrene-type material. The v.f.o. tuning capacitor, C1, is a 50-µf, double-ball-bearing type with short stiff plates. The 50-pf. bandspreading capacitor, C2, is a Philips cylindrical air trimmer which, although quite small, is remarkably stable. This trimmer is mounted on a ceramic standoff and is so adjusted that the v.f.o. covers a frequency range of 3,500 to 3,575 MHz. The 150-pf. band-setting capacitor, C3, is an APC trimmer which is mounted on the side wall of the box so that it can be adjusted from the outside. A small quantity of silicone grease is applied to the wiper contacts of the tuning capacitor and the APC trimmer.

The v.f.o. dial is a Japanese-made 2-inch planetary-drive dial having an 8 to 1 ratio. A flexible coupling is inserted between the dial drive and the tuning capacitor.

The v.f.o. is supplied with 6.8 volts from a Zener-regulated power supply, derived from the main 28-volt regulated supply of the trans-
Fig. 1—Schematic of the high-power transistor transmitter. Unless otherwise indicated, resistors are ½-watt, 10-percent tolerance. Capacitors with polarity indicated are electrolytic; S.M. indicates silver mica. The four resistors shown with an asterisk (*) in the doubler, multiplier and driver stages may require slightly different values than shown for obtaining optimum drive to the p.a. on c.w. and a.m. The type of switch used by the author at S2, S3, and S7 is not commonly available in the U.S.; readily available switches performing the same functions are shown in the schematic and in the parts list.

CR1—CR6 ind.—Rectifier, molded bridge, 6 amp., p.r.v. per cell 200 volts (Motorola MDA952-3 or similar).

CRx—SCR, GE20B or equivalent.

J1, J2—BNC chassis connector.

L1—5 µh., 27 turns close-wound on No. 20 enam. wire, ½-inch dia. ceramic form.

L3—1.2 µh., 11 turns No. 12 copper wire wound to a length of 1½ inches on ½-inch dia. bakelite form. Tapped at 5th turn from collector end for 14-MHz. operation and 7th turn from collector end for 21-MHz. operation.

L5—0.5 µh., 6 turns No. 12 copper wire wound to a length of ¾ inch on ¾-inch dia. ceramic form.
R1—0.25 ohm, 2 watts, low inductance; made by paralleling four 1-ohm 1/2-watt composition resistors.
R2—for text reference.
R3—10,000-ohm 2-watt control, audio taper.
R4—500-ohm 2-watt control, linear taper.
S1—D.p.d.t. toggle.
S2—S.p.d.t. toggle, minimum contact rating 4 amp. at 30 volts (Cutler-Hammer 7582K6 or similar).
S3—D.p.d.t. toggle, minimum contact rating 4 amp. at 30 volts (Cutler-Hammer 7592K6 or similar). One pole, as shown, is used for r.f. switching; the builder, instead, may wish to use this pole to control a coaxial antenna transfer relay.
S4—Miniature ceramic rotary, 1 section, 3 poles, 3 positions, non-shorting (Centrlab PA-6007 or similar).
S5, S6—S.p.s.t. push-pull, heavy duty.
S7—3 p.d.t. toggle, minimum contact rating 4 amp. at 30 volts (Cutler-Hammer 7615K2 or similar).

T1—Power; primary 115 or 230 volts as necessary; secondary 30 volts, 4 amp.
T2—R.f.; primary 28 turns No. 26 enam. wire close-wound on 1/2-inch dia. form; secondary 12 turns No. 26 enam. wire close-wound over "cold" end.
T3—R.f.; primary 12 turns No. 22 enam. wire close-wound on 1/2-inch dia. form; secondary 4-turn link No. 20 enam. wire close-wound.
T4—R.f.; primary 6 turns No. 22 enam. wire close-wound on 1/2-inch dia. form; secondary 2-turn link No. 20 enam. wire close-wound.
T5—R.f.; primary 6 turns No. 20 enam. wire close-wound on 1/2-inch dia. form; secondary 2-turn link No. 20 enam. wire close-wound.
T6—R.f.; primary 20 turns No. 20 enam. wire close-wound on 1/2-inch dia. form, tapped 6 turns from the S2 end for 21-MHz operation and 10 turns from the S2 end for 14-MHz operation; secondary 2-turn link No. 20 enam. wire close-wound.
Z1—Parasitic suppressor; 6 turns No. 20 enam. wire close-wound over a 10-ohm 1-watt resistor.
Z2—Parasitic suppressor; 6 turns No. 18 enam. wire spaced to a length of 1/2 inch, wound over a 1-ohm 2-watt resistor.

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mitter. Because of this two-step regulation, the supply voltage remains perfectly constant.

The v.f.o. has been thoroughly tested. Fig. 2 shows the typical warm-up drift pattern as observed on a Hewlett-Packard frequency counter. The total drift during the first ten minutes is +25 Hertz. The v.f.o. was found to be quite insensitive to small voltage fluctuations. A 0.1-volt drop in the supply voltage produced a negligible drift of -6 Hertz.

The r.f. output of the v.f.o. is about 1.5 volts r.m.s. The output is taken by means of a short length of Amphenol 21-597 subminax 75-ohm thin coaxial cable.

The Exciter

Fig. 3 shows a block diagram of the r.f. section of the transmitter. A well-designed Class C transistor r.f. stage will provide a power gain up to 17 db. However, it is not very desirable to reach the power amplifier with the minimum number of stages. With some power to spare, the coupling between stages can be made lighter, thus contributing to better harmonic suppression.

The v.f.o. is followed by two high-efficiency frequency-multiplying stages which deliver more than 20 mw. of r.f. drive to the driver stage on all three bands. The first of these is a 2N706 Class C doubler which provides about 25 mw. r.f. output on 7 MHz. In the v.f.o. zero position of $S_3$, the v.f.o. and the 2N706 stages are both switched on to provide a healthy signal in the receiver.

The 2N706 drives a 2N2270 Class C frequency-multiplier to an input of 400 mw. on 7, 14, or 21 MHz. Separate coils are band-switched on each band. Since the load impedance of the 2N2270 is around 200 ohms, while the input impedance of the driver is around 20 ohms, all the coils have a constant turns ratio of 3:1. The 7-MHz. coil is purposely detuned on the low-frequency side to equalize the output on all bands. The 14- and 21-MHz. coils are carefully peaked to provide the maximum output.

One serious problem in transistor transmitters is that of obtaining enough selectivity in the tuned circuits to give adequate rejection of the harmonic content. Since the tuned circuits are all loaded and work at very low impedance levels, their selectivity is rather poor. For example, when the exciter is delivering power on 14 MHz., there is an annoying amount of output on 10.5, 17.5 and 21 MHz. The selectivity can be improved by reducing the number of turns in the secondary links of the coupling coils to the bare minimum necessary. The writer is now experimenting on a toroidal coil for the doubler tank circuit.

The Driver

The driver stage uses a recently-introduced Motorola v.h.f. transistor, MM1601, capable of delivering 3 watts output at frequencies up to 175 MHz. from a 14-volt supply. This stage operates as a keyed stage on c.w. and as a modulated stage on a.m. Modulation of the driver along with the p.a. is essential for getting deep and clean modulation.

The MM1601 is mounted on the chassis and runs cool at an input of 2 to 2.5 watts in Class C operation, at a collector voltage of about 12 volts on c.w. and 8 volts, modulated, on a.m. These voltages can be modified, if necessary, to provide proper drive to the p.a. on c.w. as well as a.m. It may be noted here that the p.a. requires nearly the same drive for an input of 75 watts at 28 volts on c.w. as it does for an input of 25 watts at 13 volts on a.m. Since ample drive is available from the multiplier stage, negative feedback is provided in the driver stage by leaving the 3.3-ohm emitter resistor unby-passed.

The design of the driver tank coil for a multiband transistor transmitter is quite critical. In order to avoid v.h.f. instability, it is imperative that the coil be located close to the p.a. and that the secondary link run straight to the emitter and base terminals of the p.a. with the shortest possible leads. This requirement precludes the use of separate coils on the different bands or the use of a band-switched link. On the other hand, since the output impedance of the driver is in the neighborhood of 50 ohms and the input impedance of the p.a. is about 5 ohms, a constant turns ratio of 3:1 should be maintained on all bands. The writer has reconciled these conflicting requirements in the coil design shown in Fig. 1. From the viewpoint of stability of the p.a., a high Q is not desirable for the driver tank circuit. The taps are so located that peak drive is obtained on all bands within the range of the tuning capacitor. It is desirable to provide a 50- to 100-pf. fixed mica capacitor in parallel.

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**Fig. 3**—Block diagram of the transmitter. R.f. levels are shown between blocks.

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with the driver tuning capacitor, since reducing the tank capacitance to a low value may throw the p.a. into v.h.f. oscillation.

Although the drive to the p.a. can be controlled by detuning the driver tank circuit, this is not recommended since the harmonic suppression then suffers, especially on 14 and 21 MHz. The best procedure is to peak the driver tuning and adjust the secondary links on the collector coils of the 2N2270 multiplier stage so as to give a peak r.f. drive of 3 to 4 volts, measured at the base terminal of the p.a. The collector lead of the p.a. should be disconnected during the test. If necessary, the drive can be increased by cautiously lowering the value of the emitter resistor of the 2N2270 multiplier stage or the collector supply dropping resistor for the MM1601 driver.

Keying

Because of the feedthrough capacitance of transistors, at least two stages must be keyed in order to get satisfactory keying. The writer has adopted emitter keying of both the multiplier and driver stages.

Emitter keying of two transistor stages is not as safe and simple as cathode keying of two vacuum-tube stages. If one of the two stages fails or starts oscillating in the key-up position, there is the possibility of a positive voltage appearing at the emitter of the other stage, which could end up in destruction of the transistor. As a safety arrangement, therefore, the emitter of the multiplier stage is protected against any positive voltage leaking from the emitter of the driver by a silicon blocking diode.

Since the key-up voltage at the key is just about 3 volts, while the key-down current is 200 ma., the key contacts should be solid and clean for getting proper keying. It would have been better to adopt base-block keying (similar to grid-block keying), but unfortunately, there is no provision for a negative supply in the transmitter. The envelope shaping can be controlled by modifying the value of the 0.5-mF capacitor.

The Final

The final employs a Motorola 2N3950 v.h.f. transistor capable of delivering an output of 50 watts at frequencies up to 50 MHz, from a 28-volt supply. The emitter of the transistor is internally connected to the TO-60 case so as to provide the very low-impedance emitter-to-ground path which is so vital for power gain. The collector voltage is 28 volts on c.w. and about 13 volts modulated on a.m. The drive power necessary to give the full input of 75 watts ranges from about 0.8 watt at 7 MHz. to 2.0 watts at 21 MHz.

The p.a. runs as a Class C stage without any quiescent bias. Although apparently a Class B stage, the p.a. actually runs as a Class C stage with a conduction angle of less than 180 degrees, since the base-emitter junction starts conducting only when the positive base voltage swings above 0.5 volt or so. When there is no drive, the p.a. collector current is zero.

When handling an input of 75 watts, the input impedance of the stage is as low as 5 ohms, and the output load impedance about 8 ohms. The input circuit is a two-turn link wound over the cold end of the driver tank coil, connected straight to the base and emitter terminals of the p.a. The output impedance is stepped up to 50 ohms by a T network, designed for a loaded Q of 6. The T network utilizes a sturdy 1.2-mH tank coil tapped for 14- and 21-MHz. operation.
TABLE I
T-NETWORK SPECIFICATIONS

<table>
<thead>
<tr>
<th>Freq., MHz.</th>
<th>Tank coil inductance, µh.</th>
<th>Tuning capacitance, pf.</th>
<th>Loading capacitance, pf.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>1.2</td>
<td>300</td>
<td>200</td>
</tr>
<tr>
<td>14</td>
<td>0.6</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>21</td>
<td>0.4</td>
<td>100</td>
<td>70</td>
</tr>
</tbody>
</table>

See Table I. Two heavy-duty push-pull switches are used for shorting part of the coil on 14 and 21 MHz. The tuning capacitor is a 2-gang 500-pf. receiving-type capacitor and the loading capacitor is a single-gang 365-pf. receiving-type capacitor. The loading capacitor has insulated mounting and is provided with a stop so that it cannot be turned open beyond a value of 50 pf. This precaution is necessary to prevent accidental decoupling of the antenna by inadvertent rotation of the tuning capacitor to the minimum position.

Two meters on the front panel monitor the performance of the p.a. A 0-30 volt meter shows the voltage across the p.a., while a 0-3 ammeter shows the p.a. collector current.

Being a high-performance device, the 2N3950 is highly prone to v.h.f. and low-frequency self-oscillation, the latter being more difficult to tackle. V.h.f. parasitics have been suppressed by the following precautions:

a) Providing negative feedback in the final stage by inserting a 0.25-ohm 2-watt emitter resistor.

b) Loading the base with a 22-ohm 1-watt resistor.

c) Inserting a parasitic suppressor choke directly at the collector pin.

d) Providing an aluminum shield across the transistor and isolating the output network in an aluminum compartment.

e) Adopting single-point grounding of the r.f. returns of the final stage to a brass bolt affixed to the chassis.

RG-58/U coaxial cables carry r.f. into and out of the compartment.

Since the gain of r.f. transistors is frequency dependent, being greatest at low frequencies, the greatest danger to the final comes from low-frequency self-oscillation which can lead to voltage and current swings beyond the safe-area limits. The presence of low-frequency parasitics can often be noticed by carefully listening for any slight ringing or vibration of a series rheostat inserted in the collector-supply line during the initial turn-up of the transmitter. Low-frequency oscillation can be avoided with confidence only by eliminating the collector choke and feeding the collector voltage through an auxiliary tank coil forming part of the r.f. network. The writer did not adopt this arrangement since it leads to complications in band switching, but instead inserted a 0.5-ohm 5-watt wire-wound resistor in series with the r.f. choke so as to provide a certain amount of decoupling and to dampen oscillations due to resonance of the choke with the bypass capacitors.

With all these precautions, the 2N3950 remains "quiet" and stable. The negative feedback in the stage does affect the stage gain. But without feedback, the final had wide-spectrum v.h.f. parasitics when run at the maximum collector voltage, possibly due to the final stage components not being located close enough to the p.a. It is no doubt preferable to compromise on the gain rather than risk losing the 2N3950!

The p.a. needs a high-capacity heat sink to take care of a collector dissipation up to 26 watts, assuming a minimum final-stage efficiency of 65 percent. For safe operation at ambient temperatures up to 45 degrees centigrade, the p.a. needs a heat sink with a thermal resistance of about 3 degrees centigrade per watt. To be on the safe side, a heavy (6-pound) integrally-cast copper heat sink is used. The heat sink was cast in a local foundry under the writer's supervision. The 5 × 2½ × 5½-inch base plate is machined on the bottom and tapped to receive the 2N3950. The heat sink is insulated from the chassis by a 1½-inch thick bakelite sheet, and is bolted to the chassis by means of four insulated bolts. Too thin an insulating layer should not be used, as this may result in excessive sink-to-chassis capacitance. The 2N3950 is insulated from the chassis by mica and Teflon washers, and is screwed onto the heat sink. See Fig. 1. Heat conduction takes place through the chassis as well as the heat sink.

Metal washers of different thicknesses should be tried and the correct one determined by trial and error so that when the 2N3950 is moderately tightened with a small spanner wrench, the pins of the transistor maintain the desired orientation.

The Modulator

The a.m. performance of a transistor p.a. is limited by the fact that, unlike a vacuum tube,
the power transistor in a practical circuit is voltage- and current-limited, and not dissipation-limited. Full 100 percent modulation of the p.a. doubles the peak collector-emitter voltage and the peak collector current. It follows that on a.m. the collector supply voltage should be halved to prevent voltage breakdown, and the collector current should be limited to about two thirds of the c.w. value so as to avoid saturation effects. Thus, the maximum carrier input on a.m. is limited to about one third of the carrier input on c.w.

Two types of modulators are commonly used in transistor transmitters — the Class AB push-pull modulator and the Class A series modulator. The writer has adopted the series modulator in view of some of its attractive features, such as elimination of supply voltage switching for the p.a., elimination of all audio transformers, less distortion and better linearity of modulation. The chief drawback of the series modulator is the high collector dissipation of the modulator, and this is taken care of by a pair of Motorola 2N1011 90-watt p-n-p germanium power transistors in parallel.

The modulator consists of a four-stage audio amplifier capable of delivering an output of 12 watts. The audio stages work with the positive bus as the common return. The first three stages are fed from a supply of about –7 volts with reference to the positive bus, developed across a 6.8-volt Zener diode and a 5-ohm series resistor. The first stage uses a 2N123 medium-gain transistor, followed by an emitter-follower stage using a very high-gain transistor, Motorola MA288 (β = 320). Hum is minimized by locating the speech amplifier close to the microphone socket and by placing the gain control after the first stage.

The second, third and fourth stages are cascaded direct-coupled stages. The d.c. bias level of the modulator is set by the 500-ohm potentiometer. The 2N1011 modulator transistors have matched 5-ohm base resistors to equalize the audio drive, and matched 0.5-ohm emitter resistors to provide a certain amount of negative feedback. The driver and modulator transistors are mounted on the 1/8-inch aluminum front panel with 0.002-inch thick mica insulating washers.

With a series modulator, it is very important to have proper division of the supply voltage between the p.a. and the modulator. A proper arrangement is to drop about 13 volts across the p.a. and 15 volts across the modulator. In the a.m. position, the bias potentiometer of the modulator is set so that the voltage across the p.a. is 13 volts when the p.a. collector current after turn-up is 1.8 amp.

**Tune-Up of the Transmitter**

Before attempting to test the transmitter, it is worthwhile to feed the 28-volt regulated supply to an oscilloscope and make sure that the power supply voltage is free from a.c. components. The series regulator, in conjunction with the succeeding filter capacitor, may sometimes give rise to a low-frequency oscillation which will remain superposed on the d.c. supply voltage. Unless adequately suppressed, this parasitic component is almost certain to trigger disastrous low-frequency oscillation of the 2N3950.

The initial tune-up of the transmitter calls for extreme care and the observance of necessary precautions. A 50-ohm 3-amp. rheostat is inserted in the collector supply line to the p.a. A field-strength meter is a must for checking the output on the operating frequency as well as to check for the presence of any harmonic or spurious radiation.

Drive is applied and the T network is tuned for maximum field-strength meter reading on the operating frequency. It is good practice to bring up the drive along with the loading. The collector voltage is then gradually increased to 28 volts in steps by turning the rheostat, retaining the T network if necessary, and making sure every

The tiny 2N3950 p.a. transistor and the giant 6-pound heat sink.
time that the collector current drops to zero in the key-up position. The p.a. can be loaded to a collector current up to 2.7 amp. on c.w. and 1.8 amp. on a.m.

After initial tune-up, the positions of the tuning and loading capacitors are marked on the front panel so that the T network may be tuned approximately to the band of operation before applying power to the final. Also for operation, the tuning is always checked first in the a.m. position, in which the 2N3950 is comparatively safer.

Since the final is not provided with any sort of automatic bias control, operation with mismatched antennas is not contemplated. The transmitter is operated only with matched antennas of 50- to 75-ohm impedances.

**Conclusion**

Any experimenter wishing to build a similar transmitter would do well to have a more compact layout for the final stage. The strong fields associated with the heavy currents in the final stage create unusual problems that may not be fully anticipated by the builder. Shielding and grounding assume a new perspective, so to say, in these low-impedance high-current applications.

It was discovered the hard way that the 2N3950 is too delicate to be handled carelessly! The writer is even inclined to believe that operation of the 2N3950 at the recommended 28 volts c.w. does not provide a comfortable factor of safety against base-collector voltage breakdown. The feeling one gets after burning out such a hard-to-get transistor is something that cannot be described adequately in words! Fortunately, a replacement was available to carry the project to completion.

The writer wishes to express his gratitude to Joe Mehaffey, K4IHP, but for whose spontaneous help and encouragement it would not have been possible to embark upon a project of this nature. Thanks are also due to Ed Bissell, W3MSK/VU2MSK, Marv Gonsior, W6VFR, and Bob Irish, K5ZOL, for their helpful cooperation, and to Paul Thorpe of Motorola Inc., U.S.A., for releasing transistor samples for the writer's experimental use. It is hoped that this article has highlighted the unique problems involved in the design and construction of high-power transistor transmitters for amateur-band applications.

Transistor transmitters are becoming increasingly popular in a variety of applications. As r.f. power transistors become more and more popular, their present high cost is bound to come down. The day may not be far off when a 100-watt r.f. transistor will be put in the market at a price well below that of a 6146B tube! QST

![Diagram](https://via.placeholder.com/150)

DO YOU KILL ALL TRANSISTOR CIRCUITS COMPLETELY BEFORE TOUCHING ANYTHING BEHIND THE PANEL?

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28
An Etched-Circuit Monimatch
For Checking Your Antenna System

BY LEWIS G. McCOY, W1ICP

Here is the completed Monimatch with the two meters and the sensitivity control in the box at the right. The sensing unit is at the left.

A Novice who reads the instruction manual that comes with his transmitter and uses a 50-ohm dummy antenna can follow the tune-up procedures fairly accurately. With the dummy antenna he will find that the settings for the tuning controls will be fairly close to those specified by the manufacturer. However, when an antenna system is attached to the rig, in many instances the adjustments are far removed from any "book" setting. When this happens the Novice finds that he cannot get proper tuning of the rig, or worse yet, actually damages the equipment by trying to "force" it to work.

Nearly every transmitter these days, whether commercial or home-built, has a final amplifier stage that is designed to work into a 50-ohm load. If the load is something other than 50 ohms it may be impossible to tune the amplifier stage correctly. Of course, an important part of the problem is finding out what the load is — or, rather, how far from 50 ohms it happens to be. The piece of measuring gear described in this article is a device for doing just this. However, before describing the Monimatch and what it can do, let's take a little closer look at antenna-system loads.

The "50-Ohm" Load

The evolution of transmitter design since WWII has been influenced by several factors that have led to design that is more or less standard these days. First off, television came along right after the war and the hams quickly discovered that extremely tight shielding of a transmitter was needed to prevent undesired radiation that could cause TVI. However, when tight shielding was installed, band changing without band-switching became a real chore because there were so doggone many screws to unscrew and rescrew.

The one type of tank circuit that lent itself very well to the problem was the pi network. It was a fairly simple job to design a tightly-shielded bandswitching transmitter, using the pi network, that would work into a 50-ohm load. Why 50 ohms? Simply because at this time 50-ohm coaxial cable had become a very popular type of transmission line. During the war techniques were developed that made the manufacture of flexible coaxial cable a reliable and economical process. So TVI and the availability of coax feed lines were the primary contributing factors that led to our present-day transmitter design.

*Novice Editor*
If the load that is attached to the transmitter is something other than 50 ohms then the transmitter may be difficult to load, depending on a couple of other factors. While it is possible to design a pi network that will handle quite a wide variety of loads, many present day manufacturers, in order to compete in given price ranges, use a minimum number of parts in the tank circuit of the amplifier. For such rigs to operate properly the load must be between 25 and 75 ohms. This of course means that the user must furnish a load that will fall within this range.

**Transmission Lines**

The output terminal on all rigs these days is a coax fitting, which of course implies that a coaxial line must be attached to the rig. This doesn't mean that the coaxial line has to go all the way to the antenna. It could be connected to a transmatch or a balun. What is important is that the first thing in the antenna system is the coaxial line that is attached to the rig.

Many Novices mistakenly believe that if you attach a 50-ohm coaxial cable to rig you automatically have a 50-ohm load. This is not true. The 50-ohm designation on the cable merely means that 50 ohms is the characteristic impedance of the cable. The characteristic impedance of a transmission line is determined by the size of the conductors used, the spacing of the conductors, and the dielectric material used to separate and support the conductors. The only time you would have a 50-ohm load using 50-ohm cable is when the line is terminated in its characteristic impedance. In other words, if the antenna has an impedance of 50 ohms then you will have a 50-ohm load on the rig. If the antenna has an impedance of other than 50 ohms then the load at the transmitter will be something other than 50 ohms. This in turn leads us up to a short discussion of standing-wave ratio.

**SWR**

If a transmission line is terminated in its characteristic impedance, all the power fed into the line from the transmitter will be delivered to the load end—in this case, the antenna. Actually, not quite all the power will reach the antenna because there is always some loss in the transmission line itself. However, what is important is that when the line is terminated in

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**Fig. 2**—Circuit details of the etched-circuit Monimatch.

- The 0.001 µF capacitors are disk ceramic.
- CR1, CR2—1N34A germanium diodes.
- J1, J2—Coax chassis fittings, type SO-239.
- L1, L2—See text and Fig. 3.

**Fig. 1**—A typical setup for using a Monimatch in a multiband antenna system using a single dipole. The length of the dipole is not critical but it should be at least ¼ wavelength overall at the lowest operating frequency for good efficiency. The feed line can be any length. The antenna relay and low-pass filter may be omitted if not needed.

**Fig. 3**—Details of one of the Monimatch circuits. M1, M2—0-50 uA meter (Lafayette 99 H 5049).
- R1, R2—68-ohm, ½-watt carbon or composition.
- R3—25,000-ohm control, linear taper.
- S1—5-p.d.t. switch.
its characteristic impedance none of the power that reaches the end is reflected back toward the transmitter; all of it is used up in the antenna.

When the antenna impedance is different from the line impedance some of the power will be reflected back toward the transmitter end. Standing waves of voltages and currents will then exist on the transmission line. When this happens, the transmitter will no longer “see” a 50-ohm load. Exactly what the load will be will depend on several factors,1 but suffice to say it will be something other than 50 ohms.

The standing-wave ratio on the transmission line is the ratio of maximum to minimum voltage or maximum to minimum current that exists along the line. If the line were matched in its characteristic impedance the voltage would be the same along the line and of course the SWR would be 1 to 1. The SWR is determined by dividing the resonant antenna impedance into the line impedance, or vice versa. For example, if the antenna impedance were 25 ohms and a 50-ohm line were used, the SWR would be 2 to 1.

For a moment, let’s assume that regardless of how bad a mismatch exists, we are still able to tune and load our transmitter. The question then arises, how does the mismatch affect the losses in the transmission line? The answer to the question depends on how efficient the transmission line is.

Remember earlier we said there are always some power losses in every transmission line. If we have a mismatch at the antenna end, some of the power that reaches the end will be reflected back down the line. In traveling back, some of this power will be dissipated in the line, and the higher the SWR the higher these additional losses will be, because a higher SWR means that a greater proportion of the power will be reflected.

In a transmission line that is 100 percent efficient (one that has no losses) it follows that regardless of how high an SWR exists, we wouldn’t have any losses due to the SWR. Unfortunately, there “ain’t no such” line, although some types of lines are much less lossy than others.

Also unfortunately, coaxial lines fall into the class that can be considered to be lossy lines. Just as an example, let’s assume that you are using 100 feet of RG-58/U on the Novice 15-meter band, and you are getting 50 watts out of your 75-watt Novice rig. This 50 watts is what is leaving your transmitter on the way to the antenna via the 100 feet of line. The loss for 100 feet of RG-58/U at 21 MHz is 1.9 decibels. Translating this figure to power, we would lose about 20 of our 50 watts in the losses in the feed line, leaving only 30 watts to reach the antenna and be radiated. This is assuming the antenna impedance to be 50 ohms, the same as that of the line. If there is a mismatch the losses will be higher, as pointed out earlier. Suppose the SWR is 3 to 1, using the same setup. The additional loss in the system because of the SWR would be 1 dB, or a total of close to 3 dB. A 3-dB loss represents almost exactly one-half the power—that is, only 25 watts reach the antenna to be radiated. RG-8/U cable has the same characteristic impedance as RG-58/U but has less loss because it has larger conductors and more spacing between the conductors (and of course is more expensive).

The closest thing to a lossless transmission line is open-wire line. An open wire line on 21 MHz has only 0.08 dB loss per 100 feet. Even with a very high mismatch—for example, an SWR of 20 to 1, the additional losses are still less than 1 db!

This should not be interpreted to mean that

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1 Editors note: It is recommended that the newcomer obtain a copy of The ARRL Antenna Book for more detailed information on transmission line operation than can be provided in this article.
coax is an undesirable type of line to use. For beam antennas it is difficult to beat the ease and convenience of using coax. However, for a single antenna, such as a dipole that is to be used on all bands and all frequencies, the best system is one consisting of a transmatch and a feed line of open-wire line, such as shown in Fig. 1. With this system you can forget about line losses, SWR on the line, and mismatches between the antenna and feed line. By correctly adjusting the transmatch, you can always give your rig a 50-ohm load regardless of what the load is on the antenna side of the transmatch. If we use an SWR bridge in the short length of 50-ohm coaxial line that connects the rig to the transmatch, we can adjust the transmatch so that the 50-ohm line shows a match, or SWR of 1 to 1, and the transmitter always sees a 50-ohm load.

The SWR bridge in the photographs and drawings is simple to build, and when installed in 50-ohm cable, will show the relative mismatch in the line, and also will indicate when you get the transmatch properly adjusted for a match. The SWR bridge can also be used as an output indicator, which is very handy when tuning up the rig.

**SWR Bridge Circuit Details**

The etched-circuit Monimatch shown here is a reflectometer that samples the forward and reflected voltage in a 50-ohm line. Fig. 2 shows the circuit diagram. \( L_1 \) and \( L_2 \) are the pickup lines. In operation, a very small amount of power is coupled into the pickup lines and the r.f. voltages are rectified by \( CR_1 \) and \( CR_2 \). The rectified voltages are then fed to the two meters, \( M_1 \) and \( M_2 \), and the SWR then determined from the readings.

While a Monimatch is not a precise piece of measuring equipment, the SWR readings will be close enough for practical purposes. In order to determine the SWR, the forward-reading meter is set to full scale by adjusting \( R_3 \), the sensitivity control, and then the reading on the "reflected" meter is noted. The formula for the SWR using this system is \( F + R' \)

\[ \frac{F}{F - R'} \]

For example, let's assume the "reflected" reading is 5, with the "forward" reading being 10. Then 15 divided by 5 (that is, \( 10 + 5 \) divided by \( 10 - 5 \)) would mean the SWR is 3 to 1. The closer the "reflected" reading is to zero, versus full-scale reading on "forward," the closer you come to 1 to 1, or a matched condition.

In the unit shown, two meters are used, one for the forward and the second for the reflected reading. However, if desired a single meter can be used and switched as shown in Fig. 2 at B. We used two meters in the indicator as this permits constant monitoring of what is happening in the line. The meters are inexpensive ones made in Japan.

**Construction Details**

Fig. 3 is a full sized template of the etched circuit board. A very recent article in QST went into details showing simple methods for making etched circuits so we won't treat the process here. In making this board, it is suggested that the board be covered with masking tape and then the pattern of Fig. 3 transferred to the tape. Using a sharp knife edge or razor blade and a straight edge, the masking tape can be carefully

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"Schlebold, "Fast'n Easy Printed Circuit Boards," QST, August, 1959."
and accurately cut to the pattern.

After the board is etched, it can be positioned in the Minibox over the chassis connector holes and the board can then be marked at the drilling points for the mounting holes and the center conductor pins of the coax fittings. When installing the mounting screws, be sure they don't short to the center — conductor portion of the foil on the board.

There are a couple of other construction points that should be stressed. The lead lengths on \( R_1 \) and \( R_2 \) should be kept as short as possible. Also, be sure to use carbon or composition resistors, not wire-wound. When mounting the resistor and diode ends to the pickup sections, \( L_1 \) and \( L_2 \), the connections should be at the very ends of the sections. Also, use a heat sink when soldering the leads on any of the components mounted on the board, as too much heat from the iron can ruin the component.

The Monimatch and meters are mounted in separate Miniboxes, 2\( \frac{1}{4} \times 2\frac{1}{4} \times 5 \) inches. The two connectors on the Monimatch sensing unit, \( J_1 \) and \( J_2 \), are mounted with their center pins 3\( \frac{3}{4} \) inches apart, center-to-center. In order to avoid an impedance "bump" in the feed line when the bridge is inserted in the line, the circuit board should be mounted 3\( \frac{1}{4} \) inch above the base of the Minibox. Quarter-inch spacers can be used under the circuit board at the screws holding both the board and the coax fittings to position the board accurately.

Shielded conductors should be used for the connections from the diodes to the meter enclosure. The shields should be grounded to the chassis at both boxes. These lead lengths are not critical, and the Monimatch can be remote from the meter indicator.

**Using the Bridge**

If you are using coax feed from the rig to the antenna, the bridge can be installed at any convenient spot in the line. If you are using a transmatch, similar to the system as shown in Fig. 1, the Monimatch should be installed on the transmitter side of the transmatch. Any relays or filters should be installed between the bridge and the transmitter, as shown.

Set \( R_3 \) so that the arm of the control is at the top of the resistance — in other words, with all the resistance in series with the meter circuit. Tune up your rig in the normal fashion, and once tuned up adjust the sensitivity of the "forward" meter by moving the arm of \( R_3 \) until the meter reads full scale. You can then determine the SWR by the formula mentioned earlier.

When adjusting a transmatch, feed just enough power through the system to obtain about half-scale reading on the "forward" meter and then adjust the transmatch controls for a match, as indicated by zero reflected power. You may have to adjust \( R_3 \) as you adjust the transmatch to keep the "forward" meter from reading more than full scale. Once you have the transmatch adjusted for a 1-to-1 ratio as indicated by the bridge, the transmitter can be loaded up in the normal manner. We usually reduce the forward reading to about half scale, and then tune the rig for maximum output, as indicated by the meter. When doing this, you may notice that maximum output as indicated by the bridge meter occurs at some setting other than the normal transmitter plate meter "dip" reading. (Normally, the instruction manuals tell you to tune for a plate dip if the transmitter has no output meter.) However, the amplifier stage will work better if you tune for maximum output rather than the dip — keeping the plate loading within the transmitter ratings, of course.

Once you become familiar with the use of the bridge, and interpreting the readings, you'll find it a very valuable device in your station.
A Dual-Band Mobile Antenna

80 and 40 Meters Without Switching

BY NORMAN POS.* WAGKGP

LIKE most other mobile operators, the author
has stuck more or less to one band in the
past because of the nuisance involved in
stopping the car and getting out to retune the
antenna each time it was desired to change bands.
Recently, this difficulty has been overcome to
a considerable degree by the use of an antenna
loading network that takes care of the two low-
frequency bands, 80 and 40, automatically with-
out the need to change coils or otherwise retune
the antenna.

The principal is basically the same as that of
the two-band system described in the ARRL
Antenna Book.1 In the latter system, a network
applied to a whip antenna resonant at 28 MHz.
provides 10- and 20-meter operation without
switching. In the system as used by the author,
a similar network, applied to a whip antenna pre-
loaded so as to be resonant at 7200 kHz, provides
40- and 80-meter operation.

Referring to Fig. 1A, the operation is briefly
as follows: The preloaded whip is made up
essentially of whip sections L1 and L2 loaded by
L4 and the capacitive hat C1. This combination
is made resonant at 7200 kHz. The network con-
sisting of L2, L3, L4 and C1 has no significant
influence on operation at this frequency because
L2 and C1 are adjusted to series resonate at 7200
kHz, thus providing essentially a short from
point A to point B.

L3 is the additional inductance required to
resonate the antenna at 3900 kHz. At this
frequency, the combination of L3, L4 and C1
have virtually no effect because L4 is adjusted
to make the L3L4C1 circuit parallel resonant at
3900 kHz. The almost infinite impedance of this
circuit has negligible effect when shunted across
L3.

Since it can be seen that L2 and L4 are in
parallel, they can be replaced by a single coil,
L5, having a value equal to the resultant of L2
and L4 in parallel, and the network is reduced
to the circuit of Fig. 1B. Also, since L1 and L2
are in series, they can be replaced by a single
coil with adjustable taps (L6), as shown in Fig.
1C, the portion of the coil above the 40-meter
tap being equivalent to L1, and the portion below
equivalent to L6.

*1261 Mt. Acora Drive, San Diego, Calif. 92111.
1 Page 303, 11th edition. Also, Pichitino, "Automatic
Multiband Mobile Antennas and Mobile Antenna

The finished antenna for 40 and 80 meters, with capacitive
hat in place.

Construction

Initially, the author tried various types of
ceramic and mica units for capacitor C1. How-
ever, these units failed to stand up satisfactorily
at transmitter input power of more than 50 watts
or so. The final arrangement uses a tubular air
capacitor as part of an assembly which includes
the coils, as shown in Fig. 2 and the photographs.

A 12-inch length of fiber glass tubing having an
outside diameter of 3/4 inch is fitted with a
brass plug at each end. The plugs are threaded
to match the whip-antenna sections. A 6-inch
section of brass tubing having an inside diameter
of 3/4 inch, and an outside diameter of 15/16 inch,
is slid over the bottom end of the fiber glass
tube. It is held in place by two bakelite rings
(one at each end) bored out to a force fit over
the fiber glass tube, and turned down to a force
fit inside a second brass tube having an inside
diameter of 15/16 inch. This tube has an outside
diameter of 1 inch, and a length of 7 inches.
The assembly is held in place by retaining screws
or pins, as shown in Fig. 2. The two brass tubes,
Fig. 1—Circuit diagrams illustrating the development of the two-band automatic-switching network as explained in the text. The final arrangement is shown in (C).

Fig. 2—Constructional details of the coil and capacitor unit of the two-band mobile antenna.

Fig. 3—Sketch showing the dimensions and configuration of the capacitive hat.
with 1/4-inch air space between, form the capacitor $C_1$. The value is approximately 80 pf.

A clearance hole is drilled near the bottom end of the larger brass tubing to permit a connection between the inner brass tube and the bottom end of the series-tuned coil, $L_a$, as shown in Fig. 2. The top end of this coil is connected to the 40-meter tap on $L_a$ by means of a length of heavy wire running inside $L_a$. The top end of the outer brass tubing is connected to the 80-meter tap on $L_a$ with a similar but shorter lead. A screw connects the top end of $L_a$ to the top brass plug.

**Coils**

The coils are sections of standard coil stock (Pic 1771, Air-Dux 1610T or Miniductor 3907-1) having 20 turns per inch of No. 16 wire, and a diameter of 2 inches. A standard 10-inch length of this stock will be more than adequate. About 20 turns of the stock are cut off to make $L_a$, and the remainder can be used for $L_b$. The coils are supported by their leads, concentric with the fiber-glass tube, with $L_b$ as close to the bottom, and $L_a$ as close to the top as possible to avoid having the tubular capacitor in the immediate fields. Alternate turns of $L_a$ can be pushed inward in one quadrant, as is often done to facilitate tapping.

The complete assembly is weatherproofed by enclosing it in a length of large-diameter Lucite tubing fitted with end caps.

**Capacitive Hat**

The capacitive hat used is shown in the sketch of Fig. 3. It consists of a hexagonal framework made by brazing one-foot lengths of 1/8-inch brazing rod together, and to a brass hub at the center of the pattern. If the corona ball on the antenna is not removable, the hub must be large enough so that a hole to pass the ball may be drilled at the center. One or more set screws should be provided to clamp the hat to the top section of the whip, an inch or two above the coil assembly.

**Adjustment**

A desirable feature of this arrangement is that the adjustments for the two bands are virtually independent. Before adding the whip sections and the capacitive hat, the two taps lead to $L_a$ should be shorted temporarily to connect $L_2$ and $C_1$ in parallel. $L_a$ should then be adjusted until a grid-dip oscillator coupled to $L_a$ indicates resonance at 7200 kHz, after which the short should be removed.

With the antenna completely assembled and installed on the car, preliminary adjustment can be made by coupling the grid dip to one or two turns of wire connected between the base of the antenna and chassis. The 40-meter tap should be adjusted first for resonance at 7200 kHz, and then the 80-meter tap for resonance at about 3800 kHz. Final adjustment of the taps can be made by feeding power to the antenna at one frequency and then the other, and adjusting the tap for each band for minimum s.w.r.

The lower section of the whip used is 41 1/4 inches long, while the top section is 59 1/3 inches long. With the antenna installed high up on a Volkswagen bus, the 40-meter tap is set at 23 turns from the top end of $L_a$, and the 80-meter tap at 40 turns. These settings will vary, depending on the length of the antenna, and its mounting relative to the car body and ground.

After the adjustment is complete, all but a few of the unused turns below the 80-meter tap may be removed. A few extra turns are desirable for possible readjustment in case a change in frequency is made, or the dimensions of the antenna or its location changed.

**Bandwidth**

S.w.r. plots made on the two bands showed that frequency could be varied plus or minus 65 to 70 kHz relative to the optimum frequency on 40, and plus or minus about 20 kHz on 80, without exceeding an s.w.r. of 2 to 1.

A second 8-foot whip, fed directly with coax line, and mounted on the opposite side of the car is used for 10, 15 and 20 meters. With a coax switch mounted up front, it is possible to cover all bands from the driver’s seat by merely switching the coax line from one antenna to the other.

In conclusion, the author would like to thank Jim Gross, K6BQS, for many of the mechanical ideas and for his help in testing the coil. **QST**

**SWITCH TO SAFETY!**

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Here are two solid-state vhf converters that can be built in two or three evenings by anyone with a fair amount of practical experience in amateur radio. The circuits were designed for minimum "cross-mod" and low noise figure. Overall converter gain is good, making the equipment suitable for use with almost any communications receiver that can be tuned from 28 to 30 MHz. The 2-meter converter can be built for under $30, using new parts throughout. The 6-meter converter will cost slightly less.

A Solid-State Sandwich for VHF

Twin Converters for 50 and 144 MHz

BY DOUG DEMAW,* W1CER

The equipment described here uses a mixture of JFETs and MOSFETs to provide good performance at low cost. By eliminating bipolar transistors there is no need for special tuned circuits designed for matching the low input impedance of that type of transistor. FETs permit the builder to work with tuned circuits that are similar to those used with triode vacuum tubes. FETs are superior to bipolar transistors because they can handle higher signal levels without the overloading and cross-modulation problems common to bipolar transistors. This feature should appeal to vhf operators who live in close proximity to other vhf stations.

Of special interest here is the use of a dual-gate MOSFET in each converter's mixer circuit. Although Motorola MF3008s are used at Q5 and Q8, Figs. 1 and 2, an RCA 3N141 will provide comparable performance. The Motorola part, however, is less subject to damage from static charges than are some other brands. This, according to a Motorola representative, results from the silicon-nitride dielectric material used as insulation between the gates and the remaining part of the MOSFET. Earlier types used a metal-oxide film that could be more easily punctured by high electric fields. The 3N141.

*Assistant Technical Editor.

1 Bipolar transistors do not have sufficient dynamic range to accommodate strong signals without overloading; FETs are superior in this regard.
2 Since these converters were built, RCA has announced the availability of their new 40673 MOSFET which has built-in back-to-back protective diodes. The diodes prevent static-charge damage during handling, and provide in-circuit protection from transients.
3 Both the MF3008 and 3N141 MOSFETs should be handled with care to prevent damage from static charges. They should be installed in the circuit board as the last step prior to testing. Sockets are recommended, and the four transistor leads should be kept shorted together until they are installed. If the MOSFET is to be soldered into the circuit board, rather than being plugged into a socket, the tip of the soldering iron should be connected to an earth ground while soldering. Keep the leads away from plastic, styrene, or any material that can collect static charges. Once the FET is installed in the circuit it is quite safe from static-charge damage.

The twin vhf converters are housed in a homemade aluminum box which has removable top and bottom covers for easy access to the circuit boards. Each converter has its own input and output jacks so that simultaneous operation is possible.

does not use silicon nitride and requires very careful handling to insure against damage.

Both the MF3008 and 3N141 types exhibit high values of yfs (forward transadmittance, gate 1 to drain), thus making them ideal as amplifiers and mixers. The MF3008 has a yfs that ranges between 8,000 and 18,000 μmhos. Its conversion gain is on the order of 20 dB, and the isolation between the oscillator and rf signals is very good because each of the two signals being mixed has its own control element. The foregoing consideration is especially important in receivers which use tunable oscillators and mixers. Although a dual-gate MOSFET would serve as an excellent rf amplifier in these converters, it was not used in the interests of transistor protection from the strong rf fields which are often present when converters are used in combination with vhf transmitters. The JFETs (junction field-effect transistors) can safely handle up to approximately 80 peak volts of rf before being damaged, and perform nearly as well in rf amplifier service as do the MOSFETs.

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CR<sub>s</sub>, CR<sub>r</sub>—1N914 or equivalent.
CR<sub>t</sub>—9.1-volt, 1-watt Zener diode (Motorola HEP-104 or equiv.).
J<sub>1</sub>—BNC or SC-239-type chassis connector.
J<sub>2</sub>—Phono connector.
L<sub>4</sub>—4 turns No. 24 enameled, to occupy 3/8 inch on J. W. Miller 4500-4 iron-slug form. Tap 1 turn from ground end.
L<sub>5</sub>, L<sub>11</sub>, L<sub>30</sub>—5 turns No. 24 enam. to occupy 3/8 inch on same-type Miller form as L<sub>4</sub>.
L<sub>17</sub>, L<sub>24</sub>—15 turns No. 24 enam. wire, close-wound, on J. W. Miller 4500-2 iron-slug form.
L<sub>12</sub>, L<sub>21</sub>—Same as L<sub>11</sub>, but no tap.

The rf stages of both converters are neutralized for best stability. The neutralizing network, when properly adjusted, assures the best possible noise figure (approximately 2.5 dB) for the 2-meter converter. The foregoing consideration is not especially significant in the case of the 6-meter unit because atmospheric noise on that band is usually the limiting factor in low-noise reception. Either converter is capable of satisfying the needs of beginners or seasoned vhf operators who possess stable, sensitive 28-MHz tunable i-f receivers. The use of circuit boards makes the converters easy to duplicate and get operating. Ready-made boards are available for those who do not wish to etch their own.  

The 2-Meter Circuit

Because the converters were designed as part of another project, the component numbering in Figs. 1 and 2 does not start in the low numbers. Each part is numbered (though not all are called out in the parts list) for the purpose of identification on the circuit-board templates. Referring to Fig. 1, diodes CR<sub>6</sub> and CR<sub>7</sub> are bridged across the antenna input at J<sub>1</sub> to provide burnout protection for Q<sub>t</sub>, the rf amplifier. They will not conduct until the incoming signal level reaches approximately 0.7 volt. They can be eliminated from the circuit if the converter is well isolated from the transmitter by means of a high-quality, shorting-type coaxial relay. Make  

4 Stafford Electronics, 427 S. Benbow Rd., Greensboro, N. C. 27401 ($0 per board). Foto-Etch Co., 3511 Citrus Ave., Walnut Creek, Ca. 94596.
CRs—9.1-volt, 1-watt Zener diode (Motorola HEP-104 or equiv.).
CR4, CR5—Small-signal silicon switching diodes (1N914 or similar).
J3—BNC or SO-239-type chassis connector.
J4—Phono connector.
Ls—3 turns of small insulated wire wound over the ground end of Lc.
Lc, Ls—10 turns No. 24 enam. wire, close-wound, on J. W. Miller 4300-4 iron-slug form.
Lr—25 turns No. 30 enam., close-wound on 4500-2 form.

Fig. 2—Circuit diagram of the 6-meter converter. Resistors are 1/2-watt composition. Capacitors are disk ceramic unless specified differently. Numerated components not appearing in the parts list were so identified for circuit-board layout purposes.

Sure that the coax relay switches before the transverter activates!

The antenna lead is tapped down on L14, one turn from the ground end. The exact positioning of the tap can be varied for the best noise figure, though the position given here should be satisfactory. Neutralization of the rf stage is effected by the series coil, L22, which should be adjusted for the lowest noise figure consistent with good stability. Source bias is used at Q7 to prevent stage overloading in the presence of strong signals.

Bandpass coupling is used between Q7 and Q8, the mixer, to keep out-of-band signals from reaching the mixer. The bandpass coils, L15 and L16, should be stagger-tuned to give a reasonably flat response from 144 to 146 MHz. The rf signal is coupled to gate 1 of Q8, and the oscillator signal is supplied to control gate 2. Do not interchange the gates. Bandpass tuning is used at the output of the mixer to reduce oscillator feedthrough to the i-f receiver, and to provide a broad response from 28 to 30 MHz. Coils L17 and L18 should be stagger-tuned for a broad response over that frequency range. Output to the i-f receiver is taken at 50 ohms from a capacitive divider across L18.

An overtone oscillator is used at Q9 to provide a 58-MHz signal. Output from the oscillator is doubled to 116 MHz by Q10. Another bandpass tuned circuit is made up by L20, L21, and their associated shunt capacitors. Both coils are peaked at 116 MHz to lessen the chance that 58-MHz oscillator energy, and the 174-MHz oscillator harmonic, will reach the mixer. Tuned traps for both the unwanted frequencies can be added to the injection line of gate 2 by those who desire greater attenuation of those two frequencies. To assure good oscillator starting, L19 should be capable of tuning at least 1 MHz above the crystal

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frequency. When properly adjusted, it will be resonant at approximately 50 MHz. The supply voltage to Q3 is regulated at 9.1 volts by CR8, a 1-watt Zener diode.

The 6-Meter Converter

Fig. 2 shows the circuit of the 6-meter unit. For all practical purposes it is a carbon copy of the 2-meter converter, but without the doubler stage in the oscillator channel. The same circuit-board pattern is used for both pieces of equipment, resulting in a few unused holes in the 50-MHz model.

There is no need to tap the antenna down on the input coil, L6, since noise figure is not a prime consideration in this instance. A 3-turn link is wound over the ground end of L6, and is used instead of the tap. Neutralizing inductor L7 is adjusted for stable operation of Q4, and should be set while the antenna is connected to J2. The rf and mixer bandpass circuits should be stagger-tuned in the same manner as was done in the 2-meter model. Coils L12 and L13 are peaked at 22 MHz. For better purity of the oscillator output signal, if desired, tuned traps for 44 and 66 MHz can be placed in the injection line to gate 2 of Q6. Normally, this should not be necessary.

Construction

Scale templates for the etched-circuit board are available from ARRL for 25 cents and a SASE. The semiconductors are available from most of the larger mail-order houses, or from any Motorola distributor. The slug-tuned coil forms are made by J. W. Miller and should be only those numbers specified. It will be noted that some coil-form numbers have a numeral 2 at the end (4500-2) while others have a 4 at the end of the number (4500-4). These numbers relate to the core material used, which is designed for a particular frequency of operation. The core material has a significant effect on the tuning range of the inductors, and can seriously affect the coil Q if of the wrong type. If substitute coil forms are used, be sure that they're designed for the frequency range over which they will be used.

These converters can be packaged in any style of box the builder prefers. In this instance, both units are housed in a single homemade enclosure which measures 6 1/2 5 x 2 1/2 inches. The top and bottom covers are held in place by No. 6 spade bolts which are attached to the side walls of the box. This style of construction can be handled with ordinary hand tools, and only four 90-degree bends are required. This box was made from a large aluminum cookie sheet purchased at a local discount store. The dull finish results from a lye-bath treatment given the aluminum after it was formed.

The converters are mounted on the bottom plate of the box by means of 1-inch metal standoff posts. Self-adhesive rubber feet are attached to the bottom of the box. Black decals are used to identify the terminals on the outside of the box.

A 4-terminal transistor socket is used for the 6-meter mixer MOSFET. At the time the 2-meter converter was built a socket was not on hand, but both converters should use sockets for the MFE3008s to minimize the possibility of transistor damage when soldering. The sockets are Elco 05-3308 and are available from Allied Electronics in Chicago (5 for 94 cents). The binding posts used for connecting the + 12 volts to the converters are E. F. Johnson 111-1028s.

HEP-50 (Motorola) rectifier diodes are con-
Looking into the bottom of the converter box, the 6-meter unit is at the top of the photo. Each converter has four 1-inch standoff posts which secure the circuit boards to the bottom plate of the cabinet. RF shields divide some sections of the converters to prevent unwanted coupling between the tuned circuits. The shields are made from flashing copper and are soldered to the ground foil on the circuit boards. They are notched out wherever they come in close proximity to the non-ground elements of the circuit.

Connected from the 12-volt input terminals on the box to the 12-volt terminals on the circuit boards, their anodes toward the Johnson binding posts (Not shown in Figs. 1 and 2.). These diodes prevent damage to the transistors should the operator mistakenly connect the power supply leads for the wrong polarity. Positive voltage will pass through the diodes, but negative voltage will be opposed.

It is strongly recommended that the converters be housed in some type of metal enclosure, as was done here, to prevent oscillator radiation, and to insure against random pickup of interfering commercial signals by the mixer circuit. This precaution is especially important in areas where commercial fm and TV transmitters are nearby.

Adjusting the Converters

After checking for cold-solder connections and unwanted solder bridges across the circuit-board elements, connect the converter being tested to a receiver that can be tuned from 28 to 30 MHz. Using either a signal generator or a weak ham signal, adjust the tuned circuits for peak response. The low end of each vhf band will fall at 28 MHz with the oscillator frequencies given here. (Other segments of either vhf band can be covered by using crystals of the appropriate frequency.) Next, if the rf stage appears to be unstable, as evidenced by popping noises and blank carriers, as the input coil is tuned, adjust the neutralizing coil until the condition ceases. Further adjustment of the neutralizing coil can be carried out to obtain the best noise figure on 2 meters. After these initial adjustments are completed, the rf and mixer bandpass circuits can be stagger-tuned as outlined earlier. If no signals can be heard, chances are that the oscillator stage is not operating. A wavemeter can be coupled to the drain coil of the crystal oscillator to determine if output exists, then the slug adjusted until an output indication is noted. The 2-meter converter draws approximately 40 mA when operating normally. The 6-meter unit will draw approximately 35 mA.

**Performance**

Both converters show excellent immunity to spurious responses and "birdies" in their intended i-f tuning range. While checking with a laboratory-type signal generator, each converter permitted Q5 reception of 0.1-µV cw signals, and signal levels 6 dB below that value were plainly discernable in the converter noise. Both units were tested in the immediate region of several commercial fm and TV transmitters in the Hartford, and Meriden, Connecticut areas. In regions where other channel assignments are being used, it is possible that unwanted responses might show up, but tuned traps for the interfering frequency should resolve the problem. Also, it is always helpful to install a strip-line bandpass filter ahead of any vhf converter in problem areas where such responses are likely. This practice also helps reduce i-f feedthrough of 28-MHz amateur signals.

Anyone wishing to construct converters for use in the hf bands should be able to adapt these circuit boards to that use. Similar circuits can be used, selecting the proper crystal frequencies and designing the tuned circuits for the frequency of operation. The same type transistors can be used in each stage of the converter.

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**SWITCH TO SAFETY!**

October 1969
The Swan Multidrive 2-Meter Antenna

Electrical and Mechanical Details of a Popular V.H.F. Array

The vhf enthusiast is always looking for ways to improve his antenna performance, and rightly so, for any improvement here works on both transmitting and receiving, and it is often accomplished with less expense than similar improvements made within the station. For Norm Milne, WB6PDN, a marked step up in the antenna department was made possible almost by accident, and as a result an approach new to the amateur vhf field is being used at an increasing number of western stations.

Norm had used an 8-over-8 J-slot array on 2 meters for some time, but was looking for something better to put up on his new fold-over tower. He started on a long-Yagi construction project, but got no farther than a hunt for boom and element materials. This lead him to a long-time friend, Oliver Swan, a local manufacturer of TV antennas. A former ham (ex-W7KPM) recently relicensed as W6KZK, Oliver was interested in trying for 2-meter work an idea commonly used in TV antennas. The antennas shown in the sketches and photographs are the result.

The basic idea for the array, from Jasik's Antenna Engineering Handbook, is used in TV antennas for gain over a wide frequency range, in an array of relatively simple construction. In the form worked out by W6KZK, with dimensions given at the left side of Fig. 1, frequency response is a secondary consideration, though the array does have somewhat broader coverage than a conventional Yagi of similar proportions. The use of several driven elements also appears to be an efficient way of getting the optimum phasing of currents in the system, necessary for high gain and clean pattern. Results at several California stations, and with an antenna checked by the writer, indicate that the Swan antenna does outperform a conventional Yagi of the same boom length. Phased arrays of two and four bays erected by western 2-meter men have given similarly outstanding results. A four-bay system is reported to have given identifiable echoes from the moon.

A duplicate of the original single-bay version checked by Ron Henley, WB6RNH, showed uniform gain from 144 to 145 MHz. It was down 1.5 db at 146 MHz, and 2.5 db at 148 MHz. This is comparable to 5-element and 20-element arrays developed by the writer, and considerably broader than long-Yagi systems adjusted for maximum gain.

Jim Brannin, K5JC, was not interested in bandwidth, so he experimented with element lengths and spacings for maximum gain at 144 MHz. His dimensions are given on the right side of Fig. 1. Jim feeds his array with 50-ohm coax and a 52-to-110-ohm balun. The original Swan version aims for 110 ohms impedance, so that two bays may be stacked and fed at the midpoint of the phasing system with 52-ohm coax and a 1-to-1 balun.

Construction and Adjustment

The driven elements of the Swan antenna must be insulated from the boom, as they are fed at their centers. Swan uses and supplies rugged plastic blocks made for the purpose. The parasitic elements are mounted on smaller blocks, and a single bolt runs through the center of the element, the block, and the one-inch boom. The mounting holes in the blocks for the driven elements are 3 1/2 inches apart, and the elements are drilled 5/8 inch in from their inner ends. The transposed line connecting the elements is one piece of heavy aluminum wire, and runs through small U-shaped clips at each element.

3Set of 9 mounting blocks, drilled and machined for 5/8-inch elements and 1-inch boom, $4.00, incl. postage and tax, from Oliver Swan, 646 N. Union, Stockton, California 95201.
Fig. 1—Basic dimensions of the Swan Multidrive 2-Meter array, broad-band and narrow-band versions.

The loop at the back end is 7 inches long. The line should be separated from the boom, and from the other part of the line at the cross-over point, by at least 1/4 inch.

Assuming a feed impedance of 110 ohms, the writer made a Q section of rigid 75-ohm coax, two lengths side by side. This 150-ohm section should match the 200 ohms represented by the main transmission line and its 52-ohm balun to a 110-ohm load, but it did not. Standing-wave ratio across the band varied only slightly, but it was never below about 2:1. Tests with other matching devices not having provision for tuning out reactance resulted in similar degrees of mismatch. It appears that the antenna, as supplied, is reactive at all frequencies within the band, a condition that is not unexpected, in view of the phasing system.

Matching is thus a logical job for the universal stub, which has become almost standard equipment in antenna work by this writer. In this instance a line just over a half wavelength long was made of 1/2-inch aluminum tubing, flattened and drilled at one end to take the bolts that hold the forward driven element in place. The upper end is fanned out to the 3 1/2-inch separation of these mounting bolts, and the balance of the line is about 1 3/4 inches, center to center. A sliding clip is used to close the stub and resonate the antenna system at the operating frequency. The 50-to-200-ohm balun is then slid along the stub until the point of zero reflected power is found. The positions of the shorting clip and the balun connections interact to a degree, so both should be rechecked carefully for zero reflected power at the middle of the desired operating frequency range. If evaluation of the antenna performance is to be attempted, this procedure should be repeated for every frequency change.

These adjustments should be made with the array some multiple of a half-wavelength above ground, and in an area where no trees, wires or other objects are in the line of fire for distances of many wavelengths. If your test site does not meet these specifications, mount the array with the boom pointing straight up, and the reflector about a quarter-wavelength above ground. This will provide a fair simulation of free-space conditions.

**Performance**

The writer makes no claim as to accuracy of gain measurements, though relative gain can be

(Continued on page 58)
SOLID STATE SWITCHING FOR THE ELECTRONIC PADDLE

The circuit of Fig. 1 illustrates a refinement of the electronic paddle described by Ken Stone in the “Gimmicks and Gadgets” column of QST for April, 1969. Basically, the two keying relays in the original unit have been replaced by switching transistors, and the number of dc amplifier stages has been reduced from three to two with no loss in sensitivity. Thus, the modified circuit offers the advantages of being all solid state and having fewer parts than the original version. — W. D. Fredericks, WASTMA/4

![Schematic Diagram](image)

**Fig. 1**—Schematic diagram of the relayless electronic paddle. For details of the three plates, see the article referred to in the text.

BT1 — 9-volt battery.
Q1, Q2, Q3, Q2o — 2N1051 or HEP-53.
Q2o, Q2 — 2N525 or HEP-253.
R1, R2 — 1/10-megohm, 1/4-watt composition.

SIMPLE CURE FOR IGNITION NOISE

After being driven nearly nuts by the ignition noise from my mobile rig, I decided to try the complete shielding system detailed in the Mobile Manual. Although the installation took many hours of bloody fingers, greasy fingers, and not so sweet words, the job was worth the effort since the system proved to be very effective.

My rig was completely free of ignition noise for many months. Then after being informed by the local service station that it was impossible for them to service my ignition system, I slowly came to the conclusion that my many hours of work would have to go in order for the secondary things, such as my car firing on all cylinders, to endure.

For the next two months I had a hard time hearing any signal that resulted in an S-meter indication below 40 dB over S9. Then one day the idea came to mind to cover the ignition system with aluminum foil rather than shield braid. After only fifteen minutes, rather than several hours for the previous system, the foil was completely installed. The foil has worked equally as well as the shield braid, and it can be removed easily by any automobile mechanic for service of the ignition system. When I get my car back from the garage, I simply take a few minutes to cover everything with foil again, and I'm in business as before. — Dennis E. Barrow, WB4GQX

METER PROTECTION

It has been pointed out by W9YLD that the movement of the meter in the “Compact Multi-Purpose Test Instrument” (April 1969 QST, page 16) can be protected against mechanical shock in transportation by the use of electromagnetic damping. This feature can be incorporated easily by connecting the “0” terminal of S1A to the negative side of the meter, thus causing the meter to be short-circuited when S1 is turned to OFF. — Yardley Beers, W9JP

QSL CARD HOLDERS

Being unable to find QSL card holders here in Memphis, I came up with the idea of using “Glad-Bag” sandwich bags to hold my QSLs. As shown in Fig. 2, insert one card in each bag, and staple the bags together. Then roll the flap of the uppermost bag around a 6¼ x 1¼-inch piece of cardboard and staple the two together. Use a tack in the center of the cardboard to hang the QSL collection on the wall.

The best part about using “Glad-Bags” is that a box of 80 bags costs 33 cents compared to 99 cents for a QSL card holder that holds only 20 cards. — Mickey L. Bradford, WN4LSS

![QSL Card Holder Diagram](image)

**Fig. 2**—WN4LSS's method for displaying QSL cards.
ASSEMBLING TOROIDAL INDUCTORS FOR BAND SWITCHING

Double-sided copper-clad circuit board makes a convenient multiple-deck sandwich for stacking two or more toroidal inductors. The assembly shown in Fig. 3 contains four toroids which are used in a four-band transmitter. Small holes were drilled in each corner of each piece of circuit board. Bus wire was passed through the holes and was then soldered in place to hold the toroids snugly against the boards. Masking tape covers the copper surfaces that would otherwise come in contact with the windings on the cores, thus assuring that there will be no shorted turns on the coils. The enamel insulation of the wire become abraded. A standard terminal strip was soldered to one of the bus wires. It provides tie points for the ends of the windings. Because in this model one end of each winding goes to chassis ground, the copper foil of the boards is used as the ground connection. A No. 8 screw and nut were fastened to the bottom piece of circuit board and serve as a mount for the completed assembly.

Since toroidal inductors are self-shielding, they can be mounted close to one another, and close to metal, without interaction effects. The copperclad circuit board sections between the coils act as shields to prevent capacitive coupling between the coils. — W1CUER

9TO MARK II KEYER

I built the 9TO Mark II keyer described in QST for June 1967, and found it to be a fine unit. However, a problem arose when I attempted to send characters that began with a dot. The dot storage tube, V4, would occasionally stay in the memory state too long, and two dots would be sent when only one was desired. After much experimenting I solved the problem by connecting a 0.005-μF capacitor from Pin 2 of V4A to ground and changing R16 from 68,000 ohms to 150,000 ohms. These changes increased the magnitude of the pulse applied to Pin 3 of V4, and slightly increased the delay time of the relay closure, insuring that memory tube V5 would be forced back to its quiescent state at the proper instant. Even at the keyer's highest speed, no adverse effects were noted as a result of the modification. — H. Dale Stridger, W4DQS

INEXPENSIVE BLOWER

Need an inexpensive blower for your final amplifier tubes? Try using an old hair dryer. By disassembling the unit and removing the handle and heating element, a satisfactory blower can be fashioned. Fig. 4A illustrates a typical installation, and Fig. 4B shows the details of a suitable mount. A coat of paint on the modified dryer and its mount will make the whole thing look as good as a commercial blower.

Used dryers can be picked up for a dollar or more at junkyards. I was fortunate to get mine for nothing from a neighbor! If a dryer isn't available, a blower for an automobile heater can be used instead. However, a small 12- or 6-volt supply is needed to run an automobile blower from 120 volts ac. Heater blowers can be obtained for a few dollars from most wrecking yards. — Jim Brenner, WA6NEV

Fig. 3—A space-saving toroidal sandwich.

Fig. 4—(A) A modified hair dryer serves as a blower for a final amplifier. (B) Details of the blower mount.
Comdel DW 1550 Wattmeter

Whether you operate a kilowatt or a low-power transistor rig, whether you work 160 or 6 meters or the bands in between, it is likely that you want to know how much power you are putting into your antenna system. The Comdel DW 1550 wattmeter shown in the photographs can give you an answer.

The DW 1550 employs a directional coupler that is similar to one described by Bruene several years ago. A capacitive divider is used to take a voltage sample of the rf on the transmission line, and an inductively coupled toroid coil is used to take a current sample. This arrangement results in a wattmeter circuit whose readings are independent of frequency over the design range, which is 1.5 to 60 MHz for the Comdel unit. The accuracy of the readings is dependent on using the DW 1550 in coaxial lines having a nominal characteristic impedance of 50 ohms.

Forward and reflected power is read in three ranges: 0–15 watts, 0–150 watts and 0–1500 watts. On the first range the meter is calibrated from 0.2 watt to 15 watts. For the second range the user must multiply these figures by 10 to get calibration points of 2 watts to 150 watts, and for the third range he must use a multiplication factor of 100 to obtain calibration points of 20 watts to 1500 watts. Accuracy of the readings above one quarter of full-scale power is rated at plus and minus 1 dB (plus 26 percent and minus 20 percent). No accuracy rating is given for readings below one quarter of full scale.

The DW 1550 is not limited to displaying wattage readings. It can be used to measure the VSWR of a feed line, provided the power level is at least 15 watts. For this purpose the meter is calibrated in voltage standing-wave ratios of 1.0:1 to 4.0:1.

Another feature of the DW 1550 is indicated in schematic form in Fig. 1. When the Comdel unit is set up as shown, the meter indicates the approximate difference between the forward line voltage that is rectified by CR1 and the reflected line voltage that is rectified by CR2. This permits the user of a transmatch to find an approximate impedance match by merely tuning the transmatch controls for a maximum indication on the meter. The usual practice of switching back and forth between the forward and reflected voltage positions of the meter while fiddling with the sensitivity control is not necessary unless precise adjustment is desired.

Physically the DW 1550 consists of two parts, a directional coupler and a control unit. As shown in the photographs, the coupler is housed in a very rugged box made of ¾-inch aluminum channel that is 1 ½ inches high and 2 ½ inches wide. SO-239/U fittings are used to make connections to the feed line, and a three-contact terminal strip is used to make the dc connections to the control unit. The coupler can be mounted on the back of the control unit or it can be located at a distance. Sheet metal screws are furnished for the former installation, and about


Inside view of the directional coupler. The heavy wire connecting the center conductors of the two coaxial fittings passes through the center of a toroidal coil. Gunk on the coil and the wire securely keeps the two components in the same relative position, even if the unit is dropped.
5½ feet or so of shielded three-conductor cable is supplied for the latter.

The control unit is contained within a 3 × 3½ × 7½-inch aluminum case. On the front panel are a meter with a 1½ × 2½-inch window, a three-position slide switch (15 w, 150 w and 1500 w), a five-position rotary type function switch (FWD POWER, REFL. POWER, ANT. TUNE, SWR VSWR, and READ VSWR), and a sensitivity control for the VSWR of the function switch. A three-contact terminal strip for the dc connections from the coupler is mounted on the back of the control unit. — *WYDS*

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**New Apparatus**

**Display Electronics Decade-Counter Kit**

A new decade-counter kit for the electronics experimenter has recently been announced by Display Electronics. Now one can build professional-looking frequency counters, digital meters, precision clocks, and many other digital projects, using these modules as the heart of the system. The counter module uses two Signetics "UltiLogic" integrated circuits, along with a resistive decoding matrix and seven transistors which drive neon-lamp indicators. Eleven lamps, located in a molded nylon housing, display the numbers 0 through 9 and a decimal point. Power requirements for the module are 5 volts dc ±5% at 75 mA, and 105 volts dc ±15 volts at 3 mA, or at 4 mA if the decimal point is used. The input circuit triggers on a dc level, so rise time is not critical. Operation to 10 MHz is guaranteed.

The model DC10-1 kit includes all components for assembly of the module, including solder and bus wire, as shown in the photograph. The drilled printed-circuit board is of G-10 fiberglass epoxy material. An etched edge connector mates with a readily available Amphenol printed-circuit connector, or board connections may be made by soldering leads directly. As with any solid-state printed-circuit project, the surface of the tinned coating of the board should be cleaned with an abrasive material before assembly, to remove surface oxidation. (A solvent is not recommended.) This will make the soldering job easier, requiring less heat to properly "flow" solder between the board and the component leads. A low-wattage iron with a small tip is also recommended — as stated in the instructions. Following these precautions, the kit can probably be assembled by most builders in an hour or less.

The overall dimensions of the completed modules are 3 × ¾ × 4 inches. The modules may be mounted adjacent to one another with no spacing needed between. A depth of 8¼ inches is required behind the panel, excluding space for a connector, if used.

The kit, including complete assembly instructions, operating instructions, schematic and logic diagram, is available from Display Electronics, P. O. Box 1044, Littleton, Colorado 80120, for $13.95 postpaid. An assembled and tested version is available for $16.95 postpaid. Display Electronics also produces a power supply kit, model PS-1, designed especially for use with the decade counter. This supply is capable of powering up to seven modules plus other logic circuitry. — *KiPLP.*
RADIO SIGNAL ECHOS

Technical Editor, QST:
Reference your article, "Long-Delayed Echoes . . . Radio's 'Flying Saucer' Effect," May 1969 QST. I am a cw weather-intercept operator with the U.S. Air Force in southern Europe. I am stationed at the Moron Comm. Annex, located about 5 miles from Seville, Spain. This echo effect to which the article refers has been noted by me more than the "once a year" mentioned by the authors. This is why I write.

The stations which we copy are civilian weather synoptic and marine broadcast stations, using both plain text and five-character number groups. Usually the receiving equipment used is two K-900A/URI receivers with diversity antennas being used at certain rhombic antennas at a height of about 50 feet. The stations are usually copied with a bandwidth of 2 kHz to 0.1 kHz. The echo effect is still clearly audible at 0.1-kHz bandwidth.

Over the last 15 months, I have noted echo effects on two of our stations. These echoes are consistent as to frequencies and time of day heard. The only "echo-producing" frequencies thus far noticed are 2 and 22 MHz. The 2-MHz station is located in Idris, Libya, and the other station on 22 MHz is located in Capetown, S. Africa. The rated power is listed as 250 watts for the Libya station and 5 kW for the station in S. Africa. The echo is usually heard late at night (2130 and 0030 GMT on 2 MHz and 1730 GMT on 22 MHz), and are more frequent on 2 MHz than on 22 MHz. Also, the echo signal follows further behind the original on 2 MHz than on 22 MHz.

On 2 MHz the echo is anywhere from half to five and possibly more characters behind at a speed of around 18 wpm. On 22 MHz, however, the echo is usually only a half to one or two characters behind at a speed of about 15 wpm. These echoes, when they appear, only appear when the frequencies seem "clear as glass."

As a general rule, the echoes appear about once a month, with possibly two or more appearances per month during the winter. When I first noticed these echoes, I was inclined to blame them on the equipment. At the time, they were more of a nuisance than of any interest as phenomena. Even though they were "distant sounding" and not of the same strength as the copied signal, they were quite distinct and at times distracting. The next time that this effect appeared, I checked all position receivers using all antennas available and the echo was still evident, although it was not as evident when the antenna was not pointed in the direction of the transmitter. There is the possibility of the echo being generated by the transmission equipment. As we have no direct contact with these stations, I have been unable to eliminate this possibility. I have copied the echo, and it is, definitely, the same traffic that is being sent. — Sgt. John M. Geiger, W407VZ, 2186 Comm. Sqdn., Box 11030, APO N. Y. 09824.

MORE RADIO-SIGNAL ECHOS

Technical Editor, QST:
Several months ago I heard some long-delayed echo signals, but not thinking about how fast radio waves travel, I assumed they were coming around both long and short paths. I thought this was normal. Then on June 1, 1969, I heard W2HCW, Long Island, New York, with echoes on his signal, but not with as long a delay as the earlier echoes. I am enclosing a magnetic tape recording of those echoes. The time was 0600 to 0635 EDST (1009 to 1035 GMT), on 14.217 MHz. These times were when I started listening and finished listening; the echo may have been on longer. The signal was quite loud for this time of the morning. I think it had peaks of about 36. The antenna was a 20-meter dipole favoring NNE/SSW, but the echo was also heard on an 80/40-meter V which favors east/west.

I have heard W2HCW at other times, but no echoes. I was under the impression that I could not hear New York on 20 meters, but he was quite readable at about 04 early one morning. He does run high power and a 3-element beam, according to his QST. Maybe we have a good path between us. He is the only New York station I have heard on 20 meters. — Larry M. Frazier, W4LHG, 1908 Uphaer St., N. W., Washington, D. C. 20011.

ECHO SIGNALS ANALYZED

Technical Editor, QST:
I am enclosing some Sonagrams that seem to show the echo on W2HCW's signal fairly well. See Fig. 1. This one was taken with the analyzing filter in the 200-Hz position.

The narrow bandwidth of Larry Frazier's receiver only gave us a little over one kHz of bandwidth on the tape to work with. You can see a definite repetition of patterns at approximately 135 milliseconds. If this is considered to be a propagation delay, the path difference would be about 10 miles.

2 We requested Mr. Nathan Gold, K1MIA, who possesses the necessary equipment, to spectroscopically analyze the recorded audio signals. We also corresponded with Mr. Arnold Tamchin, W2HCW, regarding the delayed echoes present on his signal. Excerpts from their replies are also presented above. — Editor.

3 Registered trade mark, Kay Electric Co., Pine Brook, N. J.

![Fig. 1—Sonagram of W2HCW's signals and echoes as received by W4LHG. The chart displays a spectrum analysis of the audio signals; time is shown horizontally and frequency is shown vertically. The intensity of the noise patterns shows the amplitude of the individual voice frequencies which are present. The time between the original signals and their respective echoes is approximately 135 milliseconds.](image-url)
25,000 miles (roughly the circumference of the earth). An important point is that the echo isn’t an echo of the original signal. Something that is an echo should repeat the identical pattern except for differences in amplitude of frequencies due to selective fading. The Sonagrams show that the patterns of the echoes are roughly the same as the original signal, but the detailed frequency structure is different. It’s almost as though another voice was repeating the same words. It is possible that the ground acts as a signal propagating around the earth, the ionosphere might have had some rapidly changing characteristics that could cause enough doppler shift to make the patterns look different. The “around the earth” hypothesis might be argued against by the fact that the original signal and the echo are approximately equal in amplitude, but this could occur if the direct path had very poor conditions and the round-the-earth path had very good conditions. — Nathan Gold, K1MIA, 4 Lanewood Ave., Framingham, Mass. 01701.

"ECHO" TRANSMITTING FACILITIES

Technical Editor, QST:

I do not particularly recall conditions on the morning of June 1st, but I do note from my log that contacts were made with VK, ZL, ZS, PY, JA, DU, KR6, and FG7 stations. 4

On the 20-meter band I use two six-element wide-saced Yagis stacked vertically. The upper bay is at 105 feet and the lower is one wavelength below. The location of the antennas is on a knoll about 50 feet above Conscience Bay, an inlet of Long Island Sound. The ground falls away at about a 45° angle in most directions. The antenna sees water in all directions, although in the southerly direction the distance is several miles. In general, the location is excellent. The equipment is Collins with a BTI linear operating at near maximum power. — Arnold Tamchuk, W2HCW, Box 593, Schenectady, N. Y. 11785.

STOPPING RUST AND CORROSION

Technical Editor, QST:

In the July 1969 issue of QST, Technical Correspondence, KH6PHN asks for comments on combating corrosion in electronic gear.

I find that a good periodic cleaning with a product known as Jaxolene-Lubricate-Stop Corrosion — manufactured by Radiator Specialty Company, Charlotte, N. C., controls this condition quite well. (The frequency of cleaning would depend upon how much trouble you may have with corrosion, and, in my case, is confined mostly to coax connectors and antenna terminals located outside in the weather.) This product meets Mil. Spec. Mil-C-23411, which is concerned with appearance, sprayability, effect on paint, protection afforded, etc. The manufacturer says LSC permits electrical current to flow because it does not insulate. It provides a long-lasting, nonhardening, molecular film barrier that preserves and protects all metal surfaces against rust and corrosion. LSC will stop rust and corrosion that exists and prevent reoccurrence on new or cleaned parts; it seals the surface and blocks rust and corrosion-contributing elements — water, gases, alkali.

LSC is specifically recommended for use on radio and television antennas. A major cause of poor TV reception, and one often overlooked, can be traced to corroded antenna terminals. This product is packed in an aerosol can and may be applied by spraying on, brushing on, or wiping on with a cloth. For new work, all parts — wire, leads, terminal strips, and so on — should be cleaned with an agent that will leave no film (carbon tetrachloride, but handle with care). After the connections have all been soldered, a light coat of LSC will prevent any corrosion from forming. It is excellent for cleaning relay contacts because you don’t wear away the plating on the contact surfaces as may happen if you file them clean.

To clean tube sockets it would be best to find a very small spiral nylon (or some other nonconductive material) brush such as used by watchmakers, spray some LSC on the brush, insert into each pinhole in the tube socket, and brush the contact surface clean. Good results can be accomplished by an alternate method; spray the pins of the tube with LSC, insert and remove the tube several times to clean both the socket and the tube pins, wipe any residue from the tube pins, apply a thin film of LSC and install the tube.

For printed-circuit boards, a fairly stiff nylon brush loaded with LSC can be used to scrub the entire surface of the PC board including the conductive areas. Wipe clean with a soft lint-free cloth and apply a light coat of LSC to prevent further corrosion.

I find particularly helpful the fact that LSC will not harm painted surfaces (one of the Mil. Specs.) which makes it ideal for cleaning bright metal trim, chrome, brushed aluminum, etc., on equipment cabinets. — Sam M. Mooney, WAG-

WKW, 4116 Brighton Pl., Charlotte, N. C. 28205.

Fifty Years of ARRL

A bound 152-page reprint of the gold-edged historical articles which appeared in the 1964 issues of QST is available from the ARRL for one dollar postpaid. Titled Fifty Years of ARRL, the book covers the highlights of ARRL and amateur radio history during the fifty years from 1914 to 1964, and will make a companion piece to the classic 200 Meters and Down, a reprint of which is also available from the ARRL for one dollar.

October 1969 49
ARRL AWARDS

BY ELLEN WHITE,* W1YYM

A Primer for Certifying Achievement

BPL? OTC? RCC? A-1 OP? To the uninformed among us this alphabetical soup may seem like gobbledygook! Periodically there seems to be a need to rehash some of those amateur radio ABCs for the OT as well as the tyro. Yes, evolution has taken place — the field of ARRL awards has been no exception! From that coveted Code-Proficiency Award to the brand spanking new 5B-WAS (a start from "go" award effective January 1, 1970) here are the basics. However noble-sounding they may be, don't forget that they're downright fun to go after.

RCC

Often the first operating award new hams aim for is the RCC. The RCC is designed to encourage friendly contacts and discourage the hit-or-miss variety, bonding together operators interested in honest-to-goodness conversing over the air.

The sole requirement for membership in the RCC is to chew the rag over the air for at least a solid half hour. If you’re looking for membership, report the QSO to Headquarters and you’ll soon be issued the attractive blue certificate. If you want to nominate someone else for membership in RCC, send the nomination (date and time of QSO and length of chew) to HQ, not to ARRL Headquarters. If he wants the certificate, he can send in the nomination to HQ. This way, no one gets an unwanted certificate and confirmed ragchewers can still nominate those they think qualified.

Code Proficiency Award

Many hams (and prospects!) acquire an introduction to League Awards through the CP program. Each month both W1AW (the Maxim Memorial Station) and W6OWP transmit qualifying runs. Five minutes of text is transmitted at each speed, 10-15-20-25-30 and 35 w.p.m. You only have to copy one solid minute to qualify. Yes, typewriters are permitted! (We've seen some of that writing at 35 w.p.m.!) Underline the minute of “perfect” copy, note which station you copied, and ship your paper along to Headquarters.

In the processing, your copy is checked directly against the official tape. We then advise you if you passed or failed. If the news is good, you’ll receive either your initial certificate or an appropriate endorsement sticker. If you fail to

*Deputy Communications Mgr., ARRL.
make the grade, you'll be notified to that effect. A full card file is maintained which notes your progress in the program.

You need not be a League member or a licensed ham to participate. To give you an idea of the popularity of this service, over 3000 copies of qualifying runs were submitted in 1968.

In addition to printed schedules available from Hq, each month the Operating News section of QST details the information on upcoming qualifying runs. That's right, no charge, no membership requirement, no fee of any kind.

**Old Timers' Club**

Undeniably there is more than a little bit of nostalgia when people talk about the good old days—and the good old people. There's a lot of sentiment too when you talk about the old-time hams, particularly those hams still around who held their license "way back" when.

In recognition of the current-day hams who held an amateur license 20-or-more years ago (lapses permitted), a suitable award is available. It's called the OTC Award.

If you can qualify as an "Old Timer" you'll find the necessary paper work pretty easy. Drop a note to Hq. with the date of your first amateur license and your present call. We'd like to have a brief outline of your ham activities over the years, in addition.

If you prove eligible, you'll soon receive your membership certificate in this venerable group. No charge, OMs.

**Worked All States**

The popular ARRL WAS award is available to all amateurs, (U. S. or foreign). In addition, endorsements are also available for special modes, bands, or other purposes (upon submission of all 50 cards for each endorsement purpose). The WAS award calls for two-way communication on any of the amateur bands with each state. QSLs for contact with the District of Columbia count for Maryland.

Contacts may be made over any period of years. The confirmations must show your call and definitely indicate two-way communication. Contacts with Alaska prior to Jan. 3, 1959, or with Hawaii prior to Aug. 21, 1959, cannot be counted. These are, of course, their effective dates of statehood.

Contacts made through repeater devices or any other power relay cannot be used for WAS confirmations. Contacts must all be made from the same location, or from locations no two of which are more than 25 miles apart.

Rules require sufficient postage for the return of the confirmations. Additionally, a service charge of $2.00 is made to any applicant in Canada or the U. S. and possessions, and Puerto Rico, who is not a full ARRL member. (No service charge for foreign applicants).

To be on the safe side, ask for ARRL Operating Aid No. 8 when you're about ready to apply. This convenient form itemizes the rules, supplies the proper space for listing cards, and makes sure you are alerted to all requirements.

An additional handy aid is the WAS "map," which is suitable for posting on the shack wall. Many hams color in the states as they're worked and or confirmed to make a visual presentation of their WAS progress.

**5-Band WAS**

This is the "newest of the new." So new, in fact, that the effective date of contacts is January 1, 1970. This might be called the reciprocal of the 5BDXCC and the purposes of the award are pretty much the same—to foster more uniform activity throughout the bands, encourage the development of better antennas and provide a new and basic challenge to newcomers as well as OEs.

If the experience gained in 5BDXCC illustrates anything it does show that you better not postpone work on those antennas. Low-band activity in particular is going to be tremendous.

In addition to the basic WAS rules, 5BWAS has a "start from scratch" date of January 1, 1970, and an applications form fee of $10. This charge will cover the cost of return of your cards by first-class registered mail and a plaque you'll be proud to display in your shack. 5BWAS rules also requires the applicants in the U. S. and possessions, Puerto Rico and Canada, to be a full member of ARRL.

Unlike WAS, the 5BWAS is a one-time-only awards. No band or mode endorsements will be made.
Public Service Award

Oregon Forest Fires, July 1960, reported in November 1960 QST. . . . Hurricane Donna, September 1960, reported in February 1961 QST. . . . Alaskan Earthquake, March 1964, reported in July 1964 QST. . . . Montana Snowstorm, April 1961, reported in August 1961 QST. . . . Kansas-Missouri Tornadoes, May 1957, reported in September 1957 QST. The Public Service Award files at Hq. thus record the history of the radio amateur's contributions in the field of public service. That's right, a card file is maintained for each ham receiving a PSA. In addition to the name and call, a brief description of the event, as just noted, appears on the card.

How do you get the PSA? Well, this is one award you won't be asking for. It's a spontaneous one, recognizing outstanding work accomplished during communications' emergencies.

DX Century Club

There is, perhaps, no more prestigious award than ARRL's long-standing DXCC Award. To some, this has become the "open-ended DX contest" of all time. Basically, it is an award issued after confirming contacts with amateurs in 100 or more different countries per the ARRL Countries List.

Two types of award are available, the general type (c.w./F) and the phone type. The first is for all modes. Cards submitted can be either one mode or mixed mode. The phone award is for contacts made by any voice mode of operation.

All contacts for DXCC must have taken place after November 15, 1945. If you achieve the basic award, you can still "add on" to your totals by submitting cards in certain groups and acquiring endorsement stickers. If you've been credited between 100 to 240 countries, rules require you to submit cards for endorsement in groups of 20 (or a sum needed to bring you up to 120, 140, 160, etc.). You'll note, however, that the stickers represent steps of 10. Since a real degree of difficulty starts at the mid-200 country level, the rules are relaxed and permit you to submit cards for endorsement in groups of 10, if you have an accredited total from 240-300. At the 300 mark, you may then submit cards in groups of 5.

Still one other exception is noted when you're really up in those higher echelons! As you may have noted from the periodic listings, there is a DXCC "Honor Roll." This tabulation is composed of the calls of those amateurs who have reached the "top ten" totals in the DXCC. These top ten figures represent a deleted total of countries. Some countries are no longer available to work such as Saar, Sarawak, Ifni, British North Borneo, etc. The number of these are deleted from the over-all totals of those leading the pack to arrive at a deleted number. All deleted countries are clearly indicated on the ARRL Countries List (Op. Aid No. 7).

The rules for DXCC are fairly complex and are noted on the front cover of the Countries List. This DX Bauscher is available without charge from ARRL Hq. An s.a.s.e. (address-stamped envelope) will help speed it back to you.

If you feel you're close to qualifying, please write Hq. for the appropriate application forms. Issuance of the DXCC is an ARRL membership service without charge to full members in Canada, the U.S. and possessions, and Puerto Rico. It is also issued free of charge to foreign amateurs not included in the aforementioned categories. All others are charged $4.00 for a DXCC application and $1.00 for an endorsement.

Five-Band DXCC

This new challenge to avid DXers became effective January 1, 1969 (or haven't you noticed that increased 80- or 40-meter DX activity?). It is a start-from-scratch achievement calling for ability, tenacity, versatility—you name it!

The rules make use of present DXCC regulations and are closely tied to them. There are a few major differences to keep in mind. The 5BDXCC requires DXCC qualification on each of five separate bands. Only contacts made on or after Jan. 1, 1969 count. If you're an applicant in the U.S. and possessions, Puerto Rico and Canada, you must be a full member of ARRL. The award carries a basic $10 forms-application fee. This initially may
sound pretty high, but this in-advance charge insures return of your cards by first-class registered mail and a handsome 7-color plaque. The engraved plate on the award will note the serial number, your call and the award date. No type of endorsements (bands, modes, etc.) will be available.

Complete 5BDXCC rules — as well as the ARRL Countries List noting DXCC details, are available without charge from ARRL. Several "prospectives" have paid the forms charge but who will be 5BDXCC #1?

Brass

Pounders

League

The field of traffic handling is as specialized as almost any other within amateur radio. The fun, yes the sport of it has captured the imagination of and occupied the spare time of thousands of hams over the years. The basic system of counting traffic permits a monthly record to be reported to the Section Communications Manager (see page 6) each month.

The BPL is open to all amateurs in the United States, Canada and U.S. Possessions who report to their SCM a message total of 500 or a sum of origination and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form. If you meet the requirements, your SCM will issue one of the distinctive 3½” x 8½” card awards.

Additionally, a special engraved medallion is presented to each individual amateur when he makes BPL for the third time.

A-1 Operator Club

There's hardly an amateur in the world who doesn't want to be considered by his fellow ham as a fine operator. Over the years, in an effort to sustain this noble objective, the League has sponsored the A-1 Operator Award.

Membership attests unusual competence and performance in keying, modulation, procedure, copying ability, judgment and courtesy. Particularly unique about membership in this select group (only about 2800 verified members to date) is the absence of a "list" to aid those desiring an award. You must be recommended for the certification independently by two operators who already belong. If you ask to join you may "fail" the test on a courtesy-judgment basis. This honor is truly an unsolicited and earned one — earned by observance of the very highest operating standards, regardless of mode.

Worked all Continents

Strictly speaking, WAC is not an ARRL Award. ARRL is, however, the Headquarters for the International Amateur Radio Union which does issue it.

To qualify for the IARU WAC, you must submit one confirmation from each of the six continental areas. No photocopies are permitted. Contacts must have been made using one call sign from one metropolitan area (i.e., a 25-mile radius). Enclose a stamped addressed envelope large enough to accommodate your cards. Since this envelope will be mailed in the U.S., it should either carry U.S. postage or the equivalent in the form of International Reply Coupons (IRCs).

Special endorsements are available for this attractive certificate: all s.s.b., all RTTY, all 3.5 MHz, all 1.8 MHz, or all 50 MHz.

A painless way to conform to the rules is to ask ARRL Hq. for a WAC application form. Non-W/VE applicants must apply to the IARU member society in their country.

Strays

The logs of HU1P, single-operator 1969 DX Phone entry from El Salvador, have apparently been lost in the mail. Eloy's claimed score of 5,113,773-261-6531-B-72 undoubtedly will be of interest to many.

HEADQUARTERS VISITS

The League Headquarters building is open to visitors Monday through Friday, 8:30 to 4:30, on a "drop-in" basis, and at other times by appointment. The headquarters is on Main Street (Conn. Route 176 and 176-A) about a mile north of the center of town, and about 3 miles west of Conn. 15-U. S. 5, the Wilbur Cross Highway. (For W1AW visiting hours, see the schedule on page 116).
AUSTRALIS-OSCAR 5

WHERE IT'S AT

BY WILLIAM DANIELSON*

and SHELDON GLICK*, WA1IYO/WB2OHH

AUSTRALIS-Oscar 5 contains beacon transmitters operating at 144.050 and 29.450 MHz. The design and operation of the satellite were described in previous articles (see bibliography in QST for September 1969, pg. 47). The purpose of this article is to familiarize readers with satellite tracking techniques.

The numbers presented here are based on the TOS (Tiros Operational Satellite) orbit as an example. This orbit is a practical one since many amateurs track TOS satellites to obtain local clock cover (APT) pictures, using information transmitted by W1AW on equatorial crossings of TOS satellites. News of the actual orbital parameters of Australia-Oscar 5 will be reported either in League Lines or by W1AW bulletin.

To facilitate your hearing Australis, W1AW will transmit, on its normal bulletin schedule (see page 116), the approximate times the satellite will be over selected areas. Additionally, for those interested in more precise tracking, the times and longitude of equatorial crossings will be transmitted. This article describes how to use the equatorial crossing data.

Getting Set Up

In order to track Australia-Oscar, you will need a few items not normally found in a ham shack. First, you will need a clean table. Once over this hurdle the rest is easy! Upon the table you will need a fairly large world map — large enough to be marked off at least every five degrees of longitude at the equator. A north polar stereographic projection is best. This is the type of map with the North Pole in the center. Other types of maps can be used. But, try to avoid Mercator projection maps. Get a piece of clear plastic or glass to cover the map, a protractor, and some grease pencils for writing on the plastic or glass surface. Now, you are ready to start plotting Australia-Oscar's path.

Look at the scale on your map to determine how many miles to the inch. Find your location on the map and draw a circle with a radius of 2135 nautical miles (2455 statute miles) centered on your QTH. Unless you have an obstruction on your horizon, you will be able to hear the satellite when the point on the Earth's surface directly under the satellite (sub-satellite point) is within this circle. The longest pass you will be able to hear is one that cuts the circle in half by going almost directly over your head. Passes to the east or west of you will be of progressively shorter duration the farther east or west they are.

Where and When

The nearest pass to directly overhead will occur at about 1500 local standard time each afternoon, and again at about 0300 local standard time each morning. This is because the satellite will be in a "sun-synchronous" orbit. That is, the orbital plane maintains a constant orientation relative to the sun. Daylight portions of each pass will be from south to north (called the ascending node), darkness portions from north to south (descending node). The period of the orbit, i.e., the elapsed time between two consecutive equatorial crossings on the same side of the earth, will be 114 minutes.

The latitude of your location will determine how many consecutive passes each day and night you will be able to receive. If you live at the North Pole, you can receive every pass since the satellite will be in a near-polar orbit. If, however, you live at the equator, you could hope to hear a maximum of four passes per day — two during daylight and two during darkness. At 40° north latitude, which about bisects the United States, you can look forward to three or four consecutive passes each afternoon and morning, or, up to eight passes each day.

When To Listen

In order to find the satellite, you will need only two pieces of information not supplied by this article: the time of the equatorial crossing (ascending node) and its longitude. This data will be supplied by W1AW bulletins. The longitude of an equatorial crossing will be given in degrees west of Greenwich, the 0° or prime meridian. If
this number exceeds 180°, the satellite then really is in east longitude according to your map.

You would then have to subtract the given longitude from 360° to obtain the degrees of east longitude. Example: Ascending node is at 220° west longitude; so, 360° minus 220° equals 140° east longitude. Remember that all times will be expressed in GMT.

At this point we are ready to plot an orbital path. Let's suppose that your QTH is located near St. Louis, latitude 38.5°, west longitude 90°. Draw a circle on your map with a radius of 2135 nautical miles (2455 statute miles) centered on your location. Any satellite pass that crosses any part of this circle, you should be able to hear. The spread of equatorial crossings which will cross your acquisition circle can be found from figure 1.

Choose a pass which you intend to track and put a dot on the map at the point where it crosses the equator. Next, consult Table 1 to see that two minutes after crossing the equator, Australis-Oscar has gone north to latitude 6.2° and is 1.8° west of the equatorial crossing longitude. Find this point on the map and mark another dot. Repeat this step for each two-minute interval as the satellite travels, until you have a string of dots two minutes apart going across your acquisition circle. (Omit dots which occur prior to reaching and after leaving your range.)

**Antenna Pointing**

Now draw a line connecting the dots. The points at which this line crosses your circle are the acquisition and loss times for this particular pass. Since you know the time of each dot, you can find these times to within about 30 seconds. To determine the azimuth heading for each two-minute point (i.e., the direction in which
to point your antenna), place a protractor on the map with 0° pointing to the North Pole and the line between 0° and 180° set on your longitude. The midpoint of the protractor base should be on your latitude. If the pass is to your west, have the 90° mark point west; if to the east, the 90° mark will point east. Place a straightedge between your location and the point of the orbit for which you wish to compute, and read the degrees at the point which crosses the protractor scale. On passes to the east, this will be your antenna azimuth in compass degrees. If the satellite is to your west, subtract the protractor reading from 360° to determine the azimuth in compass degrees. Finally, to find the elevation of Australis-Oscar above the horizon, measure the distance from the sub-satellite point you wish to calculate, to your location, using the distance scale on your map and find the elevation angle from figure 2.

You will note that if you live north of about 40° north latitude, you may be able to receive a part of about 80% of the orbits as they pass through the north-polar regions.

One final word about tracking Australis-Oscar 5. The information contained in this article is based on a straightforward mathematical determination of the line-of-sight path between you and the satellite. We wish to re-emphasize the possibility of unusual signal reception as mentioned in a previous article.  

2 Dunkerley, "Australis-Oscar 5 and You!" QST, August 1969, p. 69.

The Swan 2-Meter Antenna

(Continued from page 48)

checked out fairly readily with available equipment. The comparison dipole may be a source of trouble with gain checks, so comparison with a directional system of known gain is often used.

In this instance, an optimum 6-element Yagi6 was used for the reference antenna. The Swan antenna was found to vary between 3 and 4 dB more gain, which should put it in the 12-to-13 dB gain range. Reliable figures for optimum-spaced Yagis (Fig. 8-4 of our Radio Amateurs’ V.H.F. Manual) give just over 11 dB as the maximum to be expected from a conventional Yagi of this same boom length, 10 feet. Significantly, we feel, this is the first antenna we’ve checked in this way that has shown performance in excess of that given by the chart cited above.

Bandwidth and front-to-back ratio are both better than we’ve seen in single Yagis of anything like this size. Backyard F/B ratio checks are likely to result in lower than true figures, again because of reflection problems. The Swan antenna showed 16.5 dB at the low end, nearly 18 dB at 145 MHz, and above 17 dB at 147 MHz. Gain relative to the maximum observed between 144 and 144.5 MHz was down 0.25 dB at 145, 0.6 dB at 146 and about 1 dB at 147 MHz.

With the universal stub adjusted for zero reflected power at 145 MHz, the SWR at 144 was under 1.5:1. At 147 MHz it was about 2:1.

Stacking

Two-bay and four-bay systems have been erected at several stations. The array of WB6PDN, shown in one of our pictures, has four bays, stacked 3/4 wavelength each way. We have not checked results with stacked bays, but the developer feels that closer spacing may be used effectively than with conventional Yagis of the same boom length. It is believed that the smaller number of directors employed is the reason for this. More work is needed before the full story is known. Meanwhile, we have something a little different in vhf arrays, with ideas that show enough promise to warrant serious investigation by the antenna enthusiast among us...

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QST for
So You Want to Win an SS Contest

BY STEVE EICHMAN, WA6IVN

Following each Sweepstakes contest, you hear a lot of crying and complaining from some of the participants that they can't compete with so-and-so because he has huge, monstrous antennas, high power etc. They claim that it is a hopeless effort to try to win their ARRL section against such tough competition.

The most significant reason why these people don't win is that they are already defeated before they even get started, on account of their negative attitudes. It is my true and sincere belief that anyone with a reasonable location and station set-up can, indeed, have a good chance to win his section regardless of his competitors if he really wants to make the required effort!

I hope to give some of the other small-time operators a piece of the knowledge, experience, and operating skill that I have accumulated over the past years in hopes that they can take that section home.

Your Goal

It is imperative that you condition your mind to accept your goal: to take home your section. Convince yourself that your competitors haven't got a snowball's chance in hell of winning that section this year. Your enthusiasm is a very important factor. You are going to make an all-out effort! This means minimal breaks: exercise limited to jaunts down the hall for physical relief. (If you are a heavy coffee drinker, you can count on a lot of exercise!) Now that you are convinced and positive as to the nature of your goal, your foot is already in the door to success.

Important Decisions

Make up your mind whether you are going to run high or low power.¹ Let's examine the pros and cons of both. With high power, it is much easier to hold one's own frequency and, as a result, contacts are usually easier to make and somewhat more frequent. Class-B stations usually (not always) end up with the most contacts. There is a tremendous price to pay for this privilege, however: a multiplier of × 1.25 or 25 percent. That means if you are operating a class A station and have a score of 100,000, you will, in addition, receive 25,000 free points. You can figure on a signal difference of about one to two S units between class A and class B. This is assuming that all other factors are equal (which they seldom are). There are certain disadvantages to running a linear amplifier (class B), however. You sacrifice flexibility in that you have more controls to fiddle with and it is necessary to return more frequently. It requires more time to change bands and the extra meters to watch sap up a lot of the operator's time and attention. On the other hand, a class A station will experience more difficulty in cracking the huge pile-ups on the rare ones while the high-power boys can raise them by sheer saturation (and they usually do). If you are clever, you can time your calls so that you get your John Hancock in there while the QRO boys are busy with their saturation techniques. One major factor to consider is that low power on 40 meters is, quite frankly, tough going. Unless you are so fortunate to have a beam or other high-gain antenna for this band, you can count on a frustrating evening.

It is the author's opinion that class A is the best way to go, providing you play your cards right. Look in some old QSTs and see who some of the past high scorers were. Yes indeed, they ran low power, class A.

Antennas, Equipment and Station Operation

Contrary to popular belief, five elements at 100 feet is not the answer to the best signal during the SS. Someone with such a set-up might be 20 dB over S9 in North Africa or the Middle East, but not necessarily in Jackson, Mississippi.

The author's station is designed for DX competition. The location is in the center of a 20-acre field which is located in a large valley approximately 500 miles long and 75 miles wide. My first thought when preparing for SS was that this location, antenna layout, would be superb for the SS contest. It certainly didn't take long to discover that the angle of radiation presented by my big flat top antennas was too low to be

October 1969
of much use for anything less than about 2000-2500 miles. When comparing signals to the tri-band beam (at a much lower height), the tri-bander won out by a landslide in almost every case (excepting KH6, KV4, VE8). The thought of enduring the SS with a tri-bander didn't appeal to me, especially with my other high-gain arrays roosting almost a hundred feet above well-irrigated soil. After countless tests, I became convinced that the tri-bander was going to be the antenna to use.

Therefore, unless you are plagued by high obstacles near your particular location, I strongly suggest a tri-band array of some type combined with an all-band doubler if you reside in the Central U.S. Optimum height in most cases for this type of propagation should be between 35 and 55 feet. If you have high-gain multi-element arrays at these heights you are one step ahead of the rest of us. For 40 and 80, I suggest an inverted-V as high as possible. (Of course, a rotary dipole or beam is highly advantageous; however most participants are not so fortunate to have one.) Verticals are ruled out in my book on account of the extreme low angle of radiation.

Equipment — It is mandatory that you have and utilize full break-in. If you have a transceiver, it is important to have some control of your receiver frequency (external control). Any receiver with 500-cycle bandwidth for CW and 2500-cycle for SSB will be fine. Additionally, there are many audio filters on the market which offer additional selectivity at a very modest cost. They work very well although they introduce a loss in the audio circuit.

Next, a good pair of comfortable stereo-type headphones, preferably the type whereby the ear fits inside the phone entirely. This will be a leading factor in cutting down fatigue.

For CW, an electronic keyer is certainly a great help since you have an instant, positive, and accurate control of your speed as the situation might call for. Again it certainly will cut down on fatigue during the long hours of the contest.

Station Operation — The manner in which your station is set up is more important than the kind of equipment that you will be using. A complete break-in system has to be employed and fully operational for both the phone and CW contests. VOX is too slow and too clumsy. A foot switch for transmit is mandatory. They are easy to make and a pleasure to use.

If you have means of setting your age., by all means set it as fast as possible so that your receiver will recover from mute instantly with full rf gain. Remember, you don't have much time during an exchange, so use it for filling out your log and check sheets, not fumbling with knobs on your receiver.

Be familiar with your station. Practice band changes until you can change bands and completely retune in 30 seconds or less. If necessary, mark your control settings. Your controls should be within easy reach without changing your seating position. I mentioned the digital clock employed in my station. This is an imperative measure! You don't have time to make up your mind what time of day it is. A digital clock will tell you exactly. You will simply write down four numbers. In fact it is not uncommon to be operating for several hours and not really realize what time it actually is!

Operating — Be familiar with propagation to the different parts of the country from your particular location. This doesn't mean to study all the propagation charts that you can get your hands on. It means to get on the air and use all of the different bands all day and find out when the skip is best for particular parts of the country during the period of one day. If you do this with low power, you will get a very accurate indication. Chart your findings and study them before the contest. Know when to go to what band for the best results. If you should decide to use low power, I cannot emphasize how important this is. This knowledge and experience alone may possibly be the difference between you being at a disadvantage with your low power and being on an equal level with the Class-B participants.

Section vs QSOs — There is no special rule here. Both are equally important. One cannot be sacrificed for the other. Usually the vast majority of sections will come as a result of exposure. That is, if you play your cards right. This is in keeping with your good knowledge of the bands. When the bands seem to dry up or when you feel the need for a cup of coffee or a bite to eat, this is the time to tune and hunt for multipliers. Don't waste time beating your head against a stone wall when conditions are in a null.

Go hunt the new ones!

Techniques — What is meant by exposure? Simple, just make a pattern of operating and keep to it. For example: You call a CQ on 21,030 and you get a good following started. After seven or eight QSOs the frequency runs dry; no one answers your QRZ. Now move up the band 10 kHz and start again. Bear in mind that it might take a few CQs to get it going again, but it's worth it if you get another string going (considering that you are able to hold on to your frequency). Keep those CQs short! No one is going to hang around for two minutes while you call CQ. When trying to get started on this new frequency you might not be able to make out any complete call of the stations calling you. If this is the case try this procedure for example: QST the W4-Victor station — Go... . The sta-

58 QST for
tion will usually come back all by himself and give his whole call. He may begin his exchange or he might want an acknowledgement first. When you come back to him, be sure to acknowledge his correct call in its entirety. In time this new frequency will dry up and you will have to repeat this procedure. I find that 10 kHz is just enough to expose you to a completely different group of stations hanging around that frequency. After you reach the upper limit (useful limit) of that particular band, start back down. This time, however, go down 10 kHz at odd multiples, i.e. 21,085, 21,075, 21,065, etc. Using this method, you will have covered every 5 kHz on one complete revolution of that spectrum. If there is a KV4 or VES in there somewhere, your odds against running into him, or at least hearing the pile calling him, are very good indeed!

Remember to keep a watchful eye on your schedule of peak times for skip that you charted previous to the contest. Don’t guess what times the West Coast will be coming in; know when!

If the pickings get slim and you are unable to raise anyone by the previous method, start hunting, every 5 kHz up and every 7 1/2 kHz down the band. Don’t waste time waiting for a station that just began his exchange (unless you suspect him to be a new section)—move on. You will certainly cross his path again on another sweep of the band.

Don’t forget the weak ones. Often they are good operators without favorable skip. It is still possible for an effortless exchange with a reasonable QRM level.

During the beginning of the contest, the strong high-power stations will have huge pile-ups on them. Don’t waste a lot of time trying to crack the pile-ups because tomorrow they will be thirsty for new contacts and will gladly listen for the QRP boys.

It is important to match the speed of stations calling you during the CW contest. If you are working stations at 25 wpm and a loud signal calls you at 15-20, grab that keyer and bring the speed down! It will probably pay off in a QSL of your exchange from him. Showoffs only kid themselves. It doesn’t make any sense to send your preamble three times at 40 wpm when once at 25 would have been adequate. You will find that if you set the example, the other station will usually duplicate your actions exactly. This also holds true for the phone weekend.

If you are so fortunate to be in a rare section, it is often advantageous to announce your section during a CQ or QRP, i.e. “QRP SS, this is WA61VN, San Joaquin Valley section, go ahead.”

From time to time during the course of the contest, you will work stations with more QSOs than yourself. (Well, at least they gave you a higher number.) Don’t be upset. It is customary for an occasional crackpot to give a number at least 30-75 per cent higher than yours. Last year I worked two stations claiming to be in SJV who gave me numbers over the 1000 mark (early in the contest). Needless to say that is usually the last time you either hear or see their call letters written down.

It is usually a gentleman’s rule that when you call someone else, it is considered his frequency. It is poor operating practice to attempt to take over his frequency by giving out a QRZ yourself. Often this opportunity will come up when repetition is necessary and the sequence gets out of order. If you make this a practice you will gain a reputation for this habit and will lose the respect of all of hamdom. (Say nothing of a couple of the big guns deciding to go out of their way to call CQ on your frequency.)

Fatigue

Any contest is not only a test of operating ability but it is also an endurance trial. If you don’t plan to combat it, fatigue just may get the best of you and all of your efforts will be for naught. We assume that you have chosen an operating chair that gives you good back support and an operating table of the correct height.

Control the temperature! I prefer about 60°, and well ventilated. Excessive temperatures will make you groggy and this will reflect on your performance. Your reflexes will slow down and so will your resultant score. If you are a drinking man, lock up all the booze! (And give the key to someone else). Two or three good stiff ’shots’ and you might as well shut down and save yourself a lot of grief and disappointment afterwards.

When you really seem to be getting exhausted, stop and quickly jump in the shower. Moderately cold works the best for me. A couple of minutes later you emerge, refreshed and ready to hit it again. This cool shower can take the place of about half an hour in the favorite easy chair.

How about sleep? My rule is twelve midnight to about 6 A.M. or a little before. Reserve a little time for evaluating the previous day’s performance and planning for the new day. Using this method, I am able to get a good night’s sleep and wake up completely refreshed. At the same time I take the 6 hours “off” time all at once and I don’t have to worry about it anymore. Besides most of the bands are either shut down or fairly dead. Of course 12 to 6 won’t apply to you if you live in the East. I still suggest the 6 hours be taken at once.

Honesty

A little word for personal honesty. You are

(Continued on page 97)
36th ARRL November Sweepstakes Announcement

If you haven’t done so already, it’s time now to start preparing for that contest of contests, the November Sweepstakes.

For the 36th time the SS is back, this year we hope bigger and better than ever before.

The basic SS rules are unchanged from last year, but please note carefully the following:

LOW-POWER MULTIPLIER DROPPED (on a trial basis)
GOOD IDEA?
LET THE CONTEST ADVISORY COMMITTEE HEAR YOUR COMMENTS AFTER SS
(P. 62 March QST)

This change is brought about on a trial basis on the recommendation of the ARRL Contest Advisory Committee. The other changes of last year which will remain the same are: New precedences (A and B) based on power input; minimum criteria for section award; dupe check sheets (Op Aid 6 or similar) required with log of 200 QSOs or more; incomplete entries processed as check logs.

Otherwise, you’ll observe that the format is familiar. You may operate 24 hours out of the total 30; your times-out must encompass at least 30 minutes; ARRL-affiliated clubs are eligible to compete for that handsome cobololo gavel.

Read the rules thoroughly, then send for our “SS Package”; log-sheets, summary-sheets, Op Aid 6. (Be sure to specify approximately how many log-sheets you’ll need.) Your entry (and, for clubs, the secretary’s letter) must be postmarked no later than December 15, 1969.

On your mark, get ready . . .

CONTEST PERIODS

<table>
<thead>
<tr>
<th>Start</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday, Nov. 8</td>
<td>PHONE Monday, Nov. 10</td>
</tr>
<tr>
<td>2100 GMT</td>
<td>0300 GMT</td>
</tr>
<tr>
<td>Saturday, Nov. 15</td>
<td>C.W. Monday, Nov. 17</td>
</tr>
<tr>
<td>2100 GMT</td>
<td>0300 GMT</td>
</tr>
</tbody>
</table>

Rules

1) Eligibility: The contest is open to all radio amateurs in (or officially attached to) sections listed on page 6 of this issue of QST.

2) Time: All contacts must be made during the contest period indicated elsewhere in this announcement and between amateurs in (or officially attached to) the 74 sections, Yukon, N.W.T., I.E.S.O counts as a separate multiplier, for a possible total of 75 multipliers. Time spent in listening counts as operating time. No more than 24 hours of operation are permitted during the 30 hour period. "Off" periods may not be less than one half-hour at a time. "On" and "off" must be entered in your log.

3) QSO: Contacts must include certain information sent in the form of a standard message preamble, as shown in
### EXPLANATION OF "SS" CONTEST EXCHANGES

<table>
<thead>
<tr>
<th>Nr</th>
<th>precedence</th>
<th>Call</th>
<th>CK (Last two digits of year first licensed)</th>
<th>Your ARRL section</th>
<th>Send GMT time of transmitting</th>
<th>Send month and day of birth (not year)</th>
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</thead>
<tbody>
<tr>
<td>Exchanges</td>
<td>Consecutive Serial Number</td>
<td>Power input less than 150 watts d.c.</td>
<td>Send your station call</td>
<td>Your ARRL section</td>
<td>Send GMT time of transmitting</td>
<td>Send month and day of birth (not year)</td>
</tr>
<tr>
<td>Sample</td>
<td>NR 1</td>
<td>A</td>
<td>WA3FHB</td>
<td>65</td>
<td>MDC</td>
<td>2101</td>
</tr>
</tbody>
</table>

the example, C. W. stations work only c. w. stations and phone stations only other phones. Valid points can be scored by contacting stations not working in the contest, upon acceptance of your preamble and/or receipt of a preamble.

4) Scoring: Each preamble sent and acknowledged counts one point. Each preamble received counts one point. Only two points can be earned by contacting any one station, regardless of the frequency band. The total number of ARRL sections (plus 2 for unknown) divided by the "section multiplier." It is not necessary for preambles to be sent both ways before a contact may count, but one must be received, or sent and acknowledged, before credit is claimed for either points or multiplier. If your power is 150 watts or less, send "A" as your precedence; otherwise, send "B."

The final score equals the total "points" X the "sections multiplier."

(6) Reporting: Contest forms (log sheets, summary-sheets, Operating Aid 6) are available free from ARRL Hq., or you may use forms of your own design provided they follow the indicated format. Every contest entry claiming 200 or more QSOs must have cross-check sheets (Op Aid 6 or similar) attached. To aid us in getting these forms to you as fast as possible, please be sure to include with each request a self-addressed and stamped legal-size envelope containing your full name, call and mailing address complete with zip code. We suggest a minimum of 12c postage attached. This will assure your receiving 1 summary sheet, 1 Op Aid 6, and 3 log sheets, enough for 400 QSOs. Using this as a guide-line you can adjust the postage according to your needs. ANY LOG OMITTING TIMES ON AND OFF, OR OMITTING CROSS-CHECK SHEETS (WHEN REQUIRED), OR OMITTING SUMMARY-SHEET OR ANY INFORMATION REQUESTED THEREIN (see sample), WILL NOT BE CONSIDERED FOR COMPETITIVE QST LISTINGS OR AWARDS. Such logs will be classified as "check-logs" and processed accordingly. Entries must be postmarked no later than December 15, 1965 to insure eligibility for QST listings and awards. All entries become the property of ARRL, and none can be returned.

There are no objections to one's obtaining assistance from logging, "spotters" or relief operators, but their use places the entrant in the multiple-operator class, and it must be so reported.

A single-operator station is one manned by an individual amateur who receives no assistance from other persons during the contest period. He may not have assistance in any manner in keeping the station log and records, or in spotting stations during a contest period. The operation of two or more transmitters simultaneously, whether by single-operator or multiple-operator entrants, is not allowed.

A transmitter used to contact one or more stations may not subsequently be used under any other call during the contest period (with the exception of family stations where more than one call is assigned to one family by FCC/DDT).

(6) Awards: Certificates will be awarded to the highest-scoring c. w. entrant and to the highest-scoring phone entrant in each ARRL section, provided that either (1) there are at least three single-operator competing entrants from that section, or (2) the top single-operator score is 10,000 points or more. Similarly, a certificate will be awarded to the highest-scoring Novice or Technician licence in a section if (1) there are at least three single-operator competing entrants of that licence class in that section, or (2) if, in the opinion of the Awards Committee, the entrant displayed exceptional effort. Multiple-operator entries, regardless of license class of operators, are not eligible for certificate awards and will be listed separately in the final results in QST.

A Gavel will be awarded to the highest afflicted station entry. The aggregate scores of phone and c. w. reported by club secretaries and confirmed by the receipt at ARRL of contest logs constitute a club entry. Separate club entries into phone and c. w. totals. Both single- and multiple-operator scores must be counted, but only the score of a bona fide club member, operating a station (his or another club member's) in local club territory, may be included in club entries.

The highest single-operator c. w. score and the highest single-operator phone score in any club entry will be rewarded with a "club" certificate where at least three single operator phone and/or three single-operator c. w. scores are submitted.

(7) Disqualification: Failure to comply with the contest rules on FCC/DCC regulations or the necessity for avoiding interference with channels handling amateur emergency communication shall constitute grounds for disqualification. In all cases of question, the decisions of the ARRL Awards Committee are final.

### Message Credit

Put all that preamble-exchange experience to work and earn 1000 extra points by the following:

1. Within 5 days following the end of each of the SS weekends, check into a net a local or section level1 and send a message to your SCM (p. 6, QST). SCMs may send their message to ARRL Headquarters. The message must be in proper form.2 To earn this credit for your phone and your c. w. entry you must originate such a message following the corresponding SS periods.

2. An example of a message in proper form appeared in the Operating Aid 9A enclosure in August 1965 QST. The message text (in not more than 20 words) should report claimed contacts, sections, mode, power and claimed score. An exact copy (showing station receipting for the radiogram and time-date sent) must be attached to your SS entry for any credit.

3. It's all or nothing. If all the rules are complied with to the letter, the procedure will net you a stock of 1000 points.

4. The bonus points will be added to your score at Headquarters.

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1 If there's difficulty reaching a traffic net in your section, it may be sent to a netter in the region.
2 Time Filed and Handling Instructions are optional, i.e. not a "requirement" for credit in the message started, but all other message parts as shown in 9A are necessary.
3 Copies available without charge from ARRL Hq., 225 Main St., Newington, Conn. 06111.

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October 1969

61
Around the world in 80 days, in its era, I'm sure was considered a major achievement.

In modern times, through the miracle of communications, the world may be spanned in minutes with relative ease. Amateur radio, and in particular the ARRL International DX Competition, seems to illustrate this quite vividly.

Some people may comment as to the declining interest in contests but such was not the case in the 35th ARRL International DX Competition which soared to record heights in 1969 with 2108 logs received from 118 different countries. This represents an increase of over 10 percent as compared to last year and is some 41 logs greater than the previous high of 2127 entrants in 1967. With the exception of DX phone entries which dropped somewhat; all other figures rose considerably.

In entering any contest, each of us, by our actions becomes an ambassador of good will for the nation we represent. Sufficient to say, our operating techniques should be of the highest caliber. Since I'd like to believe that this is the case almost 100 percent of the time, I feel only comments of a passing nature be given to the individuals who, by either lack of operating skill or just plain disregard for others, cause intentional QRM, tune up on frequency, fail to sign calls properly after each QSO, leave carriers on for long periods, etc., etc., etc. The problems remain the same from year to year, only the names (or, in our case, the calls) have been changed.

CLUBS

Thirty-two ARRL-affiliated clubs amassed 183 million points this year as compared to 27 clubs and 183 million points in 1968. Would you believe the Potomac Valley Radio Club, in claiming the usual lead position, increased their score by over 9 million points. How do you beat a group like that? Placing second was the Frankford Radio Club trailing some 4.7 million points behind. The Northern California DX Club unseated their rivals to the South, the Southern California DX Club in the show position; for what must be the upset of the year. The 128 Contest Club was again 5th by a solid margin, while Murphy's Marauders nosed out the Northern Illinois DX Association to claim 6th place (up 1 from last year). Completing the Top 10 were the Order of Boiled Owls of New York who slipped from 6th place in 1968 to 8th, the Laurentian DX Club maintaining 9th and the Richardson Amateur Radio Club.

*Communications Assistant, ARRL.

HC1TH, shown at his operation position in Quito, Ecuador. Tom's excellent score of over 4.5 million was good enough to rank him as number 2 in the Top 10 DX phone entries and also to win the South American DX Continental Championship. Sure wish we could increase participation from our neighbors to the South.

QST for
gone forth into and their words of the whole world.
— Rom. 10:18

1 Thanks to K9YHA

Among the rare stations which abound in each DX Test, we have (top to bottom): YK1AA, Rasheed In Damascus, Syria; KX6FJ, Stan in the Marshall Islands; KH6GPQ, Willard, Oceania Continental Champion both c.w. and phone from Hawaii; and SA4TY, Bill (WA2ETP) from Wheelus Air Base, Libya.

October 1969
Here's JX3DH checking ground conductivity on Jan Mayen Island Main Base, "Olomuin City," was site of JX3P multi-op phone operation.

Breaking down the Top 10 Affiliated Club scores by mode, we are left with an interesting grouping of each club's strong and weak points as shown by their position below:

<table>
<thead>
<tr>
<th>G.W.</th>
<th>Position</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potomac Valley RC</td>
<td>1</td>
<td>Potomac Valley RC</td>
</tr>
<tr>
<td>Frankford RC</td>
<td>2</td>
<td>Frankford RC</td>
</tr>
<tr>
<td>US Contest Club</td>
<td>3</td>
<td>No, Calif. DX Club</td>
</tr>
<tr>
<td>So, Calif. DX Club</td>
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<td>No, Calif. DX Club</td>
</tr>
<tr>
<td>Murphy's Marauders</td>
<td>5</td>
<td>No, Illinois DX Asn.</td>
</tr>
<tr>
<td>Richardson ARC</td>
<td>6</td>
<td>No, Illinois DX Asn.</td>
</tr>
<tr>
<td>Laurelton DX Club</td>
<td>7</td>
<td>Laurelton DX Club</td>
</tr>
<tr>
<td>Order of Boiled Owls</td>
<td>8</td>
<td>Laurelton DX Club</td>
</tr>
<tr>
<td>Murphy's Marauders</td>
<td>9</td>
<td>Laurelton DX Club</td>
</tr>
<tr>
<td>Richardson ARC</td>
<td>10</td>
<td>Order of Boiled Owls</td>
</tr>
</tbody>
</table>

SOAPBOX

"Tried more than one hand for the first time and was good fun." "VK9HY." "After dipping into the pile-ups in a s.s., test, sure can appreciate c.w. a lot more." "KB7UZ." "Sixteen new countries, very nice contest." "KB7UNY." "Very try 7 MHz with no remote v.f.o." "WA2HBR." "Had a ball operating in this test." "KB7UXL." "Lots of fun, most of the boys cooperated very well." "H12XRM." "Biggest thrill was being called on c.w. by 5A4TY, another highlight was working VK2DK after 3 hours of trying." "WA3ATX." "Lack of foreign stations on 8, 5 and 7 MHz, makes it a bit slow, conditions however were good." "VE7TP." "Think check sheets should be only one sided, turning them over and over again is a nuisance." "W5JN." "Next year I hope to have a beam and rig on all bands." "KB7UZ." "Set objective of 100 countries, which I found not too easy." "KB7UNY." "Sorry it's over, I just enjoy the competition even though I only beat my own scores of other years." "W5JN." "Found 7 MHz, conditions poor here during my operating time. Quite a few I know whose side I was on, hi." "VO1DC." "Very first time for any c.w. contest." "CT7AT." "My first DX test and although I became hoarse and used many tranquillizers, I thoroughly enjoyed it." "W5P7Q." "Too much QRM to keep on going on phone." "K4CG." "Conditions excellent to all areas of the world." "W5WMI." "It is sure different working the contest from this end, I do not think my exotic call was an asset." "K4CG." "W6HY." "First time in my life I've gotten a QSO from Europe." "W6BYW." "It was a pleasure to take part and we are certain to do that again in the next year under the better conditions." "UA2KA1." "Sure was a lot of competition in the Sacred Spheres of 15 meters." "K1GAX." "Conditions fantastic on 5.7 and 7 MHz on first weekend, 10 meters extremely good on the second." "W6WU." "Located at Messani Bay north of Dar es Salaam in Tanzania." "ST6C." "Working eight hour shifts at a local TV station on both weekends is a slight handicap." "W6BMB." "How come so many DX stations working by call areas." "KB7UZ." "Wonder whether other fellows have as many breakdowns." "GBQ7." "Lost all antennas in high winds, c u next year." "OZ2DX." "Not as much DX activity as I would have liked." "W5YRC." "Still lot to do on top 40 QSO DX club." "W5WMI." "During contest could I truly say that I did not know what a real pile-up was, thanks for the education." "W5BEXQ/0." "Low power doesn't get the job done, huge contest from Idaho." "W60TBOX." "Next week with an antenna farm." "W5WMI." "Good contest, enjoyed the pile-ups, got many new countries." "W5A1YX." "I was unable to enter the first weekend as I was on my way home from operation at VK6J in Antarctica." "VK4Q1." "Many thanks for the very nice contest." "OZ8X." "USA stations very fine operators, please all stations worked send me your QSL for awards." "SP9AB." "Great contest 15 W8BZ1N." "My first DX contest in years, had a ball." "W7HR." "Damn good contest." "W7M9A." "The rules for this contest work and are accepted, please do not change them." "W5L9S." "Very interesting contest, biggest thrill working VK5KJ and SW1AR on 40 phone, a completely new experience for me. CongratS on the new check lists and the smaller page format." "W7AIDJG." "Hope to be on all bands.

**AFFILIATED CLUB SCORES**

- Potomac Valley Radio Club
- Frankford RC
- Northern California DX Club
- Southern California DX Club
- US Contest Club (Mass.)
- Murphy's Marauders (Conn.)
- Northern Illinois DX Association
- Order of Boiled Owls of New York
- Laurelton DX Club
- Richwood Amateur Radio Club (Texas)
- Niagara Frontier DX Association (N.Y.)
- Overlook Amateur Radio Society (N.Y.)
- Oak Park Amateur Radio Club (Mich.)
- Central Michigan Amateur Radio Club
- Virginia Centenary Club
- Connecticut Wireless Association
- West Park Radios (Ohio)
- Miami Valley Amateur Radio Contest Society (Ohio)
- South Jersey Radio Association
- North Allegheny DX Club
- W15C DX Club
- Four Lakes Amateur Radio Club (Wis.)
- Lebanon Active Radio Operators
- Lincoln Amateur Radio Club (Neb.)
- Milford Amateur Radio Club (Ohio)
- Grand Rapids Amateur Radio Association (Mich.)
- South West Ohio Potomac & Modulators (Pa.)
- Lake Success Radio Club (N.Y.)
- North Central Amateur Radio Club
- Delta Radio Club (Texas)
- Suburban Amateur Radio Club (Pa.)
- Chicago Radio Traffic Association

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<table>
<thead>
<tr>
<th>Club Name</th>
<th>Appreciate</th>
<th>Entries</th>
<th>C.W. Winner</th>
<th>Phone Winner</th>
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<td>39,733,394</td>
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<td>W4KFC</td>
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next contest." — JX6CI. . . . "I really enjoyed the contest, North Americans are fantastic operators." — UT1IQ.

"I am strongly inclined to feel that single band entries should be allowed in order to increase participation." — HQ9W. . . . "Too bad more of the really rare DXers didn’t show up." — KA9L. . . . "Great contest, we all had a barrel of fun." — W24EX. . . . "Worked 5 new states for my WAB." — UT6BY. . . . "First time in the c.w. part of the contest and it was a lot of fun." — SP9CV.

. . . "Your contest very good, e-aug in 1970." — UR4LO.

. . . "Suggest the contest be shortened to one weekend each, much renewed interest in the lower bands due to SBDXCC." — RT5USA. . . . "Tired of being called a YL since I’m only 13 years old, maybe I should go to cw." — WA8ZCP. . . . "Had a ball, please don’t shorten contest." — W9QL. . . . "Excellent conditions made this contest one to remember." — W1PZ. . . . "My thanks to the DLA station who did not want to work an F station and carefully explained to me the contest rules." — FP5V/E. . . . "Despite limited time had lots of fun, biggest thrill being called by VA4AAS, also working K2RMM on 80 thru 10 meters." — WB0SAZ/E. . . . "I suggest you change the contest to make it world-wide, I know the foreign stations get bored working only W/VE stations and I think this boredom explains the lack of Latin Americans and other countries in this contest." — W8LIF/V. . . . "Power out the first weekend, had to fly to Sunnata part of the second, W/K stations most cooperative, wait till next year." — YB9ASS. . . . "Entertained the local kids watching me to rotate my beam out of the trees." — WA7JCR. . . . "Best DX contest I have ever been in, a lot of pile-ups but I noticed more courteous operating than usual." — W6UCK. . . . "I am full of admiration for the excellent operating standards of the W/VE group, their naughty procedure makes the handling of pile-ups so much easier when compared with some of the other major contests." — KPHQ. . . . "My first ARRL DX Test. Sure a pleasure, only sorry I could be with only some 40 hours because of my studies, CU = 70." — O89KC. . . . "Where was Wyoming," — ST8WF.

. . . "My roommate tells me that I was yelling QRM Contest in my sleep following the contest, never could raise anybody!" — JA1KUX. . . . "Thank you, please make it just one weekend for each mode." — W8BORS. . . . "Conditions to Europe FB." — KA9YRA. . . . "Almost broke a rib laughing as a DX station called, CQ, won't anyone answer me. . . there must have been a thousand hands calling him." — W9Y5Q. . . . "Special congrats to the DX stations for their patience, looking forward to next year." — WA6EM. . . . "Very pleased to participate in the contest again after absence of over 10 years." — G5COJ. . . . "My compliments to the W/VE gang who were real kind to me in the pile-ups. My first contest, really had a ball." — KX9GS. . . . "I’m a fairly new ham and this was my first contest." — K4TJY. . . . "What a show when QBV1J said "Mini tvx first VLB in test," I gladly replied "Mini tvx first 513 ever." — VE1AJ.

. . . "This is really the king of all contests." — W411HN. . . . "Pleased to see so much activity from the U.S.R.R." — W9KYZ. . . . "Finally discovered you can work DX on 80 meters." — WASHOM. . . . "Ten meter conditions outstanding the second weekend." — W85EUU. . . . "Worked only 84 hours, couldn’t spend more time due to my job." — FAKRB. . . . "Contest was fantastic," — LURABX. . . . "My first appearance on 40 meters, so the W/VE stations were the first DX stations I worked at all. Very glad about it." — D8MST0. . . . "How about telling the DX stations there are W/Ks above 7,025 MHz, working the contest." — WA5ZCO. . . . "Really got a thrill when I called CQ Test, and worked stations for about 2 hours straight." — K160GLP. . . . "This was my first serious attempt at contest operation and I really enjoyed every minute of it, including the moments when I lost control of my keyer. Hope to do better next time." — VU9JN. . . . "W4BYV will be sad to learn that when I answered their CQ on 3.5 MHz, he was 43w here but my signals did not reach him." — KD4Q. . . . "Good propagation on all bands, worked my 10,000th W/K station during the test." — O6ALX. . . . "Conditions were exceptional on 10 meters, not so hot on 80, Where were all the VE boys?" — VK6DK. . . . "Like the revised formats." — KB8D. . . . "Biggest surprise of the contest, ZDI7DX on 75 phone, trying out his new rhomboid!" — KG5CYY. . . . "Conditions fabulous, worked my first JAs on 40 meter phone ever." — KD7L. . . . "I like to work in your DX contest." — Y0KCA. . . . "Why not separate entries for single-band operations. Thanks for a fine test, see you next year." — N1BH. . . . "Conditions great, pile-ups and QRM murder." — W8BNGS/V. . . . "Conditions of propagation very bad here." — KBREU. . . . "This contest was a ball." — YB8BABB. . . . "Pet peaves — tuning up on frequency, leaving carriers on, continually calling regardless of fact DX is trying to transmit." — WIESN. . . . "Thanks for a good test, will be in there next year full swing on all bands." — VESZ. . . . "Nice contest, especially 10 meter band activity make nice work during test." — N8PVL. . . . "Second weekend heat radio conditions I have ever experienced in an ARRL DX Test." — DL6ES. . . . "My first participation, real nice thrill." — PY7VHZ. . . . "Just returned to the air after 20 years off, my first experience of the ARRL DX Competition was in 1938 and I have greatly enjoyed taking part once again." — K7CM. . . . "Had a great time in my first DX contest." — VP7NA (W3AZD, opr.). . . . "Good to hear some

From the Subantarctic islet of Heard Island in the South Indian Ocean we present VK6WR, by far the rarest DXpedition in many a year. Shown operating is Bill, W7ZFY with Henery, W8HWT taking a well earned rest. At left the boys are shown wresting the 2-element 20-meter beam into position. Brrrr!

October 1969
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<th>QRP CHAMPS</th>
<th>(ISO Watts or Less at All Times)</th>
<th>C.W.</th>
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| Thirty-Fifth ARRL International DX Competition |

W/VE scores are listed by ARRL division and section. DX scores are listed by continent and country-prefix. Multioperator scores follow single-operator scores within each section or country-grouping.

Awards: The operator of the first-listed single-operator station in each section or country is the winner for that area and receives a certificate award. In a section or country from which at least three valid multiplier entries were received, the top-scoring station in that category receives a certificate award. (Awards are selected for on the first morning following the 15th.)

Affiliated-club awards are shown elsewhere in this article.

Scores in the listing to follow, read from left to right: call of entrant, final score, multiplier (total countries per band for W/VE; total states and Canadian call-areas per band for DX), contacts, approximate d.p. power input (represents power up to and including 150 watts; C, over 150 and up to and including 500; G, over 500), total time of operation (to the nearest hour). Example: W3NX 304,186-268-738-270 indicates final score 504,186, multiplier 268, contacts 270, power over 500 watts, operating time 70 hours.

A single asterisk following a call denotes an ARRL HQ staff member, ineligible for an award. A double asterisk following the call of a multi-operator entry denotes the use of a spotting-net.

*Multioperator station.

h humor from KH6BZ during very crowded band conditions." - ARRL... "My first DX contest, sure was exciting." - W3BII... "The operating possibilities of too many stations reflected unfavorably on amateur radio." - V7EMP... "Enjoyed the test very much, rules and organization first rate." - W7BV... "Rotator boxers before the great 40-meter opening on the second weekend. Farewell 28 MHz, DXCC for this summer cycle..." - W7ESQ... "Very good contest." - L8QG... "Working mainly C.w..." - F8UJ... "We always thought there were 50 states, but now realize there are only 49; Wyoming is a myth! - G8JOC... "Great contest..." - W7NOO...
6Y8A, a special events multi-op station, was located at the Red Cross Building in Kingston which is the permanent QTH of 6Y5RA, the Headquarters station of the Jamaican Amateur Radio Association. Shown to the left is Chris, 6Y5CB, operating the 7/21 MHz position; to the right, Chuck, W4WXZ and SWL Glen Little at the 3.5/28 MHz operating table. Congrats to the gang, they have truly earned the North American DX Continental Championship, multi-op phone category.

CENTRAL DIVISION

Illinois

W6EJK 1,048,295-209-1224- C-75
W6R9R 90,510-310-65- C-52
W6ILI 27,272-292-559- C-64
W6QMV 385,710-290-559- C-70
W6QNR 283,450-195-416- C-63
W6ALUT 292,248-148-524- C-53
W6WQD 21,395-183-147- C-72
W6KLD 139,325-143-325- C-52
W6UX 114,385-137-287-140- C-70
W6QWU 21,385-138-81- C-75
W6YTG 14,566-42-118- C-5
W6G7D 14,547-45-101- C-52
W6KOU 923,425-47-74- C-73
W6HBO 713,814-51-54- C-20
W6TC 2016-24-74- A-12
W6QTE 364-15-14- B-11
W6PHG 386-11-12- A-5
W6AIF 555-10-12- A-16
W6JEU 192-8-7- A-7
K6KKS 60-4- B-7
W6EXE (4 ops) 798,569-294-527- C-82

DAKOTA DIVISION

Minnesota

W9DWD 136,622-124-286- C-41
W9DAK 136,612-144-316- C-37
W9EKR 125,316-118-354- A-50
W9ER 80,585-139-215- B-45
K9KTPF 88,322-114-285- C-47
W9KMN 60,297-101-190- C-
W9QMS 43,578-33-178- B-49
W9NEP 35,886-34-184- A-30
W9WTP 29,180-68-109- C-13
W9DQ 35,603-111-104- A-12
W9G7 37,192-90-136- B-30
W9ASE 38,376-18-157- C-
W9WUL 20,005-65-130- A-37
W9GDP 11,200-50-75- A-30
W9WQA 76- 6- A-19
W9AH (6 ops) 1,300,320-290-140-AC-90

North Dakota

W9EWC 2,385-313-118-AC-45
W9EWC 3,210- 37- B-

South Dakota

W9DCL 588- 14- C-55
W9WTV 193- 8- B-
W9ABCX 105,855-135-385- C-94

DELTA DIVISION

Arkansas

K3RFO 14,520-119-109- C-72
W3G7 30,045-102-17- C-77
W3RTh 135,450-129-55- A-55
W3R7 550-30-53- A-10
W3WSD 38,478- 81-146- C-14

Louisiana

W3M3 751,650-295-885- C-73
W3WUM 653,220-298-385- C-85

If you've worked Asia, odds are you have QSOed one of the gang here at KA9MF. For the third consecutive year they have earned undisputed possession of Asia Continental Champion in the multi-op phone category. The 175-foot tower pictured at the left of their QTH sports a TH6DX and a 2-element 40-meter beam.
Representing the Maryland-D. C. section, Cliff, K3AHB had 332 QSOs from this attractive operating position. His Yagi is 53 feet above ground.
Representing our younger set, WABWHN went multi-op for a fine score of 95K on phone. Randy, WABSLI and Charley, WABWHN lost 8 hours operating time due to a faulty coax relay.

Bob, VK28RJ/9, on Norfolk Island provided a rare multiplier for 995 lucky W/VE c.w. entrants. His efforts are surely appreciated by many of the people who QSUed him.

First place in the Maine section goes to Phil, K1GAX, who says he didn’t realize how many Extra Class licensees there were until the contest. Contrary to the picture, this was only a single-operator entry!
ZDBZ, 1959 Africa Continental Champion on both c.w. and phone, shown riding what appears to be an Ascension Islands local inhabitant. Do you think this could become a new fad? Bill is also the number one single-op DX station on c.w. with a score of over 4.2 million.

KVF4Z shown relaxing after a rigorous contest weekend. Herb takes honors as North American Continental Champion and number one single-op DX station, both on phone. What a score, over 5.9 million!
Behind each good operator there is an efficient antenna system, here's just a sampling: K4SKI's 12 el 15 mtr. beam; 9V1PD's 2-el. tri-band quad; W9YT's 5 el. 20 mtr. Yagi; W8DZ antenna farm consisting of 2 el on 7, 4 on 14, 4 on 21, 5 on 28 and an inverted vee on 3.5 MHz; and LA0AD's TH3 and Hy-Tower.
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**South America**

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**Venezuela**

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**End of Table**

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**Phone Scores**

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October 1969

77
Claude, V53WQ, paced Canadian phone entries with a score of 578K, quite sufficient for Canadian Division leadership. He comments that he learned a lot in this contest and hopes to improve his score next year.
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Let’s Stick To Communicating

It often seems that some amateurs will do almost anything to get away from the humdrum, everyday activities of a communicator. What is a communicator? In our application, it is one who performs communication on behalf of a third party. We don’t originate the communications; all we do is pass along the communications originated by others, in as close fidelity as possible to the original communication.

But many amateurs apparently don’t see it this way. They are thinking, perceiving, intelligent human beings who want to be aware of what the communication is about, what it portends, what significance it has, and who want to see the results and effects of it. They are not machines, or automatons who merely relay or parrot what they are given. It is very difficult, if not impossible, to tell some amateurs that they should send what they are given to send — nothing more, nothing less. They should not make improvements, corrections or interpretations. If what is sent is incorrect, this is not our business. If it is poorly written, it’s not our fault. If it is subject to misinterpretation, this will be a fallacy of others but not of us.

Too bad that all amateurs are not just communicators. Too bad so many of us want to originate traffic, participate in the emergency itself instead of just its communications aspects. But we suppose this is only human nature, one of the biggest failings of any communications machine.

WSZCQ recently told us of a CBer who was killed as he drove his mobile-equipped car into the middle of a race riot. No one instructed him to go in there, but he “wanted to help.” As it happened, he performed no communications service and succeeded only in getting himself shot dead by a sniper. This could just as easily have been an amateur. Other incidents tell of amateurs who, doing some patrol work for the police, took it upon themselves to apprehend criminals rather than just performing communications duty relative to their activities. Other less-serious practices which are far more common have amateurs “correcting” texts of messages, changing spellings and making comments on the side as to what he “guesses” a message means or should say.

“Now here’s one to the CD Director of Podunk,” says an amateur communicator to his contact. “It says, ‘Advise status of Mudville relative Red Cross caravan’ and is signed ‘Kelly.’ He must mean Meadville. Mudville is just a section of Podunk, and I know Meadville has been having some troubles, seems to me Red Cross is mixed up in it somehow, so better make that Meadville. Besides, I know Kelly and all his relatives live in Meadville, not Mudville.”

Is he right? Maybe. In fact, the chances are good that he is. But if he’s wrong and the text should read “Mudville,” it’s the communicator (and amateur radio) who gets the black eye for inefficiency for changing it. Whereas, if the text is incorrect as originated, the blame attaches to the originator.

Sometimes a communication makes so little sense that the operator receiving it doubts that he received it right. Of course he can always ask the transmitting operator to repeat, but this is wasteful of time, especially when he got it right the first time. So he simply asks, “Does that make sense to you?” If the sender responds “Negative” (the long way to say “No”), then it’s “Roger, go ahead,” without further ado. Only if he answers “Affirmative” (the long way to say “Yes”), is it advisable to check the text.

Another thing you hear a lot are off-the-record discussions of the emergency situation, during lulls in the flow of messages.

“How are things up there?” one operator asks.

“Oh bad, bad,” replies the other. “Thousands of people killed.”

A seemingly innocent conversation between two amateurs, nothing official about it; and yet a reporter happens to be listening, and next

W8ETU/8 operated from the Buckeye Building of the Ohio State Fair from August 21 to September 2 handling more than 1000 messages. In the front are W81MI and W8GKN ready to help the enthusiastic crowd with their origins.
day in the paper one reads that “according to amateur radio sources thousands of people were killed in Podunk.” So amateur radio gets it in the neck again, when it turns out that this report was exaggerated out of all proportion to the true figure.

Yes, we amateurs are human beings with all the natural failings of the species, but when we get on the air during an emergency let’s stick to communicating. That’s our job. Providing the content and interpretation and points to be communicated with are non-communicating functions belonging to those we serve. Let’s do our part and let them do theirs. — W1NJM.

**Public Service Diary**

Heavy rains caused flash flooding in central Tennessee on June 23. Especially hard hit was the small resort community of Red Boiling Springs. At 1430Z the Nashville-Davidson County Red Cross requested communications assistance. Since there were no stations on the air from the site of the disaster, W400A, WA4I8X and WB4JFT drove from Nashville and had a 75 meter station operating from the Red Boiling Springs City Hall by 2000. Communications were maintained until June 25, with WP4RY, WA4BUXI, WA4WEN, WB4IYB and WB4JKH handling things from the Nashville end along with club station WB4QP that had been set up in the Red Cross Headquarters building. — W4WJH, SEC Tenn.

* * *

At 0930Z on July 2, the Boeing Employees Amateur Radio Service emergency group was notified by the 4X4 Search and Rescue Council that a Navy jet had crashed near Snoqualmie Pass, Washington and that the crew of two were missing. WA7G7D, a member of both organizations, went into the field and communications were established by 1130Z. The operation required communications between search helicopters and ground parties as well as phone patches to the Coast Guard in Seattle. W7TCJLP operated the Seattle link. The operation was cancelled at 1600 when both crewmen were found safely. — W7DIF, SEC Wash.

* * *

At 0200Z only July 22, E9 W8ERD of Columbus, Ohio was notified by civil defense authorities that a civil disturbance was in progress, and was asked to activate AREC/RACES on a standby basis. A telephone alerting tree was used to alert members of the organizations. W8IMI assumed control of the ten meter net while W8AVP performed the same function on six meters. Assignments to monitor all Columbus radio and television stations were made. K9EHR and W8ERD installed six and two meter equipment in the police station, thus establishing the necessary liaison. The Emergency Operations Center was activated with K5BDD, W8AKH, W8DWP, W8KUM, W8ZTV and W8AVM present.

A number of messages from civil defense officials at the police command post were handled until 0700 when the all clear was sounded. — W8ERD, EC/RO Columbus, Ohio.

* * *

On August 4, when an airplane having a crew of four Canadians crashed while delivering relief supplies to Biafra, amateurs were responsible for supplying the necessary communications. At 0511Z VE3GCS called VE3CFP to ask his assistance in communicating with VE2DHA/aeronautical mobile who had all the details of the accident in which the four men died. By 0620Z the emergency traffic was cleared with the aid of VE3CFP’s higher power. — VE3BUX, SCM Ontario.

* * *

At about 1700Z on June 1, severe weather and tornado alerts were announced for Monroe County, Mich. WA8MTX in the Red Cross building was activated along with the county’s AREC net and liaisons were established with areas around the county by 2 meter links. No emergency situation developed, however, so the operation was secured at 0200Z of June 2. — W8NDM, EC Monroe County, Mich.

* * *

On June 12, the Columbus, Ohio, area was alerted for possible severe weather. W8ERD started the alerting tree and the AREC/RACES nets on six and two meters were activated with WS8MI, K8IF, WA8YTH and WA8VVM serving as net controls. The nets were not held in formal session, but the channel was open and status checks were made at frequent intervals. No severe storms developed and the nets were secured at 0130Z the following day.

The Oklahoma Storm and Weather Net was active on June 22, 23, 25 and 26 during severe weather alerts for various parts of the state. On June 25, K5CGD and WA5LKS tracked separate tornadoes for several miles while relaying information to WASSOD/5 at the Oklahoma Weather Bureau on 75 meters. However, no damage was apparently caused. — WA5FSN, SEC Okla.

* * *

On August 5, two dams on Greenwood Lake in Northern New Jersey were in danger of breaking

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**October 1969**
Here is part of the Redwood City (Calif.) Civil Defense and Disaster Communications group, who along with members of Explorer Scout Troop 831 helped with Marshalling duties for the annual Fourth of July Parade. In the back row are W6UOK, K6MPN, W6ZXP, WA6FXB, WN6FFC, Mario, an unlicensed helper, and Bill WA6YGR. Kneeling in front are K6GKH, K6ANN and Mike, another unlicensed helper. Also active in the exercise, but not pictured, were WB6HIX, WS7FT, W6VQV, K6UKF, K6DRN, W6DEF and W6GTH, who took the picture.

because of heavy rains. The Passaic Valley Civil Defense was alerted and the Passaic Valley Traffic and Emergency Net was activated. Approximately 150 families were evacuated from the immediate area of danger. Mobile units were at the dam sites and the Red Cross was standing by. However, by 0200 the situation had eased, the dams were holding and many of those evacuated were returning to their homes. The operation was secured with no emergency having developed. — K2KDO, SEC NJN.

On April 27, the Civil Defense Communications Officer for Waseca County, Minnesota, called a simulated tornado watch for the area. Predesignated personnel manned the base communications center, W6BJS, while others manned five mobile units. After the drill, which lasted one hour, a debriefing was held to discuss the particular problems of such an operation. — WA6BZW, SEC Minn.

The Portland (Ore.) Area AREC two meter net provided communications for a mountain rescue exercise on May 3 and 4. All stations were on the air by 1400Z and two meter contact was established even though the radio paths involved were from 50 to 130 miles in length and were over mountainous terrain ranging in altitude from three to ten thousand feet. Twenty two pieces of traffic were handled with a total of sixteen amateurs taking part in the two day operation. — W7DDH, Asst. EC, Multinomah County, Ore.

On May 4, the Canton, Ohio, chapter of the Red Cross held a simulated disaster test in which a school bus full of children was assumed hit by a train. The Red Cross Director monitored the communications from the Stark County Emergency Operations Center and was very pleased with the results of the communications effort in which ten amateurs participated. — K5DHJ, EC/RO Stark County, Ohio.

On May 10, as in past years, the Orange Section AREC provided communications for the California Interscholastic Federation tennis tournament. Two meters was used under the direction of EC WB6YX. Communications involved tourney coordination, rulings on defaults and substitutions and getting participants to the proper places on time. W6JZ, WA6UBW and WB6WWO provided mobile coverage while W6WRJ, WA6YOK, WB6OQR and WB6VJO helped with relays from their home stations. — WA6ROF, Acting SEC Orange Section.

For the month of June, 1969, thirty-nine SEC reports were received indicating activity by 14,726 AREC members. This is one report less, but 223 members more, than June, 1968. Reports were received from the following sections: Ala, Alta, Az, Ark, BC, Colo, Del, EFla, EMass, EPa, Ga, Ind, Iowa, Kan, Ky, La, Le, Mar, Mich, Minn, Mo, Mont, Nebr, Nev, NLt, Ohio, Que, SDgs, SF, SCV, SCal, SDak, SNJ, STex, Tenn, Utah, Va, WVa, and WFla.

The time has again come for our semi-annual tabulation of perfect reporters. During the first six months of 1969 we have received 242 SEC reports (251 last year) from 48 different sections (50 last year). Those sections having perfect reporting records thus far in 1969 are: Ala, Az, Ark, BC, Colo, EFla, EMass, EPa, Ind, Iowa, Kan, Ky, Mar, Mich, Mo, Mont, Nebr, Nev, NLt, Ohio, Que, SCV, SCal, SDak, SNJ, STex, Tenn, Utah, Va, WVa, and WFla; a total of 31 sections (23 last year). Ver-r-r-y interesting. Fewer sections seem to be reporting more often. Why don't some of you SECs who have not reported yet this year give it a try? It can be lots of fun.

Traffic Talk

Old time traffic man W7BA and Washington SCM W7JWJ remind us that s.a.b. nets not "affiliated" with NTS are doing a lot of traffic work and getting not a heck of a lot of credit for it in QST. The implication is that we blow up our own organization, ignore others.

On May 10 an eyeball meeting of the Metropolitan Traffic Net of Los Angeles was held. L.A. SCM WA6KZI made a number of glowing comments about the group's fine work in the public service fields. Left to right, in the front row are K5VYT, WA6SNJ, WA6DSN, WB6KYY and WA6PCT. Second Row: K6RO, WB6BNP, WA6TWS and WB6PWA. Third Row: WB6YJ, WB6ZLP, WA6AWL and WA6SSX.

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QST for
A veritable army of "CAN Men" were present at the Des Moines National Convention of June 20-22. Kneeling left to right are WA6SZM, WA8TAR, W7TID and WA8SFB. Standing in the same order are W6ZNH, W6GGE, K4QCO, W5MI, K5AEK, W4SQE, W6LCLX, W8INH, W6GTGM, W9RRAK, W9HRY, and K4DZM. Wonder what the rep on the net was like that weekend! (Photo by W8QXA)

This is true, to an extent. At least the first part of the sentence is true. The ARRL-sponsored organization gets its statistics and data presented monthly in QST, just as the staff of QST magazine appears on the front pages of each issue. The analogy is not quite accurate, however, because many of the s.s.b. net members are ARRL members, so when they report details to us we ought to publish them. W7BA and W7WJW have come through with some claims and statistics, and here they are: W7BA says that "with its long haul traffic nets, its local s.s.b. nets and its overseas phone patches, s.s.b. is doing an outstanding job of building public good will for amateur radio. Examples? The long-haul s.s.b. nets, the local s.s.b. nets such as WARTS, NTN, CBN or California's three big divisions of the Golden Bear Net, traffic and phone patches to Alaska, to Hawaii, to Okinawa, the two hospital ships Repose and Sanctuary." He says that "(a) Cross-country s.s.b. with its fewer relays is handling traffic with more speed and accuracy, (b) with the growth and advancement of s.s.b. there are fewer operators available for the c.w. nets, (c) coverage by s.s.b. nets is much better to all sections of the country, (d) s.s.b. nets are doing a more effective job for Alaska, Hawaii, the APO's and FPO's."

W7JWJ tells us that the 20 Meter Interstate Single Sideband Net was started late in 1958 by W9IDA (now W5OBD). Most of the QNI were military, with QTC in the thousands per month during 1959 and the early 60's. Total QN1 for 1968 was 634, traffic 59,366 with a maximum of 7687 for a single month. In 1969 through June the highest month was March with 9108, and a total through June of 46,396 and a QNI of 2787. Traffic is still mostly military, with origination from K6BPI and W6YDK in San Diego. Says W5OBD: "We try to keep our traffic off of MARS and NTS because this type of traffic needs to be delivered as soon as possible; if it gets on MARS or NTS it can be as much as 10 days late. I have heard traffic being handled on some state nets that was 3 to 10 days old." W7JWJ estimates that in the ten years of its operation ISSB has had 5000 different stations check in handling an estimated traffic total of over 500,000.

National Traffic System. NTS Area Staffs in two areas held formal meetings so far in 1969. The PAS met at Sacramento on June 13-14, 1969 and the CAS met in Des Moines, Iowa, on June 21-22. EAS is planning a meeting on Sept. 20-21, which will also be history by the time you read this.

Complete minutes of the PAS meeting were furnished by Chairman WA6BRG. Present were all three region net managers (WA6ROF, W7BQ, K7NHL), the TCC director (W7DZK) and three members-at-large (WA6BRG, W7CNO and W6BQF). The PAN manager, W6VNF, had recently resigned, so the first order of business was to select a new PAN manager; W6BNX was recommended to headquarters as the man to succeed W6VNF (this appointment has since been completed).

During the meeting which ensued, many crucial subjects were discussed: (1) APO/FPO and Hawaiian outposts for RKO; (2) channels by means of which section net managers may consult the PAS; (3) discussion of the problems raised in "Traffic Talk," June QST; (4) anti-NTS propaganda by NTS nets; (5) NTS incentives; (6) Denver Convention Center traffic routing; (7) more QST articles on NTS; (8) use of NTS travel expense for recruitment and promotion at club meetings; (9) a PAS bulletin.

Quite a few recommendations resulted and are under study. Of point No. 3 above, a number of shortcomings of NTS were pointed out, such as inadequate local delivery capability, no daytime coverage, poor liaison from section to region, poor AREC liaison, low percentage of interest among hams in participating, poor emergency capability, poor propagation of the NTS "species." Two of the most-discussed topics were daytime operation and general ham preference for voice operation. The PAS ultimately recommended that study be given to the possibility of establishment of some kind of daytime NTS capability, integrated with the present system, and creation of new NTS-oriented section phone nets for the specific purpose of working into the system. Those existing nets which purport to be part of the system but fail to fulfill the requirements should be dropped.

The PAS recommended a good educational program to deal with anti-NTS propaganda, but was not more specific. It also recommended that BPL be left unchanged but to set up an NTS incentive award giving credit to those things mentioned in Minute 65 of the May '69 Board Meeting except no credit for phone patches and eligibility for the award be restricted to bona fide NTS participants, or a separate award for NTS participants.

The staff also criticized present NTS promotional materials and recommended that they be updated and put in more interesting form, including major QST articles. Travel for NTS managers should be liberalized to permit attending club meetings and other amateur gatherings for promotional purposes. Staff members should receive copies of official bulletins, annual reports and minutes of the Board Meetings.

Much less can be said about the CAS meeting, because the chairman has not yet submitted a report. However, all but the TEN manager were present, along with the League's communications manager who participated strictly as an observer. Discussion was informal in nature and the meeting lasted approximately three hours. More details later when the chairman submits a formal report.

July reports: W2FR reports that 2RN certificates

October 1969
KIESG, Bruce is a high speed c.w. operator who holds the A-1 Op and BPL Medallion awards and has been active in all levels of NTS since 1963.

have been issued to WAG23 BAN BEX OBX, WB285 DRW RKK WID. According to manager KEMVO, 3RN, wallpaper has since W9S4 AI2 XAXA EEB EML LOS NEM NNL, K3KTH and 6A3HTQ, W4S1JJ says K4BSS and WB4JHJW have earned 4RN certificates. W4A2OF says some of the MARs stations are “rogering” incoming traffic when they shouldn’t be. W7BQ1 reports the best rate on R7N in recent years mainly because of the heavy load of Boy Scout Jamboree Traffic. W6C7ET says he has been unable to schedule W8IZ and W6M1M on the same evening as EAN rep, but that he’s working on it. WB4KPE received a 4RN certificate from W9HRY. WA9RAK reports the move to forty meters was made without incident and that CAN made the best rate for July on record. Doug also sent a CAN certificate to W8HI.

Most of the managers also commented on the poor conditions, the moonwalk and Boy Scout Jamboree traffic. One manager, who shall remain unidentified, also advised that he followed the advice in last month’s column. He says he cheered up and sure enough, things got worse.

July statistics:

<table>
<thead>
<tr>
<th>Net</th>
<th>Sessions</th>
<th>Traffic</th>
<th>Average age</th>
<th>Representation (%)</th>
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<tbody>
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<td>EAN</td>
<td>31</td>
<td>1052</td>
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<td>CAN</td>
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<td>531</td>
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<td>3RN</td>
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</table>

Sections: 1039 9344 5.8

TCC Eastern: 124 2408
TCC Central: 493 1530
TCC Pacific: 1311 2742

Summary: 2433 28748 EAN 14.3

Record: 2893 33732 1.267 15.5

1Section and local nets reporting (50): CPN, CN (Conn.);
VSBN (Va.); TN (Tenn.); AENB, AEND, AENH, AENM, AENT (Ala.); NYS, NLI (N.Y.); WFPN, VEN, EMTN, GN, TPTN, FPTN (Fla.); NJEPTN, NJAN, NJTEEN (N.J.); PNN (Me.); SIB, OSBH, Franklin County (Ohio); MNS, MJN (Miss.); QMN (Mich.); SSZ, OLZ (Okla.); LAN (La.); RISP (R.I.); NCNL, NCNE (N.C.); EMNN (Mass.); PTTN, EPA, EPAEPN, PFF

(Tenn.); AENB, AEND, AENH, AENM, AENT (Ala.); NYS, NLI (N.Y.); WFPN, VEN, EMTN, GN, TPTN, FPTN (Fla.); NJEPTN, NJAN, NJTEEN (N.J.); PNN (Me.); SIB, OSBH, Franklin County (Ohio); MNS, MJN (Miss.); QMN (Mich.); SSZ, OLZ (Okla.); LAN (La.); RISP (R.I.); NCNL, NCNE (N.C.); EMNN (Mass.); PTTN, EPA, EPAEPN, PFF

TCC functions, not counted as net sessions.

Transcontinental Corp. W3EML has issued TCC Eastern certificates to W7s BBJ EOB NJM YKQ ZSG, W9s FR GZK PU, K3R4H, W4s BHN BLV UWA, KEMVO, W6s NLC UQ ZM, K4KPN, K6CAG-1, W6s ARR LJX, K8KMQ, W6A2 POS ZGC, W6LX reports that most functions are working well with the Boy Scout Jamboree giving a big boost to function &. W7DXE says the Boy Scout traffic gave TCC Pacific a big boost too, but that a much better job would have been done with a little advance warning.

July reports:

<table>
<thead>
<tr>
<th>Area</th>
<th>Functions</th>
<th>Sucessful</th>
<th>Traffic</th>
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<td>2408</td>
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<td>Central</td>
<td>93</td>
<td>94.7</td>
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<td>124</td>
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<td>2742</td>
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<tr>
<td>Summary</td>
<td>341</td>
<td>94.0</td>
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</table>

The TCC Roster: Eastern Area (W3EML, Dir.); W7s BBJ EOB NJM YKQ ZSG, K3R4H, W4s BHN BLV UWA, KEMVO, W6s NLC UQ ZM, K4KPN, K6CAG-1, W6s ARR LJX, K8KMQ, W6A2 POS ZGC, W6LX reports that most functions are working well with the Boy Scout Jamboree giving a big boost to function &. W7DXE says the Boy Scout traffic gave TCC Pacific a big boost too, but that a much better job would have been done with a little advance warning.

Independent Net Reports:

<table>
<thead>
<tr>
<th>Net</th>
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<th>Traffic</th>
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<tr>
<td>North American SBB...</td>
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<tr>
<td>Interstate 20 Meter SBB...</td>
<td>22</td>
<td>483</td>
<td>7308</td>
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<tr>
<td>7290 Traffic...</td>
<td>44</td>
<td>1053</td>
<td>1150</td>
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<tr>
<td>Eastern U. S. Traffic...</td>
<td>29</td>
<td>143</td>
<td>49</td>
</tr>
<tr>
<td>Mike Farad E &amp; T...</td>
<td>27</td>
<td>356</td>
<td>270</td>
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<tr>
<td>Closing House...</td>
<td>27</td>
<td>396</td>
<td>263</td>
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<tr>
<td>All Service...</td>
<td>70</td>
<td>4</td>
<td>41</td>
</tr>
<tr>
<td>48HR QST for...</td>
<td>27</td>
<td>319</td>
<td>442</td>
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</tbody>
</table>


The Merit Award Committee of the Canadian Amateur Radio Teletype Group (CARTG) is anxious to receive nominations (from clubs or individuals) for the 1969 CARTG RTTY Merit Award. The nominators must state fully the reasons why they feel their nominee should be considered by the Committee. If the committee considers that two or more nominees equally warrant the award, multiple awards may be issued. Send your nomination(s) to: Alan E. H. Venning, VE2LL, Chairman CARTG Merit Award Committee, 6171 Brantford Avenue, Burnaby 1, B. C., Canada.

The Post Office D Department promises faster mail service with the Zip codes. Use yours when you write Headquarters. Use ours, too. It’s 08111.
SOUTHWESTERN DIVISION
CONVENTION
San Diego, California          October 17-19

The 1969 ARRL Southwestern Division Convention will be held in San Diego, California, as a special event in the San Diego 200th Anniversary celebration this year. The convention will take place at the Hilton Inn in Mission Bay Park, October 17-19. Activities will be many and varied and will cover all phases of the amateur radio and electronics fields. Forums and talks are expected to cover: homebrew, DX, cw, fm, s-m, ssb, MARS, ATV, NTS, RTTY, QRP, ARRL, ARPS, YLs and XYLs. John Huntton, ARRL General Manager, will host the ARRL open forum along with John Griggs, W6KW, ARRL Southwestern Division Director, and Arnie Dahlman, W6UEI, Vice Director. Bob White, W1CW, Assistant Communications Manager from Hq. will conduct a DX forum.

K6SD, the "Official San Diego 200th Anniversary Radio Station," is in operation throughout the year and will be for the convention also. There are a number of special awards for contacting K6SD so watch for it on the bands.

The convention banquet will take place Saturday evening, October 18 and Charles Cordell, W6SAG, the President of the San Diego 200th Anniversary will be one of the speakers. The Wouff Hong initiations will take place at midnight, Saturday. Special YL and XYL activities have been planned so bring the gals along. The telephone Company will bring their new interface device which makes phone patches legal and Signal/One personnel will hold a special technical session on their new unit.

Convention registration is $12 each for all convention activities and the grand banquet too. For tickets and information write to: Registration Desk, P. O. Box 1469, San Diego, CA 92112. Include your "handle" and indicate if you want some hotel-motel information sent by return mail. Your check made payable to the 1969 ARRL Southwestern Division Convention, will be your receipt. Don't miss out on the convention; send for your tickets NOW.

COMING A.R.R.L. CONVENTIONS
October 11-12 — Roanoke Division, Huntington, West Virginia.
October 17-19 — Southwestern Division, San Diego, California.
January 17-18 — Southeastern Division, Miami, Florida.

note: Sponsors of large ham gatherings should check with League headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL for up to two years in advance.

Hamfest Calendar

California — The Great Bay Area Hamfest will be held October 18 at the Richmond Memorial Auditorium. General admission ticket is $1.50, student 75c.

For Hamfest information and directions contact 7255 kHz (West Coast AR Service), 145.1 MHz, K6GWE (a.m. repeater VHF Expeditionary Society), 146.8 MHz, W6BAE (f.m. repeater Grizzly Peak VHF ARC), and Channel 11.

California — The Crescenta Valley Auction is scheduled for October 9.

Indiana — The Eighth Annual Hamfest held by the Hoosier Hills Ham Club will be held on October 12 at scenic Spring Mill State Park near Mitchell, Indiana. Coffee and doughnuts, Jr. ops activities, ladies bingo, playground, swapshops and coffee Saturday night. Hamfest registration is $1.00. Talk-in on 3.910 MHz lab and 50.4 MHz s-m. For Hamfest advance registrations, mail or motel reservations write JHoosier Hills Ham Club, Inc., P.O. Box 375, Bedford, Ind. 47421.

Kansas — Dates for the 5th Annual Two-Ni-Chat Amateur Radio Club garage sale will be October 25 and 26. Designated left-overs will be auctioned at 2:00 P.M. on Sunday at the close of the sale. For more information write Emil Wilborn, WARKY.

Michigan — Announcing the Fifth Annual Tawas Hamfest, October 3-5 in East Tawas, Michigan, 60 miles north of bay City on US 23. Demonstrations, displays, swap-shop, and more. For further information contact Jerry Mertz, WD8DZ or Joseph Bennett, WASGUH.

Michigan — The Iscego Radio Club is hosting another Hamfest October 3 and 4.

New Jersey — The New Jersey Emergency Phone and Traffic Net Dinner will be held this year at Barretts Restaurant, River Road, Trenton on Saturday, October 25. Send your reservations to WA2TAF, chairman.

New York — The annual dinner/banquet of the Central New York Chapter of the QCA of N.Y. will be held at the Hotel Oneida at Oneida, N.Y. on Saturday, November 1. The Finger Lakes Chapter and the Mohawk Chapter will join us in this occasion. Tickets are $5.00 per person. All reservations should be in no later than October 26. Write to your chapter secretary for full particulars and tickets. Cocktail hour 5 to 7 P.M. Dinner at 7:00 P.M. Make checks payable to Central Chapter of QCWA.

New York — The Syracuse VHF Roundup is to be held at the Three Rivers Inn, Route 67, 10 miles north of Syracuse, N. Y. Saturday, October 11. Speakers include Walt Bain, W4LTU, with new information on weak-signal detections; Bob Jeffers, W2ALL, on a.b. systems for vhf and uhf service; and probably QST VHF Editor, Ed Tilton, W1HDF. Reservations from Charles Sollwood, W2RHH, 902 1st North St., Syracuse, N. Y. 13208.

Pennsylvania — On October 25 at 6:00 P.M., Tamaqua Area Side Band Amateur Radio Assn. is sponsoring a dinner in honor of W3QOR and W3QORI. A Pennsylvania Dutch Ham and Turkey dinner will be served at the New Ringgold Community Hall, New Ringgold, Penn. Donation is $5.00, reservations must be made prior to October 18. No tickets will be sold at the door. Send for tickets from Anthony Marli, WA3CPA, 164 Spruce St., Tamaqua, Pa. 18252.

Texas — The Terry County ARC Brownfield Swapfest will be held at the Armory on October 26.
Happenings of the Month

GROUND RULES FOR IDENTIFICATION

The FCC has set forth some guidelines as to which forms of identification of an amateur station will be acceptable for short QSOs such as DX and contest exchanges. The letter is especially important in view of recent citations issued to contest operators. Here is the letter:

Since the fall amateur contest activity will soon be here, I believe you will be interested in a resume of a recent explanation of what the Commission considers to be an acceptable station identification, as follows:

For compliance with rule Section 97.87(a), the last transmission of the exchange of transmissions with another station must include that “other” station’s call sign. For example “BK 589 CAL TU DX1DX de W6XYZ K” would be in compliance with §97.87(a). When there is a need for identification of the “other” station in an exchange for the benefit of our monitoring facilities, it is most likely to be heard if it is in the last transmission or at the end of a long single transmission.

Where the transmissions of an exchange are very brief, such as the typical contest exchange, if it is less than 30 seconds duration, the entire last transmission is considered the “end of the exchange” for the purpose of compliance with §97.87(a). Provided there is no mistaking which is the transmitting station’s call sign, the call signs may be anywhere in such last transmission. While the rule no longer gives examples, continuation of the traditional practice of placing the transmitting station’s call sign last or preceding it by “de” is acceptable for this purpose.

Examples of acceptable end-of-exchange transmissions of less than 30 seconds are:

“DX1DX de W6XYZ 589 CAL BK”
“DX1DX W6XYZ 589 CAL K”
“DX1DX 589 CAL de W6XYZ K”
“DX1DX 589 CAL W6XYZ K”

For telephony, the voice equivalent of the foregoing examples may be used, substituting “this is” or “from” for “de”, etc.

JAMES E. BARN
Chief, Safety and Special
Radio Services Bureau, FCC

SIDEBAND POWER IN CANADA

Canadian Director Noel B. Eaton has been corresponding with the Department of Communications regarding the measurement of power input to amateur transmitters on single sideband. The problem arises from the fact that manufacturer’s ratings are given in somewhat hazy terms, and the General Radio Regulations Part II are not particularly clear as to what is required.

Section 47 of the Regulations limits the power input to amateur transmitters and Section 61 requires the use of meters when the input exceeds 400 watts. The recent introduction of many transmitters with p.e.p. ratings in excess of that figure has led several people to believe that they should be equipped with meters.

Letters from the Department have straightened out the matter. What it boils down to is the Department agrees with the generally accepted definition that average power input is one half of the input on voice peaks, and that meters or one switchable meter are not required until the average power input exceeds 400 watts.

HIGHWAY REPORTS BY CB STATIONS

As a matter of interest only, we report that FCC has proposed a change in Citizen Radio Service Rules which would permit Class D stations to furnish such groups as AAA and broadcast stations with road condition information. Live retransmission by broadcast stations still would not be permitted. Comment deadline for Docket 18825 was September 15, with reply comments due September 25.

Bigelow Green, W1EAE

We are saddened to have to report the sudden death, on August 11, 1969, of Bigelow Green, W1EAE, vice director from the New England Division since 1961. We understand Big was at the key participating in the Eastern Massachusetts net when stricken.

First licensed in 1928 with the call W1AKG, Big was past chairman of the Greater Boston Amateur Radio Society, was a member of RACES in Acton, Mass., and held appointments as route manager and official relay station. He was employed as a senior technical writer with RCA, held the Extra Class license and resided in South Acton. He was 63 years old.

W9 QSL MANAGER RETIRES

Alva A. Smith, W9DMA, has turned in his rubber stamps and pigeon-holes after serving more than thirty years as manager of the ARRL W9 and then W9 QSL Bureau — a long time in a volunteer, unpaid, service job! Al has earned the warm thanks of all DX-minded amateurs in mid-America, partially expressed by an ARRL Certificate of Merit recently awarded to him.

Carrying on the QSL chores is the Des Moines Radio Amateur Association, Box 88, Des Moines, Iowa, 50301.

ARRL ASKS CHANGES FOR EXTRA

In July QST, we announced FCC Docket 18540 which would let FCC licensees count time as a foreign license toward the two years needed for
Extra Class and toward the 25 years needed by an Extra Class licensee seeking a two-letter call.

The League has endorsed the docket as it stands, but has added three other matters raised at the 1969 ARRL Board meeting. First, the directors feel the waiting period for Extra Class should be reduced from two years to one year; second, they have renewed the request made in the “incentive licensing” docket 15928 that former holders of the Amateur Extra First Grade license now be given Amateur Extra Class licenses without further examination (The earlier Extra had a similar 20 w.p.m. code test, a two-year experience requirement and technical knowledge equivalent to the First Commercial of its day, the twenties and early thirties; the license was discontinued in 1933 as an economy measure, being renewed only as Class A, now called Advanced); third, that newer Extra Class licensees be made eligible for 1 × 3 calls.

The text follows:

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of
Amendment of Part 97 of the Commission’s Rules regarding licensing and operating experience requirements for the Amateur Extra Class license.

DOCKET NO. 18540
RM-1311

To: The Commission

COMMENTS ON AND COUNTERPROPOSALS TO NOTICE OF PROPOSED RULE MAKING

The American Radio Relay League, Incorporated, by its General Counsel, respectfully submits the following comments on and counterproposals to the Notice of Proposed Rule Making released May 9, 1969 (FCC 69-491).

The Commission is fully aware of the many studies made and proposals submitted by the League over the years in a continuing effort to revitalize interest in the higher classes of amateur operator licenses. At the recent annual meeting of the League’s Board of Directors in May of this year, the eligibility requirements and operating and other privileges of the various classes were examined at considerable length. The views and recommendations of the Board are reflected in the minutes of the meeting, copies of which have been made available to the Commission as well as to all League members. The comments, suggestions and counterproposals submitted herein are limited to the Amateur Extra Class license and are so closely related to the subject and scope of the Notice of Proposed Rule Making that they may be considered in this proceeding.

I.

Section 97.9(a)(1)

Section 97.9(a)(1) of the Commission’s Rules and Regulations now requires that an applicant for the Amateur Extra Class license must have held for at least two years a valid Commission-issued amateur operator license of other than the Novice and Tech-

Behind the Diamond

We’ve run several pictures of this month’s subject presenting awards to others — it’s nice to turn the tables and show Philip E. Haller, W9HPG, accepting the Illinois Amateur of the Year 1969 Award from Hamfesters Radio Club president Charles T. Borkowski, WA9TWA.

Philip started as 9ATG back in 1925, and he’s been active in amateur radio affairs ever since.

October 1969
Wayne Overbeck, K6YNB, receives the June Cover Plaque Award from Walt Larson, K6DM, assistant director from the Southwestern Division. Wayne’s article, “Three Innovations for Field Day,” was picked by ARRL directors as the best in June QST.

Amateur Extra Class license examination, because their learning capabilities and the ability to write legibly at a speed of 20 words per minute, particularly under the stress of an examination, have declined with the passing years. Some also note that they once held Amateur Extra First Class operator licenses after having successfully passed equally difficult examinations equivalent to the present Amateur Extra Class examinations.1

The Extra First Grade Amateur Operator’s License was first established by the Department of Commerce in 1923 at the suggestion of the League, and required two years experience as an amateur operator, 20 words a minute code proficiency, and a written examination similar to that for the Commercial First Grade, Operating privileges in various bands, varied from time to time. In November 1929, at the request of the League, the Federal Radio Commission opened 14,100-14,300 kHz for operation by holders of Amateur Extra First Grade licenses who had obtained special permission for such operation. In 1931, the League proposed two revised radiotelephony bands, within the 5.8 and 14 MHz bands for use by holders of a new class of license. In April 1932, the Federal Radio Commission adopted the League’s proposal to the extent of establishing an endorsement of unlimited radiotelephony on regular licensees. This endorsement required twelve months amateur experience and was issued without additional examination to holders of Amateur Extra First Class and certain commercial licenses. In June 1933, the Federal Radio Commission abandoned the Temporary, First Class, Extra First Class, and Unlimited Phone Classes and established Classes A, B and C. Class A carried special phone privileges and was issued without further examination to Amateur Extra First Class licensees. The last Amateur Extra First Class licenses were issued in 1933. Although the present Amateur Extra Class license was established in 1952 and, for all practical purposes was identical to the old Amateur Extra First Class, there was no incentive to obtain such a license until the rules were revised in November 1967 by the Report and Order in Docket No. 15928.2

Section 97.1 of the Commission’s Rules and Regulations.

One of the reasons for having the higher classes of licenses is to provide “a reservoir within the amateur radio service of trained operators, technicians, and electronics experts.” 2 A very high percentage of those who once held an Amateur Extra First Class operator license are either holding or have held an Advanced Class license already served their country in the armed forces, the laboratories, and the electronic manufacturing plants during or since World War II. Because of their ages, the possibility of their being recalled for such service is very slight. Thus, requiring re-examination of those who once qualified for the equivalent class of license does little to achieve the purposes and objectives of the incentive license plan.

The League recognized these simple truths when it included in its comments to the Notice of Proposed Rule Making in Docket No. 15928 the suggestion that “grandfather rights” be granted to former Amateur Extra First Class licensees who have held Class A and later Advanced Class licenses continuously since the Amateur Extra First Class was established in 1923. It is understood that one of the reasons the suggestion was not adopted was because the records of the Federal Radio Commission and earlier licensing authorities are not readily available and the search of the files would require an inordinate amount of time by Commission personnel.

The League’s Board of Directors, at its last annual meeting, directed the filing of an appropriate

1

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92

QST for
petition requesting the Commission to again review the hardships facing this relatively small group of active and dedicated amateurs and to grant certain examination credits to former holders of Amateur Extra First Class licenses. Specifically, the Board directed that the Commission be requested to amend Section 97.25(5) to include former holders of Amateur Extra First Class licenses within the waiver provisions of that section.2

2 Section 97.25(5) provides as follows:
§97.25 Examination Credit
(a) ...... 
(b) ...... 
(c) An applicant for the Amateur Extra First Class operator license will be given credit for examination elements 1(C), 4(A), and 4(B), if he so requests and submits evidence of having held a valid amateur radio station or operator license issued by any agency of the U. S. Government during or prior to April 1917, and qualifies for or currently holds a valid amateur operator license of the General or Advanced Class.

Section 97.21 provides as follows:
§97.21 Examination Elements
Examinations for amateur operator privileges will comprise one or more of the following examination elements:
(a) ...... 
(b) ...... 
(c) Element 1(C): Expert's code test at twenty (20) words per minute; 
(d) ...... 
(e) ...... 
(f) Element 4(A): Intermediate amateur practice involving intermediate level radio theory and operation as applicable to modern amateur techniques, including but not limited to, radiotelephony and radiotelegraphy; 
(g) Element 4(H): Advanced amateur practice involving advanced radio theory and operation as applicable to modern amateur techniques, including but not limited to, radiotelephony, radiotelegraphy, and transmissions of energy for measurements and observations applied to propagation for the radio control of remote objects and similar experimental purposes

Accordingly, and for the reasons stated, the Commission is respectfully requested to include in its report and order in this proceeding the addition of the words "or an American Extra First Class operator license issued by the Federal Radio Commission" following "April 1917" to Section 97.25(5). For administrative convenience, the Commission can place the burden upon the applicant to establish that he once held an Amateur Extra Class license, thus making unnecessary a tedious and time consuming search of the old files.

III.
Section 97.51(a)

The Notice of Proposed Rule Making also invites comments upon a proposed amendment of Section 97.51(a)(3) to extend eligibility for two-letter call sign assignments to Amateur Extra Class licensees who were first licensed at least 25 years earlier by a foreign government. Section 97.51(a)(5) now provides, in part, as follows:
§97.51 Assignment of call signs.

(a) The call signs of amateur stations will be assigned systematically by the Commission with the following exceptions:

* * *

(5) ...... Additionally, a two-letter call sign may be assigned to an Amateur Extra Class licensee who first held an amateur radio operator license issued by the Commission, or one of its predecessor agencies, 25 years or more prior to the receipt date of an application for such assignment.

The proposed amendment, in most instances, would extend eligibility to naturalized citizens of the United States, but some native born citizens who for various reasons were amateur licensees in foreign countries would also be involved.

At its last meeting, the League's Board of Directors voted to request the Commission to amend Section 97.51 to permit the issuance of a three-letter call sign with a single letter prefix (1x3) to an Amateur Extra Class licensee (regardless of tenure) upon request and payment of the appropriate fee.

The advantages and prestige of a two-letter call sign is so well recognized as to require no comment. Conversely, disadvantages of a call sign with a two letter prefix and a three letter suffix (2x3) are apparent. In every day communications, in contests, and in amateur net operation, the operator with a 2x3 call sign almost always finds himself at a disadvantage with the operator having a 1x3 or a 1x3 call sign. One of the reasons Section 97.51(a)(6) provides for the assignment of call signs with a single letter prefix and a two letter suffix is to provide incentive to an amateur to attain the highest grade of license and to recognize the many years of service.

In recent years, most of the newly licensed amateurs have been issued 2x3 call signs. Under the present rules, there is no way for the holder of such a call to obtain the more desirable 1x3 call sign even if he earns his Amateur Extra Class operator license. None of these amateurs will be eligible for a two-letter call for many years. The end result is that one of the incentives for advancing to the highest class of license is nonexistent for this youngster group.

To make the incentive licensing program more meaningful, it is respectfully suggested that Section 97.51(a)(3) be amended to permit the assignment upon request and on a random basis of a 1x3 call sign upon payment of the appropriate fee.

**WHO THE DEVIL IS WHO?**

18th in a Series of Call Conversion Charts

Here are additional calls of amateurs taking advantage of new rules which allow Extra Class licensees licensed 25 years ago or longer to acquire two-letter calls. If you should be listed here, let us know by post card right away.

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Wherefore, the premises considered, the Commission is respectfully requested to adopt not only the proposals set forth in the Notices of Proposed Rule Making in this proceeding but also the additional proposals set forth herein.

**THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED**

August 26, 1969

**BY ROBERT M. BOOTH, JR.**

**Its General Counsel**

**EXAMINATION SCHEDULE**

For the convenience of those planning to take FCC examination for General, Advanced or Extra license, we present below a tentative schedule of dates and places. (Applicants for Novice, Technician or Conditional Class licenses should follow procedures outlined in Chapter 5 of the Radio Amateur’s License Manual.)

Recent changes are in **boldface**.

1. Boston, Mass. 02109: India & State Streets; Thu.-Fri., 9-11 A.M. Exams with code test, Friday only.

   Also conducts examinations at Bangor, Me., in May; Hartford, Conn. in March and Sept.; Portland, Me. in Apr. and Oct.

2. New York, N.Y. 10011: 641 Washington Street; Tues.-Thurs., 9-12 A.M.

   Also conducts examinations at Schenectady, N.Y. in Mar., June, Sept. and Dec.


4. Baltimore, Md. 21202: Gay & Water Streets; Mon. and Fri., 8:30 A.M.

5. Norfolk, Va. 23510: Granby & York Streets; with code, Thurs., 9 A.M.; others, Wed. and Fri., 9 A.M. to 2 P.M.


6. Atlanta, Ga. 30303: 240 Peachtree Street, N. E.; Tues. and Fri., 8:30 A.M.


68 Savannah, Ga. 31402: York & Bull Streets; 2nd & 4th Tues, each month, by appointment only.

7. Miami, Fla. 33130: St. S. W. First Avenue, Thurs., 9 A.M. Also conducts examinations at Jacksonville, Fla. in Apr. and Oct.

7T Tampa, Fla. 33602: 500 Zack Street; Tues., Fri., 8:15 A.M. by appointment only.

8. New Orleans, La. 70130: 400 South Street; with code, Tues., 8:30 A.M., others, Tues.-Wed., 8:30-12 A.M.

   Also conducts examinations at Jackson, Miss. in June and Dec.; Little Rock, Ark. in Feb., May, Aug. and Nov.

8M Mobile, Ala. 36602; 113 St. Joseph Street; Wed. 8 A.M. by appointment only.


9B Beaumont, Texas 77701: 300 Willow Street; Tues. by appointment only.

10. Dallas, Texas 75221: 1314 Wood Street; Tues., 8 A.M. to 1 P.M.


11. Los Angeles, Calif. 90012: 312 N. Spring St.; Wed. 9 A.M. and 1 P.M.

   Also conducts examinations at Bakersfield, Calif. in May; Las Vegas, Nev. in Jan. and July; Phoenix, Ariz. in Jan., Apr., July and Oct.; Tucson, Ariz. in Apr. and Oct.

118D San Diego, Calif. 92101: 1245 Seventh Avenue; Wed., by appointment only.

12. San Francisco, Calif. 94111; 555 Battery Street; Fri. Extra & Advanced, (no code) 8:30 A.M.; General and Advanced with code 10 A.M.

   Also conducts examinations at Fresno, Calif. in Mar., June, Sept. and Dec.

13. Portland, Ore. 97201; 319 S.W. Pine St.; Fri. 8:45 A.M.

   Also conducts examinations at Boise, Idaho, in Apr. and Oct.; Klamath Falls, Ore. in May.

14. Seattle, Wash. 98104; 905 1st Avenue; Fri. 8:45 A.M.

   Also conducts examinations at Billings, Mont. in May; Missoula, Mont. in Apr.; Great Falls, Mont. in Sept.; Spokane, Wash. in Apr. and Oct.

15. Denver, Colo. 80202; 19th street between California and Stout Streets; 1st & 2nd Thurs., General & Advanced 9 A.M. Extra, 9 A.M.

   Also conducts examinations at Albuquerque, N. Mex. in Apr. and Oct.; Rapid City, S. Dak. in May; Salt Lake City, Utah in Mar., June, Sept. and Dec.
The function of the ARRL QSL Bureau System is to facilitate delivery to amateurs in the United States, its possessions and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope, about 4½ by 9¼ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below.

W1, K1, WA1, WNI — Hamden County Radio Association, Box 216 Forest Park Station, Springfield, Massachusetts 01108.
W2, K2, WA2, W2B, WN2 — North Jersey DX Association, P.O. Box 605 Ridgewood, New Jersey 07451.
W4, K4 — H. L. Parrish, K4HXP, RFD 6, Box 804, Hickory, North Carolina 28601.
W5, K5, WA5, WN5 — Hurley O. Saxon, K5QVR, P.O. Box 9915, El Paso, Texas 79989.
W6, K6, WA6, WB6, WN6 — San Diego DX Club, Box 3329, San Diego, California 92120.
W7, K7, WA7, WN7 — Williamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.
W8, K8, WA8, WN8 — Paul R. Hubbard, WA8CXY, 921 Martin Ave., Zanesville, Ohio 43701.
W9, K9, WA9, WN9 — Ray P. Birren, W8MSG, Box 519, Elmhurst, Illinois 60126.
W8A, WA8, WN8 — Des Moines Radio Amateur Association, P.O. Box 88, Des Moines, Iowa 50301.
KP4 — Alicia Rodrigues, KP4CL, P.O. Box 1081, San Juan, P.R. 00902.
KZ5 — Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.
KHz, WB6 — John H. Oka, KH6DQ, P.O. Box 101, Alea, Oahu, Hawaii 96701.

Back Copies and Photographs

Back copies of QST referred to in QST issues are available when in print from our Circulation Department. Please send cash, money order or check — 75¢ for each copy — with your order; we cannot bill small orders nor can we ship c.o.d.

Full size (8 by 10) glossy prints of equipment described in QST by staff members (only) can be furnished at $1.50 each. Please indicate the QST issue, page number, and other necessary identification when ordering, and include full remittance with your order — we do not bill nor ship c.o.d.

Sorry, but no reprints of individual QST articles are available, nor are templates available unless specifically mentioned in the article.
NEW MEMBER

We are pleased to announce admission of a new member to the International Amateur Radio Union. The Western Samoa Amateur Radio Club will now provide representation for SW1 amateurs in the Union. Election of WSARC was by unanimous vote of the IARU member-societies participating in the election. Union membership now stands at eighty-one.

JA STUDY GROUP VISITS HEADQUARTERS

A closer relationship between amateur societies in Japan and the U. S. was advanced through the visit of Japan Amateur Radio League representatives to IARU/ARRL headquarters during August. The group of five JARL members were on a tour of the U. S. to study the condition of U. S. amateur radio and to meet American amateurs.

The Japan Amateur Radio League is the national association of amateur operators in Japan. Its membership includes over 25,000 of the 76,000 licensed operators in the country. Each member receives the tri-monthly JARL News, and enjoys use of the society's QSL bureau. JARL also provides an information service by mail for members. They answer about 500 inquiries per day—all hand written because of the complexity of typewriting in Japanese!

Since mutual understandings among IARU societies are important, this productive visit will not end the information exchange with Japan. In fact, IARU/ARRL president W9DX plans to personally visit JARL during 1970!

To commemorate the tenth year of the presence of the Saar district in the Deutscher Amateur Radio Club, the Deutsche Bundespost (German Post Office) will issue the special post mark shown above. The post mark will be in use on October 18 and 19—the days of the DARC district meeting in Saar.

NOTES

The Malaysian Amateur Radio Transmitters Society reports that during the period from August 9, to September 9, 9VI amateurs were given special permission to use the prefix 9V6. Use of the special prefix was to commemorate the 150th anniversary of the founding of Singapore by Sir Stamford Raffles.

A club station at the Surinam Trade Fair is being organized by the Venneging van Radiomateurs in Suriname. The station will be in operation from September 25 until October 8, signing the call PZ3AA. A special QSL card will be issued.

CONTESTS

The Interamerican Union of Radio Amateurs—IARU Region II will hold its annual contest, this year organized by the Radio Club Argentino, from 1300 GMT October 11, until 2350 GMT October 12. Participants should call "CQ Region II Contest" or "CQ Region II" on any hf band using any mode. Count one point for each station worked; each country worked counts as a multiplier. Cross-band contacts, and QSOs with stations outside of Region II (North and South America) do not count. Contacts between sta-

Headquarters staffer W1IKE (right) welcomes the Japan Amateur Radio League representatives to IARU/ARRL headquarters. From left are Mr. Yoshida (Interpreter), JA1BAU, JA1ETB, JA1AP, JA1BYJ, JH1IGM, and W1IKE.
December 31, to: Gustavo Reusens, OA4AV, Secretary of IARU Region II, P.O. Box 4079, Lima, Peru.

The Radio Sports Federation of the USSR will sponsor the USSR-50 competition from 0000 GMT October 15, to 2400 GMT November 15. To qualify for a certificate, amateurs need contact 50 different USSR stations; any of the hf bands and any modes can be used. European amateurs must additionally make at least one contact with each of the 15 USSR republics including 2 contacts with Moscow and 2 contacts with Leningrad; amateurs on other continents need contact at least 5 of the republics and complete 1 contact with each Moscow and Leningrad. U.S. and Canadian applicants for the USSR-50 award should submit a list of claimed contacts, showing dates, types of emission and bands to the Central Radio Club, P.O. Box 88, Moscow, USSR. The list should first be certified, for U.S./Canadian applicants, by an ARRL-affiliated radio club.

So You Want to Win An SS Contest
(Continued from page 68)
on your honor of course, to claim class B if you operated your transmitter over the 150-watt limit at any time during the contest. This means 150 watts d.c. input. There is no such thing as cheating a little. Either you are honest or you’re not; it is as simple as that! Any award that you might win by this method is as worthless as the paper it is written on. The same thing applies to those few who are disappointed that they didn’t achieve a “clean sweep” (all 75 sections) and they look up an apparently typical call in the Call Book and Squeeze it in somewhere. Remember if you are caught in such an act you will make the listings in QST. However this listing is at the end of the results. It is called the disqualification column. Also keep in mind that if you make that column it will be your last SS!

If you make it, a hearty congratulations! Of course, not everyone can win. The reason that awards are given is so that everybody will have some goal to strive for. Therefore if you didn’t make it this year, at least you know you gave it your best; and you did it on the proving ground for the country’s best operators, the ARRL Sweepstakes.

Summation
There are probably many items in the previous text that you might consider unnecessary or even ridiculous. This is only the author’s opinion. These methods and painstaking care in planning are adapted for use in DX contests as well; and these efforts have paid off in several contest awards each year.

It is my sincere hope that through this article I will stir up new interest and added competition and better operating techniques. Without good “stiff” competition your ability will remain stagnant.
OLDER AGE GROUP

In your discussion of youth among newcomers you seem to have overlooked the fact the number of new licensees in the 45-and-over age group has also risen substantially along with the very sharp rise in the very young age group. Indeed this rise in "senior citizen" licenses is consistent with the result that the median has changed very little.

This rise in participation of the older age group is no surprise to me. Independently, I have been amazed at the number of older amateurs on the air, both newly licensed and otherwise. Apparently an increasing number of people are turning to amateur radio in their retirement years. Probably a number of the allegedly "new licensees" are really not new but those who had let their licenses lapse many years ago and now, finding less pressure from developing a career or in raising a family, have obtained new licenses. I have had a number of former and potential amateurs of intermediate age express a wish to me that later when they expected to have more time that they would become active amateurs.

While certainly the ARRL should aim its major educational and promotional efforts to the younger age group, it should also launch secondary programs aimed at the senior group. An enlarged senior group could provide a valuable source of manpower with maturity, experience, and time to serve as officers and members of committees of the ARRL and local clubs. Also, your report has shown that many of the younger group are attracted by personal contacts, and an increased senior group might result in further increases in the younger group. — Yardley Beers, W9JF, Boulder, Colorado

AMATEUR Q

A point was brought out in August QST that seems to completely resolve the incentive licensing issue. William S. Grenfell, W4GF, Chief, Rules and Standards Branch, Amateur and Citizens Radio Division, FCC, quoting the Commission said "It is altogether clear that justification for the continued allocation to the amateur radio service of a substantial portion of the (radio frequency) spectrum in the face of important demands by other radio services can not be founded on anything other than a continuing movement of the amateur service toward the goals specified in Section 97.1 of the amateur rules."

To me, the above quotation leaves no doubt, no argument, no issue, no nothing! We must upgrade the amateur service or lose some of our frequencies. I urge all amateurs to read W4GF's very informative article, and ponder the many points he brought to our attention. — Al Jones, K4JZT, Rural Hall, North Carolina.

FM FREQUENCIES

There is a definite need for standardization of repeater input and output frequencies and simplex channels. Anyone who travels a bit can tell you how frustrating it is to arrive in a large city where you know there should be some fm activity, yet be unable to find the locally used frequencies. I have no suggestions to make on particular frequencies, after all, someone will have to buy some new crystals. I am only interested in the ARRL establishing standard frequencies, at least for future installations of repeaters. In areas where there are a number of repeaters, obviously they cannot all operate on the same frequency, but the fm people in these areas should not overlook the possibility of multiple input and output frequencies or connecting a number of repeaters together for simultaneous operation. The main idea of my suggestion is that no matter where a ham with an fm rig may find himself, he will know that there are some standard frequencies which are being monitored by the local bunch. — Glen Reid, Jr., K9HGB, Pasadena, Texas.

NOVEMBER 22 — ACT II

This is my farewell to ARRL. At 79 years I am no longer able to compete in incentive licensing.

I note the membership is dropping, and that fewer hams are showing interest in ham radio. I also note that the developing nations and others are hungry after the amateur frequencies — well, so be it!

Goodbye, ARRL! — E. W. Searle K6QQI, Santa Rose, California.

In response to your column, "It Seems to Us," appearing in the August issue of QST, I should like to submit the following: Accordingly and in all probability, phase II of the incentive licensing program will go into effect in approximately three months, and once again a large segment of our amateur operators will be affected by the changes.

While it is certainly recognized by many involved in our hobby that incentive licensing has increased the number of up-graded licenses, it has also dampened the spirits of many other long-ago licensed hams. I particularly speak in behalf of the many old timers. While I believe all amateurs desire the highest grade license available, some of these old timers, who are very knowledgeable and have contributed much to the advances and successes of electronics, just find it impossible to upgrade their skills. It is a well known fact that age, physical condition and emotional factors enter into and play a major role in attaining various degrees of achievement. Some old timers cannot pass an examination not because they lack the information required, but because the emotional pressure of nervousness, apprehension and lack of confidence become overriding influences. — V. L. Mandelstamm, W3ADS, Silver Spring, Maryland.

... Please let discussions on reserved spectrum space for higher licensees bear in mind that there is a gain for incentive in not having the reserved space very much used. It is a pleasure to go into that space when QRG is rough, and that is a good reason for up-grading one's license! — Michael D. Lyons, W9PG, Broomfield, Colorado.

My XYL, W1IQT, and myself wish to say we are against incentive licensing. We now both hold

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General licenses. Listen on the bands most anytime, and you will hear most Advanced and Extra Class amateurs in the General portion of the bands. I talk with hundreds of Extra Class and Advanced men and most of them agree with us. — Blodew W. Brezina, W2CCM, Grafton, New Hampshire.

I know the League feels somehow obliged to make a recommendation to the FCC and this will be touchy. My hope is that the FCC will go ahead as scheduled with the full incentive program . . . at least for a year faced with the loss of another 25 kHz. I think at least half of the active hams who are sitting it out will give upgrading a try. If after a year the number of Advanced and Adv Level hams has not shown significant growth, then perhaps the FCC could roll back the limits to their current specifications. — Edward Yadowski, W6DNZ, Buffalo, New York.

I strongly feel the new licensing laws are a wonderful thing for our hobby. They are having the desired effect and will continue to do so in the coming years. They are a convenient and unpopular position for you to take, but I feel you made a very wise decision and I thank you.

I also think it would be a terrible mistake not to continue the band subdivision this Fall. The final phase of the band splitting was planned, I feel, to add incentive for those who are seeking the higher grade licenses. To fail to give additional privileges to higher grade license holders as originally announced would tend to depress and discourage those of us who have obtained or are seeking extra band rights. — John Tietz, WA8SSL, Marion, Ohio.

I know that in the past you have mentioned some amateurs 13 or 14 years old and others 70 to 75 who have passed the Extra Class examination and to all those amateurs, my congratulations. However, this amateur has taken his last FCC examination of any kind, including the Amateur Extra Class. Your incentive licensing plan has caused this amateur to lose all interest in amateur radio as I have not had a QSO on the ham bands in over a year. — Walter Meyer, Essexville, Michigan.

It seems that amateur radio is being turned into a profession where the best technicians and the most skillful operators are utopically coddled at the expense of the average everyday John Q. Ham. I was always under the impression that amateur radio was a hobby which anybody could enjoy but now you are limiting its full enjoyment to the aforementioned people. Come November another 25 kHz will be taken from the Generals on 40 meters. This will leave a total of 60 kHz for the Generals. The resultant QRM will be of gigantic proportions. Anybody who would like to sample this can do so ahead of time by tuning through the 40-meter Novice cw band during early winter. Imagine how much worse it will be with the wider bandwidths of phone compared to the smaller cw bandwidth. — Bernard A. Postska, W8EDO, Rantoul, Illinois.

Let's face it, QM's, incentive licensing seems to be the only way to keep everyone from crowding into the lower 10 kHz of the cw and phone bands. Now instead of gripeing about lost privileges why not study a little bit and see how much more gratifying an Extra Class ticket can be than spouting off all that hot air about unfair rules and regulations. Dennis Wallace, WAGGLY, Corpus Christi, Texas.

I think most of the hams are like myself; ham radio is just a hobby which we all enjoy. I do not desire to become an expert at radio; I don't have the time nor do I care knowing much about it.

For my part you can forget incentive licensing all together. I'm from Missouri and you have to "show me" how taking away something I already have is doing me some good. - Dave Rust, W6GLK, Cabool, Missouri.

I think that it is the second 25 kHz that gives the real incentive. You can live without 25 kHz but 50 is another story. I think the number of Extra Class operators will increase greatly after November 1969. — Jan Williams, K2PLT, Buffalo, New York.

I have tried not to add to the din, but will respond to your invitation in August QST to comment on the incentive (or insensitive) licensing program. I think the whole thing is an ineffective and valueless piece of thinking. Twenty-five kHz have been squeezed out of the bands and those who have qualified themselves to use these "exclusive" segments are not doing so, but simply adding to the QRM in the General Class domain.

If the directors want to intelligently serve the hams let them explore ways to expand the bands — not contract them! Harvey J. Hanreddy, WB8EN, Walnut Creek, California.

W6ZH

I would like to tell you of the first time I met W6ZH, and of a story he told me at the time.

This was in the early 1960s, HHjr. was Undersecretary of State, and I was a civilian employee of the military. My boss, a Colonel, had an appointment with HHjr., and asked me to go along. We were admitted on schedule for our audience. The business dragged on past the time allotted, and other visitors were kept waiting; finally we concluded the official discussions. As we were rising from our chairs the Colonel mentioned that I was a ham. At this point our host resetailed himself and he and I talked while the Colonel just watched and listened.

When HHjr. discovered that 144 MHz was my favorite band, he told me of his station in California, which included 2-meter teletype facilities. Then he got to talking about hearing aids. He told me that while his father was in the White House and he was attending college, he used a home-made hearing aid assembled in a cigar box. The mike was a "single-button carbon" acquired at a drugstore just a block from the White House. — William L. Smith, WSGKP, Spencerville, Maryland.

BROAD RECEIVER?

Three years ago this month I retired and at the time I got away from strictly 75-meter phone and went to chasing DX as I did before the war. This time on phone. What a rude awakening! The very reason we pioneered ssb was to cut down the bandwidth required for communication and to listen to and examine some of these boys on 20-meter phone is a sickening thing. On many occasions I have talked to some of these boys with 6 and 8 kHz bandwidths and have been told that they have to make noise to be heard in pile-ups, etc. Many times they tell me it is my receiver. After 21 years of sidebanding, I can tell them better but it seems to do no good. Every time you hear them, they still are 6 to 8 kHz wide with their speech slippers and processors. — Dick Long, W8ASW, Hummelsdown, Pennsylvania.

October 1969
Odds and Ends

This is one of those months when an editor wonders what he should write about in particular—and nothing comes to mind except a few rambling thoughts.

An autumn launch of the Australis-Oscar 5 ten- and two-meter-beacon satellite is presently being scheduled by AmSat. An earlier launch had been pursued by Project Oscar, but unfortunately, a launch did not materialize on the West Coast. Operating details of the satellite were given in August QST, pages 69 through 72. While this package is not a repeater satellite, as were Oscars 3 and 4, many useful results may be achieved through observation of the signal characteristics and study of the telemetry data. Australis-Oscar 5 will also serve to introduce a whole new crop of v.h.f.s to amateur satellites. An article on tracking the satellite appears on page 54 of this issue; watch League Lines and W1AW for launch information.

FCC remains silent on the November 22 implementation of the remainder of the so-called incentive licensing act. Despite rumors to the contrary, there is no reason at this time to believe FCC will not go ahead with the act. Technician and General Class licensees will be moved above 50,250 leaving the lower 250 kHz of the six-meter band to the Extra and Advance Class. There is widespread disapproval of this action among six-meter operators, but FCC had not responded favorably to filings requesting a freeze on the present six-meter allocations.

Six-meter watchdog, Bob Cooper, also notes a FCC variance allowed the Utah State University College of Natural Resources. FCC directed its Chief Engineer to issue temporary experimental authorization for the college to use 50.0 to 50.7 for jackrabbit telemetering transmitters during the month of October. The school is doing a study on jackrabbits in a remote area of southwestern Utah and small six-meter transmitters will be attached to the animals. FCC noted the school’s project was well underway before learning the frequency range was allocated to the amateur service. Mr. Cooper queries, “How do you QSL a jackrabbit?”

We also note strong favor to allow Technicians c.w. use of 144.0 to 144.1, but mixed reaction to their use of a portion of the 10-meter band.

The Central States VHF Society held its annual conference in Boulder, Colorado the third weekend of August. Ninety-nine v.h.fers registered for the third annual session. A breakdown of the call area participants indicates the scope of this conference: W1 — one (W1HDQ), W2 — two, no W3s, W4 — one, W5 — eleven, W6 — nine, W7 — eleven, W8 — two, W9 — nine and forty W0s. There were no VEs or other DX present. Those who totaled those numbers didn’t get 99, the other 13 were portable types.

F.m. interest was in evidence at the conference, and a discussion of its merits was included in an after-dinner talk by QST Vhf Editor, W1HDQ. You will note later in this column a light treatment of the f.m. scene. This is because of little response thus far from the f.m. operators. F.m. news is beginning to trickle in, however, and we shall endeavor to give coverage to the field whenever information is made available.

Another area of discussion was the organization of DXpeditions to the more “rare states,” where there is little permanent v.h.f. activity. This is a controversial proposal in that it appears to favor stations within normal tropospheric range of the temporary station. Perhaps missionary work in the interest of permanent operation in these states is to be preferred, as in the case of W7ZC in Utah.

Next year’s conference will be returned to its state of origin, Oklahoma. We’ll have a pictorial report on this year’s conference next month, and I look forward to similar treatment of other v.h.f. meetings if the pictures are made available.

Each month I’m faced with the problem of lead material. I have attempted to present a well-balanced column aiming towards different interest segments of v.h.f. Those who have written monthly columns know the difficulties in...
OVS and Operating News

50-MHz. Es has ended for another summer. Generally speaking, conditions were good, but not quite as favorable as they were the past two or three years. Here's a rundown of conditions around the U.S. by call area. WAI9DX. Mass., caught many 7s opening, highlighted by a contact on the 8th with KSICLA/9 in North Dakota, VO1DV on the 9th, and XE1MPY on the 19th. WAI9F1L, also Mass., nailed W6ANN, K3GAV/KP4 and heard XE1PY in July. WA2BBS did well during July, working 7V7DZ, Wyoming; K7TLX, Utah; K5FQ, New Mexico; W7VIE; South Dakota; K3GAV/KP4 and H1SXS/DS! W2MPK found a Caribbean opening July 26, working KP4DEC, K3GAV/KP4 and H1SXS/D. WB2RBG caught the same opening, and CO2DI on the 21st. Howard also worked 7s on 4 days in July. WB2VFX worked Utah's K7TLX on July 4. WA3JDT noted several openings. No reports were received from the 4th and 5th call districts. In California, WA6WKF had a contact with W1HDDQ/7, Wyoming.

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April 6 and 10, SV1AB worked ZE7JX and ZS8B, crossband, 21 to 50 MHz. G3JVL and G3PLX have built a solid-state triple-frequency 5-watt beacon. The transmitter is on Gibraltar, beam north on 50,009, 70,311 (Europe’s 4-meter band) and 145,130. Mike says a group of South England vifers have asked their government for use of 60 MHz during non-television hours, but the result of their petition is uncertain. Mike also wonders if some North American could put a beacon on 50 MHz aimed towards Great Britain.

On June 24, G3JVL worked TF3EA, Iceland, on 4 meters, running 50 and 15 watts respectively to 4-element Yagis. This contact was on Es and Mike says Es this summer in Europe was poor, not as all comparable with the past two years. Thanks for your letter, Mike, we look forward to your next one.

Our printer gremlins have been at work, but let it be known that W6ABN has worked and confirmed 50 states on six meters, regardless of the missing asterisk in the April states worked box.

Swany, HD8XDS, left the Dominican Republic in late August. He has returned to Vancouver, British Columbia and his old call of VETFDL. Swany says he enjoyed much during 50-80 MHz DX from the Republic, and that he has answered all QSLs. I wish there was some way to encourage more operation on six from the Caribbean. Conditions there are excellent, but there is little interest on behalf of the islanders.

In Canada, VE2DFO mentions poor QSL returns from the United States, and even less return to request such an influx of schedules. VE2HW has a new 6-element Yagi perking on six, and worked into Nebraska in July, running 5 watts of s.s.b.

W6YKM says the West Coast 6-meter Scatter Net is looking for new blood. Stations from Seattle to Los Angeles participate, but Fred didn’t mention the days, times or frequency.

K7CW is writing off six meters for the remainder of this sunspot cycle maximum. Al says indications to him don’t look favorable for any K-layer farther north than 30 degrees latitude. He says his tip-off is the total lack of triple-hop Es this summer at his latitude of about 35 degrees north.

From Florida, 1 note multi-hop Es this summer three-to-one better than last summer, with numerous openings to the west coast, below 30 degrees, and still a good number to northern California, Oregon and Washington. Stations in New England also enjoyed good periods of multi-hop to the Far West. Al says he expects aurora conditions to greatly improve this fall in the northern latitudes.

144-MHz. DXers were well treated by the August Perseid meteor shower. Although the shower wasn’t as good this year as it can be, the peak on the 12th was sharp and produced several excellent bursts. By call area, here’s a look at the results.

Connecticut’s K1HTV climbed to 32 states from his new location. Rich worked K5MQS, on both c.w. and s.s.b., and W9NXF, Nebraska. W6FJI checked in with K6MQS, K41XC and K91MX/4, Alabama. Schedules with W5HFV and W5UGO, both Oklahoma, produced poor results. K1ABR, Rhode Island, worked K5MQS, W8RI, W89D0T and W9WY. W9WY was running 120 watts of s.s.b. and stacked 11-element Yagis. K1HTV’s neighbor, W8TVU, worked for new states, W9, VWY, W8RI, K91MX/4, and W6LFE, all on s.s.b. John monitored the i.m. broadcast band for meteor activity indication. He suggests this as a means to keep check on random meteor activity. K2RTH worked W9EMS, Nebraska, W5HFV and W5RCI. WA2CJL worked North Dakota’s K9-AWU. No 3a report contacts.

In South Carolina, K4CO1 moved to 36 worked by virtue of K1BBK, K9ENC, South Dakota, and W5LO, New Mexico, 1325 miles. Jack says new business activities may slow his v.h.f. activity for awhile. The Oklahoma Cowboy, W5ORH, worked K7VTM, Wyoming, and K5JYO and W2CUX on s.s.b. Jay remains secretive on his states totals, but I bet he is about to surprise the current leader. K5JYO reports, also the contact with W5ORH was a 45-second burst. And K6JVO worked W6UGO which, he reports, is Larry’s 44th state, but no word from Larry on this. Take note, Cowboy. Other Per- seid contacts by K6JVO include VE7BQH on s.s.b. and K7VTM, Wyoming. Now here’s a good one.

ZP9AY in Paraguay has been a popular fixture on 50 MHz, for years. His mostly homebrewed station is shown here as pictured on his QSL. (photo via KH6HC)
W6GDO worked KL7GMB, Alaska, on August 12. Need we point out that this is the first California to Alaska 144 contact? KL7GMB is W7DUL from Reno, Nevada and was vacationing near Ketchikan.

W9DOT had an August 4 m.s. contact with VE2DFO. W9YF worked VE2DFO, W1FJH and K1BBK. W9YF offers m.s. schedules to anyone, but doesn’t appreciate 70 per cent of those he asked for schedules ignoring his letters. Jack suggests a column listing of 2-meter frequencies and schedule candidates. Jack, with all the v.f.o. use nowadays, I doubt the list would be of much value — and I don’t know the answer to getting schedules other than the 75-meter net or a telephone call.

Just before moving to his new home near Delta, Iowa, (There’s an unheard of town, even to this Iowa native, which will soon become famous) K9-MQ5 called a Persied doc on 144.1 early the morning of August 12th. He then proceeded to work KA1TV, W4TV, K1ABC, and W4TVU in the next 90 minutes! Dick also identified replies from W2AZL, K3RTH and W1JTK. Not bad for an idle CQ on 2 meters. D8ck also worked W7UBL ideas, for his number 45 and top spot nationally on 2 meters, squeezing past W6BFR. That’s going some in four days! Dick says W7RQT is now active in Salt Lake City with a kw. and collinear.

From Canada, VE2BQN reports Persied contacts with W9DRL and K5WZL, VE7BQ worked K5-JYO and adds that W7EKI, Oregon worked W6-GHV. During a schedule between W7EKI and K9MQ5, VE7BQI logged a burst from K9MQ5, with complete calls, a 1520 mile path! For those who want to schedule W7EKI, write Larry Liljequist, Route 1, Box 792, Salem, Oregon 97304, or phone him at 503-363-3014. VE2DFO worked K9MQ5 and offers schedules. Don runs a kw. and 40-element collinear. Write Don Falle, 508 Chester Road, Beaurepaire, Quebec, Canada, phone 514-615-1939.

Another report on that mid July tropo session comes from WA2BCY. Ross worked Illinois, Wisconsin and Ohio with 20 watts. Other tropo reports were received from W1MX, W3RD, K4EQJ and W9MOX.

432-MHz was examined during the Persieds by W9DRL and K2UYH. They proved the experts wrong, there is usable m.s. at this frequency, and although they didn’t make a contact, their results are highly encouraging. W9DRL writes that they began schedules on August 10, 0900 to 1000 GMT. Both he and K2UYH heard weak pings and bursts, but nothing identifiable other than signal characteristics — Al says who else would be on 491.968 at 4 a.m.? On the 11th, little was heard, but at 0045 GMT on the 12th, W9DRL got an “11-second burst” from K2UYH consisting of complete calls! The signal was 20 to 25 db. above the noise. K2UYH heard pings and the “S2” report W9DRL was sending him. The 13th produced nothing. The path distance is 1142 miles. W9DRL runs a measured 300 watts output and a 44-element Titan Yagi array. K2UYH has 500 watts output and sixteen 6-element Yagis.

In the standings, we have three new call area leaders. K3EAV/1 in Rhode Island enters the box with 14 states and submitted the cards as proof. Bill runs 600 watts and a 64-element collinear. Competition is tough in the second call area. Jud, K2-CBA, is now atop the heap, with 17 states, by working W3UJG, Maryland. He is closely followed by K2ACQ who worked W9DRL and K3EAV/1. K2UYH has been bumped to third place, but probably not for long.

In Ohio, K5REG moved to 16 states during an August 20th tropo session by working Maryland’s W3UJG. Vince also worked W3NG, VE3DSEE and VE3BQN the same evening. K8CNN entered the box via mid July session. He has worked 12 states from hear Chicago. W9ANKT raised his standing to 12 also during the same period. He added K4EQJ, W3RUE and K2ACQ.

And a new Canadian leader emerged. VE3DKW worked the July opening to reach 12 states. A 940-mile contact with W9DRL was his best dx. VE3-DKW runs a 4CX250B cavity and 32-element collinear.

**Lightning Protection for V.H.F. Repeaters**

Many v.h.f. repeaters located on remote mountain tops have been subject to lightning coming in on the power lines. This will generally appear as a fat spike in the power supply, which can easily knock out some components. Commercial lightning arrestors installed at W9BNO, the Pueblo repeater, did not keep the station from being put off the air in the summer months by lightning coming in on the power lines. There has been no further trouble of this kind since the installation of two sixteen coil transformers back-to-back, as shown in Fig. 1.

Any matched pair of transformers with low-voltage secondaries can be used; just be sure that they are big enough to handle the repeater load. The earth grounds shown are separate ground rods, and should not be connected to the existing ground system. Robert D. Shriner, WAB7JSO, PO Box 109, Pueblo, Colorado 81009

**A FET Tone-Keyer**

Norm Fook, WA9HUV, has designed the first FET tone-keyer that has been brought to my attention. Such a device is useful to the DXer who runs c.w. schedules or calls numerous CQs. It rectifies the audio output from a pre-recorded tape and keys the transmitter, allowing automatic transmission.
The circuit, Fig. 2, is quite simple. The 1-μF. d.c. blocking condenser and the 88-mh. toroid step up the recorder audio output and provide d.c. isolation. The diode rectifies the tone signal, and drives the FET from cut-off to saturation. The 4-ma. drain current is enough to operate the relay. The 100-ohm bias control adjusts the zero-signal current drain. WA9HUV says careful adjustment will allow keying speeds of up to 30 w.p.m.

Norm powers the circuit with the 36-volt d.c. supply he uses for antennas, switching and safety inter-lock circuits on his 432-MHz. kw. The MFP-102 is rated at 25 volts source-drain voltage maximum so in Norm’s case the resistive dividing network is necessary, but a lower supply voltage or a zener diode could also be used.

Contest Handicapping

BY ALBERT KAHN, K4FW, *ex-W8DUS

Most competitive sports have handicaps to equalize the chances of the players. Golfers average their historical scores, sailors use a complicated formula based on boat dimensions to determine sailing time. Even professional football teams use draft selection to favor the weakest teams. Why not handicap amateur radio contesters?

Not power or antennas, for these seem to make little difference between contesters. The psychological factors are what really count. Balancing these by score multipliers would make an even contest and narrow the gap between high and low scores.

The state of mind transcends one’s physical well being. Contesting is a breeze if one can concentrate on the business at hand with joie de vivre rather than a feeling of guilt for neglecting family or job. If the bands are hot, the XYL and family happy, you have just had a pat on the back from the boss, your 100 watts and dipole will turn into 10kw. and rhombics. In sailing competition there is an old saying, “A happy boat is a winning boat.” This is also true in amateur radio.

The multipliers are well known by all contest men. As a starter I shall recommend that the following be considered by the contest committee:

1) The XYL yells through the din, “My folks just dropped in for a visit. You know they don’t understand amateur radio. You better come in with them.” Add 10%.
2) You are getting ready to leave the office for an early dinner before a DX contest. Your boss calls you in and regrets to tell you that you are fired. Add 15%.
3) Your daughter walks in just as you start to run a string and says, “Mother said you should drive me to play practice and pick me up at eleven.” Add 5%.
4) You decide to sleep late on Saturday morning and be fresh for SS contest. So you read until

3:00 a.m. At 7:30 a.m. you get a long-distance call from an insistent customer and you can’t go back to sleep. Add 5%.
5) Friendly visiting hams drop in “to see you operate.” Add 1% for each half hour.
6) As you start the contest a bearing falls out of your key paddle and evaporates. You half fix it. Add 2%.
7) “The furnace is out, “the car won’t start, “someone is calling about TVI again, “a man is at the door about the car payment.” Add 2% for each.
8) A couple of days before the big contest your XYL says sorrowfully, “Dear, I have some terrible news. I forgot all about the contest and accepted a dinner and bridge invitation at the Smiths. It is too late to refuse. You’ll just have to give up a few hours.” Add 20% or consider a new hobby such as collecting chihuahua dogs.

With these additions to contest rules, everyone will have an equal chance. With the way things have been working for me these days, 10 QSOs plus these proposed multipliers, I would be world high.

* Old Carvertown Road, Gallipolis, Tenn. 37738.
CONDUCTED BY ROD NEWKIRK, W9BRD

When:
What has amounted to scarcely more than an inconvenient lease becomes really incentive on the 22nd of next month when the Federal Communications Commission's Advanced/Extra frequency suballocations enlarge according to plan. If you're about set to hop down now for your exam you should be able to beat the deadline okay. If not, bandmarketers will need revision.
The DX gang seems to be taking our new regs in stride, long-haul interest and action booming as ever. No question, though, that the multiband hunt is much easier for A/E diggers and will become deliciously more so if you have your reserved-seat ticket already, credentials soon doubly desirable, congrats! Not yet? Then good luck on your next try.

What:
The readers speak! Time to cool our Bandwagon in the barn and刽 about what the world of DX pops up. QRM is a frantic burst, man, but there's comment comin' through the din. "W8FXX, my friend of 20 years, visited me in Bucharest." - Y0KRF. "Glad to be one of your info sources while at the Newark News Radio Club Bulletin." - L. Waite. "This is the first time I've written to any department of QST." - W5EQJ. "Now 115/77 — getting closer to DXCC!" - W4ZKA. "Pullese attempt to get K96HI's QSL came back postmarked by lunar landing ship "Hornet."" - DJ1GC. "Help! Missed 3V8NO's handle and address." - W8RFZ. "We'll try to enlist friendly cooperation to help keep 1825-1890 kHz, clear during DX periods." - W1BB. "The 'AC4' I worked couldn't even spell Lhasa." - W7ERB. "Phone-patch stations over here seem to me more 'commercial' than amateur." - K9SNL. "A Rivo Muni EA0 was a rather hot one for this poor DXer." - K9DFZ. "Will try to forward more DX data in the future." - W8QLE. "As you say, 15 c.w. really is a bucket of worms, short skip and DX." - W4QSOY. "I'd rather rag-chew on 10 c.w. but DX can be fun." - WB4LAL. "Line noise and home projects keep me almost QRT." - W7BE. "No 'donations' accepted for my KAI1 Jio operation." - K9AR. "Hope to be a regular reporter to your absorbing pages." - VE2DKJ. "I'm willing and able to be a QSL manager." - W6EKN. "Lots of 40-meter c.w. DX goodies here in the land of big snows." - W9MGH. "K9AKJ usually operates every Thursday around 14,200 kHz, at 1900 GMT." - WA9HIL. "No takers yet on my QSL managerial offer." - W8BBJ. "Overseas contest managers are reminded to give ARRL and QST at least two months advance announcements of forthcoming activities." - WI1YM. "Madras Amateur Radio Society colleague VU2A1 now works with W2AW in the USA." - VU2DMY. "W8XMC's XYL, Linda, being Joe with my State-side QSL chasers." - DL1RB. "I'll try to report monthly." - WAI1FH. "When KE4HY gets on from TJ I'll handle his QSLing." - K4ZCP. "Department of State's W4KIL is on special assignment covering all Africa north of the Congo." - W1KE. "Fe 2VZ, 5HN, 50a and 5Q8Q of 3V8AA fame sure made me feel welcome in France." - K9HIK. "Those post-war '40s were good old DX days." - PA4FLX. "V5G is XYL, visited c.w. friends around the States this summer." - WA3EHP. "Quite a chow to immediately answer all cards pouring through the ARRL Bureau but prompt reply is a ham's duty." - W8YGR. "After repeatedly missing YA2HWI on c.w. in 20-meter pile-ups he called on me!" - W8BF. "Back in DX big down Mississippi way after return from Vietnam." - W3JZJ. "Joined DXCC last week after seven years of hamming and a new Extra." - W9AQE. "Milano time is one hour ahead of GMT." - LIR. "Big DX signals botch up my Novica QSOs." - WN2IIO. "Columbus Day will see solemn ceremony in Genoa." - HR1C. "Use of illegal E9 callsigns in stations elsewhere is a threat to amateur radio in Iran." - EP2GB. "KV4GY recovered his health okay and tried a trip to V9SYY. - W8TK. "Should have W4AAV back on the air before lunch." - ex-DX1AAV. "KX0EQ/KC6 made about 150 contacts from Yap." - W2GRX. "Band analysis of favorite 20 rotate too slowly in "How's" but I can appreciate the space problem." - W5JPC. "Decided to erect a beam and finish off DXCC on my summer break from N. Y. U." - W3DDZ. "Back on from Connecticut as W1HM. - ex-KV4A. "W9TYC/9 used 1810 kHz, from last month's 100-meter Reunion at Joytist." - W9UCW. "Fifteen is still very open." - WN5YMV. "Signed F8WAII on 20 midband from May 23 to June 5, 1969." - PK4AH. "Twenty-two years, 200 countries, and still no QSL from Sarlinia." - W8BOY. "Hope something is soon done about the Thailand QSO ban." - HXIR. "Just finished my 5B-DXCC hundred for 28 Mfz." - WB4EPJ. "Grabbin' a few on 20 c.w. and 15 phone." - W8LQN. "Hurry to hand out what I have and report reports." - KD8HT. "Thought C5I1 was the figure of an overactive imagination until I checked QST." - W8BBZK. "Postal regulations tend to inhibit DXQSO in many countries and it could be legally confiscated." - W8SAW. "When I get my K/P3 call I'll put DXpeditions to neighboring countries on my QSLs." - KB4AJA/KP3. "Poor location, 150 watts and dipole good.
9M2KR rolls through on short or long paths with this effective DX layout at lph. Dr. He needs only a few more stations for ARRL's WAS diploma. (Photo via K6JXH)

enough for 152/146 countries worked/confirmed.

K9UAR... "Jacked-up prices of postage and Clubbship may make a try for 136 countries offer a good idea." - W8AW.

K1JWZ... "I'm W7AJB in Pikes Peak and the DX last hit the better band more." - ex-W8AEK.

K1JWZ... "Many inquiries from W2K/VE/VO concerning our new Cornish Award." - G2AYQ.

K1JWZ... "I'm W4JM in New York and the DX last hit the better band more." - ex-W8AEK.

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expanding Utah DX Association Bulletin tips and sources. 

-WB6ASA. 

-Remembering those who have served 60 years ago. 

-WB6QH. 

-Hope you found a little space for our little island's "big event." 

-V98BP. 

-"New job, new house and new harmonic all but eliminate ham radio." 

-W4BRE. 

-"It's going to be great." 

-MR1KU. 

-"The passing of many ham friends W4QKS and W6ZVE means we're getting on, QM." 

-W6BNE. 

-MR1KU. 

-"My 60th birthday license is No. 0001." 

-V6TIR/VBYL. 

-"Q57s as we leave the station are back to the same base exchange quickly." 

-"Life's too short to rate at 238 as often as you wish." 

-W2DU. 

-"First licensed in '37 as N3AHA." 

-ZL1AH. 

-"File-ups are terrible." 

-W4QVS. 

-"Most of my ham friends in Germany read and enjoy the QSL." 

-ex-DL2ZS. 

-"This one-time profile contributed by media consultant WA4CMZ." 

-"Close to 5B-DXCC now." 

-W4RRB. 

-"Particularly interested in your 160-meter notes." 

-W4QV. 

-"Without the help of success DX stations or would have to QRZ." 

-W3CQO. 

-"K156" and I have been corresponding for four years." 

-WIBP. 

-JN7GERS. 

Back on the DX road again next month, hoping along with many other hams to make DX but I do enjoy reading about it." 

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-"We seek addresses of all past DX stations. If you've ever been QRV from Afghanistan please write us giving full details," 

-W4QV. 

-Got to talk with some other activities today, that are not clearly visible to us. 

-"I'm receiving many QSLs for SP/mm calls," remarks EP2CB (W2Y2M), robbing the braun. 

-W4QV. 

-"Imagine this Ham who holds the 60th anniversary of his license, not only has a lot of mobile phone networks, but he has no mobile phone network operation, little QSOs have been made." 

-"While the convenience of self-addressed U.S.-stamped envelopes is generally more important than the number of QSOs, the stamps are lost if a QSL is not received," writes P. Krivoy. 

-"I, in the same way I receive cards, and the expense is out of our own pockets, not paid for by the military." 

-"Those recent QSOs were participating in a month-long Singapore anniversary commemoration, suffixes unchanged. Q9VE8, for example is 9VE8, according to DX News-Sheet. 

-Africa. 

-"I've taken up duties as QSL manager for 6EA2D/8EA2D," affirms W5RE. 

-"Also have a few cards at most logs for Ham's DX Album, 60 years of DX operation M. Teheran. Up to the limit of this supply I'll be glad to QSL any contact that can be verified." 

-"As for QSLs I've received, verifying 7G1CC's QSLs of April 20, 1967, is quite a task. It's not so hard if you have a complete DX log book; in fact, I have a QSL log which is a lot less confusing." 

-"Utah DX Association Bulletin tip," remarks W4QV. 

-W5VBE. 

-"It's a new thrill for me after seven years on v.h.f." 

-KS3YB. 

-"Best DX wishes to all our gang at K4QV, 5B-DXCC." 

-W4QV. 

-"I have been kept informed on all recent DXpedition activities but there were times when I was not sure what was happening next." 

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-"As W4QV says, "DX is a new thrill for me after seven years on v.h.f."" 

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-"As of April 5, 1969, I'm QSL manager for PA3QOR, notes W6BNE. 

-W5QV. 

-"W4VE likes Q5Q's QSLs for on and off station January 29, 1969. 

-H9ABJ's contacts with North America can be confirmed through W4QV. 

-QSLs for P112A/cm QSOs dating from July 9, 1969, are available from W6BNE. 

-KV1VA and W6QOW planned to mail all W6QQ/XX, PA4JQ/PA4Q and PA4/PA4Q QSLs at once and soon, says DA4QQ (WAPMK). 

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-"V5/B8" via W8Q8Y, others via 8L/D8T, instructs DL1RB. 

-"We've been waiting for more s.a.s.e. bu but I think we'll never get them." 

-YK1AA remains the only regular active amateur in Syria from ancient Damascus. Rashid, whose son holds the call Y1AKM, is especially active on 20 sideband frequencies at 0400-0800 GMT. There's a 1A-33 jr. spinning overhead. 

-Photo via W2BZ/WOW. 

-W5QV. 

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Europe — From 0000 on the 11th to 2400 the 12th of this month International Institute of Communications, Genoa, invites world-wide participation in its multimode 1969 Columbus Contest on 5 through 28 MHz, no formal exchange required. QSLs with stations of your choice. Send in own International Amateur Radio Union Region count one point each, (b) outside one's Region count two points, (c) in the EU 9A1 M1 and HV areas count five points, and (d) with special station 1812 count thirty points — one contest start per station and no intraday QSOs allowed. For final score multiply total QSO points by the number of DXCC countries worked. Log entries sent to Cristoforo Colombo Center, Istituto Internazionale delle Comunicazioni, Genoa, Italy, by January, 1970, may qualify for awards of merit. Then, too, East Germany's WA1DM DX do, a code-only stomp, comes off on the 18th-19th of this month as described in the previous "How's DX? ... Ex-YO0 280 3LM and 4AAC now reside in New York, EX-YO2BO says ex-YO4ALT lives in Montreal, YO4ALT 3PT3 RA3 and SB97 in western Europe, and ex-YO0GL in Israel. ... Research by WAIHFU reveals YL PARABOLIC, now that QL QSLs are the wave of the future, is spreading in 1969. VWYE is working his first W6/6 on s.s.b., and SP6WM is off to India and a possible VU2 call for two years. ... I'm ready for 80 meters with a quarter-wave vertical and HW-100, warns TF2W/LJ, awaiting official clearance for some-MHz SB-DXCC fun. ... Got most of my first 1700 QSOs, 110 countries and 47 states on 20 and 15 meters but I take occasional spins on 40 and 10. ... Accommodation for bona fide amateurs is in a guesthouse Les Iard di della Forest Hotel, Guernsey, C.I. ... National Amateur Radio Union of Greece, F.O. Box 144, Athens, sponsors various DX events in the months of December and January. W3EJQ and W2AYQ will fill your s.s.b. with details on Cornish Radio Amateur Club's new diploma for QSOs with Cornwall DXers. While W3QXU is still at this house, a scoop on Diploma Lieuria, a trophy based on 15 QSOs with specified IIs, and consult YS1RP concerning the half-dozen Romanian Amateur Radio Federation awards available for working sufficient YO5s. Still hungry? All right, PQ2, FZ0, Box 430, Warsaw 1, Poland, issues a fresh Polish DX bulletin for all 17 SP provinces. ... DL8PT/LX, with DJ7KH, DJ8K 1BN 10S 1DX, DL9 ERH 8K8 and WN9N aboard, had about a thousand QSOs from about 50 states during November. ... Asian — Remember there's a Lebanese DX happening on the 4th-12th of this month, and OARC's phone-cw, K8AI, is on the EP1B-1930 Info to inform you that "I have 10 through 40 meters available, and EP2BG is on 10 through 80. We're a c.w. type." Check out EP2s BI DA and IL are also active; although licensing prospects have dwindled since EP3SM's departure. ... W9KJIW reports AP2AR attending the University of Kentucky. AYD will be the last DXer for sale. It's still raining. ... K0XJH is told by V96AL that the HKARTS Firecracker Award will call for six V96C contacts, up from the present four, after 1969. ... Tokyo's Fighting DX Club sponsors a Transatlantic Award of possible interest to sheepskin hoarders. Check with JA1QCC. ... The 50th anniversary of formation of the Royal Corps of Signals occurs next year," observes KS8UD, "V86s and others consequently may mount a coup of DXpeditions in the near future." K9RRL (W4GRD) urges ill-looked-for group of stations out his way who congregate regularly on 14,340 kHz at 1100 GMT, "We welcome all comers and are most happy to talk to every checker." "Hopefully," as politicians like to put everything, Laccadives time approaches for VU2DK. ... H9REABOUTS — "DXCC-square." No 60 goes to VE3UR, by golly, the third for Canada. Right on Ray's flying heels comes K8RUD with the first, a photograph of QSLs confirming QSOs with ARLR DX Century Club members in 100 or more DXCC countries, the fourth from England. ... V50CM (K1BTD) bails from St. Louis, with 16 QSOs on 15, 20 and 40 c.w., and KA4GS and associates are whupping up a T19 Cocos thing for January or later. ... WA9VQX expects WA8VRG/ V8435Z to sail till his Coast Guard status expires in December. ... W4BP interrupted his popular African raving for Carolina resident in August at the Washington Aquarium. ... A new world and the passing of the beloved XYL of Mr. 160, W1BB. "Alice was always rootin' for top band," remembers Steve ... NJDX's W5CJA has raised from New Jersey's Warren county from 1960 the GMT 18th to 2000 the 19th of this month on 10 through 80 meters, c.w. and voice. Tune 55 kHz, inside each band's low edge. ... Grips of the Month are piling up: W6NBG is inked by KST 599 reports coupled with QRM 80 PSE RPT. WN4YJB is just as nettled by repetitious transmission of mailing addresses on Novice frequencies. W4LUJ nominates KKK/4. ... Last of the Month, those ears whose overly long calls are smashed to zero beat with DX targets. K5DHT protests use of 1820-1830 kHz, 160's only good for grid work for easterners. Illegible Stateside rag-chewing. K3AC could get along without some self-styled DXpedition frequency-guard stations who illegally omit identification while specifying earnest instructions and general misinformation during pile-ups. ... OX5BG's TR-4 will workable on 15 and 20 at least until February. ... WAIHFU says HK1ZU hunts s.w. QSOs with Rotary Clubbers. ... PY7A AWB and AWD represent Fernando de Noronha on 40 and 80, side-band and c.w. ... K9XH is due for the Revilla Gijonos any old time now. ... Don't forget this month's VK/2L!/Oceanic go on the 4th-5th (phone) and 11th-12th (cw), always a worthy test of anyone's beams and antennas.

Feedback
The transistors in the exciter section of the QRP 80-40 Transmitter, Q1 and Q2, June 1969 QST, page 11, are mislabeled. They should be 2N4124a.

Stolen Equipment
Break Away!

Are you bored? Has operating lost its zing? Has the fun gone out of turning on the equipment, and the pleasure worn thin? Do you think of it as the same old voices with the same old habits? Are you ready to scream if you hear them just one more time? No, it isn’t that well known case of “The Blahs” you’ve just picked up a plain old-fashioned dose of too much of the same thing — the amateur doldrums, and it is time for a change. It’s time to try something different and climb out of the rut you have made for yourself, and the cure is as simple as moving the dials on your gear.

Amateur radio is as varied as a smorgasbord with the only drawback being our inability to taste everything that is spread out for us. So, if we tire of one phase, there are many more just waiting for us to sample. What is more appealing is the fact that we can adapt the techniques we have acquired in one activity to some other that pleases our fancy.

The contest addict, who finds time dragging between hassles, can find plenty of challenge in the search for the tremendous number of certificates that are available. A form of operating that requires the same patience, and knowledge of when the various bands are open to acquire multi-colored wall paper so many of us exhibit in our shack.

The traffic operator who tires of the rigidity of net participation could apply the skill of being able to dig deep through conditions that cause the best of us to give up in disgust and chase those weak elusive signals to log rare DX prefixes instead of counting the words in a message.

The people who are bored with round-tables, and wish there were something just a little more exciting than the regular chat with the same people who always seem to say the same things, but hate to slip away from that type of operating, might find a change in the local AREC net where the drill becomes a round table at the words “net is finished,” yet could turn back into a serious operation involving a community disaster while they were still casually talking.

No one who has gone after DX ever feels it cloys or is dull, but when the pile ups get disgusting, and the total of countries worked has risen to the point where the list of possibilities will soon be completed, the switch to traffic could be an easy one. It requires the same stubborn sticktoitiveness, the same demand for accuracy as the hunt through everything that the ionosphere can devise to log Lower Slobbovia.

The change of pace into something different can apply not only to our type of activity, but we might even make a full break by changing the mode. The phone operator has often learned, thanks to laryngitis, that c.w. not only can be fun, but has a special flavor all its own, and that there is as much personality in our sending style as in our voices. We find that just because we are seemingly “permanent” calls on the BPL lists, thanks to our NTS activities, there is a whole new experience in handling traffic by voice. People who love traffic but prefer voice operation, yet want something different, would find that they are badly wanted, and needed to handle the wonderfully rewarding work of the MARS phone patches between servicemen and their families.

None of us ever gets to the point where we really believe we are in “Dulcsville” because we do have that ability to break away if we want to. But just when we think we’ve had it with our chosen form of operating and decide...
to change the traffic load suddenly gets terrific, new rules appear for contests, and certificates blossom from unexpected places, or, the telephone rings and a friend says "Get on ten, it's wide open and the DX is rolling in"! And there it is waiting for us with all the old appeal of new worlds to conquer.

**30th YLRL Anniversary Party**

<table>
<thead>
<tr>
<th>Cw</th>
<th>Start</th>
<th>October 15, 1969</th>
<th>1800 GMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>End</td>
<td></td>
<td>October 16, 1969</td>
<td>1800 GMT</td>
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<table>
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<tr>
<th>Phone</th>
<th>Start</th>
<th>November 5, 1969</th>
<th>1800 GMT</th>
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</thead>
<tbody>
<tr>
<td>End</td>
<td></td>
<td>November 6, 1969</td>
<td>1800 GMT</td>
</tr>
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</table>

**Eligibility:** All licensed women operators throughout the world are invited to participate. YLRL members only are eligible for the cup awards. Non-members will receive certificates. Only YLRL members are eligible for the Corcoran Award. Contacts with OM will not be counted. Contacts on nets do not count.

**Procedure:** Call "CQ YL".

**Operation:** All bands may be used. Cross band operation is not permitted. Only one contact with each station will be counted in each contest.

**Exchange:** Station worked, QSO number, RS or RST, ARRL Section or Country. Entries in logs should show time date, band, transmitter and power.

**Logs must be signed.**

**Scoring:** A. Cw and Phone sections will be scored as separate contests. Submit separate logs for each contest.

B. All YLs within an ARRL Section score one (1) point for each QSO with another station located within an ARRL Section. Score two (2) points for each contact with a station located within an ARRL Section (DX). Definition of DX all stations not located within an ARRL Section. DX YLs shall score two (2) points for each contact with a station located within an ARRL Section. (Note: ARRL Section lists are available from the YLRL Vice President, or on page 6 of QST.) Multiply number of contacts by total number of different ARRL Sections and/or Countries worked.

C. Contestants running 150 watts de input at all times may multiply the results of (B) by 1.25 (low power multiplier).

D. Contestants running 300 watts pep or less at all times may use the low power multiplier (results of B by 1.25.)

**Awards:**

- Highest cw score
- Highest Phone score
- Gold Cup (YLRL member only)
- Highest score Phone
- Gold Cup (YLRL member only)
- Highest cw and highest Phone logs from each YLRL District, and Country will receive a certificate.
- Corcoran Award: Highest combined cw, and Phone score (YLRL member only.)
- DX Only: Highest combined cw and Phone scores from North and Central America, including the Greater and Lesser Antilles, will receive an Award from Arlie Hager, W1HLL. Highest combined score from any other part of the world will also receive this award.

**Logs:** Copies of all logs showing claimed score and signed by the operator, must be postmarked not later than November 19, 1969, and received by the Contest Chairman, no later than December 6, 1969. Mail logs to: Ebba Kristjansson, VE5DZ, Box 71, Colonoy, Saskatchewan, Canada.

**Floridora Net**

A new Floridora net now meets on Wednesdays at 8:00 PM EDST, on 7620 KHz. KA1UZ is the net manager, and all YLs are invited to check in with this new group, as well as with the one on Tuesday mornings at 9:00 AM EDST, on 3933 KHz.

**TASYL — The Motor Maids of Radio**

Almost anyone can say to friends "Let's start a club," but those words spoken on and off the air among Michigan YLs meant: we speak the same "language," we know each other from constant contact although most of us have never met, so we really want to organize a group that represents the women amateur radio operators in our state. The words became reality in December 1965 when WASENW, K8VCB, W2ST, WASARJ, W8LYL, WASUXE, KSIAI, and WASLML met at the home of KSZJU, to discuss the qualifications, by-laws, dues, and other things that are so necessary to an effective organization. They wanted an appropriate name that would identify this 100 percent YL club, and finally settled on The Auto State Young Ladies, because, despite the many things for which Michigan is famous, the name connotes automobiles to everyone.

Membership is open to all YLs living within the state who are licensed Amateur Radio Operators. Because of the wide area that it covers, the TASYLS are an on-the-air club, however, the personal touch is maintained by scheduling get-togethers at all conventions and picnics. At present 32 women belong to TASYL, and all Michigan YLs are welcome to join.

Tasyl is affiliated with YLRL, and sponsors an adoptee under the YLRL "Adopted YL" program. The TASYL certificate is available upon receipt of log information of communication with members of the club. The full rules are available from the Certificate custodian, Betty House, K8VCB.

**Alaska Lassies Certificate**

For those who are interested in acquiring the Alaska Lassies Certificate, the address of the custodian has been changed. The new address is: Rose Kybacsek, KL7FQ3, 444 Mile Badger Road, Fairbanks, Alaska, 99701.
Alice McCullough, K7RQZ

She learned the code while still in high school, and then she promptly forgot it. The years brought marriage, a family, and then came Civil Defense, and another bout with the code that resulted in an amateur radio license in 1956, and Advanced Class in 1968.

For a year Alice was almost pure CW, and then she got into CD, MARS, and Traffic fone nets, and there she has stayed. She seems to always be involved in some public service activity such as forest fires, traffic accidents, traffic pile ups in the mountains, lost mountain climbers, and similar incidents that need communications. As one of the few YLs in Oregon Army MARS, she spends about 13 hours a week in that service. Her preoccupation with the public service end of amateur radio has resulted not only in her regular appearance on the BPL list, but she holds the distinction of having handled more traffic than any other YL in Oregon. In addition to BPL, CP-20, and PAM for Oregon, Alice is originator of the Beaver State Net that proved its effectiveness during the severe snow storm in January of this year. She holds ARRL Public Service Awards, as well as those from the Oregon State Police, Forest Service, and commendations for her work from State and County CD directors.

When not on the air, Alice is equally busy with her family of five children ranging in age from 4 to 19.

Feedback

VE6DZ, YLRL Vice president, advises that UA3KBO should have been listed among the YL Phone scores with a total of 11,232 points in the 1969 YL—OM Contest.

Changes of Address

Please advise us direct of any change of address. As our address labels are prepared in advance, please allow six weeks notice. When notifying, please give old as well as new address and Zip codes. Your promptness will help you, the postal service and us. Thanks.

October 1944

... The status of the radio amateur after the war is discussed by K. B. Warner editorially. In spite of distressing rumors being circulated, he is firmly convinced that we shall resume operations in due time and with ample allocations. Not many amateurs have had the time or knowledge to overhaul their pre-war rigs with a view to stabilizing the signal, eliminating key clicks, harmonics and other faults. But with some open sky showing ahead, he thinks it is high time we took a real hard look at our rigs. A few remarks are addressed to holders of WERS permits. Many of these who are not licensed amateurs would like to become same and Warner urges them to get busy, learn to operate the code and prepare for the written examination.

... Walter E. Bradley, W1FWH, describes an advanced and versatile design for a two-tube regenerative receiver. It uses small plug-in coils to cover from 350 to down through the amateur bands. It uses a 6J7GP for the detector and a 6V6GT as pentode audio amplifier.

... The American Standards Association has a new set of schematic symbols and they are published in this issue.

... The FCC's Radio Intelligence Division in action is described by Oliver Read, W85CT. Here all unidentified signals are monitored. Fixes by direction finders locate the station. — W1ANA

October 1919

... At the very last minute before mailing, the official announcement from Washington arrived. "Ban Off" was the caption of the little pink sheet enclosed with the mailed copies. It took a good deal of doing to get Secretary Daniels to lift the restrictions on amateur operation. The Canadians had been operating for months. In fact, a committee from ARRL got a resolution into Congress requesting Secretary Daniels to lift the ban. Nothing happened until the Hon. William S. Greene got a joint resolution through Congress directing the Secretary to remove the restrictions. There then followed, as we know, the tremendous boom in all sorts of activity—broadcasting, etc.

... The new Connecticut vacuum tube, the invention of H. P. Donie, is described. The tube is plated on the outside of the glass envelope—the current passes through the hot glass by ionic conduction. The tube thus avoided some bothersome patents. (The tube did not enjoy great popularity.)

... No articles on tube transmitters yet. Everything is still spark. There are some articles on spark transmitters. Tordarson not only supplements its line of transformers but advertises components, rotary gap, plate condensers, etc. The condensers are glass plate with sheet bakelite as dielectric! The Amrad quenched gap makes its appearance. Price $17.50. — W1ANA
Identification. Some of us amateurs give the regulations regarding identification a pretty severe beating. This has been the subject of discourse before, but it seems to bear repeating, because recently it has come to our attention that at least two amateurs have been cited for not identifying the station with whom they were in contact. Oh yes, they identified themselves all right, but there was more required than this. You have to identify the other guy, too, before you stand by for him.

Perhaps many of you had the impression that this requirement had been rescinded. Not so. What was rescinded was the requirement of having to send the call of the station being contacted at the beginning of the transmission. Most of us send this call anyway, otherwise how in hades would the guy know we were calling him, but the principal purpose of this was to legalize "tail ending" in working DX.

Many others had the impression that the FCC monitors pay no attention to this rule. Maybe they don't, most of the time — but don't assume that this makes you immune. No sooner do you get that comfortable feeling that what you are doing (or not doing) may not be technically legal but nobody pays any attention to it, and — bang! In comes that "pink" ticket.

What, specifically, do the regs say? Well, as a licensed amateur you're supposed to know that. Ignorance of the regs is no excuse for violating them, and they are printed in full in every copy of the ARRL License Manual. Nevertheless, here is the pertinent regulation:

"97.87(a) An amateur station shall be identified by the transmission of its call signs at the beginning and end of each single transmission or exchange of transmissions and at intervals not to exceed ten minutes during any single transmission or exchange of transmissions of more than ten minutes duration. Additionally, at the end of an exchange of telegraphy or telephony transmissions between amateur stations, the call sign of the generally accepted network identifier shall be given for the station, or for at least one of the group of stations, with which communication was established."

So, you can start your transmission with only your own call (e.g. "This is W1NJM," or DE W1NJM), but in ending it you must identify whom you are in contact with (e.g. "W3NF from W1NJM" or W3NF DE W1NJM). Whether this makes any sense or not, you better believe it's the rule. See page 90 for further samples of FCC approved identification procedures.

We believe that nine out of ten amateurs violate this rule in contests. Better make that 99 out of a hundred. Those engaged in network operation also violate it consistently. Most of

<table>
<thead>
<tr>
<th>October</th>
<th>November</th>
<th>December</th>
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<tbody>
<tr>
<td>1 Qualifying Run, W6OWP</td>
<td>1-2 Massachusetts QSO Party (rules same as p. 122 Sept. 1968, logs due Dec. 1, 1969)</td>
<td>3 Qualifying Run, W6OWP</td>
</tr>
<tr>
<td>4-5 VK/ZL phone, p. 93 Sept.</td>
<td>1-3 Delaware QSO Party, p. 119 Zero District QSO Party, p. 132</td>
<td>16 Qualifying Run, W1AW</td>
</tr>
<tr>
<td>4-6 RTTY Medallion SS, p. 54 Sept. California QSO Party, p. 126 Sept.</td>
<td>5-6 YL/AP phone, p. 111</td>
<td>Jan. 10-11 VIIF SS</td>
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<td>* League Officials and Appointees, only.</td>
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NOTE: Possible W6OWP Qualifying Run "alternate" (same times/frequencies) is W62RJ.
the time, you get away with it. If you get tagged, however, all we can do is "punch your card."

SCM Lifers. Approximately 800 ARRL members have signed up for life — that is, either plunked down their $130 for life membership or signed up for quarterly payments toward that end. This is approximately 1% of the full membership. Nothing so outstanding about this, although we hope and expect this percentage will keep going up as more and more dedicated amateur radio operators realize the value and investment it is. What we want to brag about is the percentage of our elected CD officials who are "lifers." There are nine of them, out of 74, a percentage of 12.2. Of the nine, four are Charter Life Members: W2ZI (S.N.), W8PN (III), K2SNF (E.N.Y.), and W4BY (Mo.). The others are W6BUQ (Ind.), W7JW (Wash.), K6BZ (Hawaii), W4KPD (S.C.), and W7CAF (Ariz.).

Nice to know that so many of those elected to high office have made sure that their ARRL membership won't expire until they do!

Staff Note. We don't believe we've previously mentioned that Bob Hill, W1ARR, is no longer on the CD staff. Bob departed in July, and we're going to miss those spickily contest writeups of his.

Meanwhile, Al Noone, WB6SAZ, who left us in February, returned in May (he just couldn't stand being away) and resumed his old job under W1CW in DXCC — and also acquired a new call, WA1KQW. With W1ARR's departure, Al is being given a crack at the contest job and a chance at assistant communications manager status.

This again leaves a vacancy as assistant DXCC. Anyone interested? Young, some amateurs preferred. — W1NJM.

ELECTION NOTICE

To all ARRL members in the Sections listed below:

You are hereby notified that an election for Section Communications Managers is about to be held, in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must meet the following requirements prior to deadline date listed below: (1) Holder of amateur Conditional Class license or higher. (2) A licensed amateur for at least two years immediately prior to nomination, (3) An ARRL full member for at least two years immediately prior to nomination. Petitions must be received on or before 4:30 p.m. on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set aside to the dates given herewith. The complete name, address, zip code and station call sign of the candidate and signers should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for addition, a petition may be found invalid by reason of expired memberships, individual signatures uncertain or ignorant of their memberships status, etc.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots from Headquarters to full members will be sent in alphabetical sequence names of all eligible candidates.

The following nominating form is suggested. (Signers should be sure to give city, street address and zip code.)

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for July Traffic:

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<tr>
<th>Call</th>
<th>Orig.</th>
<th>Recd.</th>
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Late Reports:

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Elections will be conducted in all Sections except where the ARRL Communications Manager is also the Section Manager. The ARRL Communications Manager for each Section will be the judge of the election.

Communications Manager, ARRL.

225 Main St., Newington, Conn. 06111
We, the undersigned full members of the

ARRL Section of the

Division, hereby nominate, as candidate for Section Communications Manager for this Section for the next two-year-term of office.

You are urged to take the initiative and file nominating petitions immediately.

— George Hart, W1NJM, Communications Manager.
ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

West Indies
José Medina-Hernández, KP4CO
May 1, 1969

Oregon
Dale T. Justice, K7WWR
July 1, 1969

San Diego
Richard E. Leifer, WA6CBOE
July 1, 1969

W. Mass.
Percy C. Noble, W1BVR
Aug. 11, 1969

Kansas
Robert M. Summar, K8KXP
Aug. 15, 1969

Delaware
John L. Penrod, K3NYG Oct. 10, 1969

Rhode Island
John E. Johnson, K1AAV Oct. 13, 1969

In the Western Section of the Roanoke Division Mr. Donald B. Morris, W5JM, and Mr. David L. Mayes, K8MYU, were nominated. Mr. Morris received 114 votes and Mr. Mayes received 123 votes. Mr. Morris' term of office began Sept. 18, 1969.

JULY CD PARTIES

The following are high claimed scores; they read, from left to right: appointee, total score, number of QSOs, number of sections, number of hours of operation. Final trusted scores will appear in the October CD Bulletin. — WAIKQM

C.W.
K2KDR 247,516-702-54-15 WAIKQM 173,555-651-53-20
W2KAF 335,860-737-56-20 WAIKQI 173,440-835-54-20
K8HKM 218,745-643-57-19 WAIKAR 146,210-437-56-18
K3HHK (K3HT, opt.) 215,803-695-65-20 WAIKTR 145,520-683-58-18
W8DIH 200,865-695-56-20 WAIKOF 141,090-695-68-18
W9AFI 200,650-643-48-17 W9PYI (W9YQ) 140,490-343-65-15
W8GKK 182,810-615-65-17 W6ZFN 138,580-651-68-11
W8WUM 178,570-577-62-13 W8MME 138,230-400-61-9

DX CENTURY CLUB AWARDS

From July 1, 1969 through July 31, 1969, DXCC certificates based on contacts with 100- or more countries have been issued by ARRL Headquarters to the amateurs listed below.

New Members

W7LEA...234 WB4KZG...129 HB9DI...108 J4AFM...104 W3BZQ...102 K8LTH...100
O8CBQ...221 KSCUN...118 W3BQ...104 W4AO...102 K8KXI...100
S5FAJ...202 K8RKL...114 V66AV...107 J4PAA...104 W3AJE...102 K8DKM...100
K7STW...161 W6JHQ...114 W3RR...106 J86K...111 W3KAK...102 SC33K...100
UG5GB...144 W5VQ...110 W3WJF...116 J46G...106 W4KFL...102 KD9GR...100
G88RC...134 J4FPA...110 W6GJF...110 J4TJ...106 W4FQW...102 KD5L...100
K6QW...127 JA6F...119 W6WX...105 KG3B...102 KD5L...100
ARI...172 W81AX...110 WS9...108 KS6LD...102 KD5M...100
HE8J...134 W6HRX...109 E8FJ...104 UP2SIC...100

Radio telephone

W4EGT...281 OH2AD...203 DL7EX...119 DL7CD...108 W5AQF...104 K66A...101
HV6...266 K8CMI...196 W6HJZ...114 W5FPH...102 K8X9U...101
W2KDR...244 VB90...109 W6RQ...106 W5TQ8...102 K8DC...101
W6BJS...253 W5JHA...113 W5H6M...110 W6CFA...106 K8XJ...101

Endorsements

Endorsements issued for confirmations credited from July 1, 1969 through July 31, 1969 are listed below. Endorsements listings from the 120 through the 240 level are divided into increments of 20, from 240 through 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

335
W8AND WIBFY W6RJL W66BD
310
YV6BZ K6A6R W61WZ W6CAB
280
JASADQ V66AU W6B3 W6CAB
250
W61WZ W61WZ W61WZ W61WZ
235
K66K W6C6Y K8KX K66X
220
W61WZ W61WZ W61WZ W61WZ
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W61WZ W61WZ W61WZ W61WZ
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Radio telephones

W6BRAU 480 VO1BD W8SUL W8VHY
270
W8A8Q 480 W6B3 W68D W68DC
250
W8GDR 480 W6BRC W6B6J W6B6J
200
W6VHA 480 W6B3 W6B3 W6B3
180
W6BRAU 480 W6B3 W6B3 W6B3
140
W6A8Q 480 W6B3 W6B3 W6B3
120
W6BRAU 480 W6B3 W6B3 W6B3
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W6BRAU 480 W6B3 W6B3 W6B3

October 1969

115
ARRL CODE PROFICIENCY PROGRAM

Qualifying Runs

Any person can apply for an ARRL code proficiency award. No amateur license membership on an amateur license is required. 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 six speeds transmitted (10-35 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. Each month the ARRL Activities Calendar notes the qualifying run dates for WA1W, and W6OWP (W6MDJ, alternate) for the coming 3-month period.

WIAW will transmit a qualifying run on all listed c.w. frequencies at 0130 GMT October 17. (In converting, 0130 GMT October 17 becomes 2130 EST October 16.)

W6OWP (W6MDJ, alternate) will transmit a qualifying run on 3500 and 7129 kHz. 0400 GMT October. (In converting, 0400 GMT October 1 becomes 2100 PDT September 30.)

Code Practice

WIAW transmits daily code practice according to the following schedule. For practice purposes, the order of words in each line may be reversed during the 15-15 w.p.m. transmissions. (Each type carries a checking reference.)

<table>
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<tr>
<th>Speeds</th>
<th>Local times/days</th>
<th>GMT times/days</th>
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<tbody>
<tr>
<td>10, 15, 15</td>
<td>7:30 P.M. EDST daily</td>
<td>2300 daily</td>
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<tr>
<td>5, 7 1/2, 10</td>
<td>9:30 A.M. EDST (Sat)</td>
<td>0130 MWSF/8</td>
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<tr>
<td>15, 20, 25</td>
<td>6:30 P.M. EDST (Sat)</td>
<td>1200 MWF</td>
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<td>20, 15</td>
<td>9:30 P.M. EDST</td>
<td>0130 TThSat</td>
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<tr>
<td>35, 20, 25</td>
<td>6:30 P.M. EDST</td>
<td>1300 TTh</td>
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The 0230 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending in step with WIAW (but not over the air), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and text to be sent in the 0250 GMT practice on the following dates:

- Date Subject of practice text from August QST Oct. 13: It Seems to Us, p. 9
- Oct. 16: Fit 'Em: The Station Receiver, p. 17
- Oct. 21: Building A Home Rig, p. 37
- Oct. 23: Amateur Radio Public Service, p. 60

Date Subject of practice text from Understanding Amateur Radio Nov. 5: Odd Harmonics, p. 112
- Nov. 7: Using the Transm. p. 113

WIAW FALL-WINTER SCHEDULE, EFFECTIVE OCT. 26

(The WIAW Spring-Summer schedule, through Oct. 25, appears in Sept. QST.)

The ARRL Maxim Memorial Station welcomes visitors. Operating—visiting hours are Monday through Friday 3 P.M. to 3 A.M. EST, Saturday 7 P.M. to 3 A.M. EST and Sunday 3 P.M. to 10:30 P.M. EST. The station address is 225 Main St., Newington, Conn. About 7 miles south of the LHS of Hartford. A detailed local street detail will be sent upon request. If you wish to operate, you must have your operating license or your on-air operator's license with you.

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1 CW OWS (bulletins, 18 w.p.m.) and the code practice on 1,805, 3,595, 7,029, 14,032, 21,024, 28,026, 50,020, and 145.6 MHz.
2 Phone OWS (bulletins, 1,82, 3,82, 7,28, 14,22, 21,27, 28,52, 50,12, and 145.6 MHz.
3 RTTY OWS (bulletins, 3,825, 7,095, 14,095, 21,095, and 29,015 MHz.
4 Starting time approximate. Operating period follows conclusion of bulletin or code practice.
5 Operating schedule will be on one of the following frequencies: 21,024, 21,27, 21,41, 28,026 or 28,52 MHz.
6 WIAW will have dyseptics for Novice cw operators, on the band indicated, transmitting on the frequency shown.
7 Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.

Maintenance Staff; Ws QIS WPR, KG6050. * Times—days in GMT. Operating frequencies are approximate.
Two rugged Eimac 3-500Z high-mu triodes are featured in Henry Radio's new 2K-3 linear amplifier. Henry designed the amplifier around versatile Eimac power tubes because these popular triodes are ideal for grounded-grid operation at the 2 kW PEP SSB input level, and at the 1 kW DC input level for CW, AM and RTTY. Users of this new Henry rig will enjoy a conservative plate dissipation rating of 1000 watts for year-in, year-out reliability under key-down service. Henry's choice should be your choice. For more information on the 3-500Z and on Eimac's line of power tubes for advanced transmitters, write Eimac Amateur Services Department or contact your nearest Varian/Eimac distributor.
In the power tetrode field we're defining the state of the art by demonstrating intermodulation distortion better than any other known tubes. In 1966 we introduced the 4CX1500B, a 1.5 kW tetrode with the highest linearity then known: better than —40 dB 3rd order IM distortion. Since then we produced the 4CX800J, a 600 watt tube with —45 dB 3rd order IM products—without feedback—and later a 5 kW tetrode with the same figure. Now the latest tetrode in our program, a 15 kW tube, exhibits —40 dB 3rd order IM products. We can show IM distortion improvements from 10 to 20 dB in a practical quiescent plate current range.

Other tetrodes now under development will deliver up to 40 kW with linearity as high as —45 dB IMD, according to preliminary data. Such performance advances are part of a long range program employing computer-assisted design studies to optimize internal tube geometry—all part of our plan to insure you get state of the art products every time you buy from Elmac.

Contact your nearest Varian/Elmac distributor or ask Information Operator for Varian Electron Tube and Device Group.
ATLANTIC DIVISION

DELWA—SCM, John L. Penrod, K3NYG—SEC/PAM; W8DKX, RM; W3EEM. Renewals: K3KAJ as OBS, WB2JDF as O, K3HVE as Q, K3LNO as W9WS, K3W3D as OVS, W3RZD as OS, K3SRG as OS. K3GRF is a very busy OS, having sent some 250 notices the first six months of the year. He has moved into the E-J section. We welcome our 2nd-meter NCS back on the air. Bill had a slight stroke which disabled him for a short time in late June, but he will be back on the air this fall. The emergency power plant came in handy recently. K3NYG watched the moon landing strictly on emergency power. He is going to bring W3REM out of retirement so that he may keep the juice on. It's the season for club activities. Have you attended a club meeting recently? Delaware has a bunch of bulletins. EPN reports QN1 23, QTC 6. DTMN reports QN1 19. Traffic: W6GDK, WA3GMS 17, WSTRC 9, WA3DUM 8, W3DSQ 9, W3FQK 8.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr, W3K-SEK—SEC/PAM; WS1GC, RMs; K2EML, K3HW, W3MPX, K3LQG, W4SGLI, K3MYS, V.H.F.; PAM; W3PFG. OBS reports were received from W3AS.

DELWAQO QSO PARTY November 1-3, 1969

The Delaware ARC, W3L, announces its 14th Delwaqo QSO Party event scheduled for the 1st, 2nd, and 3rd of November. The party is for all airmateurs to participate. Delaware hams are urged to work as many out-of-state stations as possible so all correctly answered QSOs will give credit toward WAS and the W-DL certificate. Rules: The contest will take place in the 30-hour period from Nov. 1 to 1000 GMT on Nov 3. There are no power restrictions. Del. stations score 1 point per contact and multiply the total by 100, of stations, Canadian provinces and foreign countries worked. Outside stations score 5 points for each Del. station worked and multiply the total by the number of counties in Delaware worked during the contest period. Credit will be given for contacts with the same station on more than one band, but not for contacts with the same station using two modes on the same band. A certificate will be awarded the highest-scoring station in each state, Canadian province and foreign country (with 3 or more contacts) and to the highest-scoring station in each Delaware county. In addition, a W-DL certificate will be sent to any station working all three Delaware counties. Party logs showing required data will be accepted in lieu of QSLs. Suggested frequencies are cw 3560 7060 14060 21060 26060, phone 3975 7725 14325 21425 29600, phone 4762 23600. The general call will be CQ DEL, Delaware cw stations should identify themselves by signing DE (call B. K. Phones say Delaware calling Delaware). Del. stations send QSO number, R5(T) and county (New Castle, Kent or Sussex). All others send QSOr Question Mark and station province or country. Logs and scores must be postmarked no later than Dec. 1, 1969 and should be sent to WS3HJ, 860 12th Mill Rd., Apt. B-4, Wilmington, Del. 19808. (Applications for the W-DL certificate also go to this address.)

MARYLAND-DISTRICT OF COLUMBIA—SCM, John Munhoolland, K3LFD—SEC: W3LDD.

MDD 3643 2200Z Daily 31 248 10.2 W3HFE/RM
MDDS 3643 0000Z Daily 31 248 10.2 W3HFE/RM
MDCTN 3290 2200Z TSTS 18 75 14.7 W3TQP/PAM
MP2N 3290 2200Z MWFF 22 68 21.3 K3AG
MSFN 80400 0000Z M 4 5 5.5 WA3BOP
MTM/TN 145300 0100Z 1S 25 10.8 W3HFW

Appointments: W3A8JR as FC Prince Georges County, his new R-41, W3JZK as OA, W3EGB as OBS, W3LDD as C, K3SHQ, W3QTO, W3SRL, W3MDS. MDCTN gangs enjoyed eyeball QSOs in Patapsco State Park at their Annual Picnic July 37. The highlight of the occasion was the presentation of a nickel-plated handkey inscribed “Iron Man Award presented to Dave B. Fell, W3TN, in appreciation of his long service to W3TQP/PAM and to the Maryland.” W3A8HEN, W3LQY and K3TBD awarded the title of “Mr. Twinkletoes” to K3KID in the name of the Maryland Unit. SCMD had the pleasure of certifying to the total of 67 Section Net certificates to stations active in MDD, MDDS and MDCTN. W3JQF reports that AMSAT hosted a NASTAR group from New York and heard speakers on the Amateur Moon Relay Project. (Continued on page 184).
NOW ON AT YOUR DEALERS —

GALAXY ANNIVERSARY SPECIAL!

Buy your new GT-550 before November 1st—
Get the $29.95 VOX ACCESSORY FREE!

- You’ve heard about this fabulous Galaxy GT-550...maybe you’ve even had an opportunity to sit down and try one at your Dealer’s or a fellow Ham’s place. Sooner or later you figure you’re going to own one—well, NOW’s the time! During the month of October all Galaxy Dealers are giving away a VOX Accessory with every GT-550 sold. But if you’re going to get one—act now, your order has to be in before November 1st, 1969!

Your Bonus Gift for buying in the Month of October!

VOX ACCESSORY - VOX35C

Completely solid-state and instant plug-in (internally) on the GT-550 chassis. Three controls allow full-range settings for “vox gain”, “anti-vox gain” and “time” delay. Controls may be adjusted from outside cabinet. Regularly sells for $29.95.

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WORLD RADIO
3415 West Broadway
Council Bluffs, Iowa 51501

QST-EE46
Diode Switching for VHF FM Channel Selection

(Continued from page 17)

12 volts d.c. be available at the control position, as well as in the equipment itself. A voltage divider, \( R_aR_b \), is tapped at 4 and 8 volts. The remote control switch \( S_1 \) connects the switching matrix to either +12 volts or ground. In the position shown, the d.c. voltage is applied through \( RFC_1 \) to the diodes. Note that it is applied to the cathode of \( CR_1 \) and the anode of \( CR_2 \). The anode of \( CR_1 \) has 8 volts on it, from the voltage divider, so it is reverse-biased. The cathode of \( CR_2 \) has 4 volts on it, so it is forward-biased, connecting crystal \( Y_2 \) into the circuit. The situation reverses when \( S_1 \) is in the other position, \( CR_1 \) being forward-biased and \( CR_2 \) reverse-biased.

The r.f. chokes \( RFC_1 \) and \( RFC_2 \) affect the operation. It is easiest to get working if 2.5-mh. chokes are used, but smaller ones, or TV peaking coils, may work. Oscillator output level can be checked by measuring bias developed at the first multiplier grid (or grid current) and chokes selected for best results.

This modification is easily used with Motorola or Marconi transmitters, but may be more difficult with G.E. Progress-Line transmitters and receivers. The G.E. units have their crystals working into a lower capacitance (10 pf.) than the other two, and the modification introduces some stray capacitance, which tends to lower the frequency of oscillation. Motorola crystals, for 24-times frequency multiplication, may be used in the Progress-Line transmitters, to get around this problem. It may also be necessary to increase the value of the screen-to-cathode capacitor in these units.

Diode switching can be used in circuits where both sides of the crystal are above ground, but providing for individual frequency adjustment may be difficult. A modification for the Motorola 5V transmitter is shown in Fig. 4. The tuned circuit \( L_1C_1 \) is as in the original, with \( C_2 \) added to tune down into the 2-meter band. The extra capacitance required is 30 to 40 pf. The netting capacitors \( C_1 \) and \( C_2 \) are added, for individual crystal-frequency adjustment. The chokes and electrolytic capacitors, \( L_2C_5 \) and \( L_3C_7 \) are to be used only if necessary to remove hum or other modulation from the d.c. leads. Otherwise, the circuit is similar to that of Fig. 3.

Transistor Checker

(Continued from page 16)

Test Procedure

To test an unknown transistor with this unit, proceed as follows:

1) Place the transistor in the socket or connect it to an appropriate cable-and-plug assembly inserted in \( J \).
2) Move \( S_1 \) to on.
3) Set \( S_6 \) to TYPE CHECK. The \( S_2 \) position that results in a meter reading indicates the transistor type. If the same reading is obtained in both positions, the transistor is no good. However, if meter indications are obtained in both positions and one reading is much higher than the other, the transistor is probably okay. The smaller reading is a measure of leakage currents, and it varies from transistor to transistor.

4) With \( S_2 \) set at the appropriate position determined in step 3, put \( S_3 \) in the ERTA TEST position. If \( M_1 \) doesn’t read zero, the transistor is bad. If the transistor appears to be okay so far, close \( S_5 \). The meter needle should move up scale. If no reading is obtained, set \( S_3 \) at a different position and close \( S_5 \) again. If no setting of \( S_5 \) will cause the meter needle to move above zero when \( S_5 \) is closed, the transistor is defective.

5) Return \( S_1 \) to off.

Silent Keys

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

W1EAE, Bigelow Green, South Acton, Mass.
W1FQK, Richard Warren, New Haven, Conn.
W1GMR, Stanley E. Warner, Rocky Hill, Conn.
W1UGC, Walter M. Shorthouse, Hamden, Conn.
W1JU, Ralph M. Bray, Brookfield, Conn.
W1NVV, Oliver J. Morin, Jr., Randolph, Mass.
W1TCD, Norman J. Butler, Tilton, N.H.
W1WOO, Stowell R. Fenn, Middlebury, Vt.
W2AFX, Frederick A. Lewis, Rock Tavern, N.Y.
W2KK, George D. Nicholson, Ocean City, N.J.
W2GLM, Edward Mulroy, Piscataway, N.J.
W2LGH, Joseph W. Stachnik, Hempstead, N.Y.
K2SJH, Fr. Roehl J. Mullin, Garrison, N.Y.
W2THB, Lt. Ronald L. Warnett, Morristown, N.J.
W2UOH, ex-W8NTZ, Walter A. Krieman, Tomawanda, N.Y.
W2CGB, Donvil O. Compton, Washington, D.C.
W3ADQ, Robert A. Ghealardi, Bloomburg, Pa.
W3FQC, Joseph J. Heindl, Jr., Baltimore, Md.
W3JP, Dr. Leon Freedom, Baltimore, Md.
W4MUP, Wiley R. McKellar, Jr., Goldsboro, N.C.
W4RLQ, Robert L. Buysse, Coral Cables, Fla.
W4TCF, Lloyd Fishbeck, Lake Worth, Fla.
K4VCQ, John H. Keaton, Elizabeth City, N.C.
W5DCH, William N. Broman, Austin, Texas.
W5JQ, Richard W. Keeling, Houston, Texas.
W5NZB, Sam O. Hartze, Grove, Okla.
K5OCM, Joseph T. McConachie, Natchez, Miss.
K5ZOU, Elmo C. Parrell, Beaumont, Texas.
K6BID, Adrian A. McCrooke, Riverside, Calif.
W6CQS, Edna D. O'Donnell, Long Beach, Calif.
W6IN, John Kaye, Redlands, Calif.
W6CMZ, Jesse C. Kelley, Woodland Hills, Calif.
W6BPH, William L. Molina, Riverside, Calif.
W6DTO, Richard A. Froncy, Glendale, Calif.
W7IVT, James C. Woods, Seattle, Wash.
W8ZKJ, Delammers J. Peterson, Port Angeles, Wash.
W7OKX, Richard W. Nuttall, Midvale, Utah.
W7VNE, Malcolm J. Juring, Anacosta, Mont.
W7VUD, Marvin E. Youker, Auburn, Wash.
K8AAG, Emmett M. Gant, Fairview Park, Ohio.
K8DII, Harvey R. Chaffin, Canton, Ohio.
K9TGB, Oral H. White, Franklin, Ind.
W9AHH, Henry R. Worme, Alton, Ill.
K8URQ, Jesse E. Comer, Grant City, Mo.
VE1AZ, G. M. Howell, Riverview Heights, N.B.
E1TL, Andrew J. Kettle, Dublin, Ireland.
WIRED – Ready for Operation

- Designed for the Amateur whose interest is 80 and 40 meter SSB. Here’s power and performance at a very reasonable cost! Power to make good contacts...a selective Receiver, Stability and compactness! (5”x11½”x10”). Weight 11 pounds. Smaller by far than anything in its power class. Beautifully finished...a Fantastic performer! Available in both Fixed Station and Mobile Packages (not shown).

THE BEAUTIFUL NEW Duo Bander “II” TRANSCEIVER

ORDER #66M0A95

$169.95

Only $8 Monthly on payments

LOOK AT THESE FEATURES: Up to 400 watts * PEP/SSB * 2 Kc Calibration * Solid State VFO * Covers LSB on 3.8-4 and 7.1-7.3 mHz * Sharp 2.7 kHz Crystal Filter * New, husky 6L6G tubes in the final to a Pi-network * “S” and RFO Metering * E-Z one knob tuning.

*With individual Deluxe WRL Supplier.

BRAND NEW FROM WRL!

THE “Duo Power 300” DUAL POWER SUPPLY

Rated for operation at 300 Watts PEP with all Duo-Bander models—fixed or mobile.

ORDER #66MA003

$149.95

Only $8 monthly

- The all-new “Duo-Power 300” Supply is ideal for the man using the rig as Fixed-Mobile-Portable at the least cost. Use as a complete 12VDC mobile supply or unplug the transistor module end and use it for a 115VAC home supply. Approx. 5¾” x 6¾” x 9½” (HWD). Weight 18.5 lbs.

Buy ’em together – SAVE $20!* (Order Package ZZM189)

You get the DUO-BANDER II and DUO-POWER 300 Both for $299.90! *Cash order only

WORLD RADIO

3415 West Broadway • Council Bluffs, Iowa 51501
“SERVING THE AMATEUR FOR OVER 33 YEARS”
K3TEZ, a newcomer to MDC from WPA, plans to give local traffic circles a whirl when he completes his new 144 mc. rig. He lists his antenna in a storm on July 8. Glad to hear that W39W7T is well again and
hurting his back in a fall. K31JY and W3GJQ still hold
Alaska. W366T on KITTY, all bands. W4TXV/3 enjoyed the July Old Party. W3KGF qualified as W3ARQY with a General Class ticket while Apollo 11 raced for the moon. W3ENW enjoyed seeing that W3GKZ is back. W3FWRV was a
delegate from Delawor, Thanks to K3QDC for taking
good care of the "QNC Kitty" for the past year and
to K3GZQ for taking it over for the next year. Nice
to hear K3JYJ in good voice at the picnic. W31LQM is
a new technician. Hats off to K3RGB and his pace-
setting beam, K3HJX held a SET to make ready for the 1969 hurricane season. Good
back to K3OAE at W8YF with the Wiscagin group. A
large crowd at the Johnson's Mill C/Q/C/13 169.
K3BRI, W3YD/A, W3GT, W3IR, W3JY, W3KQ, W3JS,
W3RJ, W3HDY, W3GJQ, W3MD, W3VX, W3MYQ, W3MYU,
W3PGR, W3RRW, W3S4, W3T3N, W3A6Q, W3BDI, W3C0,
W3C5, W3C6, W3D0C, W3D0D, W3E2R, W3F4R, W3G6,
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INTRODUCING THE

DELUXE SWAN Cygnet

MODEL 270...5 BANDS...260 WATTS

The deluxe Cygnet is a complete amateur radio station including AC and DC power supply and loudspeaker, beautifully integrated into one package. It contains all the features required for home station operation with enough power to work the world. Yet the 270 is compact and light enough to make an ideal traveling companion on those business or vacation trips (second only to the XYL, of course). Incidentally, a carrying case for the Cygnet will soon be available.

For temporary mobile installation, either in your own or someone else’s car, Swan will soon offer an installation kit, including antenna, which will put you on the air in 5 minutes (no holes). Thus, you’ll be able to operate mobile from a rental car! For permanent mobile installation, your Swan dealer has mounting kits and 5 band antennas in stock.

For those who feel they need higher power to climb above the QRM level, Swan will soon announce a matching 1 KW Cygnet Linear. It will also come with a handle just in case you decide to take its 25 pounds along on a trip. With this much power of course, it works only on AC.

SPECIFICATIONS:

- Power Input: 260 watts P.E.P. in SSB voice mode, and 180 watts in CW mode
- Frequency Range: 3.5-4.0 mc, 7.0-7.3 mc, 14.0-14.35 mc, 21.0-21.45 mc, 28.0-29.7 mc
- C.P. Networks: Crystal Lattice Filter. Same as used in the Swan 800 C. 2.7 kc band width at 6 db down, 4.6 kc wide at 50 db down. Ultimate rejection exceeds 100 db
- Unwanted sideband suppressed, 50 db. Carrier suppressed 60 db. Third order distortion down approx. 30 db.
- Audio Response: flat within 3 db from 300 to 3000 cycles in both transmit and receive modes.
- PI Antenna coupler for 50 or 75 ohm coaxial cable.
- Solid state VFO circuit temperature and voltage stabilized.
- Receiver sensitivity better than 5 microvolt at 50 ohms for signal-plus-noise to noise ratio of 10 db.
- 100 kc Crystal Calibrator and dial-set control.
- S-meter for receiver, P.A. Cathode meter for transmitter tuning.
- Improved AGC and ALC circuit.
- Separate R.F. and A.F. gain controls.
- Sideband selector.
- Provision for plug in of VOX accessory, as well as headphones and/or Cygnet Linear.
- Dimensions: 5½ in. high, 13 in. wide, 11 in. deep.
- Weight: 24 pounds.

Amateur Net: $525

See the Swan 270 at your Swan dealer

ACCESSORIES

- Mobile Mounting Kit.......................... $12
- VX-2 Plug-in VOX Unit....................... $35
- 5 Band Model 45................................ $65
- Mobile Antennas Model 55.................... $95

125


COMPARE IT?

...WITH WHAT?

The CX7 practically demands comparison. Question is . . . what to use for a standard? A transceiver? Or transmitter-receiver separates?

You'll really need one of each. Don't forget power supplies, speech processor, keyer, directional wattmeter. Pick the best. In fact, set up your "dream station" . . . at least on paper. NOW . . .

WHATEVER YOUR CHOICE IN THE PAST . . .

COMPARE IT POINT-BY-POINT with the NO-COMPROMISE CX7 . . .

COMPARE the CX7 with any receiver for sensitivity, selectivity options, dynamic range, AGC merit, VFO smoothness, interference rejection . . .

COMPARE the CX7 with any transmitter for continuous power output in all modes, P.A. ruggedness, crisp audio punch, low distortion, instant CW break-in and spotting, quick band-change . . .

COMPARE the CX7 with any transceiver for total size and weight . . . the extreme flexibility of its dual-channel system . . . the convenience of its completely self-contained design . . .

CONSIDER the CX7's incomparable frequency coverage and readout precision . . . aerospace-bred excellence in engineering and craftsmanship . . . built-in "extras" . . . overall versatility . . .

SEE WHAT YOU'VE BEEN MISSING?

"It Speaks for Itself"

Write for detailed technical information. 2200 Anvil Street N. • St. Petersburg, Florida 33710
DELTA DIVISION

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5OB, RM: K5ANS/S, V.H.F. PAMs: W4QRQ, W4ZDR, W4ZHP, W5CSV, W4ZHC, We reserve W4ZHF as pres.; W4ZTPS, vice-pres.; W5OB sec.; W4ZMC, treas.; W4SOJU, act. mgr. W4QGG, up Tennessee way, who has his 2-meter QSL card. The recent Shreveport 2-meter Base Award for working five stations in Shelby County. Try 3553 and 3550 kc. W5NY is setting up a new shack and also reports the Jefferson ARC is holding Advanced Class instruction. W5CZQ has been with MARS activities to the extent his fishing is falling behind. K5ANS/S spent his vacation in California and urges LAN members to send them their LAN Award reports. W5OVX has been handling phone patches. W5KJS is a busy ham, W5LTY, W5QYN has put up a two-element quad and hopes to snag some DX. Up Bastrop way W53ZS, W5ZJL (father and brother are both in the Army) say they plan to go back at USL and will be there one year. Incidentally, the Loyola AR station is being operated by W5CHZ. W5BJS and W5AVF were the guests of the LARC during FD. Yours truly just pumped this out of as a quickie. After some ten years on 201 KJIBC he spent his vacation up in Yancey Land. The GNOARC reports its 4-meter repeater has been reworked and is operating much more efficiently. The CLARO Hamfest was canceled. An additional Louisiana Alligator Net has been launched by the Ozone ARC on 14.250 at 0000 GMT Wed. W5JBT is Net Control. Traffic: W5M 247, W5CEZ 79, K5ANS/S 60, W5CHP 59, W5WZB 47, W5MZX 45, W5MBC 20, W5SA 14, W5QVN 12, WJTA 1.

MISSISSIPPI—SCM, Clinton C. Comfort, WASKEY—SEC: WAJWJ, WAJWJD’s new address is P.O. Box 1125, Oxford, Miss. The MSBN Net Manager election resulted in W5SIM being elected for a full term beginning Aug. 1, Net Control stations for the new quarter are: Sun, W5QST; Tue, WASKY, Wed, W5QBT; Thu, W5QBT; Fri, Sat, WJS ; W5QQ. We welcome W5AZYU/W4PJP to Mississippi. Thanks to W5KMA for relaying for the MSBN, W5KNJ and W5ZQG. W4KRSF and W4QKS are our newest hams. W5ZRNJ is 7 years old, K5UBL’s son is recovering nicely from a broken leg. W5PBT is expected to be out of the hospital in a week or two. W5MVW, of the Winrock, Tex., came home in Aug, K52MF has had a full summer schedule working with boys camps, W5QJX has been spending much of his time camping. No one has reported getting the Sesquicentennial Award certificate from Memphis, Shelby County, Tenn. At this writing, we quote 2000 kc. on your dial. Check into one or more of our nets.


Traffic: (July) KARIN 75, W4FII 47, W4SEY 28, W4SMC 12, (June) KARIN 48.


K4N 3520 M-Sat 33Z45 211 150 150 W4JBT TPN 3590 M-Sat 1145 211 1160 91 W4FPF ETPN 3580 M-F 1040 23 199 41 W4EWEW TUN 3590 Thurs 0100 5 27 W4JW TSN 3590 Tues 2340 5 3 25 KBATA TNT 3590 Daily 2100 31 233 129 W4HMA TN 3535 Daily 0000 31 143 80 W4BSG


GREAT LAKES DIVISION
KENTUCKY—SCM, George Wilson, WQYI. SEC: W4YVS. Appointed: W4JWNT as QO.

Net QNI QTO Net QNI QTO
KRN 117 0 80 117 115
MKN 347 87 PCATN 68 38
KTN 711 135

Everyone is proud of KYZU and the Kenvenn station. W4NJK is now at Sacramento. W4HAB had a bout with muscular dystrophy and was back in Maryland a few days ago. He’s back on. Kentucky State Fair traffic was really wild. We’ll see it in the traffic totals next month. W4VYVS spent his vacation in the Kentucky River. Louie’s Talico ham club is scheduling some public service projects. More 2-meter hand helds are evident, 3 AAAM, visiting, it looks W4WDPK made Advanced Class. K3RRL/WBDEZ is recuperating from a stroke...
QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts... W3—

CUBICAL QUAD ANTENNAS—
these two element beams have a full wavelength driven element and a reflector (the gain is equal to that of a three element beam and the directivity appears to us to be exceptional!) ALL METAL (except the insulators)—absolutely no bamboo. Complete with boom, universal alloy spreaders; sturdy, universal-type beam mounts; uses single 52 ohm coaxial feed; no stubs or match; no hardware needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional gain. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you.

10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.


Dimensions: About 16' square

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' x 1 1/4" OD, 18 gauge steel, double plated, gold color.

Beam Mounts: Square aluminum alloy plate, with four steel U-bolt assemblies; will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064" diameter.

X Frameworks: Two 12' x 1 1/2" OD aluminum 'hi-strength' alloy tubing, with telescoping 7/8" OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Clinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

Note: Check these startling prices—note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD ....... $35.00
10-15 CUBICAL QUAD ......... 30.00
15-20 CUBICAL QUAD ......... 32.00
TWENTY METER CUBICAL QUAD ......... 28.00
FIFTEEN METER CUBICAL QUAD ....... 24.00
TEN METER CUBICAL QUAD .... 23.00
(all use single coax feedline)

How to order: Send check or money order. We ship immediately upon receipt of order by railway express, shipping charges collect. DEALERS WRITE!

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139
back operation and says he worked WAC on 40-meter c.w. with low power and low dipoles. W8HTX claims that 75 feet of coax between the "tower" and the antenna cuts up his already scarce r.f. W8DQG has been working W8HTX in the competition in the SS and CD, you bet. They were 122 present at the Phone Net in Lansing. The W8DQG net meets at 0015Z on every 11th, each Mon. Remember to convert to GMT. WASKY is retiring from the Central Mich. ARC Scope editor's job and is on his home receiving. WASHUK is going up 60 feet for 2 f.m. 1 hear. There is a rolling Baraboo Ice Cream Man around Lansing. Traffic: W8YQP 101, WBBY 204, KSKQ 323, K8JU 196, W8CMG 188, W8DO 110, W8JZ 99, W8C8W 93, W8B8X 53, W8X1W 52, KX9B 51, W8Z9X 49, W8G9X 48, W8G8X 47, W859X 46, W8SSQ 45, W8JBG 44, W858W 43, W8B8Q 42, W8G9X 41, W8V8Q 38, W8C8Q 34, KX9SM 31, W8G9Q 31, W858W 30, W8G9W 29, W858Q 28, W8B8Q 27, W858X 26, W8G9W 25, W858Q 24, W8B8Q 23, W858W 22, W858Q 21, W8B8Q 20, W8G9W 19, W858Q 18, W8B8Q 17, W8G9W 16, W858Q 15, W8B8Q 14, W8G9W 13, W858Q 12, W8B8Q 11, W8G9W 10, W858Q 9, W8B8Q 8, W8G9W 7, W858Q 6, W8B8Q 5, W8G9W 6, W858Q 5, W8B8Q 4, W8G9Q 3, W858Q 2, W8B8Q 3, W8G9Q 2, W858Q 1, W8B8Q 2, W8G9Q 1, W858Q 1.

OHIO—SCM: Richard A. Esbert, W8ETU—Asst. SCM; Roger Barnett, K8XDD, SEC; W8OUQ, RM; W8BMI, PAM; K8UBK, V.E.F.; PAM; W8ADU, BFL certificates go to W8BZK, K8QXG, W8X7M, W8B6X, W8WYV, WM8X, and W8WZL for completion. W8HUF has also worked W8P8Z for June traffic. OSSBN net was worked by KSKQ, K8PB8, W8HTX, KSKQ, W8Q8W, K8B8V, W8WYV, W8X7M, W8B6X, W8WYV, K8SDQ, K8WZL, and K8QXG. The Ohio Traffic Nets Picnic in Worthington was a dandy affair with JSN, OSSBN, ONN, MN, and Anderson. A new Ohio Section Emergency Plan was presented and distributed. Attendees received the plan well, and if their enthusiasm and interest are any indication, we’ll have lots of support from our trafficers. The plan will be sent to all known members of NTS traffic nets in the section, all appointees, EOE, and anyone else interested. Others wanting copies need only send me a radiogram or card. July appointments: W8BQ8 no OSSBN and K8XDD. Check your certificates. Appointments need to be renewed each year. Congratulations to new Extra Class W8KMZ and W8TMX. April awards are W8BQ8 and K8XDD. W8SKY and K8PB8 report a Van Wert Co. ARC drill in July to check Control Center equipment. W8AOCG tells us that the Portland ARC is setting up a 2-meter repeater for Southern Ohio use. AO WSGR has completed a frequency counter to help in his Oons. W8G9X has also moved him with a new installation. W8ASV leaves for the section for a new job in Detroit. Columbus ARA had reports and slides from six area clubs on this year’s Field Day for the second year in a row. W8SDQ has three Field Day messages were received from W8B9Z, W8G8T, W8CNDC, W8WYV, W8ASV, W8X7M, W8DCQ, K8QXG, W8WYV, W8BQ8, W8Q8W, K8SBK, K8QXG, W8C8Q, K8SUW, W8B6X, W8WYV, W8Q8W, W8SUW, and W8SDQ. All are out. The W8BQ8 traffic lab stationed at W8VBM. Congratulations to K8PB8, who won the Toledo TO "Area Fun of the Year" award. Reports on July’s Northern Ohio storm disaster are trickling in. W8Q8W had a very good many instances of "beyond the call of duty" and even downright heroism out of the reports, which will help in the Ohio Section Emergency Plan. Address them to W8OUU, The Third Annual Eighth Region Amateur Radio Public Service Course will be held Oct. 28-30, at W8CBF, with an amateur with an interest in ARPSO is urged to attend. This will be a series of work-out-the-problems sessions covering a wide range of details. Traffic (July) W8Q8W 100, W8B9Z 44, W8WYV 37, W8ASV 242, W8BMI 215, W8USU 131, W8C8Q 122, W8C8Q 116, W8SUW 97, W8WYV 91, W8ASV 91, W8WYV 87, W8SUW 81, W8USU 80, W8C8Q 77, W8ASV 74, W8WYV 64, W8ASV 63, W8WYV 60, W8USU 58, W8C8Q 58, W8WYV 58, W8SUW 58, W8CBF 50, W8USU 47, W8WYV 45, W8ASV 45, W8WYV 42, W8C8Q 37, W8ASV 35, W8WYV 33, W8USU 33, W8CBF 31, W8CBF 29, W8WYV 29, W8ASV 28, W8CBF 25, W8USU 23, W8CBF 23, W8ASV 21, W8CBF 17, W8USU 15, W8CBF 15, W8ASV 13, W8CBF 12, W8USU 12, W8CBF 10, W8USU 8, W8CBF 7, W8USU 6, W8CBF 5, W8USU 4, W8CBF 4, W8USU 3, W8CBF 3, W8USU 2, W8CBF 2, W8USU 1, W8CBF 1, W8USU 1, W8CBF 1.

Hudson Division

Eastern New York—SCM: Graham G. Berry, K8JSN—Ass't. SCM and RM; Ruth B. Rice, W8VBC—Sec.; W8C8Q, PAM; W8P8Z, SEC; W8YRP, V.E.F.; PAM; W8YRP, Q.S.T. Section nets: NYS on 3075 kHz nightly at 2300Z; ESS nightly on 3950 kHz at 2300Z.


Ohio City and Long Island—SCM: Blaine J. Johnson, K2BD—Asst. SCM: Fred J. Brunjes, K2DGI, SEC; K2C0N, PAM; W2EY.

115" 1415/2200 Nightly K2UT RM
116" 1415.8 Me. 1300 MTWTF W2FRF PAM
117" 1415.8 Me. 1200 DMT W2FRF PAM
118" 1415.8 Me. 1100 Daily W2F0T MF
914" 1465.8 Me. 1000 DMT W2FRF PAM
915" 1465.8 Me. 0900 DMT W2FRF PAM
1014" 1475.8 Me. 0800 Daily K5RAF ZMF
913" 1475.8 Me. 0700 Daily K5RAF ZMF

1350
Heathkit® Amateur Station Accessories

**SB-610 Signal Monitor Scope** ... operates with transmitters on 160 through 6 meters at power levels from 15 watts through 1 kw. Shows transmitted envelope. Operates with receiver IF's up to 6 MHz. Spots signal distortion, over-modulation, etc.
Kit SB-610, 14 lbs. ........................................... $79.95*

**SB-630 Amateur Station Console** ... including 24-hour clock, SWR meter, 10 minute timer with audio-visual signalling, and more. Styled to match your SB-Series station.
Kit SB-630, 10 lbs. ........................................... $79.95*

**SB-620 Amateur Radio Spectrum Monitor** ... displays all received signals up to 250 kHz either side of receiver tuned frequency. New narrow sweep function shows 10 kHz for single signal analysis.
Kit SB-620, 15 lbs. ........................................... $119.95*

**SB-600 Communications Speaker** ... matches the Heathkit SB-Series line and includes space for HP-23A fixed-station power supply. Features an 8 ohm 6" x 9" speaker with 300 to 3000 Hz response.
Kit SB-600, 6 lbs. ........................................... $19.95*

**HM-15 Relative Power SWR Meter** ... indicates forward and reflected power and SWR. Band coverage is 160 through 6 meters. Handles peak power well over 1 kw. Wiring options permit operation with either 50 or 75 ohm transmission lines.
Kit HM-15, 2 lbs. ........................................... $14.95*

**HD-10 Electronic Keyer** ... all solid-state circuitry for perfect characters. Two speed ranges — 15-60 wpm or 10-20 wpm. Solid-state switching ... no sticking relays or contact bounce. Built-in sidetone & speaker. Grid-block keying, 105 V, 60 35 mA, max. only.
Kit HD-10, 6 lbs. ........................................... $39.95*

**HN-31 “Cantenna” Transmitter Dummy Load** ... provides 50 ohm non-inductive load with SWR less than 1.5:1 for frequencies from 1.5 to 300 MHz. Coax fitting for transmitter line; phono jack for relative power measurements. Oil coolant (not supplied) permits power up to 1 kw.
Kit HN-31, 3 lbs. ........................................... $10.95*

---

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as OPS transferred from Minnesota; WAGGY as ORS transferred from Nebraska; WAOLEM as ORS transferred from Kansas, WOLGG and WVEEL vacated in Minnesota. Tom and Bette Russman have moved into the incentive program. A homebrew receiver is undergoing design and construction at the QTH of WAIIBBP. For some time now it has been housed in a small room, but to that luncheon party on Wednesday, the 13th, it will be a pleasant surprise to everyone. It will be putting together a homebrew phase type s.a.b. exciter, K2RLW says he finally tired of his good modern, advanced Advanced and a new Cymatron which is on a shakedown cruise on 30-meter phone. The Polytechnic Radio Club, which dates back to the theory course, has the recent call of W1BZK for a new one, which is K2KT. W1NHB has rebuilt his 100-meter filters and kicked out the racy TV.

**NORTHERN NEW JERSEY**—SCM: Louis J. Amoro, 301 E. Main St, K2EQD, RFD 1, K2KKK, PAM: W2PEV, K2RDQ, W2KRIK and WATTB.

**ARPSC Section Net Schedules**

<table>
<thead>
<tr>
<th>Net</th>
<th>Freq.</th>
<th>Time</th>
<th>Days</th>
<th>QTH</th>
<th>Mgr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NJ1</td>
<td>3695.00</td>
<td>7:00 PM</td>
<td>Day</td>
<td>WABLY</td>
<td></td>
</tr>
<tr>
<td>NJ3</td>
<td>3695.00</td>
<td>10:00 PM</td>
<td>Day</td>
<td>WABLY</td>
<td></td>
</tr>
<tr>
<td>NJ4</td>
<td>3647.50</td>
<td>3:00 PM</td>
<td>Day</td>
<td>WABLY</td>
<td></td>
</tr>
<tr>
<td>NJ3FN</td>
<td>3680.00</td>
<td>8:00 PM</td>
<td>M-Sat</td>
<td>390 357 W2PEV</td>
<td></td>
</tr>
<tr>
<td>NJ3NF</td>
<td>3680.00</td>
<td>8:00 PM</td>
<td>M-Sat</td>
<td>390 357 W2PEV</td>
<td></td>
</tr>
<tr>
<td>NJ2B</td>
<td>3680.00</td>
<td>8:00 PM</td>
<td>M-Sat</td>
<td>390 357 W2PEV</td>
<td></td>
</tr>
<tr>
<td>NJS</td>
<td>3695.00</td>
<td>8:00 PM</td>
<td>Sun</td>
<td>45 69 12 WATTB</td>
<td></td>
</tr>
<tr>
<td>NJ201</td>
<td>3695.00</td>
<td>9:00 PM</td>
<td>Sun</td>
<td>45 69 12 WATTB</td>
<td></td>
</tr>
<tr>
<td>NJ202</td>
<td>3695.00</td>
<td>9:00 PM</td>
<td>Sun</td>
<td>45 69 12 WATTB</td>
<td></td>
</tr>
<tr>
<td>NJ3F</td>
<td>4417.50</td>
<td>7:30 PM</td>
<td>Day</td>
<td>165 218 K2RDQ</td>
<td></td>
</tr>
<tr>
<td>NJ3F</td>
<td>4417.50</td>
<td>7:30 PM</td>
<td>Day</td>
<td>165 218 K2RDQ</td>
<td></td>
</tr>
</tbody>
</table>

New appointments:

**K2KDO as SEC, W2ADNB and W2ABJ as ORS, W2YDZB as OBS, Endorsements:**

**New Officers:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Freq.</th>
<th>Time</th>
<th>Days</th>
<th>QTH</th>
<th>Mgr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>K2KDO</td>
<td>3680.00</td>
<td>3:00 PM</td>
<td>Day</td>
<td>W2ABJ</td>
<td></td>
</tr>
<tr>
<td>K2KDO</td>
<td>3680.00</td>
<td>3:00 PM</td>
<td>Day</td>
<td>W2ABJ</td>
<td></td>
</tr>
</tbody>
</table>

K2KDO and K2YJ added to old ARRL Handbooks, W2JPS added a mailbox to his 350-ft. long wire. W2ABDJ applied for DXCC with W2K. W1ER used the ‘K6’ and ‘W1ER’ as K6ER. W1NHS, W1NWS, W1KZ, and W2KFX receive the call back. A new W2KFX is on the air and W2KRF is in the air. W2KRF is now model 15. W2KFM is planning for NCC-5, W2KJA and W2KFX received 20-watt power, has his 40-watt on his new tower. W2KAZ has a new tower. W2ADNB took first place in the recent V. QSO Party, W2JDN is back from a vacation in Arizona. W2ABJ is collecting old ARRL Handbooks, W2JPS is back on 6, W2KRF was the new N.H. QSO Party. W2KQY is a new member of the club. W2KRF is back on 6, W2KFX is a new member of the club and W2KRF is back on 6.

**MIDWEST DIVISION**


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**ZERO DISTRICT QSO PARTY**

**Nov. 1-3, 1969**

**Sponsored by The**

**The Roosevelt H. S. ARC of Des Moines**

**Rules:**

- 0000-0400 GMT Nov. 1, 0000 GMT Nov. 2, 0000-2400 GMT Nov. 3. (All times local.)
- Stations engaged in work once per band (phone and c.w. are considered separate bands). All calls C Q.
- Each station may send one QSO per party per ARRL section or country.

**Scoring:**

- For stations there are two multipliers. First, the total number of ARRL sections and foreign countries (not including Canada) contacted in the contact. The second, the total number of QSOs in the states that were not ARRL sections of the party. For example, the total number of QSOs in the state of the W0 district are also two multipliers. First, the total number of QSOs in the states that were not ARRL sections of the party. The second, the total number of QSOs in the states that were not ARRL sections of the party.

**Awards:**

- Certificates shall be issued to each. QSOARL section and country.
- Party certificate is first in each QSOARL section and country.
- Party certificate is first in each QSOARL section and country.

---

**Inclusion of statement on cover will be disquilled.**

- When ordering dates, times, stations worked, exchanges, bands and modes, and claimed points are the responsibility of each QSO. They will be submitted to the National Association of QSOARL Section and Country.
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SPECIMEN
MISSOURI—SCM, Robert J. Fevrier, WBOC—SEC, WBOUL. New appointments: KQEM as WBOUL on KGHS, QHS as WAQAA on PAM, MON certificates went to WOJRF and WAOYR. Net reports.

Note that most of these men will meet one hour later QMT with the shift back to Standard Time. WBOUL is the Missouri Watermelon Pickers (111!) Net, started by WAORV and WAOKEP to move traffic back from the late season before the WATYRP, which is scheduled to begin from all amateurs interested in starting a 6-meter net in the Springfield area. Contact John, KRIEM. WATYRL, Route 1, Box 83, Buffalo Mo. 65622. The PIDARA will hold an auction Sept. 30 at 7:30 p.m. at 124 N. Main, Liberty. KOONK was interviewed by WKSQ for his report in experimental theater. KOFFY and KOEH were interviewed by KWOS on radio on ham radio. Field Day and emergency preparedness WATOF and WAOKEP passed the extra class exam. WAOBO has an Advanced Class license. WNOOW passed the General and Advanced exams in one session. New roster WNOYB, WNOZCC, WNOZIK. Traffic: KOONK 1923, WAORV 205, KQEM 249, WAQAA 177, WAQOF 128, WOBY 59, WAQHM 55, WATOF 36, WOBU 24, KRIEM 18, WAQOA 15, WAQAO 10, WAOKEH 8, WAQATY 8.

NEBRASKA—SCM, V. A. Cashon, KQOAL—SEC, KQOOP.

Traffic: WAOQX 121, WAQOB 51, WAQOF 47, WAQOB 42, WAQOF 39, WAQOF 37, WAQOF 35, WAQOF 34, WAQOF 32, WAQOF 31, WAQOF 30, WAQOF 29, WAQOF 28, WAQOF 27, WAQOF 26, WAQOF 25, WAQOF 24, WAQOF 23, WAQOF 22, WAQOF 21, WAQOF 20, WAQOF 19, WAQOF 18, WAQOF 17, WAQOF 16, WAQOF 15, WAQOF 14, WAQOF 13, WAQOF 12, WAQOF 11, WAQOF 10, WAQOF 9, WAQOF 8, WAQOF 7, WAQOF 6, WAQOF 5, WAQOF 4, WAQOF 3, WAQOF 2, WAQOF 1.

NEW ENGLAND DIVISION


Traffic: WAOQX 121, WAQOF 51, WAQOF 47, WAQOF 42, WAQOF 39, WAQOF 37, WAQOF 35, WAQOF 34, WAQOF 32, WAQOF 31, WAQOF 30, WAQOF 29, WAQOF 28, WAQOF 27, WAQOF 26, WAQOF 25, WAQOF 24, WAQOF 23, WAQOF 22, WAQOF 21, WAQOF 20, WAQOF 19, WAQOF 18, WAQOF 17, WAQOF 16, WAQOF 15, WAQOF 14, WAQOF 13, WAQOF 12, WAQOF 11, WAQOF 10, WAQOF 9, WAQOF 8, WAQOF 7, WAQOF 6, WAQOF 5, WAQOF 4, WAQOF 3, WAQOF 2, WAQOF 1.

Traffic: WAOQX 121, WAQOF 51, WAQOF 47, WAQOF 42, WAQOF 39, WAQOF 37, WAQOF 35, WAQOF 34, WAQOF 32, WAQOF 31, WAQOF 30, WAQOF 29, WAQOF 28, WAQOF 27, WAQOF 26, WAQOF 25, WAQOF 24, WAQOF 23, WAQOF 22, WAQOF 21, WAQOF 20, WAQOF 19, WAQOF 18, WAQOF 17, WAQOF 16, WAQOF 15, WAQOF 14, WAQOF 13, WAQOF 12, WAQOF 11, WAQOF 10, WAQOF 9, WAQOF 8, WAQOF 7, WAQOF 6, WAQOF 5, WAQOF 4, WAQOF 3, WAQOF 2, WAQOF 1.

Traffic: WAOQX 121, WAQOF 51, WAQOF 47, WAQOF 42, WAQOF 39, WAQOF 37, WAQOF 35, WAQOF 34, WAQOF 32, WAQOF 31, WAQOF 30, WAQOF 29, WAQOF 28, WAQOF 27, WAQOF 26, WAQOF 25, WAQOF 24, WAQOF 23, WAQOF 22, WAQOF 21, WAQOF 20, WAQOF 19, WAQOF 18, WAQOF 17, WAQOF 16, WAQOF 15, WAQOF 14, WAQOF 13, WAQOF 12, WAQOF 11, WAQOF 10, WAQOF 9, WAQOF 8, WAQOF 7, WAQOF 6, WAQOF 5, WAQOF 4, WAQOF 3, WAQOF 2, WAQOF 1.
TOP OF THE YAESU F LINE

THE FT dx 400 TRANSCEIVER

Conservatively rated at 500 watts PEP on all bands 80 through 10 the FT dx 400 combines high power with the hottest receiving section of any transceiver available today. In a few short months the Yaesu FT dx 400 has become the pace setter in the amateur field.

FEATURES: Built-in power supply • Built-in VOX • Built-in dual calibrators (25 and 100 KHz) • Built-in Clarifier (off-set tuning) • All crystals furnished 80 through the complete 10 meter band • Provision for 4 crystal-controlled channels within the amateur bands • Provision for 3 additional receive bands • Break-in CW with sidetone • Automatic dual acting noise limiter • and a sharp 2,3 KHz Crystal lattice filter with an optimum SSB shape factor of 1.66 to 1.

Design features include double conversion system for both transmit and receive functions resulting in, drift free operation, high sensitivity and image rejection • Switch selected metering • The FT dx 400 utilizes 18 tubes and 42 silicon semi-conductors in hybrid circuits designed to optimize the natural advantages of both tubes and transistors • Planetary gear tuning dial cover 500 KHz in 1 KHz increments • Glass-epoxy circuit boards • Final amplifier uses the popular 6KD6 tubes.

SPECIFICATIONS: Maximum input: 500 W PEP SSB, 440 W CW, 125 W AM. Sensitivity: 0.5 uv, S/N 20 db. Selectivity: 2.3 KHz (6 db down), 3.7 KHz (55 db down). Carrier suppression: more than 40 db down. Sideband suppression: more than 50 db down at 1 KHz. Frequency range: 3.5 to 4, 7 to 7.5, 14 to 14.5, 21 to 21.5, 28 to 30 (megahertz). Frequency stability: Less than 100 Hz drift in any 30 minute period after warm up.

CLARIFIER CONTROL — Does the work of an external VFO — allows operator to vary receive frequency 10KHz from transmit frequency, or may be used as an extra VFO combining transmit and receive functions.

SELECT CONTROL — Offers option of internal or outboard VFO and crystal positions for convenient preset channel operation.

FUNCTION CONTROL — Selects crystal calibration marker frequency and desired transmit mode of operation.

This imported desk top transceiver is beautifully styled with non-specular chrome front panel, back lighted dials, and heavy steel cabinet finished in functional blue-gray. The low cost, matching SP-400 Speaker is all that is needed to complete that professional station look.

FT dx 400 $599.95 — SP-400 $14.95

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PROFESSIONAL EQUIPMENT FOR THE AMATEUR
WESTERN MASSACHUSETTS—SCM Percy C. Noble, W1BV—C.W. RM: W1DVM, SEc: --, PAM: --. Sincere congratulations to W1STR on a job well done! It is hard to believe that these past two years have passed. W1MW, C.W. Net, on 3560 kc. daily at 7:00 p.m., has 116 QNs during July handling 95 messages. Attendance of the top four stations, W1BVR, W1DVM, W1ZB, K1ZW 17, W1UBF, of Pittsfield, pres., of the North-easteren States 100-Meter Amateur Radio Assn., would like to have more stations to join. We have many application blanks and certificates here for various League appointments, and now that I am retired I haven't so much time to do this except to make out the Mass. Certificates! There are Official Phone Station certificates for you good-quality phone operators; Official Relay Station certificates for keying for the B.S.S.; Official Observer certificates for those who like to listen; Official Bulletin Station certificates for those who like to talk; Official Coordinator certificates for those of you on 50 Mc. and higher; Emergency Coordinator certificates for those in communities without an EC; and a Certificate of Appreciation for everybody! Take your pick! Yes, we'll have news next month with the return of the vacationers and the receipt of club bulletins. Maybe you think nobody is interested in what you are doing, but I'll bet some are. How about a note from you for information for this section? New address here is: Bailey Road, F.O. Box 5, Lansingboro, Mass. 01237. Traffic: W1ZB III, W1DVM 78, W1BVR 67, W1KX 35, W1CA 23, K1ZW 20. W1STR 3.

NORTHERN DIVISION

ALASKA—SCM, Albert F. Weber, KL7AEG—KL7FIF is finding out what it takes to come up with an issue of NACU News. We have a feeling he may not say "yes" very often, or reach some calls for Mail Box. C.AH and KL7BDD have moved their house and were off the air for a spell but are back on again with the old Station. K17KLM, E.C. KN6TQ is now in the Fairbanks area, is now situated in Tennessee, and plans to stay for a year or so. KL7EUW has taken over the EC slot. The group is making plans for another get-together for the summer season, probably in the AGJ-ville and has been replaced by a Swan lineup. KL7DJO and KL7GIO used up two helicopters this summer to try to reach their RAC stations due to either map, fortunately. KL7GFT and KL7GFL are joining the mountain-toppers out on the Nenana Road. K17XL and KL7DBB have a K17XL, an ARRL award at Lake Minchumina and Dick is hunting for the best place for the 2-meter antennas.

IDAHO—SCM, Donald A. Crisp, W7ZNN—The Farm Net conferences week days on 3050 kc. at 0000 GMT. The RACES Net conferences week days on 1041 kc. at 1415 GMT. W7DQI, Bonneville County EC, reports that K7PQG has been appointed Ass't. EC. W7CJ is recuperating from an open heart operation. K7DB was injured in an airplane crash. W7GET qualified for a WPJ award with a traffic total of 779. Two stations were set up at the annual Jamboree at Farragut using the call KF7BSA. One of the members had a plane crash, lost a leg, and is in a wheelchair. K7CJ is the local ham for the VHF link with Spokane, Wash., through a repeater station, and a 2-meter f.m. link with W7AR/3 in Hayden Lake, Idaho, who relayed the traffic to W7GET and W7ZK, who in turn relayed the traffic to TNN and RN. Spokane Amateur relayed the traffic by using all area nets. Other amateurs who played a major part in handling the Scout traffic were K7CJ, KL7KL, WTOF, K7FJ, K7KJH, K7GJL, W7Q4, W7GUA, W7WP7, W7W, W7VB, W7IDP, W7VW, W7SW and W7WV, operated the traffic station at Farragut. Farm Net report: 20,000 messages, 450 cheeze nets, 2,000 QSLs. W7DQI, W7GUA, W7KZ, W7W, and W7WV operated the traffic station at Farragut, Farm Net report: 20,000 messages, 450 cheeze nets, 2,000 QSLs. W7DQI, W7GUA, W7KZ, W7W, W7WV, operated the traffic station at Farragut, Farm Net report: 20,000 messages, 450 cheeze nets, 2,000 QSLs.


Welcome to new Novices W1NLIQ (Billington) and W1NLIJ (Plymouth). Word is that the V7010 Net doesn’t have very many Vermonters check-in. Can you help? Hope all had a good time at International F. W7EC was busy, as usual, making the rounds for the new call in Anchorage is W7NNAA. New calls in Bozeman are W7MNIM, W7MTNR, W7M7ZV, W7MTNJ and W7MTM. The Butte Amateur Radio Club held
How to get into one of today’s hottest money-making fields—servicing 2-way radios!

More than 5 million two-way transmitters have skyrocketed the demand for service men and field, system, and R & D engineers. Topnotch licensed experts can earn $12,000 a year or more. You can be your own boss, build your own company. And you don’t need a college education to break in.

How would you like to start earning $5 to $7 an hour... $200 to $300 a week... $10,000 to $15,000 a year? One of your best chances today, especially if you don’t have a college education, is in the field of two-way radio.

Two-way radio is booming. Today there are more than five million two-way transmitters for police cars, fire trucks, taxis, planes, etc. and Citizen’s Band users—and the number is growing at the rate of 80,000 new transmitters per month.

This wildfire boom presents a solid gold opportunity for trained two-way radio service experts. Most of them are earning $5,000 to $10,000 a year more than the average radio-TV repair man.

Why You’ll Earn Top Pay

One reason is that the U.S. doesn’t permit anyone to service two-way radio systems unless he is licensed by the FCC (Federal Communications Commission). And there aren’t enough licensed electronics experts to go around.

Another reason two-way radio men earn so much more than radio-TV service men is that they are needed more often and more desperately. A two-way radio user must keep those transmitters operating at all times, and must have them checked at regular intervals by licensed personnel to meet FCC requirements.

This means that the available licensed expert can “write his own ticket” when it comes to earnings. Some work by the hour and usually charge at least $5.00 per hour, $7.50 on evenings and Sundays, plus travel expenses. Others charge each customer a monthly retainer fee, such as $20 a month for a base station and $7.50 for each mobile. A survey showed that one man can easily maintain at least 15 base stations and 85 mobiles. This would add up to at least $12,000 a year.

How to Get Started

How do you break into the ranks of the big-money earners in two-way radio? This is probably the best way: 1. Without quitting your present job, learn enough about electronics fundamentals to pass the Government FCC License. Then get a job in a two-way radio service shop and “learn the ropes” of the business. 2. As soon as you’ve earned a reputation as an expert, there are several ways you can go. You can move out, and start signing up and servicing your own customers. You might become a franchised service representative of a big manufacturer and then start getting into two-way radio sales, where one sales contract might net you $5,000. Or you may be invited to move up into a high-prestige salaried job with one of the major manufacturers.

The first step—mastering the fundamentals of Electronics in your spare time and getting your FCC License—can be easier than you think.

Cleveland Institute of Electronics has been successfully teaching Electronics by mail for over thirty years. Right at home, in your spare time, you learn Electronics step by step. Our AUTO-PROGRAMMED® lessons and coaching by expert instructors make everything clear and easy, even for men who thought they were “poor learners.” You’ll learn not only the fundamentals that apply to all electronics design and servicing, but also the specific procedures for installing, troubleshooting, and maintaining two-way mobile equipment.

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DX-ARRAY
NEW 20 ELEMENT ANTENNAS

HIGH FORWARD GAIN
LOW ANGLE
OF RADIATION

OPTIMUM FRONT LOBE
BROADBAND COVERAGE
DIRECT 52 OHM FEED
GREATER CAPTURE AREA
STACKABILITY

144 mhz 220 mhz 432 mhz
A breakthrough in VHF/UHF Amateur antennas!
The new Cush Craft DX-Arrays combine the World’s
best yagi and collinear features with the World’s most
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Realizing that the antenna is the most important
part of your station, Cush Craft engineers have
devoted two years of intensive development and
testing to perfect DX-Array. DX-Arrays have al-
ready established new records in DX-ing and moon-
bounce programs.

Whatever your interest may be, ragchewing,
contests, DX, or moonbounce, get in on the excitement
of VHF hamming today with DX Array.

DX-120 - 144 mhz $29.50
DX-220 - 220 mhz 22.50
DX-420 - 432 mhz 17.50

See your local distributor or write for complete
specifications on these exciting new antennas from
the world’s leading manufacturer of UHF/VHF
Communication Antennas.

PACIFIC DIVISION

EAST BAY—SCM. Paul J. Parker, W88DHE—Well,
everyone says that the summer months bring about a

its summer get-together at the QTH of Thelma, WAT-
OMA is working in Seattle this summer. Well, it’s
that for this month. We still need more news on
activities.

OREGON—SCM. Dale T. Justice, K7WVR/WATKV
—Notes: K7PBM, W7HLS, F.H.M; W7ZPF, F.H.M
No net reports. K7IFG reports for the BSN, session 55,
traffic 171, check-ins 990. K7YQ reports for the Ore-
gon AREC Net, session 21, traffic 43, check-ins 123;
maximum number of counties 20, contacts 101. K7YQ
reports for the Salem AREC Net, sessions 28, traffic
43, check-ins 235. K7GQG reports for the GWS,
session 16, traffic 10, check-ins 22. W7GFB reports
fine opening on 8 meters and a very successful V.H.F.
Picnic. W7GCS and W7GFB are building some 492-
3.5 gear. W7GFB reports seven stations on the
local v.h.f. net in the Medford area. K7OUF is spend-
ing a lot of time in bed, but still hands in his traffic
reports. K7GQM dropped his mike and went off the air
for awhile. A new band in Ashland is W7MUY. WAT-
FTN handled 230 phone patches in S.E. ARA, in spite
of exciter trouble during the month. Traffic: K7QI
454, W7TDZ 229, W7LJY 62, K7QYM 32, W7KHY
32, K7WVL 41, W7BNS 20, K7OOF 18, W7HLS 12,
W7MLJ 11, W7JMD 8, W7CPFR 6.

WASHINGTON—SCM. Harry W. Lewis, W7JW
—Net reports:

<table>
<thead>
<tr>
<th>Net</th>
<th>QTH</th>
<th>QTC</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSN</td>
<td>250</td>
<td>85</td>
<td>29</td>
</tr>
<tr>
<td>WARTS</td>
<td>1524</td>
<td>874</td>
<td>29</td>
</tr>
<tr>
<td>WSN</td>
<td>310</td>
<td>564</td>
<td>31</td>
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<tr>
<td>WBN</td>
<td>674</td>
<td>830</td>
<td>31</td>
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<tr>
<td>ABRC</td>
<td>25</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

W7QDN reports on his EOC structure in Wash-
ington to include ten areas with morph and issues in
each. New EOC certificates have been issued to K7-
QMC, W7ATY, W7KVG, W7HJ2W, W7KQZ, W7ATX,
W7AVY, W7QDN, W7ATY, W7RGC, W7GVC, W7DTS, W7GVS,
and W7KLRD. W7UWU is in Boston for the summer.
W7DZX sends in a late traffic report for June with 236
handled. W7KZ has now made the BPL and qualified
for a BPL medalion. W7KZK is now an NCS on the
Novice Slow Speed Net which meets at 0000Z on
the second Tuesday. W7KZK submitted, 2703 Mz. W7KQY
submitted a month’s traffic report with zero for the total.
This should qualify him for the enthusiasm certificate.
W7AEB reports his activity down because of summer
disactivities. The Code Practice Net meets on 3725 kc.
(W7LBC) at 1600Z. W7OTA noted one violation of a
Novice being out of the band. W7BQ is taking
time out to rebuild the shack, repaint the house and
take a vacation. W7PI spent part of his vacation
pointing. W7GLY, Northwestern Division ARRL Di-
rector and W7POMC attended the Annual Glacier Ham-
fest in Montana. W7IDZT soon will be back on the air
with a new Swan Craget. W7QEMI submitted July
report with a letter to our Director and ARRL
requesting delay by FCC in implementing the incentive
license program. "Greetings from the 7th National Boy
Scout Jamboree located at Farragut, Idaho." This was
a common message to be heard in July with 2001
originations from Farragut and K7DOM. A hand-
written was sent on the point effort by their Spokane radio
team, the Inland Empire V.H.F. Club, the Spokane
Dial Twisters and the Spokane Radio Amatuer.
Traffic from K7BGA went out on 146.34 and 146.75
RTTY to Spokane and Hayden Lake, Idaho. Amateurs in
the Spokane and Idaho area taking part were K7-
UXS, W7BBD, W7HDC, K7C5S, K7JRM, K7LDD, W7DEQ,
W7ATY, W7KZK, W7NWE, W7COI, K7-
YBN, W7BPM, K7OY, W7GS, W7W2M, W7W1B, W7HCF
and others. Amateur in the Northwest added stations
picked up the traffic and relaid it through several traffic
networks. Participating stations were W7EA,
W7GPM, W7TQY, W7ATQ, W7WW, W7VZ, W7MO,
W7RQ, W7ATQ and others. Traffic: (July) W7BA, 2919,
W7AEG 1595, K7UXS 1290, K7LDD 1258, W7DEQ
1038, W7TQV 550, W7TM 744, W7HM 585, W7AFW
401, W7ATQ 390, W7ATQ 283, W7BOB 325, W7-
ZMW 257, K7LBO 186, W7GHC 157, W7ZREZ 150, W7-
JOG 150, W7UCA 70, W7ZM 55, W7VZ 55, W7ZOE
55, W7ATQ 45, W7ATQ 42, W7DEQ 39, W7TEU 31, KS8UX 30,
K7TVY 19, W7FX 19, W7BQO 10, K7PBM 12, K7GBF
11, W7VZ 10, W7ZMW 10, W7TQV 8, W7QDN 8,
W7W1B 8, W7ZAF 8, W7BPM 2, W7DQZ 1, W7FCE 1,
W7KQY 6 (June) W7BA 2445, W7AEG 1154, (May)
W7BA 2225, K7UXS 1490, W7AEG 1163.
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FULL in station activity but I don't believe it and I have a stack of activity reports for the last two months. Official announcements this month go out to W6IPW, and W4DZL, and endorsements to W6UZQ and W6-
QWY. Good work fellows, and keep the station activity reports coming, Gene Dorion sent me a note
letter. W6CFB had a zaz time in the CD Phone Party with a score of 749, Clyde also received his teleph
forces day certificate after a long wait. W6IPW re-
ports that traffic is somewhat light this month. Oh, and I almost forgot, K6GP has just been appointed
ORF and spent July on vacation. JAIQBQ made the
BPL again, even with a vacation thrown in there. Due to"also was busier than NM and PAN in July.
K6YQ has been pretty busy with outside activities
and Z-19 has been very busy with outside activities
these past few months and has not been on the air
much. W4UZQ seems to have a pipe line into Europe
these days and I think the radio phone is a regular
thing with the people on the other side. WATTS has been
building a line to go along with his other home-
brew radio gear. Well, it was great to hear from all
the people in the section. I hope all who are on vaca-

HAWAII—SCM, Lee R. Wied, KH6ZFB—SEC; KH6GZ, PAN; KH6QW, KM; KH6AD, VEL; PAN; KH6BE, QSL, Mgr.; KH6DQ, RACES Node; (40, 20, 8 and 2 meters). Coordinated with K6AIK.

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NEVADA—SCM, Leonard M. Norman, W6PV-
SEC: WATBEG. The ARRl Nevada QSO Party rules are in force. For full details in issue of QST. KTRKH is operating portable. W7DMI is no longer a bachelor. W7QPA is a bug collector. K7KX should be back to work in a few weeks. LQHQ may become a million-rater on TWA before the summer ends. K7UQT, the Reno area 2-meter f.m. repeater, also will transmit on 147.490. K7DQK, reports working Albuquerque, Amarelo, Tulsa and Memphis on 2-meter f.m. repeaters on his vacation.

SACRAMENTO VALLEY—SCM, John F. Minke,
III, WFKY/W6MPJF—ECs: K5HRI, W6SMU, WAT-
TQJ, RMA: W6LZK, W6VDA/6

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RF-130 1KW HF/ISB TRANSMITTER

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AREL lists members in 19 out 20 S.V. counties, the hold-out being Alpina County. It would be appropriate if those of you who participate in the California QSO Party the first week end in Oct., would please send your logs. Traffic: (July) W6TV 334, W6NZ 41, WB6XAE 12, W6VUZ 2. (June) W8VDA 151.

SAN FRANCISCO—SCM, Hugh Casey, W8AUI
SEC: W6WLV, W6BYZ made the BFL am in July for the seventh month in a row in 1961. W6DQJ is working on a solid-state transmitter in the wilds of Etzbergh. K6TWJ still continues to be the section mascot on the Golden Bear Net while W6IDP, in San Francisco, is checking into the Mission Trail Net. W6WLV was in the hospital but is out working traffic again. W6BXY is getting ready to relinquish his fire duty at Knoa and will have time for more operating in the future. W6HJP visited AREL Headquarters during Aug. New in DX activity from the Northern areas are K6UAP, W6CEK, W6EJQ, W6EJQ, W6BOJ, Losale, passed away June 23. Heard in the July CD party were W6WLV, W6RQP and W6DID, W6IDQ attended the Western Washington DX meeting in Seattle in Aug. W6ZC has returned from a trip through Western Europe. W6DQJ has been doing a lot of fishing but continues to get in some sessions with the NCM handling traffic. While mobile to Missouri on vacation, W6ALK and W6ULD managed to work six states. W6LUZ visited Walla Walla while over on the coast from the Sacramento Valley. Quick action by W6BCE in noting the legislation to increase the costs of call-sign license plates some 2000$ a plate has started action which killed the possibility. W6AUD, on being notified, alerted all of California to the danger. The map before the State Senate Transportation Committee at which time all references to amateur plates was deleted from the legislation. The Marin Club handled communications for a Joycey Opera Pageant, the Disce Drama and the Mariner Club in Aug. Traffic: (July) W6WLV 304, W6DQJ 54, W6VUZ 39, K6TV 27, W6RVP 19, W6AUI 19, W6DID 19, W6XCY 1. (June) W6AUI 4. (May) W6WLV 59, W6DQJ 8.

SAN JOAQUIN VALLEY—SCM, Ralph Saravana, W6P0U—W6COY is a new v.h.f. appointee, W6UQO is being heard on 75 m.s.b. W6SRJ has moved to a new QTH and it is on a ridge 3000 ft. high. W6UBR is running two kw. on 10-15-10, W6NRV is building a 200 watt amplifier for 6 meters. W6OOL is moving with a Swann 300. W6VMH has a 4T-530 and is back on the air. W6ROB, the voice of Heartwick, is on the air with a Drake Line. W6JMP is on 75 and 40 m.s.b. and is holding daily skeds with K6DQG. W6BDC is in the Central Coast, Single-Sideband A.O. W6BZKX is putting up a four-element tri-band beam. W6ZKS is active on the high frequencies. W6COY is back on the air. K6KOL is putting up antennas at his new QTH. W6ZKM reports that additional stations are needed in Fresno, Tulare and Bakersfield to handle traffic. You can by checking in on NCR on 3450 kc, at 2000 and 0300Z every night, and on RNC on 3550 kc. every night at 0245Z and 0400Z. K6GTI went salmon fishing and his vacation, W6WLV cut out of Alameda County in Aug. The Delta Amateur Radio Club meets the 3rd Tue, in Stockton at the Dan Webster School. Traffic: (July) W6SCC 293, W6XCU 47, 56XO 40. (June) W6COY 30, W6BZKX 17.

SANTA CLARA VALLEY—SCM, Albert F. Gnatano, W6VYZ—SEC: W6VZE, RM: W6AIFC. W6AIFC has a yen for family net, he keeps teams with his brothers, W6BEU and W6IAO, and his nephew, K7TIO. In between times he handles phone patches for the seversing on Guam and other W1XH. The DXN reports that traffic is picking up on NCR on 5350 kc, every night and 0300Z on 3550 kc. every night at 0245Z and 0400Z. K6GTI went salmon fishing and his vacation. W6WLV cut out of Alameda County in Aug. The Delta Amateur Radio Club meets the 3rd Tue, in Stockton at the Dan Webster School. Traffic: (July) W6VZONE 1058, W6WSY 237, W6AFLA 235, W6BVE 215, W6DEF 136, K6DQG 97, W6VUZ 48, 56XO 19, W6WLV 22, W6FGT 18, W6BZKX 17, W6ZJZ 4, W6BZKX 17.
ROANOKE DIVISION

NORTH CAROLINA—SCM. Calvin M. Dempsey, W4UQC—Asst. SCM; James O. Pullman, W4YTR. SEC: W4AILWE, RM; W4IRE, PAM; W4AJT, V.H.F. PAM; W4NJJ. We are getting some nice reports from our OOs. This looks for the fine party we had on Field Day are the Rowan Amateur Radio Club, Raleigh Amateur Radio Society, Seymour Johnson Air Force Base, and Bynum amateur radio Club. The Yadkin Valley Amateur Radio Club is setting up an emergency net on 10 meters.

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Opequon Radio Society of Martinsburg, received a
first-place plaque from ZSIAK during the Annual
Convention. WM7AAX, a new QSL card, was issued
during the convention and will supply a special QSL card. WM7AAX is active on the C and O
Nets. Opequon plans to make regular QSL cards.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Charles M. Cotterell, WOSIN—
WCON, Joe Mantell, K4BU, is the SCM, and W4HLOQ,
RM: W0LHN, PAM: W0CQ, FLF: PAM, Jere Ne-
ares: WA0LH, W0AHL, QSL cards have renewed the EC
appointments of W0HKS and W0AHL of Delta, K0DXF of Poncha
Springs and K0FA, of Florence. K0FO, W0FD and W0GW, W0WYX has a new mobile on the
2-meter repeater. K0JSD has been out of town
but still managed to put up a good tow. W0AHL 
with WA0LVAI and many others provided communica-
tions for the Burro Race. W0LHW and WAOUS were in the July CD Party. WAOUS has
extended his invitation to Craig and several amateurs were on vacations.

COLORADO—ZS, K0KQD, sent out 12 cooperative reports for July
and W0LHW is getting started with 1. W0M0X is active again as an OVS and is busy on antennas.
He reported some troops on 344 and 432 for stations
above 8000 feet. The Colorado State VHF Society
plans to meet in Boulder. We have a total of 232
registered VHF members. Why not you, Mr. ARRL
member? New Colorado Code of Corpora-
tion and Columbine and Hi-Noon are down. Co-

SAVE!

W1RQG 699, W0FES 602, W0WYX 128, K0JSP 120, K0T0T 27, W0SIN 17, WA0LJK 8, W0LHW 8, WA0PGM 8, W0PKQ 2, W0LCE 2.

NEW MEXICO—SCM, James R. Prine, WSNUT—
At a joint meeting of the three Albuquerque radio
clubs on July 7, George Hart, W1NJJ, presented a
program on "The League Activity"... interest in f.m.
repeater operation is very much apparent
in the state. Groundwork is being done to
establish a repeater for multiple locations in the
Denver, Colo., The Roadrunner Net desires particip-
ants from Santa Rosa, Hobbs, Las Vegas, Farming-
ton, Truth or Consequences, and Fredonia on
3015 kHz. at 1800 Mountain Time and get ac-
quainted. WSNUT has completed installation
for emergency communication capability. Traffic: W0D9JG 10, WSNJT 29, WSNUT 16, WJSLE 13, WSNJY 10, WSN
9, WSNJX 4, WSN0J 4.

UTAH—SCM, Thomas H. Miller, W7QWH—The
present status of appointments in the Utah section is as
follows: EOC, W7WKF, OS; W7RGN, W7RGN, W7RGN,
W7OYX, WM7LH, W7FQM, W7KTR, W7KTR, OS; W7KZS, W7KZS, W7KZS, W7KZS, W7KZS, W7KZS, W7KZS.
This will be a busy task for the Utah section, especially during the summer months. The time
was accomplished primarily on the region level net, TWW. The Rocky Mountain Divi-
sion Convention held in Salt Lake City, July 4-4 was
considered successful. Our Vice- Director, W3THL, was in the host-hotel and every effort was made to get
the division down to Salt Lake. Robert Ray Harmon, W7WKF, is a
lifetime ARRL member, OS K7ZS has been active during the summer. He sent out 19 reports during
July. Hann should appreciate more the work
done by OOS in saving many from getting a "ticket" from the FCC. Traffic: K7TLR 506, W7ATN 103, W7OYX 102.

WYOMING—SCM, Wayne M. Moore, WQ6Q—SEC;
K7NQX, RM: K7RSA, PAM: W7T7MK, K7SLM, OBS: K7SLM, K7NQX, W6S6A, K7TAQ, WAFBE, Neta: Pony Express, Sun. at 0800 on 3920; KY,
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  - Reed relay keyed output
  - TTL integrated circuit logic
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  - Monitor frequency and volume adjustable from the rear panel
  - Magnetic tension paddle assembly
  - Instant character start
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daily at 0130 GMT on 3610; Jackalope, Mon. through Sat. at 1215 on 7200; WX Net, Mon. through Sat. at 0830 on 3920; PO Net, 1900 Mon. through Fri. on 3900. New appointment: WATGQK as SC for Lamorim. Another newlyweds—K7FM—was married the first part of Aug. WTYWW is out of the hospital and back on the air again. KF5AL is in the service of Germany. We got an ex-WYX, W7MQ, DHR, ex-W7LMZ, is now in the Cooper, The Wyoming Mobile Club held its first picnic near Cheyenne Aug. 4 with roasts, eats, etc. There are prints, parades, etc. making sure to have the Wyoming Hamnet every year on the third week out in July at a place to be chosen each year. Get me a line with your comments. Thanks: W7DTA 61, W7TTZK 52, K7VWA 23, W7AEK 10, K7AHO 8, W7ATGQ 5.

SOUTHEASTERN DIVISION

ALABAMA—SCM. Donald W. Bonner, W4WLG—SEC: K4KJD, KM: W4HPU, PAM: W4AEKC. The Alabama 8M AM Bird Net is operating now on 50.11 at 1000Z Tue. and Thurs. You can contact any five hands in Shelby County (Morphine) and get their operator permit certificate. W4WME is in Germany and wants some phone patches into Huntsville. Contact the SCM for details. K4UIMD now has mobile and emergency power equipment. Good to know WH2W has been on a long vacation. W4ATIM has his Extra Class ticket, K4KJD is back on the air after over 20 days in the hospital and surgeon. He had a real sick boy there by himself but it's good to have your back. Billy, W4A4M has a new TR-2, 30-ft. tower and TD-5. John, W7GK, has W4B8K, 90, W4BDJ 90, K4A0Z 89, W4FYV 75, W4BMT 60, W4QIN 37, K4WOP 34, W4MBB 21, W4COP 19, W4CGI 19, W4BQG 15, W4BCD 12, K4UIMD 10, W4AEG 3, W4GQH 5, W4WJ 3. K4KJD, K4ATIM 1.

CANAL ZONE—SCM, Russell E. Oberholtzer, KZ-0K. A recent visitor to KZ-0T, Lamp was W4NKK. Dan is well known for his tour of duty on the Canal for a few years back. W4WKE in the Zone is operating KZ3DR. KZ3IK is on statewide on a vacation—hamming, too. The CARC held a farewell dinner for KZ3SWR and his XYL, who are moving to Alaska. KZ3LM now is pres. of the CARC with KZ3DR as vice-pres. KZ3SS and KZ3SN are happy with their son and his XYL visiting from the states.

EASTERN FLORIDA—Acting SCM, Ronald J. Lecoo, W4YFX—SEC: W4YTTX, Ass’t SEC: W4CSM, RM: K4RMY, c.w. W4WWM, RTY, W4QOG, PAM 78; W4SDR, PAM 40; W4ABMG, PAM V.H.F. Official Bulletin reports were received from W4A6YU, K4LEPS, c.w. K4QDAX. Good news from County RACES. W4LEP, c.w. W4WIHD and ex-Hudson Division Director, now is back in action as Radio Officer for that County. Now that the hurricane season is at hand be sure to have a plan B. K4EYH, RM for c.w. now on the U. of B, Fl., has been in charge of bandsmanship and classes, according to his Pop, W4DVO. Multi-appointment while results at the fact that XYL, Angie is now General, W4JFH; FAST Net manager; PAM 78. Some announce new NCSs are W4BYVE and K4SCIL. Vero Beach ARC and Jacksonville’s NOFARS both announce new Novice classes starting after school begins. Jacksonville’s 2-meter repeater, W4IZ, hopefully is on the air by this time, in on 146.34, out on 147.60. W4MEPD is fixing some of the cables in his new 2-meter fm. rig. The massive power outage from Ft. Lauderdale to Miami early in Aug. gave an opportunity for Florida to try out new practice for the Florida Side-Banders Emergency Net on 3940. Mobiles and generator-powered base stations in the affected area were well represented. Time looks to be proud of the highly organized damage control set-up sponsored by the Florida Side-Banders Assn. Ex-Atlanta, W4WQF, c.w. W4QAK, c.w. W4QXG, c.w. W4QW, now is Jackson, Ok., BHR, W4QOH, c.w. W4XG, with a new call. K4LO, W4BMRG, the star of the John and Barbara show several years ago, now is communicating with beautiful in lanado, from the Navy complex in Brunswick, Ga., with a new Swam. John provided the SCM with mobile-unit information tables. Tradition (July) W4QIT 599, W4A4M 427, K4EHY 279, W4VJO 218, W4B4CD 126, W4A4FG 117, K4WJH 115, K4DX 114. W4WFW 114, W4WDR 85, W4WEPX 85, W4FRLW 73, W4HEJ 67, W4LE 60, W4AZK 53, W4Y3Y 43, W4SMK 31, W4XGK 30, K4QFX 44, W4WTO 38, W4WJ 37, W4WEPX 34, K4LSC 35, W4B4PD 32, W4MDDH 26, W4SVO 25, W4JWW 28, K4JPS 26, W4ADL 25, W4BLN 20, W4YFT 26, W4B4DA 19, W4BNE 11, W4LX 11, K4-
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SAN DIEGO—SCM, Richard E. Leffler, W6QOE
I wish to thank W6KSA and others for their
nominating me to the SCM position for
the next two years. The biggest event for Oct. is
the oncoming The national ARCS are at the Hilton
for the 17th-19th get-together is the S.D. 200th Pres.
Charles Cordell, W6SAG, Clubs: The El Cajon ARC
has rules and logs for your Award. No.
Shores has conducted a "Name the Paper" contest.
A new specialized group has begun under the
of 80DFMARRA. Chairman for this fun group is
K4APS/8, V.H.F., held its 8th anniversary meeting in
Aug. Look for S.D. County Amateur Directory sales
by the Palomar RC, pomJAM and W6H-CQ, and all members of the ARC of El Cajon.
Section News: We're sorry to note the passing of
W6MOYE. Look for satellite information on the Astro
Net this month. Tomations at W6AIB (Pendleton), W6AKRN got his quad up for
20. WAPC is kept busy visiting clubs for CEPH.
The new EC for the 2-meter band is W6AIB.
EC for Imperial County is W6DLM, K0BHI has
received a BPL certificate every month for more than
13 years! K6FIO and W6AIB are OVS. Would
like to have more of you reporting in each month.
Ask for Form I cards from me. Everyone in this
section is invited to contribute station activities re-
ports to me. Listen to S.D. OBS for the latest
information. Remember: Oct. 17-19, See you there?
Traffic: (July) K0BHI 9551, W6VNO 531,
K-H 18, W6QOE 14, K5FRE 2, (June) W6OT 238.

SANTA BARBARA—SCM, Cecil D. Himson, W6-
OKX—SEC: KEGV, R.M.: W6UJ, W6DPV has
received the degree and is working for the
Navy at Port Hueneme. W6B6BZ has built the AD-1
a.f.s.k. which was described in a recent QST article.
W6DEQ is busy at summer school work but not too
busy to work on an all-hand rhodio antenna. W6BQP
devotes his spare time to civil defense efforts. W6B-
W6 is still working with his 1/4 K. W. QRP rig. The Santa Barbara ARC operated 4 trans-
mitters during Field Day covering 89 through 2 meters
(excluding the 6 meter) The site of activities was Bell
Tower Hill and the report indicates it is a great location
for all bands, including V.H.F. W6B6BWZ (EC for
the Santa Barbara Valley) has originated a letter to all
potential ARPS members. Those interested in the
Santa Maria area should call W6B6BWZ at 903-5531.
The Mission Trail Net Roundup was held in June at
the Santa Maria Inn, reports K6EQV, who is the
newly-elected secretary. The Mission Trail Net meets
seven days a week at 1000 local time on 3820 kc.
Traffic: W6DE6 60, W6DPV 44, W6UJ 25, W6-
W6K 11.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. E. Harrison, W5-
LH-Asst. SCM: Gene Pool, WSNFO, SEC: W9JSM.
PAM: W5QW, PM: W5QW, W5N: W5QW, WSS: W5QW
QZQ: Asst. SEC: W9KHE, Field Day messages for
extra points continue to come in, The NBT is due in
Jan. His test covers many facets of the club, similar to FD. If you do not understand SET ask
W9JSM, he's the man. Our new Asst. SEC East Texas, W9KHE, is looking for Emergency Coordin-
ators. W9HT is most interested in League affairs.
The Garland Amateur Radio Club personnel is de-
veloping a computer application for the North Texas
membership list. The July issue of CapRock Radio
Society carried an editorial entitled, "You once me
your list, now what?" which raised an eyebrow and
it like it was, W9JSM and Division Director W5EYB
attended a HACES meeting in Austin Aug. 2. Our
SEC reports that 125 are now participating in
cw work, including 40 ARRC members attending
48 drills, 30s W5QW, W5QX, W5SMQ, W5BN,
W5YD, W5F and W5QWP. They also indicated the
understand the Lake Merval Hamfest in Panola County
had an attendance of about 250. A new QO certificate
Class I CQ was issued. The W5QW Club Swap meet
is set for Sun., Oct. 23. The East Texas Emergency
Net reported a total of 51 sessions, 550 check-ins,
4 sessions free to the public. The four Radio Days
July '90. K5QK, Athens, Texas is Net Control. The
Arlington Christmas Party will be held Dec. 18. The
Panhandle Amateur Radio League plans their first
of Panhandle Weather Net, meets on 3940 kc.
00 p.m., daily. Net Mgr. is W9FEGO. The Shaw
Family, P.O. Drawer 516, W5JRI, Worley, W9JRI
of Arlington are all very happy. W5JRI is back from his Merchant Marine travels. W9JMK checked
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MONTAB—arry Stacey, VE1FT—SEC: VEC11A, PA1: VEGQ9, KM: VEGQ1. It is a pleasure to announce that VEOA has accepted the position of SEC. John is a leader in the ABED, and many activities are available for members to participate in. The ABED activities are all held this month: some summer dahors have set in. Not reports MN, K1F, Q52, C1T, and Phone reports are due by the 15th. Traffic: VEOQ1, VE1CR9, VEOPJ8, VEO8, VE1Q4, VE1E8.

MARITIME—CMC, William G. Gillis, VEO2R—SEC: VE1HJ. Two-meter mobile highlights much of the summer activity. P.M. operators are operating at 0000 hours and several others may be on this band. At the same time, visitors have checked in while on vacation. APD would like to see more stations calling in. VE1FM reports this month: APD reports a new location. APD reports a new location. APN reports operations. With summer drawing to a close let's have more equipment and check in. APN reports operations.

ONTARIO—CMC, Roy A. White, VEO8UX—SEC: VE1E8W. It would be appreciated if the VE2 boys would be good enough to avoid 3370 at 2200Z week days. VE2DMU is in the Ontario Phone Network. It's only for 30 minutes or so. A hearty welcome to VE1FSW, who is now a controller on the Ontario Phone Network. We need more. Traffic: VE2DMU and VE2FSW. Are you eligible? I promised a field appointment. Drop a line. Please inform that traffic and other reports reach us not later than the 5th of the following month. My deadline is the 5th. VE2DMU has been transferred to the East Coast from Ottawa and will be at a tower of the first half of June. VEO10C will be in Carleton County and we very much like to find a replacement. Will you help? Another loss is VE2FDN, who has moved to VE2L-land. VE2JG in Windsor, probably due to a traffic jam not. 3565 to serve the southwestern portion of Ontario. It would operate at 2200Z. Dick's PTX4000 is down in April and he hasn't got it back yet! Glad to hear VE16F is active and putting out a darned signal with his new HW-100. You should see the award medals CARTG has for the 1961 World Wide DX RTTY Contest. Oct. 1-6. About 250 turned out for the competition. VE2PN in July was up to 500 watts and 250 watts by October. VE2PW tells me that no less than 56 blind amateurs are now licensed in Ontario. Lots of VE2 boys converted VE2KU following the launching of Apollo II both on phone and CW, and await their certificates. Summer vacations, garden statues, etc. hit the bands during July and August. VE2PW tells me that no less than 56 blind amateurs are now licensed in Ontario. Lots of VE2 boys converted VE2KU following the launching of Apollo II both on phone and CW, and await their certificates. Summer vacations, garden statues, etc., hit the bands during July and August. VE2PW tells me that no less than 56 blind amateurs are now licensed in Ontario. Lots of VE2 boys converted VE2KU following the launching of Apollo II both on phone and CW, and await their certificates. Summer vacations, garden statues, etc., hit the bands during July and August.

QUEBEC—CMC, J. W. Hebb, VE2OJI—VENDA is in the new QTH in VE2L-land. VEOJ9 is replacing VE2CA now located in VE2L-land. The VE2CA Phone Net (FQ) on 3780 kc. is very active and VE2BH requests traffic for your reports. VE2BPA makes his presence felt again. VE2DK'll hints at giving up traffic-handling. VE2FR is Z-meter mobile. It will be a scene when VE2WI leaves 3780. Another good signal is VE2BD. Time one OQN Manager VE2ZRY paid us a visit in August. Trying to keep VE2BDR busy. The new director for RAQ. Three Rivers VE2BAI and VE2BML keep very active and VE2GBP contacted the AO Clag for a rare one. VE2BN now in Secretary. VE2BZ has several local clubs. VE2EY keeps the newsmen busy. Now that fall and winter activity is with us, please consider how you will help if you are going to be active. VE2EY reports operations. VE2EY reports operations.

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<table>
<thead>
<tr>
<th>Filter Type</th>
<th>XF-9A</th>
<th>XF-9B</th>
<th>XF-9C</th>
<th>XF-9D</th>
<th>XF-9M</th>
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<td>SSB</td>
<td>AM</td>
<td>AM</td>
<td>CW</td>
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<td>Bandwidth (6 db down)</td>
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<td>3.75 kHz</td>
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<td>Step Band Attenuation</td>
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<td>100 db</td>
<td>90 db</td>
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<tr>
<td>Price</td>
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<td>$22.50</td>
<td>$29.50</td>
<td>$29.50</td>
<td>$20.95</td>
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Working together, the members of ARRL have for fifty years provided the base of support from which our great public-service hobby has grown and maintained the precious privileges that many amateurs now take for granted.

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15,000 VOLT R-F SWITCH

The No. 51001 features high voltage insulation and a non-arc tracking and arc resistant molded frame. Both collector and switched contacts break contact. Additional features include heavy duty silver contacts and insulated mounting. The No. 51001 has self-cleaning wiping action on contacts, insulated shroud, and is available with two to six contacts.

ADDITIONAL FEATURES:
- Positive Snap Action
- Contacts Break Clean
- Positively Non-Shorting
- Large Air Gaps
- Long Leakage Paths between Contacts
- Rugged Construction

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MAIN OFFICE AND FACTORY
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MASSACHUSETTS
NEW DRAKE MODEL TR-6 6-M SIDEBAND TRANSCEIVER

- Exclusive Features
- Greatest Value
- Unmatched Performance

GENERAL SPECIFICATIONS
- SIZE: 5x4" high, 10¾" wide, 16½" deep (plus feet and knobs). WEIGHT: 15¾ lbs.
- FREQUENCY COVERAGE: 49.4 to 54.0 MHz (crystals supplied for 49.9 to 51.1 MHz).
- VFO DIAL CALIBRATION: 1 kHz divisions; dial accuracy is within ±1 kHz.
- CALIBRATOR: 100 kHz calibrator built in.
- FREQUENCY STABILITY: Less than 100 Hz overall drift per hour after 15 minutes warm-up; less than 100 Hz for 10% supply voltage change.
- SPLIT FREQUENCY OPERATION: Xmt and Rcv frequencies may be separated by up to 600 kHz by use of the RV-6 or FF-1 accessories.
- MODES: SSB, AM, and CW.
- POWER SUPPLIES: Drake AC-3, AC-4, DC-3, DC-4 or DC-24.
- TUBES AND SEMICONDUCTORS: 19 tubes, 7 bipolar and 3 field effect transistors, 12 diodes.

RECEIVER SPECIFICATIONS
- SENSITIVITY: Less than 1/10 microvolt for 10 db S/N ratio at 2.4 kHz RSP.
- SELECTIVITY: 5 db bandwidth 2.4 kHz with USB filter provided, Accessory filters available for LSB, AM (6 kHz) and CW (3 kHz).
- AUDIO RESPONSE: 400 to 2800 Hz at 6 db.
- INPUT: 50 ohms unbalanced.
- OUTPUT: 4 ohms to speaker or headphones.
- AUDIO OUTPUT POWER: 2 watts at 10% HD.
- AVC: Output variation less than 3 db for 60 dB input change. Fast attack, release time selectable.
- MANUAL GAIN CONTROL: RF gain control sets threshold for AVC, AF gain control.
- DETECTORS: Switch on front panel. Product detector for SSB and CW. Envelope detector for AM.
- NOISE BLANKER: On-off switch for accessory noise blanker on front panel.
- INPUT: 13.9 to 14.5 MHz receiving input/output jack for converters and/or output jack for receivers.

TRANSMITTER SPECIFICATIONS
- POWER INPUT: 300 W PEP on SSB, 300 W PEP on AM. 300 W CW (50% maximum duty cycle).
- OUTPUT IMPEDANCE: 50 ohms nom, unbalanced, 2:1 max. SWR adjustable loading.
- MODES: SSB (USB provided), LSB with accessory filter, AM (controlled carrier system), CW (semibreak-in, Sidetone).
- AMPLIFIED AGC: Prevents flat-topping.
- CARRIER INSERTION AND SHIFTS: Automatic on AM and CW, shifted carrier CW system.
- VOX AND PTT: VOX and Anti-VOX built-in.
- AUDIO RESPONSE: 400 to 2800 Hz at 6 dB.
- 40 dB SIDEBAND SUPPRESSION above 1 KHz. 50 dB carrier suppression.
- DISTORTION PRODUCTS: Down 30 db minimum from PEP level.
- MONITORING AND METERING: Final plate current, AGC action, and relative output can be read on meters. Sidetone for keyed CW.
- OUTPUT: 13.9 to 14.5 MHz output for Drake TC-2 and other transmitters.

Model TR-6 $599.95 Amateur Net

COMPARE THESE FEATURES
- Full coverage of 6 meter band plus MARS.
- Four IF band widths: 2.4 kHz upper sideband (supplied), 2.4 kHz lower sideband, 3.0 kHz AM, 0.3 kHz CW, all selectable with front panel switch.
- Function switch selects product or envelope detector as well as built-in AM screen modulator, compatible with linear amplifiers.
- No carrier balance or carrier insertion adjustment for AM or CW.
- Shift carrier CW system for compatibility and versatility.
- Ultra-stable linear VFO. 600 kHz in one range, 1 kc readability.
- Built-in PTT, VOX, ANTI-VOX, 100 kHz calibrator.
- ALC prevents flat-topping.
- Ample metering provisions with two meters. For ALC, S-Meter, Transmitter Plate Current, Relative RF Output.
- RV6 External VFO allows split-frequency operation, (RV3, RV4 usable).
- Fast or slow AGC for receiving. For meteor scatter work, selectable from front panel.
- Ultimate receiver front end performance using FET's. Less than 1/10μV required for 10 dB S/N ratio on SSB.
- Input and outputs provided for Drake TC-2 or other 2-meter transmitters. All switching done internally with band switch.
- 300 watts CW and PEP input.
- 6JB6 final tubes eliminate replacement problems.
- Extra input and output jacks for converters and/or output board receivers. Permits monitoring of more than one frequency simultaneously.

Model 9NB Plug-in noise blanker accessory: $95.00

See your distributor or write for free brochure:
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TRA-6 ACCESSORIES
- RV6 Remote VFO. Separates receive and transmit frequencies within the same range...$99.95
- FF1 Fixed frequency adapter...$24.50
- MMK-3 Mobile mounting kit...$8.95
- Power supplies
  - AC-4 120 V 50/60 Hz...$99.95
  - DG-12 VOX...$125.00
  - DG-24-CV VOX...$195.00
  - MS-4 Matched speakers...$19.95

175
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... $475.00

CAL-25. Plug-in 25KH$_2$ solid state calibrator .................................................. $25.00
VOX35C. Plug-in VOX control unit ................................................................. $29.95
F3. Plug-in 300 Hz CW filter ........................................................................... $29.95
RF550 R.F. CONSOLE. A precision wattmeter in the range of 3.5/30.0 mHz — Contains switch to select 5 antennas or a dummy load (not supplied) .................. $69.00
SC550 SPEAKER CONSOLE. A matching speaker with headphone jack — AC400 power supply will mount inside ................................................................. $25.00
AC400. Full power, heavy duty state supply for 115/230 volts ....................... $89.95

GALAXY LA550 LINEAR AMPLIFIER. 200 watts PEP input on SSB, 1000 watts DC input on CW/RTTY. Band switching 80 thru 10 meters, with some adjacent MARS and special frequencies.

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GALAXY RV550 REMOTE VFO. A solid state VFO complete with simple plug-in cables. Gives flexibility of a separate transmitter and receiver.

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**Heathkit® SB-101**

- **180 watt PEP SSB input** — 170 watts CW on 80 through 10 • Switch selection of USB, LSB or CW • Built-in CW sidetone • Heath Linear Master Oscillator features 1 kHz dial calibration • Built-in 100 kHz crystal calibrator • Triple Action Level Control • Front panel selection of built-in 2.1 kHz SSB or optional 400 Hz CW crystal filters • Built-in VOX • Run fixed or mobile with appropriate power supplies • Fast, easy circuit board wiring harness construction

**SB-101 SPECIFICATIONS — RECEIVER SECTION:** Sensitivity: less than 1 microvolt for 15 dB signal-plus-noise to noise ratio for SSB operation. SSB selectivity: 2.1 kHz minimum at 6 dB down, 5 kHz maximum at 60 dB down — 2.1 nominal shape factor — 6-60 kHz. CW selectivity (with optional CW filter SBA-301-2 installed) 400 Hz minimum at 6 dB down, 2.0 kHz maximum at 60 dB down. Input Impedance: Low impedance for unbalanced coaxial input. Output Impedance: Unbalanced 8 and 600 ohm speaker, and high impedance headphone. Power output: 2 watts with less than 10% distortion. Spurious response: {} Image and IF rejection better than 50 dB. Internal spurious signals below equivalent antenna input of 1 microvolt. TRANSMITTER SECTION: DC power input: SSB: 180 watts F.E.P. continuous voice. CW: 170 watts — 50% duty cycle. RF power output: 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 ohm non-reactive load). Output Impedance: 50 ohms to 75 ohms with less than 2.1 SWR. Oscillator feedthrough or mixer products: 55 dB below rated output. Harmonic radiation: 45 dB below rated output. Transmit/Receive operation: SSB: Push-to-talk or VOX. CW: Provided by operating VOX from a keyed tone, using grid-block keying. CW side-tone: Internally switched to speaker in CW mode. Approx. 1000 Hz tone. Microphone input Impedance: High impedance. Carrier suppression: 50 dB down from single-tone output. Unsolicited sideband suppression: 55 dB down from single-tone output at 1000 Hz reference. Third order distortion: 20 dB down from two-tone output. Noise level: At least 40 dB below single-tone carrier, RF compression (TARC): 10 dB or greater at .1 mV final grid current. GENERAL: Frequency coverage: 8.5 to 4.0; 7.0 to 3.5. 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5. 29.0 to 29.5. 29.5 to 30.0 (megahertz). Frequency stability: Less than 100 Hz per hour after 20 minutes warm-up from room ambient conditions. Less than 100 Hz for 1% line voltage variations. Modes of operation: Selectable upper or lower sideband (suppressed carrier) and CW. Dial accuracy — *“repeatability”*: Within 200 Hz on all bands. Electrical dial accuracy: Within 400 Hz after calibration or nearest 100 Hz point. Dial mechanism backlash: Less than 50 Hz. Calibration: 100 kHz crystal. Audio frequency response: 300 to 2400 Hz ± 3 dB. Phone pad impedance: 8 ohm or 600 ohm receiver output to phone patch; high impedance phone pad input to transmitter. Front panel controls: Main (LMO) tuning dial; Driver tuning and Preselector; Final tuning; Final loading; Mic and CW Level Controls; Mode switch; Band switch; Function switch; freq. Control switch; Meter switch; RF gain control; SSB-CW filter switch; Audio Gain control. Internal controls: VOX Sensitivity; VOX Delay; Anti-Idler; Carrier Null (control and capacitor); Meter Zero control; CW Side-Tone Gain control; Relative Power Meter Adjust control; F.A. — Bias; Phone Vol. (headphone volume); Neutralizing. Rear Input Connections: CW Key jack; 8 ohm output; Space A; Space B; Phone patch input; Mic input; Power and accessory plug; RF output; Antenna switch; Receiver Antenna. Power requirements: 700 to 800 watts at 250 ma; 300 watts at 150 ma; 12 volts at 10 ma/12 volts at 4.26 amps. Cabinet dimensions: 14”x9” W x 6”H x 13¾” D.
Here are many exciting solid-state hobby projects

For you, in this manual from RCA, are 35 construction projects to satisfy your hobby interests for the coming months. This addition to the expanding RCA technical library, the RCA Solid-State HOBBY CIRCUITS MANUAL, HM-90, has "something for everyone"—from beginner to expert. The 35 circuits are of interest to electronic experimenters including hams, motorists, photographers, home owners, and music and hi-fi buffs. Circuits are described in detail with circuit schematics, layouts, templates, parts list and photographs. In addition, there are sections on theory and practical applications of solid-state devices—including integrated circuits and MOSFET units as well as a section on trouble shooting and testing.

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See your RCA Distributor today for your copy of HM-90, published by RCA Electronic Components, Harrison, N.J. 07029