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Novices! The GL-807 power tube is your biggest dollar value most versatile performer!

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Start right with economy GL-807's! Design your first rig around this low-priced, versatile, efficient power type! Your G-E tube distributor will be glad to assist you with complete tube information. See him today! Tube Department, General Electric Company, Schenectady 5, New York.

GL-807
Beam Power Amplifier

<table>
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Electronics Tubes of All Types for the Radio Amateur

General Electric
BETTER
LC RATIOS
at high
frequencies

... with beam power tubes

B&W Types CX and JCX Butterfly Variable Capacitors with coils integrally mounted pave the way for increased efficiency in single-ended circuits.

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FEBRUARY 1953
VOLUME XXXVII • NUMBER 2

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

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Subscription rate in United States and Provinces, $4.50 per year, prepayment $4.75 in the Dominion of Canada; $5.00 in all other countries. Single copies, 40 cents. Foreign remittances should be by international postal or express money order or bank draft acceptable in the U. S. and for an equivalent amount in U. S. funds.


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representation of the radio amateur in legislative matters, and for
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GEORGE V. COOK, JR. ....... W2OBU
45-47 259 St., Bellefonte 26, N. Y.
Vice-Director: Thomas J. Ryan, W2KCD
                            1082 Anna St., Elizabeth, N. J.

Midwest Division
WILLIAM J. SCHUMHRT ..... W8ZJN
310 S. Vine St., Waukesha, Wisconsin
Vice-Director: James E. McKinnon, W8MYV
                            1404 S. Tenth, Sault, Ontario

New England Division
PIERCE C. NOBLE .......... W1RVR
35 Broad St., Waltham, Mass.
Vice-Director: Frank L. Baker, Jr., W1ALP
                            91 Atlantic St., North Quincy, 71, Mass.

Northwestern Division
R. REX ROberts ............ W7CPE
237 Park Hill Drive, Puyallup, Mont.
Vice-Director: Karl W. Weingarten, W7BGO
                            3219 N. 24th St., Tucumcari 7, N. M.

Pacific Division
KENNETH E. HUGHES ........ W6CIS
3900 Clover Drive, Sacramento, Calif.
Vice-Director: Russell F. Ochreitz, W6ATO
                            243 Colusa Ave., San Francisco 22, Calif.

Roanoke Division
P. LANIER ANDERSON, JR.
314 Madison Lane, Danville, Va.
Vice-Director: Gus M. Browning, W4RPO
                            135 Broughton St., E. R., Orangeburg, S. C.

Rocky Mountain Division
FRANKLIN R. MATEJKA ....... W0DD
P. O. Box 272, Fort Collins, Colo.
Vice-Director: Claude M. Maer, jr., W0IC
                            710 Lafayette St., Denver, Colo.

Southeastern Division
LAMAR HILL ................ W4BOL
104 South Street, Columbus, Ga.
Vice-Director: Ernest W. Barr, W4GCR
                            911 Rosemary Ave., S.W., Atlanta, Ga.

Southwestern Division
JOHN R. GRIGGS .......... W5RKB
10112 Doh Pico Rd., RFD 2, Spring Valley, Calif.
Vice-Director: Walter R. Jost, W6FJK
                            1314 N. Overhill Dr., Inglewood 3, Calif.

West Gulf Division
A. DAVID MIDDLETOWN ...... W5CA
9 Ray Road, Thiers, N. M.
Vice-Director: Carl C. Drumeller, W5RHC
                            6024 W. 28th St., Oklahoma City 12, Okla.
"It Seems to Us...

THE DEATH OF CLASS A

Well, the Commission has settled, presum-
ably once and for all, the question of whether
special qualifications will continue to be re-
quired for operation with voice on certain ama-
tear bands; they won't be. Effective February
18, 1953 (see "Happenings" in this issue for
details), any amateur licensee except Novice or
Technician may use voice anywhere it is per-
mitted; more specifically, newly in the 3800-
4000 and 14,200-14,300 kc. suballocations.

This question has been the subject of debate
in amateur circles for years. At one or another
of its meetings, the ARRL Board of Directors
has devoted much attention to it. There are
valid arguments pro and con. But when all was
said and done, it always has been the Board's
view that a higher license (Class A, or its new
name of Advanced Class) with a moderately
more difficult examination and some extra
privileges was a desirable thing for amateur
radio and the Board consistently maintained
that view; this was not only long before the
Commission injected itself into the matter, but
throughout the last several years of FCC's
often-conflicting rule-making proposals dealing
with privileges and licenses.

The Commission has been far less consistent.
Its present action is, rather, an astonishingly
complete reversal of views it expressed in a
separate matter (Docket 9295) less than four
years ago. At that time, as will be recalled, it
had "reflected upon the general situation in
which the Amateur Radio Service finds itself"
and concluded that we needed "a new overall
plan or blueprint to provide scope and direc-
tion for the immediate and long-range develop-
ment of the service." Part of its objective was
defined as "a program which provides for en-
couragement for advancing skills in both the
communication and technical phases of the
art." A study of detailed proposals in the
original document provides one inescapable
conclusion: the Commission was going all out
to force drastically upwards the standards for
voice operation. For example, at that time it
proposed to establish 6-kc. (and other) band-
widths of emission in our voice suballocations.
More significant, it proposed that all Class A
holders were to lose their special privileges out-
right, and every single one of them who wanted
to continue 75- and 20-meter voice operation

was to be obliged to go again to an FCC office
and take a new Amateur Extra Class examina-
tion with a really tough technical written test,
and a code speed of 20 w.p.m., so much tougher
than Class A as to raise serious question of the
ability of any great number of amateurs to
qualify. In the League's view, such require-
ments were wholly unrealistic for the 'phone
privileges sought. The League battled both
these proposals, and won. For a while the Com-
mision continued to insist, however, that
though it would let present holders of Class A
keep their privileges, after a certain date all
newcomers would have to take the tough exam.
It was obvious that in the Commission's view,
not only should there be a special exam for
'phone (and possible other) privileges, but it
should be much tougher than Class A. That
view has now, apparently, switched 180 de-
grees. It is the Commission's final decision in
the whole drawn-out subject that no special
examination is necessary. (Throughout the
entire time the League's position was that
Class A should be continued, as it was, as a
practical but not discriminatory incentive to
improvement of the art.)

Among the arguments, pro and con, in the
amateur debate on this subject over the years,
we recall such things as the relative knowledge
of Class B and C versus Class A licensees,
"favored few," TVI problems in the 28-Mc.
Class B band, claims of class distinction, and
so on. But we think we correctly interpret the
Board's view, which has been consistent, when
we say that none of these, pro or con, had any
major effect on the ARRL decisions. Rather,
it was adherence to a view expressed, surpris-
ingly enough, by the Commission itself as one
of the purposes of the amateur rules quoted
earlier: "encouragement for advancing skills."
The Board felt that the stepping-stone princi-
ple, the providing of an incentive for personal
improvement, was a part of that objective.
Even in an isolated case where a ham might
memorize the License Manual answers, at least
he would learn in the process.

On the other hand the Commission appar-
ently now takes the obverse view; at least, its
decision completely removes the practical
incentive for self-improvement. It seems to us
that the effect will be to stagnate the great
body of amateur radio at the General Class
level. Don’t misunderstand — that’s quite a respectable level. But the FCC decision is a step backward from the theory of progressively higher levels which held attraction for most all of us, which gave us the incentive for moderate technical improvement (or at least a refresher), and which is now withdrawn.

We think the Class A license served amateur radio well; we think it still could aid in a desirable objective. However, by Commission action, which we believe the body of amateur radio neither asked for nor wanted, it no longer has that opportunity.

Strays

W3lez thinks he’s found the ham with the shortest call — WIDIT.

Many TVIs in the Belleville, Ill., area will soon get plenty of real TVI. W9BA reports that a Channel 54 station will go on the air there in May. Its call sign? WTVI.

W8JDC just obtained his ham ticket. His name — Paul E. Newcomer. We’ll be watching for another item on him 20 years hence when he joins the Old-Timers’ Club! — W1FWH

Add new odd applications for the Pride of Marconi: U.h.f. pack-portables now serve as liaison between main offices and pick-and-shovel crews in larger cemeteries. — W2QPP

W4TBO finally got around to firing up a BC-374A on 75 meters eleven months after purchasing it from W9DSB/1. The first comeback? None other than ex-W9DSB, now W1YSB.

Tape-Respondents International, an association of hobbyists who enjoy exchanging tape recordings — “talking letters” — with fellow recorder enthusiasts throughout the world, seeks to enlarge its membership. Amateurs desiring information about TRI may write Fred Goetz, Secretary, 3488 22nd St., San Francisco, Calif.

Does your high school or junior high school have an amateur radio club? A roster will be compiled of all replies to this item. To be sure your school club is in the first issue, write to Willis C. Brown, Room 3643, U. S. Office of Education, Washington 25, D. C. Give him the following (and any other) information: Name of school, town, state, name of club, name of president, when club meets, number of members, special activities, exhibits and demonstrations. Copies of the list will be available on request when compiled and should help you make schedules with other schools having similar activities. You may apply for a copy merely by sending Mr. Brown the facts about your club.

Our Cover

An historic milestone in amateur radio — the first use of a transistor for transmitting purposes — is depicted as the designer of the equipment, George M. Rose, K2AII, operates what is probably the lowest-powered rig ever to be used in amateur communication. The complete transmitter (with power supply!) rests on the camera tripod in the foreground. Details on page 65. (Photo by Fred M. Wenzel)

Hamfest Calendar

MICHIGAN — Saturday, February 28th, at the Rowe Hotel, Grand Rapids — the Grand Rapids Amateur Radio Association will hold its annual Midwinter Hamfest. The 3:00 p.m. session will include a Michigan Council of Clubs meeting, traffic net meeting and a “swap and chop” affair. There will be a business meeting in the evening. Phil Rand, W1DBM, ARRL technical consultant, will be the principal speaker and will conduct afternoon and evening demonstrations of practical TVI elimination measures. Accompanying him will be Lewis G. McCork, W1ICP, of the ARRL Technical Department. Tickets may be obtained by writing the Secretary, Grand Rapids Amateur Radio Association, Box 323, Grand Rapids, Michigan.

Nineteenth Annual ARRL DX Contest

'Phone: Feb. 6th-8th, Feb. 20th-22nd; C.W.: Mar. 6th-8th, Mar. 20th-22nd

Amateurs everywhere are invited to take part in the 19th Annual ARRL DX Competition. There will be two week-end periods devoted to c.w. participation and to 'phone. Special certificate awards will be given to the highest-scoring c.w. and 'phone stations for each country and each continental U. S. A. and Canadian ARRL section entered in the contest. Operators outside the U. S. and Canada will attempt to work as many W, K, VE and VO stations as possible. Exchange of serial numbers will be required. Complete rules and details on scoring appear on page 35 of January QST.

The contest periods will be divided for c.w. and 'phone as follows: first 'phone period will begin on Feb. 6th at 7:00 p.m. EST and end on Feb. 8th at 7:00 p.m. EST. The second 'phone period will be scheduled during the same hours from Feb. 20th to 22nd. The first c.w. period will begin at 7:00 p.m. EST on Mar. 6th and end at 7:00 p.m. EST Mar. 8th. The second c.w. period will be scheduled during the same hours from March 20th to 22nd.

Though not necessary for entry in the contest, ARRL will supply convenient report forms upon request. If you request report forms from Headquarters, please indicate whether you plan to enter the c.w. section, the 'phone section, or both.
The "Ultimatic"—
The Key with a Memory

Automatic Spacing with a Margin for Manual Error

A
n
article
in
QST
some
time
ago
described
an
electronic
key
that
sent
automatic
spaces
as
well
as
automatic
dots
and
dashes.
The
author
described
it
as
an
"infernal,
maddening
machine"
because
it
required
that
the
operator
"stay
with
it"
all
of
the
time.
The
continuously
running
time
base
resulted
in
an
uncontrollable
"beast"
that
would
wait
for
no
one.
If
the
key
was
not
closed
at
the
instant
of
the
marking
pulse
the
character
was
lost.
However,
using
the
basic
idea
of
a
continuously
running
time
base
and
adding
"memory"
to
the
key
transforms
the
"beast"
into
a
"beauty."
Once
the
key
has
been
closed
to
select
a
character,
that
character
is
stored
and
properly
transmitted
when
the
"mark"
pulse
arrives,
even
if
the
key
is
open,
or
closed
on
the
opposite
side.
And
adding
"sequencing"
allows
the
storage
of
a
dot-dash
(or
dash-dot)
dot
series,
even
if
both
are
stored
before
the
appearance
of
the
first
character
at
the
output.
Stated
simply,
with
the
key
set
for
10
w.p.m.,
you
can
hit
a
40-w.p.m.
"N"
and
walk
away
while
the
key
produces
a
slow
"dash-dot."

In
general,
the
"Ultimatic"
key
considers
interletter
and
interword
spacings
as
specific
code
characters,
just
as
much
as
the
dot
and
dash.
These
all-spacing
characters
are
delivered
in
exact
one-
and
two-cycle
duration,
just
as
start-
stop
autokeys
deliver
exact
one-
and
two-cycle
marking
characters.
The
memories
provide
tremendous
timing
leeway
at
the
key
for
selection
of
a
succeeding
character,
in
some
cases
as
much
as
three
cycle.
The
astounding
ease
of
operation
due
to
this
leeway
cannot
be
fully
appreciated
without
some
knowledge
of
how
the
circuits
work.
The
key
combines
a
free-running
time
base,
a
differentiating
network,
a
dot
generator,
a
dash
generator
that
starts
the
dash
for
completion
by
the
dot
generator,
a
dot
memory,
a
dash
memory,
a
sequencing
circuit,
a
regulated
power
supply,
a
heavy
iron
base
and
the
front
half
of
an
old
bug.
Shoehorn
it
all
into
a
3×4
×
6-inch
box
and
you
have
the
Ultimatic,
a
key
that
gives
Klein
output
with
Lake
Erie
input.
It
does
everything
for
the
operator
but
spell
and
punctuate.

The
sketch
in
Fig.
1
illustrates
to
some
extent
the
potentialities
of
the
key.
The
top
line
shows
some
possible
key-lever
positions
in
sending
the
word
"MICE,"
and
the
second
line
shows
the
perfect
copy
that
comes
from
the
key.
The
third
line
shows
the
positive
and
negative
pulses
of
the
time
base
—
it
can
be
seen
how
they
line
up
with
the
code
characters
in
the
output
and
thus
account
for
its
perfection.
Note,
however,
that
the

*Here
is
something
that
comes
as
close
to
being
an
electronic
brain
as
you
are
likely
to
encounter
in
amateur
radio.
A
big
step
forward
in
the
automatic-key
field,
it
has
the
ability
to
hold
a
dot
or
a
dash
and
send
it
at
the
proper
time,
thus
eliminating
much
of
the
need
for
perfect
rhythm
on
the
part
of
the
operator.
As
the
inventor
says,
"It
gives
Klein-
schmidt
output
with
Lake
Erie
input."

The
history
of
the
key's
development
is
a
story
in
itself,
and
one
that
we
have
followed
with
the
author
for
about
a
year
and
a
half.
During
that
time
several
versions
have
been
submitted
to
QST,
and
uncounted
more
have
been
devised
and
tested
by
the
author.
The
present
key
is,
therefore,
a
simplification
of
the
original
concept
and
a
key
that
anyone
can
build
and
put
to
use.

901
N.
1st
St.,
Banning,
Calif.
1
Herbstreit,
"Automatic
Spacing
of
Letters
and
Words
for
the
Electronic
Key,"
QST,
April,
1951.
2
Pat.
pending.
key takes over from the operator and corrects his timing errors. For example, his poor spacing of the “M” and “I” would normally show up as a poorly-sent “Z,” but here the too-short space allowed after the completion of the “M” is corrected to a full letter space by the Ultimatic. Farther along, the first dash of the “C” is made too soon after the “I,” but the key corrects for it, as well as for the sloppy spacing within the “C.” The “C” also illustrates the memory principle to its fullest capability — notice that the last dot of the “C” is hit while the last dash is just starting, but it shows up correctly in the output.

This particular model was selected for description because it proved to be the simplest to build and the easiest to adjust. Motor-drivencams, capacity-delayed buzzers, square sine wave and sawtooth oscillators, etc., have been used success-fully for the base time. Directly-operated relay integrators, flip-flop triggers, gas triodes, blocked oscillators, transistors — all work equally well as marking generators, memory and sequence circuits. With three more inches on the box, secondary memories fit in, permitting advance storage of a full letter C or unslant A ( - - - ).

**General Circuit Data**

A hazard was introduced in minimizing this model's bulk and, for safety's sake, the line rectifier and heater string should be operated from an external isolation transformer. Unregulated 140 volts is fed to the relays, while the cathode-coupled multivibrator is run from 108 volts regulated and decoupled to prevent reaction from relay and line surges.

All relays are open in the idle circuit condition, as shown in the schematic in Fig. 2. The back contacts are shown above the relay arms and will be called “B” in the discussion. The contacts made when the relays are closed are shown below the arms and will be called “C.” The figure “BC” would therefore refer to the contact closed when relay $K_b$ is energized. A constant holding current of 1.5 ma. flows in all relays via series tubes or resistances. This does not cause operation of the relays, but holds them closed after pull-in by a pulse.

To separate the functions of the various components in the circuit, a tabulation is given below:

<table>
<thead>
<tr>
<th>Component Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power: $CR_1, R_6, R_7, R_8, C_1, C_9, V_7$.</td>
</tr>
<tr>
<td>Time Base: $V_1, V_2, C_3, C_8, R_3, R_8$ (speed range limiter), $R_4$ (speed control), $R_5$ (mark-to-space control).</td>
</tr>
<tr>
<td>Differentiator: $C_4, R_1, R_2, R_3$ (lead isolation).</td>
</tr>
<tr>
<td>Dot Generator: $V_4, V_5, R_9, R_{10}, R_{11}$ (dot output), $K_2$ (dot memory clear).</td>
</tr>
<tr>
<td>Dash Generator: $V_6, V_7, R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}$, $R_4$, $R_8$, $C_6$ (release delay), $K_a$ (dash output), $K_4$ (dash memory clear).</td>
</tr>
<tr>
<td>Dot Memory: $K_7, C_3, R_{22}, R_{24}$.</td>
</tr>
<tr>
<td>Dash Memory: $K_2, C_7, R_{22}, R_{23}$.</td>
</tr>
<tr>
<td>Memory Clear: $C_6, R_{24}$.</td>
</tr>
<tr>
<td>Sequence: $K_5, R_{29}, R_{31}$.</td>
</tr>
</tbody>
</table>

**Time Base**

The time-base generator is a cathode-coupled multivibrator, which generates rectangular-shaped waves. The on-off ratio can be adjusted by the setting of $R_6$. The square wave output from $V_2$ is passed through the differentiator circuit $C_6 R_{10}$ only, the spikes shown in the third line of Fig. 1 get through, corresponding to the rise and fall of the square wave.

**Dot Generation**

These alternate positive and negative pulses are applied to the grids of $V_4, V_5$ and $V_6$. When the key is idle, the cathode of $V_5$ is heavily biased and the pulses have no effect. Ground on the dot bus from the key or dot memory applies 13 volts cut-off bias to the cathode of $V_5$ from $R_{15} R_{19}$. The first positive pulse at the grid of $V_5$ then produces a 4-ma. peak pulse through $K_1, K_2$ and...
The marking output starts at closed 1C. The 1.5 ma. through R8 and V4 holds K1 and K2 closed until the following negative pulse cuts off V4 and releases them. A second dot marking baud cannot be generated until the arrival of the next positive pulse, one baud later. This provides the spacing baud to complete the dot.

Dash Generation

Similarly, V3 closes K3K4 on a positive pulse when the dash bus is grounded at the key or dash memory. Dash output begins at 3C. K3 and K4 hold in via R14 and 1B. The opening of 2B lifts ground from the grid of V3. When the following negative pulse cuts off V4 and V5, the grid of V3 is raised to its plate potential via R8 and R9 during the pulse. K1 and K2 close on the resultant 4-ma. pulse through V3 to continue the marking output at 1C. The K3K4 holding current is now interrupted at open 1B. These relays release after C8 charges. This delay guarantees that 1C closes before 3C opens. The following positive pulse does nothing except momentarily pulse K3 and K4 if the dash bus is grounded. The second negative pulse releases K1 and K2, as in dots.

Dot Memory

While the memory is idle, C8 discharges across R29. Grounding the key dot contact charges C8 through K7. The 8-ma. peak pulse closes the relay, which then holds in on the 1.5 ma. through R25, R29 and 7C. Ground is maintained on the dot bus at 7C independently of the key. When K2 closes later on for this stored dot, discharged C8 is applied to the top of K7 via 2C, releasing the relay to clear the memory. Steady ground at the key generates successive dots. The resistor R24 is more than a spark suppressor—it also prevents reverse-current hang-up of the relay because of the large capacity of C6.

Dash Memory

Similarly, ground at the key dash contact closes K6 by charging C7. Independent ground is maintained on the dash bus at 6C. The memory is cleared by C6 via 4C and 2B when K4 closes at the start of the stored dash. Contact 2B is never open when 4C initially closes on a dash. When 2C does close after 4C has already closed, C6 has charged up enough so that it does not affect K7. Therefore, the action of 2C clears only the dot memory, and 4C only the dash memory. Steady ground at the key generates successive dashes.

Spacing Characters

A one-cycle interletter spacing is obtained if the new letter is started at the key any time between the two successive positive pulses following the preceding letter's last spacing baud. The key need be merely bumped, not held until the second pulse. The memories hold the character until that second pulse. Interword spacing of two cycles is obtained by starting the new word at the key any time between the second and third positive pulses following the preceding word's last spacing baud. In Fig. 1, the key may be bumped, or held solidly, any time between "x" and "y" to start the "C."

The first two characters of a letter may be stored during the last cycle of the spacing character. The time base thus corrects underspacing at the key, and the memory eliminates the necessity for the manual delay used to get adequate spacing, which usually results in overspacing.

The "Ultimatic" key is built on two sides of a sheet of plastic, and the whole is mounted on an iron plate.
Accurate overspacing in three- and four-cycle units is available for feeble signal work.

**Sequencing**

A dot and a dash often are so rapidly stored, in that order, that both busses are grounded before the dot is started by a positive pulse. Subsequent closure of 2C by the dot generator clears the dot memory, but the simultaneous brief closure of 4C by the dash generator does not clear the dash memory because of open 2B. The dash remains in storage until the dot is completed and then appears after the dot's spacing band. Contact 4C clears the dash memory this time, as 2B is closed.

A problem arises when a dash-dot combination is similarly stored. Ground on both busses would permit operation of the dot generator first, converting the stored dash into a dot to be followed by a dash in reverse order. However, when K₅ stores the dash the opening of 6B provides 6 ma. to pull in K₅ via still-closed 7B. When 7B opens as the dot goes into storage, the current through K₅ drops to 1.5 ma. for holding. Open 6B removes the memory ground (and key) from the dot bus until the dash has been started first and the dash memory cleared. Contact 6B then re-shorts K₅, and the stored dot reappears as ground on the dot bus via 5B. The dot follows the dash in the order keyed.

Returning to the combination dot-dash: 7B opens first (on the dot), so the current through K₅ is only 1.5 ma. when 6B opens (on the dash), and the relay does not close. Ground on the dot bus therefore appears through 5B. As the dot starts and the dash memory clears, 7B closes. K₅ pulls in since 6B is still open on the stored dash. After this instant another dot to follow the dash may be stored for an "R." The "Sequence" would then be holding a dash-dot series.

**Timing Leeway at the Key**

It is to be noted that once a character has been stored in the memory it appears at the output in the order of selection, independently of the position of the key. A dot can be coming out while the key is being held to dashes, or while the operator is applying a match to his pipe. A stored dash can be transmitted while the operator waits over on the dot side or just relaxes. For the amazement of visiting speed merchants, one can crank the speed down low and demonstrate the maximum full three-cycle interval during which a dot may
be struck off when it follows a dash in a letter. In ordinary sending not much more than one or two bands of leeway is actually used or needed within a letter, but by taking advantage of three or more bands of leeway, continuously perfect letter and word spacings come up with no attention whatsoever paid to the spacing.

If Fig. 1 were transmitted as is, it would read ZTR E, and very poorly at that; yet it comes out MICE a la Klein, with proper letter and word spacing. Any character can be keyed as late as the positive pulse that would start the character, or as early as right after the pulse that starts a foregoing spacing cycle or like marking character. When it is the second character in a letter, it can be stored as early as right after the pulse that starts the last spacing cycle prior to the letter (after storage of the first character, of course).

**Construction**

The Ultimatic key works equally well spread all over the work bench or jammed into the same volume occupied by an ordinary bug. The photographs show some of the details. The relays and associated RC components are assembled on top of the notched ¼-inch lucite deck. The four sockets are fastened to the lucite bracket glued to the deck, with most of the time-base and generator components tied to the socket terminals. The power supply components and speed control are mounted on and about the bug frame. $R_3$ and $R_5$ are mounted under the frame with shafts projecting through counterbored holes in the 4 × 6 × ½-inch iron base. The deck is then attached to the base on four long pillar bolts and the few interconnecting wires tied down. No tie-point strips are used. Resistor and condenser leads pass through small holes drilled in the plastic and are secured with solder blobs on the far side. Wires are tied to these leads on both sides of the lucite. The entire circuitry could just as well be spread out in the station rack with only the key and speed control leads brought out to the deck.

The cover is ¼- and ½-inch plastic sheet cemented together and painted with black auto lacquer. The base and rear of the cover are riddled with ¼- and ½-inch ventilation holes. That weird knob accommodates the radically different reaches and techniques of the author and wife while it plugs up the unavoidable slot in the cover.

**Adjustment**

The relays are all initially adjusted to close on 2.0 ± 0.1 ma, and to open on 1.0 ± 0.1 ma. These figures are readily met with 0.008-inch armature travel and 20 to 23 grams spring tension when the operated contact is turned in just far enough for reliable contact. With two relays in series in the generators there is a tendency for one relay only to close on the exceedingly short pulse. A slight variation of the armature travel at the back contact on one relay of the string equalizes the relays for simultaneous operation. Use of d.p.d.t. relays such as the 10,000-ohm Potter Brumfield type

(Continued on page 120)

Another view of the key shows the four tubes mounted between the iron and plastic plates.
Structural Details of the Detroit C.D. Portables

How-To-Build-It Information on the Result of the Mass-Production Project Described Last Month

BY GUS E. UNDY, W8YNC,* AND JOSEPH A. GARDELLA,** WSWFA

In a recent issue was told the story of how amateurs in the Detroit area built their own hand-carried portable rigs on a group basis. Many requests have been received for the details of this unit.

The sets in question are complete float-power stations with separate r.f. sections for transmitting and receiving, not transceivers in the usual sense. Their power amounts to 80 milliwatts output by actual measure at the antenna terminal when using the bottom-loaded whip described here. Eighty milliwatts may sound insignificant in a day when kilowatts are the password, but it can provide solid contact between two of these units a mile apart. In tests with fixed stations, DX on the order of five miles has been logged frequently.

The receiver is a 1U4 superregenerative detector preceded by a 1U4 r.f. amplifier to increase gain and reduce detector radiation. The transmitter consists of a crystal-controlled 3V4 oscillator-doubler using a 40-meter crystal. This drives a 3V4 doubler in the final to 29 Mc. The modulator and audio stage also use a 3V4.

Placement of parts is not too critical if caution is used in preventing long leads and interstage coupling. The layout shown in the photographs seemed to work out best in practice. If parts must be substituted for those in the original design, be sure allowance is made for any difference in physical size. The audio output transformer was specially built for the Detroit group on a production basis. Individual constructors will find the UTC 0-9 "Onner" transformer an excellent substitute.

The slug-tuned circuits are quite broad and are best tuned with the aid of a grid dipper. L1 is peaked at the 7-Mc. crystal frequency. L2 is then peaked at the second harmonic of the crystal and L3 to the output frequency. L4 in the receiver is also rather broad and can be tuned over approximately half of the 10-meter band. The coil values given will peak up best on the high end of the band. The 100-ohm units built here were all tuned up on 29,610 kc., the Detroit civil defense mobile frequency. The unit could be made more flexible by replacing the 5-µfd. fixed condenser across L4 with a miniature variable or padder type. For emergency work, however, it was decided to make the receiver fixed tuned.

The bias battery shown in the photographs was made by cutting up "B" batteries into three-cell units. This would hardly be economical unless the construction was to be on a production quantity. For individual units, bias cells or "Teflite" cells will be more suitable.

A 4-section send-receive switch is used to perform the following functions: Section A — antenna, Section B — earphone on-off, Section C — transmitter or receiver filaments, Section D — modulator filament. It will be noted that Section B could be eliminated by leaving the earphone permanently connected in the circuit, but some of the audio power needed for modulation would be wasted thereby.

Two sections are required for filament switching, in order to be able to cut off the modulator filament when the set is turned off, this tube being common to both transmit and receive positions.

Battery location can readily be seen here. The positive "A" battery terminals contact an insulated copper strip not shown. The "A" batteries are held in place and grounded by the three phosphor-bronze springs on the cover at left. Microphone and earphone connections are also on the cover. The antenna may be removed for storage or to allow the station to be used with full-sized antenna.
Fig. 1 — Schematic diagram and parts list for the Detroit portable transmitter-receiver.

C₁,  C₄ — 5-μfd. ceramic.
C₂,  C₅ — 10-μfd. ceramic.
C₄,  C₆ — 0.01-μfd. disk ceramic.
C₆,  C₁₀ — 75-μfd. ceramic.
C₇,  C₁₁ — 0.001-μfd. disk ceramic.
C₈ — 12-μfd. 150-volt electrolytic.
C₉ — 680-μfd. ceramic.
R₁ — 0.33 megohm.
R₂ — 47,000 ohms.
R₃ — 1 megohm.
R₄ — 3 megohms.
R₅,  R₆ — 0.1 megohm.
R₇ — 33,000 ohms.
All resistors 1/2 watt.
L₁ — 48 turns No. 30 s.c.w., jumble-wound.
L₂ — 26 turns No. 30 s.c.w., close-wound.
L₃ — 11 turns No. 22 s.c.w., close-wound.
L₄ — 3 turns No. 22 s.c.w., close-wound, adjacent to cold end of L₂.
L₅ — 14 turns No. 30 s.c.w., tapped at center, close-wound.
L₆ — 6 turns No. 30 s.c.w., at grid end of L₅. All coil forms 3/8-inch diam., slug-tuned (CTC LS-3, or equiv.).
L₇ — Antenna loading coil. 13 turns No. 22 enam., spaced 8 turns to an inch on top end of hard fiber form 1-inch diam., 4 inches long.
BT₁ — 41/2-volt bias battery (see text).
BT₂ — 90-volt "B" battery (2 Burgess XX30 45-volt batteries in series).
BT₃ — 11/2-volt "A" battery (3 flashlight cells in parallel).
RFCh — 2.5-mH r.f. choke.
S₁,  S₂,  S₃,  S₄,  S₅,  S₆,  S₇ — 4-pole 3-position wafer switch (Mallory 32432-J).
T₁ — 200-ohm prim. to 0.5-megohm sec., single button to single grid (UTC O-14 "Quencer").
T₂ — 10,000-ohm prim. to 50-ohm sec. (UTC O-9 "Quencer").

Bottom view of the chassis. At upper left is the bias battery described in the text. The coils, left to right, are the final plate, final grid, oscillator plate and detector coil. Sockets along the bottom of the photograph are the final amplifier, oscillator, modulator, detector and the r.f. amplifier, in that order. Note that the construction is compact, yet not overly crowded.

"The works" of the 10-meter portables. The first three tubes from the left are 3V4a, the two on the right 1U4a. The slug-tuning adjustments are along the center of the chassis. On the front left corner is the output transformer, next the off-receiver-transmit switch, the crystal and microphone transformer. At far right, the "B" battery clips and "A" battery positive strip.
The case and chassis were built of steel and brought the total weight of each unit to six pounds, including batteries and antenna. This weight can be cut to 4½ pounds by using aluminum. Even at six pounds the weight is not objectionable. The batteries last an average of 16 hours on intermittent service. A piece of fiber separates the batteries from the chassis.

The photographs show the antenna clearly. The whip section is a Buick auto radio replacement part and extends to 46 inches. The leading coil form is made of four inches of hard fiber, one inch in diameter. The coaxial fittings were employed to facilitate the use of existing antennas at home stations where emergency power is not available for the "big" rig.

There are perhaps many refinements that can be made on the unit, but in Detroit the design shown has been highly successful. With over 100 of these compact hand-carried units already in service, the Detroit Office of Civil Defense has added another muscle to its mighty communications arm.

Fig. 2 — Detail drawing of the chassis and case parts for the hand-carried portable rig.
The Clapp Oscillator—and How!

An Explanation of the Series-Tuned Colpitts Circuit

BY REX CASSEY,* ZL2IQ

• In this article, ZL2IQ discusses the principles behind the popular Clapp VFO circuit, and applies the theory to practice. A discussion of the "remotely-tuned" Clapp is included.

Many of the peculiar results obtained with the Clapp oscillator can be explained by a simplified analysis of the circuit, such as the one given below based on the work of Sandeman of the B.B.C.¹ Give it a few minutes' study and you'll be surprised how many improvements you can make on your oscillator!

The basic r.f. circuit for the Clapp oscillator is shown in Fig. 1. The oscillatory circuit consists of the series-tuned circuit $L_1C_1$ together with its loss resistance $R$, and the feed-back condensers $C_2$ and $C_3$. The condition where the feed-back energy balances out the losses in the circuit, i.e., the condition for oscillations to occur, is given by

$$R = -\frac{1}{2\pi}X_2X_3$$  \hspace{1cm} (1)

where $X_2$ and $X_3$ are the reactances, respectively, of $C_2$ and $C_3$.

The condition determining the frequency of oscillation is given by

$$f = \frac{1}{2\pi}\frac{1}{\sqrt{L_1C_1\sqrt{1 + \frac{C_1}{C_2} + \frac{C_1}{C_3}}}}$$ \hspace{1cm} (2)

(see Appendix).

Just take another look at that formula (2) above. What does it tell you? Sure—the frequency of oscillation; but that's not all by a long shot. It also tells you how to make your oscillator have high stability! Take a good look at that expression under the square-root sign on the right. It includes $C_2$ and $C_3$, the feed-back condensers. The value of the effective capacitance of these two condensers will change as the loading of the oscillator is varied, since they have the effective grid-cathode and plate-cathode capacitance in parallel with them. However, the resultant changes in frequency will be quite small because of the effect of that square-root sign. If we make the tuning capacitance, $C_1$, small and the feed-back condensers large, the expression under the square-root sign will be very nearly unity, and the frequency becomes relatively independent of the feed-back condensers and dependent only on the series-tuned circuit, $L_1C_1$. Hence, dynamic instability attributable to change in tube capacitance is effectively eliminated.

What else can we find out from that expression under the root sign? One thing is that it can tell us why the oscillator is often called the "series-tuned Colpitts." It will be seen that the expression never quite reaches unity, but is always slightly larger. Putting it another way, the oscillator frequency can never be the same as that of the series-tuned circuit alone, but is always slightly higher. If we made the same as the resonant frequency of the series circuit, we would have merely a pure resistance of value $R$ across the $e_1$ terminals of Fig. 1. We would not expect the circuit to oscillate in that case. However, at a higher frequency the reactance of the series circuit will be positive and it will look like a small inductance across the terminals. This is equivalent to the circuit condition we have in the normal Colpitts! Are the Colpitts and Clapp oscillators the same? No. Thanks to "Cathode Ray" with his reactance-frequency diagrams,² this has been made abundantly clear. Briefly, if we used only an inductance, the inductive reactance across the $e_1$ terminals would vary very slowly with change in frequency. By using a series circuit, $L_1C_1$, however, a small change in frequency causes a large change in the inductive reactance across the terminals and hence an extremely small change in frequency will be sufficient to counteract any change in the phase shift taking place around the feed-back loop. The stability is therefore very much higher than can be obtained with the normal Colpitts—probably at least 100 times more so.

There is one other difference which may be mentioned as a matter of interest. In the Colpitts we generally tune by varying the value of the feed-back condensers, $C_2$ and $C_3$, whereas in the Clapp circuit we vary the "effective" inductance across the terminals.

* 92 Aitmers St., Wellington, N. Z.

Fig. 1 — Basic Clapp circuit.
by altering the series-tuning capacitance. However, the essential difference does not lie in the method used for tuning, but in the method of providing the effective inductance in the oscillatory circuit.

Now take a look at that other formula marked (1) above. What can you deduce from it? Yes, sir, this one’s the 64-dollar question. And the answer is that if the value of the expression on the right-hand side is less than the value of $R$, the circuit just doesn’t oscillate. If the right-hand side is greater than $R$, the circuit will oscillate and the grid current will flow. As grid current increases, the operating $g_m$ falls until the value of the expression on the right-hand side equals $R$, when stable oscillations result. There’s one thing in particular you should notice in that formula. You may have the idea that if you increase the $Q$ of the coil, the efficiency and output of the oscillator will be improved. But take another look at formula (1). It’s not the $Q$ of the coil that’s the important factor but the value of the loss resistance $R$. If you put in a coil with a higher inductance and a higher $Q$, the efficiency won’t be improved unless the loss resistance has been lowered in the process.

Now let’s look at some of the problems you can solve by this “oscillation formula.”

Some of the local gang have been telling you that the Clapp oscillator is just the cat’s pajamas for stability, so you decide to build one. You were going to change from X10 to VFO before the Sweepstakes Contest, anyway. Half an hour before the contest starts everything is almost ready. You’ve checked the tuning range of the series circuit with the grid-dip meter and the range is OK. Fine— you flip the switch—and what happens? It doesn’t oscillate. Wow! Better check the plate voltage—where did I put that multimeter? Ah, yes, here it is. Just over 300 volts and the ICAS rating is only 300. Should be getting plenty output. Hmmm. Maybe it’s a bad tube. There’s a new one in the box at the top of the shelf there. Here she is—plug it in and let it warm up a bit. Now flip the switch once more — and what happens? No oscillations. Hmmm.

This is going to be a job for the soldering iron. It’s also a job where a look at that “oscillation formula” can be mighty useful. On the left-hand side of formula (1) we have the loss resistance. We could reduce it in various ways. For example, we could raise the $Q$ of the existing coil by removing the shield can and replacing it with a bigger one. This would result in a lower value of loss resistance, which is what we want. We could prune some turns off the coil, but this would mean that the series-tuning condenser would be bigger, but we have already seen that this may reduce the stability slightly. What about the expression on the right-hand side of the formula? The first part is the $g_m$ of the valve. We’ve got the correct voltages for the plate (and screen) applied so we can’t very well increase it to make $g_m$ bigger. We might be able to use another value of cathode or grid resistor, though. What else have we that can be varied? The only other terms in

the formula are the reactance of the feed-back condensers. We could increase the reactance by putting in smaller values of feed-back condensers, although this would reduce the frequency stability slightly as we have already seen in connection with formula (2). This would be the easiest way to make the circuit oscillate; but the best way

would be to reduce the loss resistance in the series-tuned circuit.

You take a look at the clock and find that there’s still 10 minutes to go before the contest starts, so you decide to reduce the values of the feed-back condensers. A moment’s work with the soldering iron and the job is done. You flip the switch once more, and—bubbety-boppey-boo—it goes!

Nice timing—still 5 minutes to go before the contest starts. You check the setting for the low-frequency end of the band and then swing the dial to check the high frequency end and suddenly “plop”—no oscillation. Down again and it’s OK. Up again and it stops. Why? Well, the only term in the oscillation formula which is dependent on frequency is the reactance of the feed-back condensers. At the higher frequency the reactance is lower and the $g_m$ would have to rise to counteract the effect. Another quick change is made. With a lower value of feed-back condenser, everything is OK, and you’re off to a flying start in that contest after all. When it’s over, you’ll have time to think out ways and means of reducing that loss resistance in the tuned circuit so that the value of feed-back condensers can be increased.

One point, which we have not considered so far in our discussions, is the desirability, or otherwise, of using a grid-blocking condenser such as $C_4$ in Fig. 2. It is certainly not necessary for the

Fig. 2 — Circuits using remote frequency control. In the circuit of (A), a single coax conductor is used between the tuned circuit and the feed-back condensers. In (B), two cables are used between the feed-back condensers and the tube.
purpose of blocking the high voltage from the grid of the tube; this is effectively done by the series-tuning capacitance, \( C_4 \). Does the inclusion of the grid condenser have any undesirable effect on the operation of the oscillator? The answer can be found by an extension of our simplified analysis of the circuit. In the analysis, we assumed that the grid voltage was equal to \( 6062 \). However, if \( C_4 \) is included in the circuit, only a portion of the voltage across \( C_4 \) will be applied to the grid, since \( C_4 \) and the grid-cathode capacitance of the tube form a voltage-divider network across the feed-back condenser. If the appropriate change is made throughout the analysis, it will be found that the right-hand side of formula (1) is multiplied by a factor of \( C_4/(C_4 + C_0) \), while the frequency formula (2) remains unchanged. If the grid condenser is very much larger than the grid-cathode capacitance of the tube, its effect may be neglected. However, it must be remembered that under operating conditions, the grid-cathode capacitance may be as much as 30 or 40 times the static value. In the case of a triode, it may be as high as 100 \( \mu F \) as a result of the Miller effect, with a 100-\( \mu F \) condenser for \( C_4 \), only half the voltage would be applied to the grid. In this case the circuit would not oscillate so readily and it may be necessary to reduce the value of the feed-back condenser to offset the effect, with a resultant loss in stability.

In general, we deduce that the grid-blocking condenser is undesirable in the case of a triode, since it reduces the efficiency and stability of the oscillator. In the case of a pentode it has little effect but is still an unnecessary element in the circuit.

Since this dissertation has been prepared as a result of reading a very interesting article by W3ASW in August QST,\(^3\) it may be of interest to comment on the effects found in the remote-controlled VFO which he described. The appropriate circuits are shown in Fig. 2.

In a description by W9ERN of a somewhat similar arrangement,\(^4\) it has been pointed out that 70-ohm coaxial cable has a capacitance of about 20 \( \mu F \) per foot. Two 10-foot lengths were, in fact, used by W9ERN in place of \( C_5 \) and \( C_6 \). In the circuits shown in Fig. 2, each of the lengths of coaxial cable would have a capacitance of about 125 \( \mu F \). The effect of this additional capacitance will depend on how it is introduced into the circuit and a number of cases are shown in Fig. 3. The circuit in A shows the normal condition, while those in B, C, and D contain added capacitance. In the normal case A, the effective capacitance which has been placed across the series-tuned circuit is 250 \( \mu F \). For the other circuits, this value will be found to have been increased to 313, 375, and 405 \( \mu F \), respectively. In the case of B, the values of \( X_3 \) and \( X_4 \) in our oscillation formula (1) above will have been reduced and the circuit will not oscillate so readily. The original conditions could be obtained by simply reducing the 500-\( \mu F \) condensers to 375 \( \mu F \). This is effectively the arrangement used by W9ERN in his oscillator circuit. However, in order to use this arrangement, a grounded-cathode oscillator circuit must be adopted. This does not present any difficulty.

In the case of C, which is equivalent to Fig. 2B, and in the case of D, which is equivalent to Fig. 2A, it will be noticed that the feed-back condensers have been by-passed by the 125-\( \mu F \) capacitance of one of the coaxial cables. This results in a portion of the current \( I_1 \) which flows in the oscillator circuit, being ineffective insofar as the production of grid voltage across \( C_5 \) is concerned, and hence lowers the efficiency of the oscillator. If we increase the current flowing in

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Mechanical Bandpass Filters for I.F. Ranges
An Approach to the Ideal Selectivity Curve

BY BEN ROBERTS,* W8IEU

For a good solid QSO in a crowded amateur band, we like to hear just one signal and nothing but that signal. The receiver that will come closest to meeting this requirement must have a selectivity curve with a flat top, straight vertical sides, and a bandwidth only wide enough to pass the desired signal. This is the "ideal" selectivity curve.

Receiver selectivity is usually increased by adding tuned i.f. stages. However, when this method is used to increase selectivity, even to the point where so much sideband power is lost that phone signals become unintelligible, the skirts of the selectivity curve may still be broad enough to pass interference from strong signals a few kilocycles away. Crystal-lattice filters 1 offer one approach to the ideal selectivity characteristic, but they are usually expensive and their commercial use has been confined to telephone-company applications.

The Mechanical Filter

An entirely new approach to high selectivity is available through the use of the "mechanical filter," a resonant mechanical device. Shown in the photograph, it consists of three sections: an input transducer, a mechanically-resonant filter section, and an output transducer. The input and output transducers are identical and use magnetostriction to convert the electrical signal to mechanical energy and vice versa. Three small metal rods are used to connect together the resonant disks of the filter section. The second disk from each end connects to a transducer by means of a small metal rod, and the two end disks are secured to the transducer housings to serve as supports for the filter section.

Magnetostriiction, which makes possible the electrical-to-mechanical and mechanical-to-electrical transformation of energy in the transducers, is a fairly well-known but rarely used phenomenon. When a highly magnetic substance such as nickel is subjected to magnetic flux, the shape and volume of the magnetic substance change. The metal will elongate, twist, or bend. The magnetostriuctive transducer used at each end of the mechanical filter consists of a small coil of wire surrounding a nickel core. Application of a 455-ke. signal (or whatever other frequency the filter is designed for) to the input coil causes a magnetostriuctive action resulting in a mechanical vibration of the nickel core. This 455-ke. mechanical vibration is transmitted through the interconnecting metal rods to the mechanically-resonant disks of the filter proper. Each disk is mechanically driven by the preceding disk, so that all of the disks vibrate at 455 ke. The last resonant disk drives the core of the output transducer. Here the vibrations of the nickel core are changed by magnetostriiction into a varying magnetic field. The output coil intercepts this field and supplies a 455-ke. output voltage.

In order to avoid a frequency-doubling action that would generate a mechanical cycle for each electrical half-cycle, a small magnet in the mounting above each transducer applies a magnetic bias to the nickel transducer core. The elec-

* © Collins Radio Co., Cedar Rapids, Iowa.
1 Weaver and Brown, "Crystal Lattice Filters for Transmitting and Receiving," Part 1, June, 1951, QST.
trical pulses then add to or subtract from the magnetism that already exists, causing the filter elements to reproduce the input cycle. There is no movement in the mechanical filter except for the imperceptible vibration of the internal filter elements.

The mechanically-resonant disks of the filter proper have extremely low losses at their resonant frequencies. Each disk has a Q greater than 2000. These high-Q components exhibit characteristics that make possible application of the theory of lossless elements to filter design. A mechanical filter can be constructed for either narrow or broad bandpass without sacrificing its nearly rectangular selectivity curve. The relatively low Q of electrical elements does not permit the design of equivalent electrical filters. Typical characteristics obtainable with mechanical filters are shown in Fig. 1, with the selectivity curve of an i.f. amplifier using nine tuned circuits (electrical elements) shown for comparison. The transmission loss of 23 db, or so through the 3-ke. mechanical filter is made up easily by subsequent amplification by vacuum tubes.

Once the mechanical filter has been constructed, it is enclosed in a hermetically-sealed case and requires no further adjustment. Connections to the input and output transducer coils are brought out of the unit on feed-through insulators whose edges are sealed to the case.

**Using the Filter**

A receiver using the 3-ke. mechanical filter in its i.f. amplifier handles differently than one with a conventional selectivity characteristic. As the receiver is tuned across the band, signals appear and disappear with more than usual suddenness. The straight-sided selectivity curve makes the band appear less crowded — such a curve is easier to interpose between two signals without responding to either of them.

Using a steep-sided 3-ke. bandwidth for phone reception is by no means standard procedure, and it requires a bit of explanation. With a good conventional i.f. curve, like the one obtained from nine tuned circuits and shown in Fig. 1, the carrier frequency must be tuned very close to the center of the selectivity curve. This is because the carrier level decreases as the receiver is tuned off. As the signal is moved off the center of the selectivity curve, the carrier level decreases but one of the sidebands does not. This results in too much sideband for the available carrier amplitude and causes the distortion (overmodulation at the detector) that always results when a receiver with a rounded selectivity curve is not tuned "on the nose." The only way to avoid this distortion is to tune the receiver to the carrier rather than to a sideband. This is the conventional way to tune a receiver; however, when we do this, we are splitting our available bandwidth between two sidebands, although we need to receive only one. Therefore, if a receiver with a conventional i.f. curve has a 3-ke. bandwidth and is tuned to the carrier, as it must be for distortionless reception, it will respond to audio frequencies up to about 1500 cycles — not to 3000 cycles as is sometimes assumed. To accept side frequencies up to 3000 cycles, the carrier must be set off to one side, and distortion will result, except at very low percentages of modulation. But the curve of the mechanical filter has a flat top, and setting the carrier off to one side does not substantially reduce its amplitude with respect to the sideband. By keeping the carrier inside of the flat-topped selectivity curve, we can tune to either sideband without introducing the "overmodulation" type of distortion. Since it is no longer necessary to split the available bandwidth between two sidebands, we can pass a given range of audio frequencies with a passband only half as wide as would be required with a conventional i.f. selectivity curve. Since only one sideband is needed for reception of a signal, setting the carrier at one edge of the passband will still permit us to hear all of the audio frequencies up to 3000 cycles, when the 3-ke. mechanical filter is used.

The 3-ke. filter is excellent for use in reception of s.s.b. signals, when used with a receiver of good

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**Fig. 1** — Selectivity at 455 kc. of two mechanical filters of different bandwidths, shown for comparison with the selectivity obtainable with nine tuned circuits at the same frequency. The narrower "skirts" and the flat "top" of the mechanical filters account for their superior performance in crowded amateur bands.
the filter it is only necessary to cut in a filter of different bandwidth. The new Collins 75A-3 receiver is supplied with a 3-ke. mechanical filter and has plug-in provisions for the optional installation of a 1-ke. filter. The 3-ke. filter is ideally suited for all types of 'phone reception including s.s.b., and for exalted-carrier reception of regular a.m. signals. Even the 1-ke. e.w. filter can be used for 'phone reception, as described above. The crystal filter is retained for phasing out heterodynes.

The mechanical filter is not just an accessory, but is an entirely new development in communications. It shows promise for use in many applications, including the simplification of single-sideband transmitter circuits. Presently, development work is proceeding toward the production of mechanical filters with higher and lower operating frequencies and bandwidths as required for special applications.

Strays

W4GJW, compiling the second edition of his Directory of Physician and Dentist Amateur Radio Operators, invites ham members of those professions to write him requesting applications for listing.

Philo TV receivers of 1951 and 1952 vintage may be dc-ITVd by means of anti-radiation shield kits (Part No. 45-1783) now available. The kits are applicable to sets having the following power and deflection chassis serials: A1, AP1, C1, C2, C3, CP1, CR3, F2 and FR2. No holes need be bored and everything fits snugly; a high-pass filter in the antenna lead at the tuner will clinch the job. — WIAVY

Silent Keys

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

W1AJS, Lee Morehouse, Marbledale, Conn.
W1QAR, Kenneth L. Sumner, East Hampden, Me.
W1EZX, Arthur J. Heckbert, Lynn, Mass.
W1UD, Isaiah Grenzer, Springfield, Mass.
W2AQF, John G. Tredwell, Suffern, N. Y.
W2IRF, Earl G. Ports, Livingston, N. J.
W2PUL, George F. Herman, Buffalo, N. Y.
W3IBT, Stephen J. Zubrecky, Silver Spring, Md.
WN3SLM, Lee S. Effenbein, Erie, Penna.
W4JYR, Darrell A. Downard, Louisville, Ky.
W5AK, Josie T. Piner, San Juan, P. R.
W5IOQQ, Dr. John A. Strickland, Alice, Texas
W5WA, John McArthur, Moss Point, Miss.
W7EGR, Ruben L. Johnson, Olympia, Wash.
W8-ABZ, M. B. West, Lima, Ohio
W8ML, Frank M. Murphy, Cleveland, Ohio
W9GA, John Dodman, Chicago, Ill.
W9MVE, N. Rex Scott, Anderson, Ind.
W9QRA, Welby E. Dahman, New Lenox, Ill.
W9TFV, Paul R. Clark, Riverdale, Ill.
W9YDG, Harry C. Young, Silkston, Mo.
V3EBA, W. Mitchell, Bramford, Ontario
A Self-Contained VFO Rig
50 Watts — 3 Bands in a Single Unit

BY GILBERT L. COUNTRYMAN,* W3HH

W3HH's 3-band VFO transmitter. The high-voltage power supply is at the left, and the low-voltage power supply, along with the clapper tube, is in the center behind the VFO box. On top of the VFO box may be seen the screw for adjusting the slug of L1. A final tank coil is soldered directly to the tank condenser and the contacts on the bandswitch. The low-pass filter had been removed when this photograph was made, but it fits on the chassis in the right rear corner.

In the November, 1948, issue of QST a VFO/crystal exciter was described that did yeoman service for several years. When the rebuilding urge developed sufficiently (aided by the advent of TV and the need for more stability), the chassis, panel, two power supplies and dial were retained. Everything else was stripped clean and a compact unit evolved that fully satisfied the following requirements:

1) Bandswitching operation in the c.w. 20-, 40- and 80-meter bands.
2) Reasonable output to permit use of the unit as either a transmitter or as a driver for a high-powered final amplifier.
3) Stable drift-free VFO control.
4) Rack construction to permit inclusion in a relay rack or optional use on the operating table.
5) Complete elimination of BCI and TVI.
6) Excellent keying characteristics.
7) Operating convenience including terminals to permit operation with relay control of the entire station, and frequency setting without putting a signal on the air.

8) Simplicity of circuit for ease of construction adjustment and maintenance.

Considerable time was spent in arriving at a final design that was foolproof and that would include all of the above requirements. The new rig is a job with two power supplies, a Clapp series-tuned VFO, one isolation stage, one buffer-doubler and an 807W or 807 final. The 807W is a ruggedized version of the 807 and is an excellent tube provided either fixed grid bias or clapper-tube screen control is used. Otherwise, its service life appears to be comparatively short. This rig includes a clamp tube which may be a 6V6, 6L6, or 6Y6G. Right now the tube in the socket is an old reliable 6L6. The circuit is shown in Fig. 1.

Complete TVI elimination has been achieved. The unit is constructed on 10 × 17 × 3-inch steel chassis and an 8¾ × 19-inch steel rack panel. The meter, MA1, is enclosed in an aluminum shield box; another small aluminum shield box contains the v.h.f. chokes, RFC7 and RFC8, as well as by-pass condensers, C27 and C28, in the a.c. input line; and a simple low-pass filter in a third aluminum box is included in the r.f. output lead. An aluminum chassis bottom cover is included. A few ¼-inch holes drilled in it permit ventilation. The sides and back are shielded with a formed sheet of ¼-inch aluminum ¾ inches high bolted to the chassis sides and back. Lengths of ¼-inch aluminum angle, drilled and tapped, permit a 10 × 17-inch aluminum top to complete the shielding. The top has clusters of ¼-inch ventilation holes drilled over each vacuum tube, and similar holes in the sides and back permit complete ventilation and at the same time keep the r.f. where it belongs.

In the photographs the shielding has been removed for clarity, but the aluminum angle

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Fig. 1 — The circuit of the W3HH transmitter-exciter shows a 6AK5 VFO and 6AG7 isolation stage operating at 3.5 Mc., a 6AG7 buffer-doubler that can be tuned to either 3.5 or 7 Mc. by its tuning condenser, C10, and an 807 final amplifier with coil switching in the output circuit. By doubling frequency in the output stage, 14-Mc. output is obtained. Two power supplies and a metering system are included.
across the panel top, to which the front of the top shield bolts, is in place.

Operation is completely stable on all frequencies without neutralization. When running full-
blast beside an RCA television receiver, there is no indication of the signal on Channels 4, 5, 7, or
9, which are the channels in use locally.

Referring to the photographs, across the front,
left to right, are the milliammeter with a toggle
switch, $S_3$, below it to place the meter in the plate
circuit of either the buffer or the doubler stage,
the National ACO VFO dial, the bandswitch, $S_2$,
and the final-tank tuning control, $C_{21}$. Below are the a.c.
on-off switch, $S_4$, pilot light, $I_1$, the VFO
switch, $S_1$, and the buffer-doubler tuning control,
$C_{16}$. A calibration card on the front panel
below the VFO dial shows the settings of the two
vfo tuning condensers for the three bands. (The settings are approximate; actually the
circuits must be tuned to the dip in the plate meter.) The only other operation necessary when changing bands is
to turn the bandswitch to the band desired, as
this switch selects the proper number of tank coil
and the correct tap for proper loading of the
final. On the rear chassis apron are the a.c.
terminals, VFO-control terminals for use if de-
sired, keystone jack, $J_1$, a jack into which a milli-
ampmeter may be plugged to read the grid current of the
$807$ final, $J_2$, and the coaxial r.f. output
socket, $J_8$.

For use on the operating table, a wooden cabi-
net was constructed in which the rig with its
$8\frac{1}{2}\times 19$-inch steel rack panel just fits. If de-
sired, the rig can be removed from this cabinet and
inserted in the relay rack with the high-
powerful final and associated components.

Circuit

Let's look over the circuits for a minute. There is nothing unusual about the VFO, which
operates in the 80-meter band. A screen-grid tube is used to give a measure of isolation in
addition to the isolation stage. The VFO coil,
$L_1$, is a National XR60 form, wound full of No. 26
carmed wire. The combination of negative-
($C_2$) and zero-temperature ($C_1$ and $C_3$) com-
penating condensers shown in the wiring diagram
cuts the drift from a cold start down to where it is
less than the drift in the receiver used. The VFO
is completely enclosed in a separate $3\times 4 \times 5$-
inch steel box with the leads coming out the bot-
tom and through the $17\times 10 \times 3$-inch main
chassis. The VFO coil is mounted so that the
plug-adjusting screw protrudes from the top of the
VFO box, making initial adjustments easy and
accurate. The usual care in building a VFO
must be taken. Make all wiring short and rigid.
You should be able to jar the operating table
without causing the slightest change in your note.
With the three-plate Hammarlund double-bearing
midget tuning condenser, $C_4$, a 180-degree
revolution of the dial covers from 3500 to 3800 kc.
If you wish to cover the entire band from 3500 to
4000 kc., use a five-plate midget condenser of the
same type. There will, of course, be some sacri-
ifice of bandspread on the 20- and 40-meter bands.
If the rig is to be used only on c.w. the stated
coverage is to be preferred, because of the better
bandspread on 20 and 40.

The isolation stage is self-explanatory from the
wiring diagram. A piece of $\frac{1}{4}$-inch copper gas line
was fastened with cable clamps and takes the r.f.
output wire from the VFO, where it comes
through the chassis, to a point about $\frac{1}{4}$ inch from
the grid-socket terminal of the $6AG7$ iso-
lation stage.

The VFO and isolation stages are run at 105
volts, regulated, from a separate power supply.
A switch, $S_1$, in the panel is connected in the high-
voltage lead to the VFO and isolation stages.
This switch is paralleled by two terminals in the
rear chassis apron for connection to a control re-
lay or foot switch if desired. To set the VFO on a
received signal, it is only necessary to snap the

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VFO switch on (or press the foot switch if used) and listen for the note in the receiver as the VFO is tuned. This switch can also be used as a send-receive switch in applications where the unit is used as a transmitter or, if no external relay is used, in those applications where the unit is serving as an exciter.

The buffer-doubler is another 6AG7. The tank coil, $L_2$, is a B & W 3015 Miniductor cut down to 25 turns. With the 250-µfd. midget surplus tuning condenser, $C_{10}$, it covers both 80 and 40 meters at about 10 degrees and 90 degrees on the dial, respectively. The lead from this tank to the grid of the 807W is also inserted in a short length of copper gas line supported under the chassis by cable clamps.

The buffer-doubler and final are keyed simultaneously. The VFO may be keyed if break-in operation on the same frequency is desired, but the author prefers to let the VFO run and key a later stage or stages, since a keyed oscillator does not readily permit shaping of the waveform. A final high-powered amplifier, if used, should be biased to cut-off. An Ohmite Z-50 choke, $RFC_s$, inserted in the keying lead under the chassis, removed the last vestige of a persistent harmonic that fell in TV Channel 5 and was radiated for about 30 feet by the lead from the rig to the key.

A 10-µfd. electrolytic condenser should be connected across the key terminals for shaping, unless a separate vacuum-tube keyer is used. With a v.t. keyer no additional shaping condenser is necessary. A simple keyer was recently described by the author.²

The milliammeter may be switched to the plate circuits of either the buffer-doubler or the final and is by-passed with a 0.005-µfd. mica condenser, $C_{54}$. The jack in the grid circuit of the 807W, $J_4$, is located on the rear chassis apron. It is helpful to be able to check the grid current of the final during initial adjustments or when trouble-shooting, but once the rig is in operation no meter is needed.

The clumper tube keeps the 807W on an even keel and its use is recommended. No by-passes in the clumper tube circuit are necessary.

The final tank is made of two B & W one-inch-diameter Miniductors. The 24-turn coil, $L_4$, is mounted directly from the tuning-condenser terminal to the bandswitch, parallel to the panel. The 48-turn coil, $L_3$, is switched in for 80-meter operation and is mounted from the bandswitch to a ceramic stand-off, at right angles to the other coil. This arrangement reduces the length of the leads to the taps on the coils. Incidentally, tapping a turn of the 48-turn coil is easy if the two adjacent turns are pushed down leaving the turn to be tapped in the clear. At first it was feared that the little Miniductors would heat up at 50 watts but no difficulty of any kind has been experienced. The taps on the coils, as shown in the wiring diagram, permit loading on all three bands to 85 ma. Moving the 20- and 40-meter output taps one turn, and the 80-meter tap two or three turns toward the "hot" end, increases the loading to 100 ma. This output tends to overdrive the author's 400-watt final, hence the taps are located as shown in the diagram. For use as a transmitter, the taps should be changed to give full fifty watts input, 500 volts at 100 ma. There is no change in the smooth operational characteristics or keying.

Using the clumper tube, key down, the voltage on the screen of the 807W is 210 volts at 13 ma. With key up, the voltage drops to 28 and the current increases to only 22 ma. — well within the limits of the screen-dissipation rating. The plate of the 6AG7 buffer-doubler runs at 220 volts and its screen at 125 volts.

Since the aluminum shielding is perforated, ventilation is no problem. The wooden cabinet has holes drilled in the bottom, sides, and in the top directly over the VFO tube, the 807W and the 5R4GY rectifier. The wooden cabinet is raised slightly from the operating desk by means of four screw-on rubber feet. No excessive heating has been experienced, even over extended periods of operation.

**TVI**

After the rig has been completed and is operating smoothly, an absorption wavemeter covering the TV bands and using a 1-ma. indicator and crystal rectifier should be used for checking parasitics. A.c. leads and key leads should be checked. Next, use a 50-watt bulb for dummy load and check the output leads. The meter pick-up coil should then be held adjacent to the final tank coils (caution!). Tests must, of course, be made on all three bands. If the slightest indication of harmonics on any TV band shows up, it must be eliminated. A few Ohmite Z-50 or other v.h.f. chokes and some ceramic disk condensers in values from 100 µfd.d. to 0.01 µfd. should be tried in various places until the harmonics disappear. Then check everything again, since the insertion of a choke or by-pass may cause other harmonics to appear. The wiring diagram shows all the measures necessary for complete TVI elimination, although different wiring arrangements may require different treatment in the rig you build. Grounds and by-pass returns from each tube should be made to the same point adjoining the tube on the chassis. A lug attached to one of the screws holding the tube socket is convenient.

A Lysco Model 75 low-pass filter, as used in their Model 600 transmitter, is installed in the r.f. lead from the bandswitch to the coaxial output terminal. The case is only 6 inches long by 1 3/4 inches square. It is available separately and is adequate. A simple filter can be easily constructed by following directions contained in the ARRL Handbook, if desired.

Some expense may be saved by using surplus transformers, chokes, filter condensers, etc. Only the best by-pass condensers, r.f. chokes and VFO fixed condensers should be used, however.


(Continued on page 183)
An 80- and 40-Meter Antenna System for the Novice

Making Use of Flashlight Bulbs To Show Antenna Loading

BY LEWIS G. McCOY,* WIICP

A hard job for any newcomer is to decide upon an antenna system and then find an antenna tuner to go with it. The “package deal” presented here gives him the whole works, with an economical approach that is hard to beat.

The first big adventure confronting almost any newly-licensed amateur is the business of building that all-important first transmitter and putting it into operation. But ask these same newly-licensed amateurs what their most difficult problem is during this period, and nine out of ten will agree that it is knowing when the power is getting into the antenna. Many of them will say that they are not making contacts on the air, although the plate meter shows that the final is drawing current and everything seems to be working.

Obviously, some of this can be caused by unfamiliarity with operation techniques, but we aren’t going to talk about that phase of amateur radio. One of the purposes of this article is to describe a simple means for insuring that the power from the transmitter is on its way toward the antenna. At the same time we’ll tell you about an antenna system you can use on 80 and 40 meters with practically no fuss or bother.

There are a number of different types of antennas that can be made to work on 80 or 40 meters, as the ARRL Antenna Book or Handbook antenna chapter will testify. And the more types one hears about, the harder it becomes to make any decision about them! To eliminate the necessity for decision, we will describe one particular antenna, with information on two different lengths of feed lines just to take care of varying circumstances. The ultimate performance of any antenna depends on factors such as height above ground, surrounding objects, and ground conductivity, to name just a few. But one hasn’t very much control over these factors, so the antenna must be planned to fit the location.

The first step in any antenna planning is a study of the location where the antenna will be erected. Look for points on your (and your neighbors’) houses to fasten the antenna ends, always keeping in mind that the higher the antenna is, the better it will work. Trees make convenient tie points for antenna ends, and there are recommended methods for suspending antennas from trees given in the antenna chapter of the Handbook. Also given in the Handbook are construction details of masts and towers.

Don’t be discouraged if it is impossible to put your antenna up 50 or 60 feet in the air. It will still do a fair job of radiating if as low as 20 feet. Many newcomers also feel that an antenna won’t work unless it is straight. It will work best when it is run straight but it will still do a fair job of radiating if the ends are dropped down or bent around corners.

In this case we are describing an antenna 67 feet long. The 67 feet is opened at the center and fed with open-wire line. Most of the books on antennas recommend using an antenna 133 feet long for 80 meters. But, while the longer length is preferred, 67 feet will radiate almost as well. What is more important, it will fit many locations better than 133 feet would.

The best feed line for our purposes is “open-wire” line. Open-wire line is made of two wires supported a fixed distance apart by insulated “spacers.” Because it is mostly air-insulated, it has low losses. Since the advent of television, several manufacturers produce a low-cost open-wire line that is readily available for less than five cents a foot. This line costs much less than any home-built feeders and saves the work of building your own.

There are two choices of feeder lengths for this antenna system, 33 or 66 feet. If your shack is in

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*A Technical Assistant, QST.

A top view of the antenna coupler for the 80- and 40-meter antenna system. The antenna terminals are on the left and the coax input jack on the right. The light bulbs for indicating feeder current are insulated from the chassis by rubber grommets.

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the attic or close to the antenna, the 33-foot length will be best. For basement locations or longer runs, the 66-foot length will fill the bill. Plan your antenna location so the feeders will end up right at the antenna coupler. Some shack can be taken up by the way in which the feed line is hung between antenna and shack.

Three insulators are needed for the antenna, one for each end and one for the center. There are several different types of insulators, such as ceramic, glass and Pyrex, and any of these are suitable. The cheapest kind are the ten-cent store glass type receiving insulators. These will work just as well as the expensive kind. The antenna wire size can be any that is strong enough to support its own weight and that of the feed line. No. 14 or 12 enamelled is the most commonly used wire. Stranded copper receiving type is also suitable. "Copperweld" and hard-drawn copper are the strongest.

Two 34-foot lengths of wire are cut for the antenna, allowing the extra 6 inches for the loops through the insulators. The antenna drawing, Fig. 2, shows the layout of the antenna and feeders. The ends of the antenna are run through the insulators and twisted around themselves. These ends can be soldered for a strong mechanical connection. The center ends of the antenna are cleaned and looped through the center insulator. To insure good mechanical rigidity and electrical contact, the respective feeder wires are also run through the insulator, wound around the antenna wire, and soldered.

The antenna is then raised to its permanent location and the feed line run to the transmitter. The feed line should come away from the antenna at as close to a right angle as possible. There are several approved methods of bringing the feed line into the shack, and the antenna chapter of the Handbook should be studied to choose the best system for your location. Most shacks are near a window, and one simple way of bringing in the feed line is to mount two feed-through insulators in a board held down by the window. For lightning protection, a double-pole double-throw knife switch is mounted where the feeders enter the building. Two of the contacts of the switch are connected by heavy wire to a metal stake driven in the ground. The feeders coming from the antenna are attached to the center switch blades and the feeders to the transmitter to the other two switch contacts. When the antenna is not in use, the switch is thrown to

![Figure 1](image1.png)  
*Fig. 1 — The 80- and 40-meter antenna system uses a 67-foot antenna fed at the center by a 33- or 66-foot length of open-wire feed line.*

![Figure 2](image2.png)  
*Fig. 2 — The terms "series" and "parallel" are used to describe the connections of the coil and the tuning condenser. The feed line connects at the points shown as arrowheads.*

![Figure 3](image3.png)  
*Fig. 3 — Circuit diagram of the antenna coupler to be used with the 80- and 40-meter antenna system. C1 — 200-μfd. variable (Millen 19200). L1 — 26 turns No. 22 enam. 1/4-inch diam., space-wound (National XR-4 coil form). L2 — 4 turns No. 26 d.c.e. interwound at center of L1. I1 — Flashlight lamps. See text. I2 — Coaxial input jack (Amphenol 83-1R). S1 — D.p.d.t. wafer switch (CRL C 1).*
The coupler is built on a 7 x 5 x 3-inch aluminum chassis. As can be seen from the photograph of the top, L₁ and L₂ are wound on a plug-in coil form and the socket for L₁ is mounted in the exact center of the chassis. The back view shows the antenna terminals and the coax input jack. Three flashlight lamp sockets are mounted on the chassis and insulated with rubber grommets. The bottom view shows C₁ mounted on an insulated bracket so that both the stator and the rotor are free from ground. An insulated shaft coupling is used to isolate the rotor shaft from the chassis, S₁a and S₁b, the d.p.d.t. switch, is mounted on the right.

L₁ is wound with No. 22 enameled wire spaced the wire diameter. The easiest method of winding the coil is to first drill two holes for L₁ spaced 1 ½ inches apart. Two additional holes for L₂ are then drilled ½ inch apart at the center of the L₁ holes. Eleven feet of No. 22 wire is needed for the 28 turns of L₁. The ends of the wire are scraped clean of enamel and one end is run through a hole in the coil form and soldered into one of the base plugs. The other end of the wire is clamped in a vise or wrapped around a nail in the wall. Pull the wire taut, then wind the coil while walking toward the anchor point. Maintain tension so that the turns are wound tightly onto the form.

The end of the wire is then run into one of the coil base plugs and soldered, keeping the turns as tight as possible. Use soldering paste to insure a good solder job. Another piece of No. 22 wire is wound between the turns of L₁ and then unwound, to give the proper spacing. Then give the coil a coat of dope. After the dope has dried, L₁ is wound on at the center. L₁ has sufficient range to cover both the 80- and 40-meter bands, so this one coil is enough.

Operation

The transmitter is hooked up to the coupler with a piece of 72-ohm coax cable, which can be any length needed for convenient placement of the coupler. For powers up to a few hundred watts, RG-59/U coax cable will work well. A supply of light bulbs is needed for the power indicators in the coupler. Three No. 40, 6- to 8-volt, 150-milliampere brown-bead, and three No. 48 2-volt, 60-milliampere pink-bead, will be enough for a start. The three No. 40 bulbs are screwed into the sockets on the coupler and the rig turned on. The coupler and the final of the transmitter are tuned to resonance, as indicated by the bulbs lighting up and the dipping of the amplifier plate meter. If the bulbs fail to light, they should be unscrewed, one at a time, until there is an indication of power going into the feeders. It may be necessary to put in the No. 48 bulbs for indication, as the less sensitive No. 40 bulbs won't light under some conditions. Once a combination of bulbs is obtained where there is an indication, it is simply a matter of tuning the coupler and rig for maximum brilliance of the bulbs. The brighter the bulbs become, the more power goes to the antenna. A few spare bulbs should be kept on hand for replacement, as a burned-out bulb would leave an open circuit in the feed line.

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... It is stressed editorially by ARRL Secretary Warner that, although the recent Conference did not bestow the widest privileges desired, here at last is the first concrete official international recognition of our hobby.

... Clark C. Rodmon's "MacMillan and Party in Labrador" gives information on the latest cruise of the "Basilion" the Rawson-MacMillan Field Museum Expedition with Cliff Himoe, I.I.K. operating onboard radio gear.

... Ross A. Hull dwells upon the ascendance of international amateur radiotelephone communication as embodied in the propagation possibilities of our newly-opened 20-meter 'phone band.

... In the Experimenters' Section are details on the 5-meter equipment of BEITT, Lawrence, Kansas, featuring the reflector antenna which has enabled BEITT to be heard on that band in San Diego, California.

... For the second of their series of articles on the design of filters and filter components, D. E. Replogle and James Millen furnish an analysis of "The Final Capacity in a Two-Section Low-Frequency Filter."

... Neon lamps as convenient indicators for ham work are the subject of an article by F. B. Huddly, 111-128-78W, while Ralph B. Mason provides valuable data in "The Shielding Efficiency of Metals."

... Don C. Wallace and QST Technical Editor Robert S. Kruse collaborate to tell of interesting circuits and gear used at 6AM, the former's widely-worked Long Benches, California, station.

... Correspondence reveals mixed reactions regarding Conference decisions. 1BFT leads BPI with 500 traffic points. WAC certificates issued now total 117. Work on the new 10-meter band is eagerly anticipated.
Practical Adjustment of the Gamma Match

Feeding the “Plumber’s Delight” with Coax

BY WARREN H. DAVIS, W61BD

Although many articles have been written on the subject of parasitic-beam adjustment, there are still many who are puzzled as to the relative importance of the various factors involved in attaining optimum performance. But no matter how much you have studied the subject, we believe that you will find the experiences of W61BD, in feeding the plumber’s-delight type 3-element beam with coax cable, most interesting.

Articles on antennas are as old as ham radio itself. Therefore, it is not my intention to present anything sensational for the beam I am about to describe, but I would like to state that it works as well as any beam it has ever competed against. I use the word “competed” because there is no other way really to check an antenna if you are a DX man.

The competition in this case was supplied by some of our better known local stations, namely: W6FSJ, 3 elements, 50 feet high; W6ENV, 3 elements, 65 feet high; W6SN, 3 elements, 65 feet high; and W6CYT, 3 elements, 60 feet high. Of these four stations mentioned, two are very active in DX contests and three of them have worked more than 240 countries. They are all very rough in any dogfight.

In the recent DX contest, most of these gentlemen waited for me to finish, then they took their respective turns. Upon occasion I, too, would wait for them, but not too often. Now, considering that we all run about the same power, all live within a fifteen-mile radius, and we all think we are the world’s best DX operators, the obvious conclusion is that our beams, for all practical purposes, work equally well. Therefore, the only claim that I can make for my beam is that it is the easiest to build, which I consider a prime factor to be considered by any ham.

Feed System

The part of the beam that usually is the worst to build and to make work is the feed system and the matching device or driven element. Two of the above-mentioned rascals use one method of feed system and matching, and the other two use another. W6FSJ and W6CYT use folded dipoles and two pieces of RG-8/U to feed them. W6ENV and W6SN both use split driven elements. W6ENV uses a single piece of RG-8/U to feed his, and W6SN uses a quarter-wave matching section, then 600-ohm line.

Well, I ask you, which is the easiest type of line to feed into the modern well-shielded TVI-free final amplifier? Naturally, anyone in his right mind would choose a single piece of coax. W6ENV, Andy Elsner, took the honors here—that is what he uses.

Several months ago when I decided to build this beam, that was what I decided to use. Andy assured me that he had never experienced any trouble with unbalance, and he thought it was great. However, I did not like to think of the reasonably difficult problems of attaching a split driven element to the 2½-inch square aluminum boom that I proudly possessed. Moreover, I did not wish to detune the parasitic elements of my beam to raise the center impedance to meet that of 52-ohm coax, although this in itself will not hurt the operation of a beam if the correct spacing is used. By the way, I am glad I added that last statement; it should get me off the hook for implying that Andy’s beam is a mess.

A plastic fruit-juice container makes a good weather protector for the variable condenser.

The next step was to decide what type of match could be used to feed a piece of 52-ohm coax into a plumber’s-delight type of beam. A plumber’s-delight was decided upon because there was no question in my mind that this was the easiest to build. However, feeding a beam of this type with coax line presents a few problems, such as balanced feed, obtaining a low standing-wave ratio, and the actual mechanics of obtaining these desirable features. There was one other feature that I desired in this beam. It was that the beam must be resonant in the 14-Mc. band. This is not a prime factor for good operation of
the beam itself, although it should be reasonably close to resonance. But it is necessary for a low standing-wave ratio and good coax efficiency.

The obvious choice for my beam was a gamma match. This, with a few refinements, is what I have used. A few articles have appeared on this type of match but they seem to present no details of how they should be tuned, nor do they tell the performance data on a beam using this match, such as what is the bandwidth of the usable standing-wave ratio. When running high power into RG-8/U that has a low-pass filter in it, the s.w.r. should not be over certain limits. Therefore, I decided to run some experiments with a gamma match and see just how good it really was.

**Element Spacing**

Some months before all of this brain work started, my child bride and myself had rented a house only 300 yards from WOSN. This, in itself, was a mistake, but it was the only habitation available at the time. The house did not come equipped with poles for antennas, but it was owned by a lady who said that I could put up one small pole for my wireless if I would promise to remove it when leaving. This promise was very glibly given and in we moved.

Immediately after this event, my beam was attached to a piece of pipe, and placed in a vent pipe on top of the house where it was approximately 25 feet above the ground, but could still be reached when standing on the roof of the second story. This was, of course, an ideal place to tinker with the beam and its matching device.

If you will refer to the diagram of Fig. 1, you will see that the beam has a 22-foot boom, and that the reflector is spaced closer than the director. I do not believe that this is any better than when the reverse is true, as in most beams, but the center impedance of a beam is slightly higher when the director is spaced farther than the reflector. The spacing of this beam is approximately R-0.15 and D-0.2.

In spite of the volumes written on beam spacings, if a beam is resonant in the band where you wish it to work, the director is tuned to a frequency higher than that of the driven element, the reflector is tuned to a lower frequency, and the beam is fed properly, it will in all probability get out as well as any other beam with the same number of elements at the same height, regardless of spacing. However, beams with wider spacing do have a higher impedance and slightly better bandwidth, so I tried to go down the middle of the road so far as boom length goes.

**Adjustment of Gamma Match**

After erecting the beam on its pipe in the roof, I grounded the braid of the coax to the boom, directly under the center of the driven element and connected the center wire to a piece of aluminum tubing that ran out under the driven element about four feet. The end of this small piece of tubing was then connected to the upper tubing by a brass clamp that could slide back and forth to vary the point of attachment for the gamma match. The driven element at this point was 2½ inches in diameter and the gamma match was 1 inch in diameter, and spaced approximately 5 inches from the element.

After considerable checking with my trusty coax-line standing-wave indicator in the line, at long last I discovered what others before me had learned—it won't work; that is, the standing-wave ratio cannot be made low enough at the resonant point of the beam. This is probably true because it is very difficult to get the right ratio of tubing size to spacing between the matching system and the driven element, plus the fact that the point at which the gamma match is attached to the element is critical if there is reactance. And, believe me, there is.

Therefore, the next step was to put a variable capacitor in series with the center wire of the coax and the gamma match. This was better, but not quite as good as I had expected. I could get the standing-wave ratio down quite low, but the beam was resonant outside of the band; and when I changed the length of the driven element of the gamma match to pull the resonant point back into the band, the standing-wave ratio was again kaput. This got to be very tiring, so I tore off the tubing that made up the gamma match and replaced it with a piece of No. 10 wire. This piece of wire merely looped from the capacitor up to the driven element and was attached to a point approximately 35 inches from the center of same. Immediately things began to get better. The s.w.r. was now 2/1 at 13.5 Mc. and dropped as I approached the center of the band, rising again to about 3/1 at 14.3 Mc. The piece of wire I used between the condenser and gamma tap was about 33 inches long. The length of this wire has an influence on the tapping point, so if the length is changed, a different tapping point must be used.

By the way, the condenser being used was a 120-µfd. variable with ½-inch spacing. This was considered adequate to tune out the reactance of the gamma match and, since it was located at a low-voltage point, the spacing should be enough.

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**Fig. 1** — Sketch of W6IBD's "plumber's-delight" beam antenna with dimensions for the 14-Mc. band. The use of the variable condenser is discussed in the text.
We found we were correct on both accounts.

Once the wire was installed and the s.w.r. found to be as stated above, I decided to make the beam resonant in the middle of the band and to make the s.w.r. as low as possible. Actually, all that I did was to shorten the driven element a bit on each side, then, keeping my eye on the s.w.r. meter, I tuned the capacitor and the needle dropped almost to zero. This was the equivalent of about 1:4:1 s.w.r. A series of measurements was then taken from about 13.5 Mc. to 14.4 Mc. The point of lowest s.w.r. was found to be at 14.150 Mc., and the s.w.r. at this point was as near to 1:1 as anyone could ever hope to get a beam. This is also the resonant point of the beam, and this resonant point is always found at the point of lowest s.w.r., regardless of what the s.w.r. may be.

When checking the bandwidth of the beam, it was learned that it was 2:1 at 13.900 Mc. moving downward to its low point at 14.150 Mc. and then moving upward to 2:1 at 14.450 Mc. The low point, as stated before, was about 1:1 to 1. There is no question that a folded dipole would be better, but think of the extra work involved in construction, to say nothing of the fact that two wires are necessary to feed it. What about the losses at 2:1 s.w.r.? Well, at 14 Mc., which is where s.w.r. is almost, but not quite, that amount, the loss in the line using 100 feet of RG-8/U is 0.75 db. This I refuse to worry about.

Element Length

The next month was spent in changing the lengths of the various elements to see if I could raise the gain, or perhaps improve the front-to-back ratio. This latter could be done, but the forward gain always remained about the same, so long as the reflector and the director were not detuned too far from the frequency of the driven element. Incidentally, after each adjustment of the elements, it was only necessary to change the length of the driven element slightly one way or the other and to touch up the condenser on the beam, and the antenna would be back in the band with the s.w.r. back to normal.

I also tried moving the point of attachment of the gamma match to the beam back and forth. This would make a difference in the s.w.r. and the resonant point of the beam, but not as much as I had expected. I finally left it at 35 inches.

By this time I was sick and tired of spending half of my waking hours on the roof, so the director was set at 14.3 Mc. and the reflector at 14 Mc. The s.w.r. indicator was inserted in the line about 15 feet from the beam. After checking the s.w.r., the beam was found to be resonant at 14.3 Mc. I merely lengthened the driven element an inch or so on each side, trimmed up the condenser while watching the meter, and — presto! — we were back in the middle of the band with the previously-mentioned excellent s.w.r.

Feeling that it was necessary to keep our gentle Los Angeles rains off my precious con-
denser, I mounted it upside down in a plastic fruit-juice container that was mounted on the side of the boom just under the driven element. This did the trick; the job was done. The sad part of this entire affair was that after weeks of fooling around with this beam, my final results were the same as the ones I had in the beginning.

Summary

In conclusion, let me say that this match can be attached to any beam that has an unbroken driven element. The director and the reflector should be set by the charts in the ARRL Handbook. They may be tuned, if you wish, but it is your time that is being wasted, not mine. The driven element should be set initially for the center of the band by the chart in the Handbook and the gamma match, consisting of a condenser and a piece of No. 10 wire, attached to the driven element. This point of attachment is about 35 inches from the center of same. A section of 52-ohm coax, with the s.w.r. indicator inserted in it, should be attached to the beam; the braid is grounded to the center of the boom directly under the center of the driven element, and the center wire of the coax is attached to one side of the capacitor. A VFO should be fed into the coax. Set the frequency in the middle of the band and adjust the capacitor to give the lowest s.w.r. Then, run a series of checks across the band to find the resonant point of the beam. If that point is not where you want it, either lengthen or shorten the driven element. Leave the parasitic elements as they are. If a complete null cannot be obtained, it may be necessary to change the point of attachment on the driven element slightly. This should do it; you are now in business.

The photograph shows how the match and its plastic container looks on my beam. This particular set-up will take a kw. of phone and several on c.w.

By the way, in spite of the fact that I had the highest score on 14 Mc. in the Southern California area, I was severely thrashed by W6BAX in Northern California during the last DX contest. Believe me, if Opie would only move south to this land of half-hour European openings I would fix his wagon.

Oh yes, my beam is now on a small pole 57 feet high, and my landlady is really flabbergasted!!

--- Suggested by W9YMD ---

34 OST for
Low-Voltage Filament Supplies

A D.C. Source for Battery-Tube Filaments

BY E. J. GAUSS. W9EOS

Experimental work by the ham, with tubes designed for dry-battery operation, often is hampered by the prohibitive cost of the batteries. If such equipment has been built and is ready to test, it is disconcerting to find that the batteries have run down. A trip to the store is then necessary before work can be resumed. Anyone who has serviced or experimented with circuits using filament-type tubes realizes the convenience and saving of some sort of a stable low-voltage supply that can be plugged into the power lines.

Most battery tubes are designed to work at 1.4 volts and a supply capable of providing an amperage should be sufficient for most work, since battery-tube filaments usually take only 50 or 100 ma. This, of course, must be pure d.c. to eliminate hum.

Rectifier

The logical choice of a rectifier to supply a few volts output at about an amperage is the copper-sulfide magnesium type. These units are small in size, and have a break-down potential of 4.0 volts per section. However, most units tend to heal if the damage done by surge voltages is not too severe. Such rectifiers are commercially available as they have found extensive use in commercial battery eliminators and pin-ball machines. The internal resistance is appreciable in the forward direction, and allowance must be made for the voltage drop. A satisfactory design supplying about 2 volts into a filter would consist of a bridge rectifier and a transformer supplying about 3 volts, the rectifier and the filter dropping the output to the desired 1.4 volts. This is shown in Fig. 1.

Transformer

The most satisfactory transformer commercially available for this circuit is a 6.3-volt center-tapped heater transformer. By using only half of the secondary 3.15 volts is obtained. If a more flexible system is desired, a transformer

* Blacker House, California Institute of Technology, Pasadena 4, Calif.

should be wound giving steps of 0.2 volt from 2.8 to 3.6. A universal output transformer might be usable with the plate winding going to the power line and the rectifier operating from the speaker winding, although the experimenter should check its voltages before using.

Filter

For the current involved, large values of inductance in the filter become impractical. Therefore, much of the filtering is done by the condensers which are available in values on the order of 2000 µfd. with a voltage rating of 3 volts, which is adequate. To secure sufficient filtering, a two-section choke-input filter is advised. The choke-input design is preferred, as it gives longer rectifier life. The input choke, L₁, need have a value of only a few hundredths of a henry. The second-section choke, L₂, is less important with respect to rectifier life and can be the same as L₁ or even may be replaced by a one-ohm resistor, R₁. In this case, it may be convenient to use a rheostat to provide a means of adjusting the output voltage.

Choke Construction

The chokes are not difficult to make. Many cheap output transformers and chokes have cores similar to that in Fig. 2A [p. 128]. Almost any core will do; the design given being a minimum size for economy of space. Even a solenoid wound on the core obtained from a burned-out automobile spark coil (Fig. 2B) will work. The required gap in the design of Fig. 2A is made with use of a file card. Such cards have a thickness of about 0.01 inch, while imperfections in the core provide for the additional 0.005 inch. Although

(Continued on page 38)
75 AND 20 \"CLASS A\" REQUIREMENTS BEING DROPPED

On December 23rd, in what might be considered a Christmas present for General and Conditional Class licensees, the Federal Communications Commission amended the amateur rules, effective February 18, 1958, to eliminate the requirement of an Advanced or Extra Class license as a condition to operation in 3800–4000 kc. and 14,200–14,300 kc. with voice emission. Thus, on and after February 18th, all amateurs except Novices and Technicians may use voice in those bands.

As of the first of the year the Commission discontinued examinations for the Advanced Class license. Under the regulations as amended all amateur privileges will be equally available to licensees of General, Conditional, Advanced and Amateur Extra classes.

The text of the Commission's release is as follows:

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington 25, D. C.

In the Matter of
Amendment to Part 12 with respect to special radiotelephone operating privileges presently granted only to holders of the Advanced and Extra Classes of amateur operator licenses.

REPORT AND ORDER

The Commission heretofore, on April 26, 1952, published a Notice of Proposed Rule Making (17 F. R. 3754) to amend existing rules, which provide that only radio amateurs holding an Advanced or Extra class amateur operator license may utilize radiotelephone emissions in the frequency bands 3800–4000 and 14,200–14,300 kc., so that holders of General and Conditional class licenses may likewise utilize radiotelephone emissions in these frequency bands. This operator restriction was imposed, originally, some twenty years ago as a precaution against possible interference to radio services other than amateur and among amateurs, to reduce interference through faulty operation of radiotelephone transmitters by unschooled persons. Written comments concerning the proposed amendments were received from nearly 300 individual amateurs and local amateur clubs and from two national organizations.

Comments in favor of the proposed amendments were to the effect that larger numbers of amateur operators would be available for emergency network operation and civil defense work than are now available should the proposed rules be adopted. The comments also indicated that the need for denying persons, who hold a conditional or general class operator license, the privilege of utilizing radiotelephone emissions in the frequency bands 3800–4000 and 14,200–14,300 kc as an anti-interference measure no longer exists.

Comments in opposition to the proposed rules alleged that elimination of restrictions with respect to classes of operators who may utilize radiotelephone emissions in the frequency bands in question would reduce incentive for amateurs to progress from lower to higher grade licenses and result in over-all lowering of amateur standards of technical knowledge; that the frequency bands in question are already overcrowded and to permit additional persons to operate in them could be expected to result in use of excessive power in out-of-band operation. Rules, recently put into effect in long range planning, provide for discontinuing the issue of new Advanced class operator licenses after December 31, 1952, thus leaving the Extra class operator license as the next step above the General class license. One comment was that the Commission should nullify these rules and maintain the Advanced class license as a logical step between the General and Extra licenses. Disparity between the requirements for the General and Extra class license was given as a reason for this suggestion. It was further suggested that, in view of certain pending rule-making proceedings (Dockets 10073 and 10188), which contemplate providing additional space for voice operation in the frequency bands 7 and 21 Mc., adoption of the rules proposed in this proceeding is unnecessary.

Proposals in Dockets 10073 and 10188 have not yet been adopted and, if adopted, could not be considered to affect today's proceeding except so far as they relate to voice space in the 7 and 21 Mc. bands, for voice emission, possibly, would relieve, to some extent, congestion in the frequency bands under consideration.

Study of all the comments received leads to the conclusion that the objections to the new rules are based, largely, upon sentiment and the desire for continuation of personal privileges rather than upon any technical or practical considerations. The suggestion that adoption of these rules would reduce incentive to progress from the General or Conditional to a higher class license (the Extra) is merely conjectural. The Extra Class license signifies that the holder is a pioneer in the field of amateur radio or that he has attained a code speed of at least 20 words a minute and passed an examination in advanced amateur technique, or both. That this in and of itself affords real incentive for obtaining the Extra Class license is evidenced by the fact that over 1,000 Extra Class licenses have been issued since January 1, 1952. Nor is a lowering of over-all amateur technical knowledge expected to result. On the contrary, it is believed that to make the frequency bands 3800–4000 and 14,200–14,300 kc available to all classes of operators, except the Novice and Technician, would encourage increase in technical skill on the part of General and Conditional Class operators desiring to communicate proficiently in these bands. The suggestion that elimination of restrictions would increase congestion in the frequency bands under consideration, the Commission realizes that these bands are already crowded, but the additional man-power which would become available for emergency and for civil defense operation from eliminating operator restrictions as contemplated by these rules would more than compensate for any inconvenience to operators which might result in the frequency bands under consideration.

The technical knowledge and skill of the average amateur has been demonstrated to be such that the distinction between classes of operators as a means of reducing the probability of interference resulting from the use of telephony in two bands, for which the distinction was originally imposed, is no longer justified. Also it is believed that the reduction of congestion in particular amateur bands by means of such discrimination is not appropriate.

The proposed amendments may be adopted pursuant to the provisions of Sections 440 and 303(b), (1), and (9) of the Communications Act of 1934, as amended.

In view of the foregoing, it is ORDERED, This 23rd day of December 1952, that Sections 12.23(c) and 12.111(a)(4) of Part 12 \"Rules Governing Amateur Radio Services\", ARE AMENDED to read as follows:

SECTION 12.23(c) General and Conditional Classes. All authorized amateur privileges.

SECTION 12.111(a)(4). 3800 to 4000 kc., using type A3 emission and narrow band frequency or
phase modulation for radiotelephony, to those stations located within the continental limits of the United States, the Territory of Alaska and Hawaii, Puerto Rico, the Virgin Islands, and all United States possessions lying west of the Territory of Hawaii to 170° west longitude.

SECTION 12.111(a)(4). 14,000-14,350 kc, using type A emission and, on frequencies 14,200 to 14,300 kc, type A3 emission and narrow band frequency or phase modulation for radiotelephony.

IT IS FURTHER ORDERED, That the foregoing amendments shall become effective on the 18th day of February, 1953.

FEDERAL COMMUNICATIONS COMMISSION

T. J. Slowie
Secretary

Released: December 29, 1952

40-METER 'PHONE TO BE OPENED

A simultaneous action of the Commission, but effective February 20, 1953, amended the amateur rules to permit voice emission in the frequencies 7200-7300 kc. Either A-3 or narrow-band frequency or phase modulation may be employed. These privileges will be available equally to all amateurs except Novices and Technicians. As on other bands, of course, mobile will be permitted. For the eager burners, we remind you that on the 20th the amended rule becomes effective at 3:00 A.M. EST, which is midnight on the West Coast.

NOVICE AND F.S.K. PRIVILEGES BEING EXPANDED

Further actions of the Commission two days before Christmas expanded Novices' privileges, opened some low-frequency channels to frequency-shift keying techniques, established standards for teleprinter operation, and clarified call sign identification procedures — all effective February 20, 1953.

On and after that date, Novices will be permitted the use of 7175-7200 kc, for radiotelegraphy, type A-1 (c.w.) emission only. The usual requirements of crystal control and 74 watts input apply to this new band also.

Effective the same date, F-1 emission will be authorized in the non-voice portions of our 80-, 40- and 20-meter bands — specifically, 3500-3800, 7000-7200, 14,000-14,200 and 14,300-14,350 kc. This type of emission can be used either for manual keying or for radio teleprinter operation. For RTTY operation, our rules are amended by the addition of some new standards.

The text of the Commission's release is as follows:

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington 25, D. C.

In the Matter of
Amendment of Part 12, "Rules Governing Radio Service."

FCC 52-1634

Docket No. 10073

ORDER

At a session of the Federal Communications Commission held at its office in Washington, D. C., on the 23rd day of December, 1952;

The Commission having under consideration its Further Notice of Proposed Rule Making in the above entitled matter in which it was proposed to provide for use of radio-television emissions in the 7200-7300 kc segment of the 7 Mc amateur frequency band, to provide for the use of the 175-7200 kc segment of the 7 Mc amateur frequency band by Novice Class amateur operators, to provide standards for amateur radio teleprinter operation, to provide for the use of F-1 emission in the non-radiotelephone segments of the 3.5, 7 and 14 Mc amateur frequency bands and to provide for readily identifiable transmission of call signs;

IT APPEARING, That in accordance with the requirements of Section 4(a) of the Administrative Procedure Act, general notice of proposed rule making in the above entitled matter, which made provision for the submission of written comments by interested parties, was duly published in the Federal Register on April 29, 1952 (17 F.R. 3754), and that the period provided for the filing of comments has now expired;

IT FURTHER APPEARING, That comments were filed by some 265 individuals, amateur radio clubs and other amateur organizations and that a large majority were in favor of adoption of the proposed amendments, some opposition to the severity of technical and identification requirements proposed for amateur radio teleprinter operation was expressed, clarification of the transmission of call signs was requested, the American Radio Relay League requested more space for Novice operation than was proposed and the League and several individuals requested that F-1 emission be restricted to a segment of the 7 Mc amateur band only;

IT FURTHER APPEARING, That, in order to facilitate monitoring and to assist the Commission in carrying out its responsibility for the proper enforcement of its rules and regulations, the proposed teleprinter technical and identification requirements cannot be relaxed at this time, and;

IT FURTHER APPEARING, That consideration of providing a larger segment for Novice operation in the 7 Mc amateur frequency band than that proposed preferably should be deferred until such time as experience with Novice operation in the space proposed has indicated the necessity for additional space, and;

IT FURTHER APPEARING, That, in view of the present practice in amateur radio teleprinter operation to concentrate operation on a few frequencies selected, for their own advantage, in a manner least likely to interfere with other modes of amateur operation, the greater latitude of choice of frequency permitted by the amendments as proposed will be the most beneficial to the amateur service as a whole, and;

IT FURTHER APPEARING, That clarification of the proposed requirements for the transmission of call signs as requested is desirable, and;

IT FURTHER APPEARING, That authority for the aforesaid amendments is contained in Section 4(i) and 303(a)(1), (c), (e), and (t) of the Communications Act of 1934, as amended;

IT IS ORDERED, That effective February 20, 1953, Sections 12.23(e)(2), 12.82(a), 12.111(a)(2), 12.111(a)(3) and 12.111(a)(4) ARE amended, and a new Section 12.167 IS added, as set forth in the attached Appendix:

FEDERAL COMMUNICATIONS COMMISSION

T. J. Slowie
Secretary

Attachment

Released: December 29, 1952

APPENDIX

PART 12, RULES GOVERNING AMATEUR RADIO SERVICE, IS AMENDED IN THE FOLLOWING PARTICULARS:

1. AMEND SECTION 12.23(e)(2) TO READ AS FOLLOWS:

(2) Only the following frequency bands and types of emission may be used, and the emissions of the transmitter must be crystal-controlled:

(i) 3700 to 3750 kc, radiotelegraphy using only type A-1 emission in accordance with the geographical restrictions set forth in Section 12.111 of this Part.

(ii) 7175 to 7200 kc, radiotelegraphy using only type A-1 emission.

(iii) 26,060 to 27,230 Mc, radiotelegraphy using only type A-1 emission.

(iv) 145 to 147 Mc, radiotelegraphy or radiotelephony using any type of emission except pulsed emission and type B emission.

February 1953
2. AMEND SECTION 12.82(a) TO READ AS FOLLOWS:

(1) The operator of an amateur station shall transmit the call sign of the station or stations (or may transmit the generally accepted identification of the network) being called and identified with, or shall identify appropriately any other purpose of a transmission, followed by the authorized call sign of the station transmitting:

(i) at the beginning and end of each single transmission or;

(ii) at the beginning and end of a series of transmissions between stations having established communication, each transmission of which is of less than three minutes duration (the identification at the end of such a series may be omitted when the duration of the entire series is less than three minutes), and;

(iii) at least once every ten minutes or as soon thereafter as possible during a series of transmissions between stations having established communications, and;

(iv) at least once every ten minutes during any single transmission of more than ten minutes duration.

(2) The required identification shall be transmitted on the frequency or frequencies being employed at the time and, in accordance with the type of emission authorized thereon, shall be by either telegraphy using the International Morse Code, or telephony. In addition to the foregoing, when a method of communication other than telephony or telegraphy using the International Morse Code is being used or attempted, the prescribed identification shall also be transmitted by that method.

3. ADD NEW SECTION 12.107 AS FOLLOWS:

§ 12.107 Special provisions regarding radio teleprinter transmissions. The following special conditions shall be observed during the transmission of radio teleprinter signals on authorized frequencies by amateur stations:

(a) A single channel five-unit (start-stop) teleprinter code shall be used which shall correspond to the International Telegraphic Alphabet No. 2 with respect to all letters and numerals (including the slant sign or fraction bar) but special signals may be employed for the remote control of receiving printers, or for other purposes, in "figure" positions not utilized for numerals. In general, this code shall conform as nearly as possible to the teleprinter code or codes in common commercial usage in the United States.

(b) The nominal transmitting speed of the radio teleprinter signal keying equipment shall be adjusted as nearly as possible to the standard speed of 60 words per minute and, in any event, within the range 50 to 65 words per minute.

(c) When frequency-shift keying (type F-1 emission) is utilized, the deviation in frequency from the mark signal to the space signal, or the space signal to the mark signal, shall be adjusted as nearly as possible to 800 cycles and, in any event, within the range 800 to 900 cycles per second.

(d) When audio-frequency-shift keying (type A-2 or type F-2 emission) is utilized, the highest fundamental modulation audio frequency shall not exceed 3000 cycles per second, and the difference between the modulating audio frequency for the mark signal and that for the space signal shall be adjusted as nearly as possible to 800 cycles and, in any event, within the range 800 to 900 cycles per second.

4. AMEND SECTION 12.111(a)(2)(i) TO READ AS FOLLOWS:

(i) 3500 to 4000 kc, using type A-1 emission and, on frequencies 3500 to 3800 kc, using type F-1 emission, to those stations located within the continental limits of the United States, the Territories of Alaska and Hawaii, Puerto Rico, the Virgin Islands and all United States possessions lying west of the Territory of Hawaii to 170° west longitude.

5. AMEND SECTION 12.111(a)(2)(ii) TO READ AS FOLLOWS:

(2) 7000 to 7300 kc, using type A-1 emission and, on frequencies 7000 to 7200 kc, using type F-1 emission and, on frequencies 7200 to 7300 kc, using type A-3 emission or narrowband frequency or phase modulation for radiotelephony.

6. AMEND SECTION 12.111(a)(4) TO READ AS FOLLOWS:

(4) 14,000 to 14,350 kc, using type A-1 emission, 14,000 to 14,200 kc and 14,300 to 14,350 kc using type F-1 emission and on frequencies 14,300 to 14,350 kc using type A-3 emission or narrowband frequency or phase modulation for radiotelephony.

CALLING FREQUENCIES ABANDONED — EMERGENCY RULES AMENDED

As announced briefly in our January issue, the Commission in early December acted in the matter of its Docket 10237, wherein it proposed complex rules for emergency operations, and a channel system for calling and answering purposes. In its final action, FCC completely abandoned its idea for restricted calling bands for amateurs. It adopted the League view also in the matter of emergency operation when it amended our rule § 12.156, effective February 2, 1953, to read almost exactly as the text offered by ARRL as a simplified alternative:

§ 12.156 Operation in emergencies. In the event of an emergency disrupting normally available communication facilities in any widespread area or areas, the Commission, in its discretion, may declare that a general state of communications emergency exists, designate the area or areas concerned, and specify the amateur frequency bands, or segment of such bands for use only by amateurs participating in emergency communication within or with such affected area or areas. Amateurs desiring to request declaration of such a state of emergency should communicate with the Commission's Regional Manager of the area concerned. Whenever such declaration has been made, operation of and with amateur stations in the area concerned shall be only in accordance with the procedures hereinafter set forth, but such requirements shall in no wise affect other normal amateur communications in the affected area when conducted on frequencies not designated for emergency operation.

(a) All transmissions within all designated amateur emergency communication bands other than communications relating directly to relief work, emergency services, or the establishment and maintenance of efficient amateur radio networks for the handling of such communications, shall be suspended. Incidental calling, answering, testing or working (including casual conversation, remarks or messages) not pertinent to constructive amateur radio activities or to emergency situations shall be prohibited within these bands.

(b) The Commission may designate certain amateur stations to assist in the promulgation of information related to the declaration of a state of communications emergency, to monitor the designated amateur emergency communications bands, and to warn noncomplying stations observed to be operating in those bands. Such stations, when so designated, may transmit for that purpose on any frequency or frequencies authorized to be used by that station, provided such transmissions do not interfere with essential emergency communications in progress; however, such transmissions shall preferably be made on authorized frequencies immediately adjacent to those segments of the amateur bands being cleared for the emergency. Individual transmissions for the purpose of advising other stations of the existence of the communications emergency shall refer to this section, by number (§ 12.156) and shall specify, briefly and concisely, the date of the Commission's declaration, the area and nature of the emergency and the amateur frequency bands or segments of such bands which constitute the amateur emergency communications bands at the time. The designated stations shall not enter into discussions with other stations beyond furnishing essential facts relative to the emergency, or acting as advisors to stations desiring to assist in the emergency, and the operators of such designated stations shall report fully to the Commission the identity of any stations failing to comply, after notice, with any of the pertinent provisions of this section.

(c) The special conditions imposed under the provisions of this section shall cease to apply only after the Commission, or its authorized representative, shall have declared
such general state of communications emergency to be terminated; however, nothing in this paragraph shall be deemed to prevent the Commission from modifying the terms of its declaration from time to time as may be necessary during the period of a communications emergency, or from removing those conditions with respect to any amateur frequency band or segment of such band which no longer appears essential to the conduct of the emergency communications.

SCATTER SOUN DunG OKAYED

Just a year ago, W6QYT and W6PHO conducted the first of some extremely interesting and productive experiments in measurement of radio transmission paths, their purpose being the instantaneous determination of skip distance. While heralded as an outstanding development in propagation prediction techniques,1 it prompted the Federal Communications Commission to raise the question of whether the amateur rules permitted the specific type of emission employed, which was a form of pulse. After several exchanges of correspondence between FCC and the amateurs, the League requested an informal meeting with Commission personnel to discuss the problem. Such a meeting was called in early December by Commissioner George Sterling, W3DF, in his Washington office, attended by FCC's Safety & Special Radio Services Bureau Chief White, Public Safety & Amateur Division Chief Rollins, Amateur Service Branch Chief Grenfell, and ARRL's General Manager Budlong and Technical Director Grammer. The meeting was characterized by an evident desire on the part of all concerned to find a method to permit full use of amateur capabilities in advancing propagation techniques and knowledge in such a fashion, but with adequate safeguards to keep non-amateur interests from seizing the opportunity to conduct their investigations under the guise of amateur operation. It was concluded that no change in the amateur rules was necessary or desirable, but that special temporary authority would be granted in instances where the Commission is able to satisfy itself that a proper and useful purpose will be served thereby. Subsequent editions of the ARRL License Manual will contain the following editorial footnote:

Enron's Note: Adequately-qualified amateurs interested in undertaking, purely as an amateur activity, special technical investigations, such as observation and measurement of propagation phenomena, may apply for special temporary authority to employ types of emission other than those provided for in § 12.111. Requests for such authority should include full details and should be addressed to the Secretary, Federal Communications Commission, Washington 25, D. C.

LEAGUE FILES 50-MC. REQUESTS

In early December the League filed, in accordance with policy established by its Board of Directors, requests with the Federal Communications Commission to amend the amateur rules to provide (1) Novice operation with A-1 or A-3 in 51-53 Mc. for an experimental period of one year, and (2) A9 operation (duplex) in 51-54 Mc. The text follows:

(Continued on page 180)

1 QST, p. 11, Mar. 1952.

WHAT BANDS AVAILABLE?

Below is a summary of the U. S. amateur bands on which operation is permitted as of February 20th. Readers are cautioned that a number of proposals are now pending before the FCC and that action on those proposals may change this compilation considerably. Changes will, as usual, be announced by WIAW bulletins. Figures are megacycles. A9 means an unmodulated carrier; A1 means c.w. telegraphy; A2 is m.c.w.; A3 is a.m. 'phone; A4 is facsimile; A5 is television; P1 is frequency-shift keying; n.f.m. designates narrow-band frequency- or phase-modulated radiotelephony; and f.m. means frequency modulation, 'phone (including n.f.m.) or telegraphy.

<table>
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<tr>
<th>Frequency (Mc.)</th>
<th>Band</th>
<th>Power (watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.500-4.000</td>
<td>A1</td>
<td>500</td>
</tr>
<tr>
<td>3.500-3.800</td>
<td>P1</td>
<td>200</td>
</tr>
<tr>
<td>3.800-4.200</td>
<td>A3 and n.f.m.</td>
<td>500</td>
</tr>
<tr>
<td>7.000-7.300</td>
<td>A1</td>
<td>100</td>
</tr>
<tr>
<td>7.000-7.200</td>
<td>P1</td>
<td>50</td>
</tr>
<tr>
<td>7.300-7.300</td>
<td>A3 and n.f.m.</td>
<td>100</td>
</tr>
<tr>
<td>14.000-14.300</td>
<td>A1</td>
<td>200</td>
</tr>
<tr>
<td>14.000-14.200</td>
<td>P1</td>
<td>100</td>
</tr>
<tr>
<td>14.300-14.500</td>
<td>A3 and n.f.m.</td>
<td>500</td>
</tr>
<tr>
<td>14.300-14.350</td>
<td>P1</td>
<td>200</td>
</tr>
<tr>
<td>28.960-27.200</td>
<td>A6, A1, A2, A3, A4, f.m.</td>
<td>500</td>
</tr>
<tr>
<td>28.900-29.700</td>
<td>A1</td>
<td>300</td>
</tr>
<tr>
<td>28.500-29.700</td>
<td>A3 and n.f.m.</td>
<td>500</td>
</tr>
<tr>
<td>29.000-29.700</td>
<td>f.m.</td>
<td>100</td>
</tr>
<tr>
<td>50-54</td>
<td>A1, A2, A3, A4, n.f.m.</td>
<td>100</td>
</tr>
<tr>
<td>52-54</td>
<td>f.m.</td>
<td>50</td>
</tr>
<tr>
<td>144-145</td>
<td>A6, A1, A2, A3, A4, A5, f.m.</td>
<td>300</td>
</tr>
<tr>
<td>220-225</td>
<td>A8, A1, A2, A3, A4, A5, f.m.</td>
<td>300</td>
</tr>
<tr>
<td>420-450</td>
<td>A7, A1, A2, A3, A4, A5, f.m.</td>
<td>300</td>
</tr>
<tr>
<td>1,215-1,300</td>
<td>A8, A1, A2, A3, A4, A5, f.m.</td>
<td>300</td>
</tr>
<tr>
<td>2,300-2,450</td>
<td>A1</td>
<td>500</td>
</tr>
<tr>
<td>3,300-3,500</td>
<td>A8, A1, A2, A3, A4, A5, f.m.</td>
<td>300</td>
</tr>
<tr>
<td>5,850-5,925</td>
<td>A8, A1, A2, A3, A4, A5, f.m.</td>
<td>100</td>
</tr>
<tr>
<td>10,000-10,500</td>
<td>pulse</td>
<td>200</td>
</tr>
<tr>
<td>21,000-22,000</td>
<td>All above 30,000</td>
<td>500</td>
</tr>
</tbody>
</table>

* Peak antenna power must not exceed 50 watts.

In addition, A1 and A3 on portions of 1.800-2.000, as follows:

<table>
<thead>
<tr>
<th>Frequency (Mc.)</th>
<th>Power (watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.800-1.850</td>
<td>500</td>
</tr>
<tr>
<td>1.850-1.875</td>
<td>300</td>
</tr>
<tr>
<td>1.875-1.900</td>
<td>200</td>
</tr>
<tr>
<td>1.900-1.925</td>
<td>150</td>
</tr>
<tr>
<td>1.925-1.950</td>
<td>100</td>
</tr>
<tr>
<td>1.950-2.000</td>
<td>50</td>
</tr>
</tbody>
</table>

* Except in State of Washington where daytime power limited to 200 watts and nighttime power to 50 watts.

Novice licensees may use the following frequencies, transmitters to be crystal-controlled and have a maximum power input of 75 watts.

<table>
<thead>
<tr>
<th>Frequency (Mc.)</th>
<th>Band</th>
<th>Power (watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.700-3.750</td>
<td>A1</td>
<td>25</td>
</tr>
<tr>
<td>7.175-7.200</td>
<td>A1</td>
<td>145-147</td>
</tr>
<tr>
<td>7.175-7.200</td>
<td>A3</td>
<td>145-147</td>
</tr>
</tbody>
</table>

Technician licenses are permitted all amateur privileges in the bands 220 Mc. and above.
Expedition to Brunei

The Story of VS5ELA

BY CLYDE F. NORTON,* W9ELA, VS5ELA

Almost every DX man who is seriously interested in his favorite phase of amateur radio activity has at some time or another had a secret desire to be rare DX himself. The thought of having the world calling your station, instead of your station calling the world, possesses a fascination which only a DX man can fully appreciate. It was basically this desire which motivated my actions in planning a radio expedition to a country in which there had been no previous amateur radio operation.

The story of the VS5ELA operation actually began in the spring of 1951. At that time it appeared probable that I would make a trip to the Orient late in the summer. It then occurred to me that it would be an interesting venture to take a side trip to some country in which there had never been amateur radio activity and to place a station on the air with the objective of giving the DX enthusiasts of the world a new country for their lists. Unfortunately, however, a series of serious delays ensued after elaborate preparations had been made for such a DXcursion in collaboration with Joe Pehoushek, ex-W9EFFK and second operator at JA2BQ for some time. Tardy official authorization, airline schedules changes and other factors conspired to force a postponement of the effort until the following year.

In the spring of 1952 I started planning for a second attempt. In May Joe came to the Mayo Clinic for an operation. Because of the resulting extended absence from his work in Tokyo, I withdrew from participation in the expedition. I immediately contacted fatty Fung, VS6CG, who had previously indicated an interest in the expedition, and offered him the assignment as second operator. Fung quickly accepted.

Improved equipment was assembled in Minneapolis and was packed in a large wooden box. Upon my arrival in Tokyo on July 12, 1952, I requested that the box be stored in customs in bond until the time of departure of the next flight to Manila.

Two days later upon my arrival at the airport from the hotel the box could not be found. A search was quickly started, but no information regarding the whereabouts of the missing equipment was obtainable. That evening I was informed that an agent loaded my box erroneously onto a plane for Hong Kong the previous day. It was my intention to fly to Hong Kong that night anyway so I took off in accordance with original plans. Upon arrival I checked carefully with airline and customs representatives but they knew nothing about the missing radio gear.

The predicament was outlined to members of the Hong Kong Radio Club, Pat O’Brien (VS6AE), Bill Musty (VS6BA), and Fatty Fung (VS6CG). As a result, VS6CG volunteered the use of his home station, which included a pair of S07s in the final. Plans were proceeding on this basis when a letter was received from Joe Pehoushek on Monday, July 21st, stating that Joe would meet me in Manila on Wednesday, and that he was bringing the equipment assembled the previous year, and in addition that he was bringing his sixteen-year-old son, Bill. When this letter was received, they had already left Tokyo for Manila so we could not inform them of the changes in plans. Realizing the extreme shortage of space aboard the plane to Labuan as well as the virtual impossibility of obtaining additional transportation and living accommodations in Brunei, Fung then very graciously withdrew.

On July 25th Joe, Bill, and I went to the Manila Airport to board the Cathay Pacific Airways flight to Labuan. The equipment, together with our luggage, weighed nearly three hundred pounds. After considerable delay we learned that the DC-3 airplane would be nearly 700 pounds over gross weight with us aboard, and that some reduction in weight was therefore necessary. It appeared that Bill would have to

* 14 Westwood Circle, Ivanhoe Woods, Minneapolis 16, Minn.

QST for
The going gets rough as the author bears down amid 14-Mc. pile-ups at the V56EZA shack.

remain behind. However, at the last minute the captain decided to reduce the gas load, and that change, together with a reduction in cargo, made it possible for all of us to take off. V56CO, who is a flight radio operator for Cathay had arranged to be working on this flight, and his efforts were instrumental in getting our load on board. (Were these narrow scrapes never to end?)

We flew across the South China Sea and landed at Sandakan, British North Borneo. The airport there consists of a grassy landing strip hewn out of the jungle and an open terminal building. After a stop at Jesselton, we departed for Labuan where we retired at the Airport Hotel.

The next morning we arose early. The manager of the Shell Oil Company in Manila had provided me with a letter of introduction to the manager of the British Malayan Petroleum Company on Labuan. Because Labuan is a small island, we had no difficulty in locating the manager with the aid of the local Chief of Police, a jeep and a driver.

The manager informed us that his organization operated a small airplane which would fly to Seria in Brunei at noon, but that it probably had a full load on board. Later, the airport representative belatedly informed us that he thought arrangements had been completed to board us on the flight. We and our baggage were weighed and we learned that we were one hundred pounds too heavy. (Again it looked as though Bill would have to remain behind!) However, at the last minute the captain decided that the full load could be boarded. We took off (much to my relief) and in less than one hour we saw the Seria airstrip below us—a grassy runway chopped out of the jungle about two hundred yards from the shore.

We were met by an East Indian with a car who drove us through the oil fields of Seria to the government rest house in Kuala Belait. The Indian told us that there were black snakes eighty feet long in the area. That’s more than a full wavelength on twenty meters, even allowing for exaggeration! The driver assured us that these big snakes were non-poisonous, but any resulting feeling of relief faded quickly when he explained that they readily kill human beings by strangulation. On arriving at the rest house, I explained that we had previously requested accommodations. We were informed by a bare-footed Malay, “no room.” Because there are no hotels in Brunei and now no way of leaving the country for at least several days, it was obvious we were in trouble.

I asked the Indian boy to take me to the Chief of Police, who I hoped would have some helpful suggestion to offer but the Chief was not expected to return to Kuala Belait for several days. Without explanation, the boy then took me to the home of one of the natives who, fortunately, spoke English. He informed me that he was the Senator-Inspector, apparently a position of considerable responsibility. He seemed impressed when he learned that our arrangements had been made with the Chief of Police and immediately stated that he would evict two residents of the rest house to provide room for us and wrote out an eviction order which the Indian took back to the place. Unfortunately the two men evicted sat on the steps of the house trying to decide what to do for nearly three hours and we could not risk erecting our antenna. Finally, they left for places unknown and we furiously started unpacking.

Several hours later after hurriedly assembling the complete station we found that it was impossible to load the antenna. It was then after midnight and extremely dark. (We were not very eager to investigate the difficulty at the antenna itself because we were not sure what sort of opposition we might encounter from the animal kingdom.)
Finally I listened across the 14-Mc. band and heard W7GUI say, “I guess he didn’t get on the air this morning as haven’t heard anyone calling him.” Apparently the DX fraternity was really watching for our start of operations! Feeling very much disappointed and even more exhausted, we crawled under our mosquito netting and quickly went to sleep.

The next morning we arose and rushed out to inspect the antenna; we found the trouble immediately. One side of the transmission line had been torn off when the line had become snagged in a tree in the darkness. Repairs were made, and the antenna loaded normally. We then concentrated on improving the installation. For example, because a nonstandard type of power outlet was used in the rest house, we snaked a light bulb and soldered wires onto the base in order to obtain power for our equipment.

Finally at 0835 GCT on July 27th, the big moment arrived; I called CQ for the first amateur radio transmission ever made in the country of Brunei! We received a tremendous thrill when we heard an answer to that first CQ; it was VK4QL. Upon signing with him five minutes later, I was surprised to hear W6FSJ call us for the first U.S.A./Brunei QSO in history. The first ten stations worked were VK4QL, W6FSJ, V6CCG, KC6QL, ZL1AU, W6MX, W6LW, W6ME1, W7AMX and ZL2FA. Twenty-five stations were Q5Od during the first hour.

Subsequently the tempo was accelerated, and we worked stations at the rate of 45 per hour during peaks. During the best short interval I worked ten stations in six minutes including three in a period of one minute. One of the highlights of the entire expedition for me developed just past midnight of that first night of operation when Ray Weibe, W6CTW, operating W0ELA, called me and I experienced the thrill of working my own station from a distance of nearly 10,000 miles.

Finally at about 1:30 a.m., Brunei time, after working nearly 125 stations, we became so exhausted that we decided to stand by for a few minutes of rest. Bill had been asleep for several hours, and Joe and I climbed under our mosquito netting. I intended to get up again in about fifteen minutes because there still seemed to be hundreds of stations calling VS5ELA; however, I didn’t awaken until eight o’clock the next morning.

The next evening we were off the air for an hour and a half during a period of peak conditions as the result of a blown filter condenser. The line voltage normally drifted down from a maximum of about 230 volts to about 150 volts, but superimposed on this general decline in voltage were several unexplainable surges to extremely high values which deflected most of our meters off scale. By moving rapidly it was usually possible to turn off all power before damage was done, but in this case we blew out the main line fuse in the rest house.

Also, because of the tremendous heat and humidity, we continued to lose parts of the transmitter. Even the insulation in the amplifier variable condenser started to break down. The grid meter developed internal arcing and had to be removed. (The heat and humidity were so high that a package of candy mints which I had obtained in Manila deteriorated into a moist powder and could not be eaten.)

The operation of the station was continued for a period of five evenings. Very few signals were heard in the daytime; in general, only Asian stations were worked at that time. In the middle of the afternoon, Australian, New Zealand, and west coast U.S.A. signals usually started coming through, followed in the early evening by central U.S.A. and African stations. When U.S.A. signals faded out at approximately midnight, European stations made their appearance. It wasn’t until the fourth night of operation that stations located along the east coast of the U.S.A. were heard. Upon completing a QSO with PY2CK at 1100 GCT on July 30th, I heard W1PH break

(Continued on page 189)
Universal-Shunt Milliammeter Design

Simple Multiplier Calculations

BY WALTER PRICE,* W2ZQY

Many articles have appeared, at various times, describing the construction or the design of the conventional type of multirange milliammeter. But for some reason, the universal-shunt circuit, which appears in most commercially-designed milliammeters, is neglected in the average home-constructed instrument. Since the universal-shunt milliammeter has some advantage over the conventional type, the necessary data for design of this type is presented in this article.

Two examples of the universal-shunt milliammeter circuit are shown in Fig. 1, the only difference being that a 100-µa meter is used in circuit A, while a 1-ma. meter is used at B. In contrast to the individual-shunt-type circuit, the switch contacts are external to the meter circuit and therefore variation in contact resistance does not affect the meter reading. In the conventional arrangement, switch-contact resistance may not be a negligible portion of the multiplier-shunt resistance. Another advantage of this circuit, when properly designed, is that there is always some resistance in series with the meter, which offers a measure of protection against accidental burn-out when the meter is switched to the wrong range.

While the changing combinations of series and parallel resistance may look a little complicated on the surface, actually the design of the universal-shunt system is quite simple. For maximum protection to the meter, it is desirable to have as much series resistance, \( R_s \), in the circuit as possible. However, as \( R_s \) is increased, the resistance of the multipliers must also be increased. And since the current through the multiplier resistor remains the same regardless of its resistance, the dissipation varies directly with the resistance value. The limitation on dissipation is, of course, principally a matter of physical size and procurability.

It will be found that the greatest dissipation takes place at the lowest-resistance (highest-current) multiplier, \( R_1 \). If this resistor is to be limited to a 1-watt size, its resistance cannot exceed

\[
R_1 = \frac{P}{I^2}
\]

where \( P \) is the power dissipation in watts and \( I \) is the maximum current in amperes through resistor. If the highest-current range is to be 500 ma. (0.5 amp.), \( R_1 \) should have a value no greater than

\[
R_1 = \frac{1}{0.5^2} = 4 \text{ ohms.}
\]

Fig. 1 — Universal-shunt milliammeter circuits, (A) for a 100-µa meter, (B) for a 1-ma. meter. As explained in the text, different resistance values may be substituted if found desirable.

For the next step, the following formula is used:

\[
R_1 = R_t \left( \frac{R_{\text{max}}}{R_{\text{min}}} \right)
\]

where \( R_t \) is the total multiplier-branch resistance, \( R_{\text{max}} \) is the maximum multiplier factor and \( R_{\text{min}} \) is the minimum multiplier factor.

For the 100-µa meter and multiplier in the example of Fig. 1A, \( R_{\text{max}} \) is 5000 for the 500-ma. range and \( R_{\text{min}} \) is 1.5 for the 150-µa. range. Substituting known values in (2),

\[
R_t = 4 \left( \frac{5000}{1.5} \right) = 13,333 \text{ ohms.}
\]

The meter-branch resistance, \( R_b \), is determined by

\[
R_b = R_t \left( R_{\text{min}} - 1 \right).
\]

Substituting values,

\[
R_b = 13,333 \left( 1.5 - 1 \right) = 6666 \text{ ohms.}
\]

The position of each tap on the multiplier

(Continued on page 134)
Magnetic Ceramics: Ferrites
The Latest in Magnetic Materials for R.F.

BY F. E. VINAL,† WIGXJ

Through current advertising items and severa articles which have appeared recently, some in electronics journals, it is becoming increasingly evident that an entirely new series of electronic components exists based on the magnetic ceramics or ferrites. These materials, many of whose trade names have been obtained by taking various liberties with the Latin word for iron — ferrum — have opened new horizons for the professional design engineer, but they are no less a challenge to amateur ingenuity and the home experimenter.

It is the purpose of this article to introduce magnetic ceramics to the rank and file of the amateur fraternity; from there, one hesitates to predict what may result. No attempt will be made to be fundamental about the sources of the magnetic effects. The writer, who is a chemist gone astray, does not follow all of the abstractions which are available on the internal workings of atoms, but friends who are theoretical physicists tell me that quantum mechanics are required to give an adequate explanation of the origin of the magnetic effects in ferrites; further, there are adequate theoretical publications now available dealing with these phenomena in ferrites. Let us see instead what ferrites can mean to those who get their callouses handling the soldering iron.

First, one might ask, “Why ferrites?” Refreshing our memories from what the ham’s bible (20th edition, 1952, page 27) has to say about iron-core coils and their properties, we can conclude that where currents run small — as in r.f. or i.f. transformer windings for receivers — it would be very helpful to have high-permeability, low-loss cores. For this purpose, component manufacturers have provided powdered-iron cores which have permeabilities of the order of 125. Powdered-iron cores offer great improvement at low and intermediate frequencies, but at the high frequencies losses still plague us and the effective permeability of a powdered-iron slug is far below the true permeability which may be obtained with a closed magnetic circuit (toroidal cores). Now come the ferrites with maximum permeabilities ranging up to 4000 at 1 megacycle and with a loss factor of 0.0003 at that frequency. With further increase in frequency, the path divides at present into high-permeability materials with rapidly increasing losses and lower-loss materials of much lower permeability. The field is an active one and advances are being made daily, so it would be foolish to assume nothing better is forthcoming — but just how soon would be hard to say.

Where the Losses Come From

High permeability and low losses in the r.f. range! How do we get it? Well, first let us borrow a formula from the metallo-iron core designer. From it we can say that the eddy-current losses (which are the principal losses to be considered) for each lamination in the core are dependent upon a number of factors, some of which we can monkey with and some of which we cannot:

\[
\text{Eddy current loss in watts} \quad \begin{cases} \text{for each lamination} \frac{A}{R} \\
\end{cases} \quad \text{where } A = \frac{\pi^2}{6} \text{ a constant}
\]

\[
V = \text{volume of the lamination} \\
R_{\text{max}} = \text{magnetic flux in the lamination} \\
d = \text{thickness of the lamination} \\
f = \text{frequency} \\
R = \text{specific resistance of the lamination}
\]

Frequency and thickness both occur in the

† 31 Silver Hill Road, Weston 93, Mass.
‡ Magnetic Circuits and Transformers, M.I.T. Staff, p. 136, J. Wiley and Sons, 1943.
numerator as the square power and work against you, and volume should be kept as low as possible.
You can't help wanting to use high-permeability material at high frequencies but what can you do
about the thickness? There is practical limitation to minimum thickness for a single lamination,
and to exceed that limit core manufacturers have turned to finely-powdered iron particles. How-
ever, these cannot be packed together without insulating them from each other, just as the lami-
nations in a power transformer are coated with a film of shellac. Plastics have been used to coat
the powdered-iron particles, but the amount of

* Get acquainted with one of the newer magnetic materials that looks destined
to play an important part in the communications field. It is already responsi-
able for some of the high-Q coils that have gone into low-frequency "super-
selective" i.f. amplifiers.

at high frequencies, become serious or prohibitive.
Permeability decreases further because these fine-
grain materials have higher coercive force values, and as the area enclosed by the hysteresis
loop increases, so do the hysteresis losses. The use
of open magnetic circuits (slugs) instead of closed
magnetic circuits (toroids) takes away a consider-
able chunk of the true permeability, so that at
100 Mc, one can expect an effective working
permeability of about 5.

Referring back to the formula, the denomi-

$\frac{1}{d}$


ator is seen to contain the specific resistance of
the core material. For iron (no matter how small
the particles may be) this figure is about 0.000001.
Dividing an already large numerator by such a
figure makes the answer come out extravagantly
large, and there is no way to change this ma-
terially so long as you are dealing with iron and its
alloys; it's just the nature of the beast.

Why Ferrites Are Better

Ferrites, however, are different. The various
commercially available types have specific resi-
dance values ranging from 10,000 to 1,000,000-000
ohms per centimeter cube. With this sort of
figure in the denominator we no longer care about
the thickness, $d$. We can make the core of one
solid piece to achieve maximum working perme-
ability and take full advantage of the magnetic
properties, at least up to moderate frequencies.
Although $V$ increases, this is more than offset
by high specific resistance values in the denominator.

At present, materials for use at 3 to 6 Mc. are
available which have low loss and high permeabili-
ties (700–800). Toroidal coil forms of this ma-
terial should provide the highest efficiency yet
achieved in transformers for this range and
perhaps the next 5 or 10 Mc. as well, for although
losses increase rapidly with frequency, they don't
go out of sight yet. Many problems remain to be
solved, but ferrites offer more promise for r.f. cores
than any material known.

At the very high frequencies, dielectric losses
in ferrites become quite high and we do not
yet have the answer to very good cores for use
above 10 to 20 Mc.; but, even so, those now
available are fully equal to or superior to pow-
dered iron at 100 Mc.

As we go from the very high to the ultrahigh
range, oddly enough the dielectric losses largely
disappear in the range of 500 Mc. for some of the
ferrites. Above that, these materials are rather
free of loss up to the range of 12,000 Mc., with
the exception of a range around 3000–4000 Mc.
where large losses occur from magnetic resonances
within the crystal lattice structure of the ma-

February 1953
What They Are

A few words about the composition and manufacture of ferrites may be of interest. First of all, it has been found that a few simple inorganic chemical compounds, known as ferrites, are magnetic (there are many other ferrites which are not magnetic). The basic ideas are not new, as they are a logical extension and expansion based on the magnetic lodestone whose origin is lost in Chinese antiquity. Hence, one could easily say, "Why didn't I think of that?" Be that as it may, it was not until about 1935 that any systematic studies were undertaken toward the results we now have available. Commercially, the development is entirely a postwar one.

Magnetic ferrites are formed by chemical reaction of one or more oxides of certain metals with a chemically equivalent amount of red oxide of iron. This reaction is usually carried out between the mixed oxide powders at temperatures above 2000° F. The various metal oxides which may be reacted with red oxide of iron are magnesium oxide, black oxide of iron (which results in magnetite or the lodestone), nickel oxide, copper oxide, cobalt oxide, manganese oxide and lithium oxide. These combinations will each give a simple magnetic ferrite. However, complex mixtures of oxides are usually employed, in order to give improved or special properties to the ferrite. Oxides of zinc and cadmium form nonmagnetic ferrites, but are often blended with the magnetic ones to reduce the temperature at which maximum permeability occurs to a value near normal operating temperature.

Once the oxides have been reacted, the ferrite powder thus formed is used to shape the piece or core desired. The usual practice is to mix a little binder with the powdered ferrite and then press the desired piece in steel dies. The piece thus formed will hang together until placed in a furnace for the final hardening or sintering process. During the early stages of this heating, the binder is burned out of the piece and later, at temperatures above 2000° F., the particles sinter or coalesce into a dense, hard, somewhat brittle material, usually dark in color.

Applications and Possibilities

Ferrites have already seen many applications, and new ones are coming up practically daily. Some of the better known applications see them used in recording heads, i.e. transformer cores, magnetic modulators, horizontal sweep output transformer cores for TV, yoke cores for TV, audio transformer cores (fine for the very high audio frequencies), tuning slugs, "built-in" antennas, electronic computer "memory devices," pulse transformer cores, recording tape coatings, etc. One of the most intriguing uses proposed is the microwave gyror. In this application, a rod of ferrite is inserted axially in a wave-guide where a polarized microwave may be rotated up to 90° upon passing through the ferrite in one direction but a reflected wave is rotated 90° again in the same direction and hence it is possible to isolate an oscillator or some other associated device from the rest of the microwave system.

The limit to which ferrites may be applied is not now known, and it is not possible even to speculate on it because of the continuous march of new ideas as the properties of ferrites are further explored. For instance, it has been found that the shapes of the hysteresis loops of ferrites can be modified with (see photograph) on a practical basis. The two hysteresis loops shown are for specimens prepared by the author, and yet the chemical analysis of both specimens is the same. Fast-switching ferrites suggest magnetic switches which will operate in 1 or 2 microseconds, and many other interesting possibilities. Now it's up to you to try ferrites in your pet circuit or scheme and see what comes of it. Who knows—you might make a million dollars!

Editor's Note: Ferrite parts are being produced by General Ceramics & Stonite Corp., Kearny, N. J.; Stackpole Carbon Co., St. Mary's, Pa.; Ferroxcube Corp. of America, Saugerties, N. Y.; but all current production is of manufacturers' items only. It is expected that Ferroxcube Corp., through its affiliate, the Sprague Products Co., North Adams, Mass., will soon make ferrite parts available through regular distributors.

46 QST for
Announcing:
The YL CENTURY CERTIFICATE

1) The YL Century Certificate for confirmed contacts with stations operated by 100 or more different licensed women amateur radio operators is available to all amateurs throughout the world, and is issued by the Young Ladies Radio League at no cost to the applicant upon compliance with these rules.

2) Two-way communication must be established on the authorized amateur bands with stations—mobile or fixed—operated by 100 different licensed women amateurs. Any and all amateur bands may be used.

3) All contacts must be made from the same location. Within a given community, one location may be defined as from places no two of which are more than 25 miles apart.

4) Contacts may be made over any period of years, provided only that all contacts are from the same location as defined in Rule 3.

5) Contacts with YLs anywhere in the world are recognized, provided only that confirmations clearly indicate that the stations contacted were operated by duly licensed women amateur radio operators.

6) One hundred QSL cards, or other written communications from the stations worked confirming the necessary two-way contacts, accompanied by a list of claimed contacts, including the full names of the operators, alphabetically arranged, and the dates and times of contacts, must be submitted by the applicant directly to the YL-CC Custodian. Sufficient postage must be sent with the confirmations to finance their return by first-class mail. The YLRL will not be responsible for any loss or damage to same.

7) Endorsements: Confirmations of contacts, accompanied by alphabetical list, as per Rule 6, from stations operated by additional YLs may be submitted for credit each time 50 additional confirmations are available. Endorsements will be made to the original certificate as applications are approved.

8) Decisions of the YL-CC Custodian regarding interpretation of these rules as less stated or later amended shall be final. All inquiries regarding cards, applications or the certificates should be addressed to her.

Notes: A Custodian has not yet been appointed, so please hold back your cards and questions until notice of her appointment appears in this column.

Keeping Up with the Girls

Two new notes — W6RIF, Rosemary, is NCS of a Calif. YLRL Net which meets Wednesdays, 1:00 a.m. PST, 3815 kc., phone and c.w.; W7GLK, Dot, is NC of an 80-meter c.w. net which meets Mondays, 10:45 a.m. PST, 3580 kc. . . . 2S YLs have formed a new club — the South African Women's Radio Club. 2S2AA is Pres., 2S9KG is V.P., and 2S6KK and 2S6CH are Joint Secretaries. . . . W6CCK, Maxine, will soon operate "portable-five" from her new 7-Mc. home in Tyler, Texas, QTH. . . . W3JSH worked 2S9I on 7 Mc. for her . . .

(Continued on page 186)

If you have worked Ann Chandler, W10AK, of Orange, Vermont, you know how good c.w. should sound. An A-1 operator for some time, Ann is ever patient in helping other beginners, and her excellent operating sets a fine example. An RM and member of the VTSS, VTN, and 1RN, she spends most of her operating time in nets. Ann's OM is W1MMN.
Progress Report on TVI Committees

FCC Sponsorship of Community Interference Committees Pays Dividends

BY GEORGE S. TURNER,* W3AP

• Here’s a summary of the first year’s experience in FCC sponsorship of local TVI committees. The effectiveness of this program conclusively shows that your community should have one to help lick the interference problems.

It has been a little over a year since the FCC Field Engineering and Monitoring Bureau directed its Regional Managers to assist in organizing interference committees within their respective regions. The response from amateurs, service men, distributors and other groups has generally been most gratifying. The most recent reports received from the Regional Managers showed a total of 177 established working committees with 30 more being formed or in a proposed status. These do not include MARS operations which have established committees throughout the 4th Air Force. Committees which have not made their existence known to the Regional Manager and established working procedures with him for referral of complaints received by FCC district offices are not included in the above statistics.

The FCC does not in any manner wish to give the impression that this plan of community interference committees was wholly its idea. Most amateur radio clubs since their inception have had such committees. The pioneer work on TVI by the hardworking, courageous amateurs comprising the Dallas Amateur Club TVI Committee was done before the FCC directed its Regional Managers to coordinate committees and to sponsor and assist in forming new committees. The FCC and its predecessor agencies have helped to organize groups outside their own ranks for the old bugaboo of BCI before the advent of TV. Some of you real old-timers may remember “The Chicago Plan” which was developed to solve BCI back in 1920 by a group of Chicago amateurs called together by Supervisor of Radio Charles C. Kolster of the Department of Commerce, Radio Division, who then was in charge of the old 9th radio district. Through Mr. Kolster’s efforts upon transfer to Boston, a similar plan was put into effect there. There were many other instances of cooperative effort on the part of the amateur and the regulatory body to eliminate BCI but it would mean digging into dusty files or old-timer’s memories to recall them.

In this day and age the BCI problem is a very minor one compared to its offspring TVI. The decision was made in November, 1951, to have the Regional Managers assist in forming and coordinating interference committees outside the Commission because the investigative work load at the FCC district offices had reached such staggering proportions that the reduced staffs could not successfully cope with it. Also, as was later pointed out in an article by the writer in the January, 1952, issue of QST and in a guest editorial by Commissioner George E. Sterling in CQ magazine for February, 1952, the amateur TVI problem is one which in most instances may best be tackled by amateurs, TV set owners, manufacturers, dealers and servicemen working together to remedy the situation without recourse to the FCC except as a last resort if all other efforts have failed.

It is pleasing to report that the work accomplished by the interference committees has materially lightened the interference investigative work at the FCC district offices. One district office reports that TVI committees operating in the metropolitan area have reduced the FCC office workload to the extent that time can now be given to handling more cases in rural areas. It is also known that this assistance to FCC field offices has also made it possible to handle more of the type of investigations which relate to unauthorized operation and to interference to services other than broadcast and TV from sources other than amateur. Yes, there are many such cases unfortunately; the amateur is by no means the only one who causes radio interference. It is necessary that commercial and military communications be kept free of interference. This is FCC’s job both from a rule-enforcement standpoint and to keep communication channels interference free for handling traffic vital for national defense. Therefore, you can understand how the community committees dealing only with TVI and BCI are nevertheless of very real value to the over-all communications picture.

The Regional Manager’s last reports show interference committees known to them to be located by region as follows:

<table>
<thead>
<tr>
<th>Region</th>
<th>Established</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central States</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Great Lakes</td>
<td>26</td>
<td>10</td>
</tr>
<tr>
<td>Gulf States</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>North Atlantic</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>North Pacific</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>South Atlantic</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>South Pacific</td>
<td>41</td>
<td>4</td>
</tr>
<tr>
<td>Alaska</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Hawaii</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>177</td>
<td>30</td>
</tr>
</tbody>
</table>

* Chief, Field Engineering and Monitoring Bureau, FCC.
The internal organization of interference committees, their policy in handling complaints, and the types of cases considered, appear to vary from city to city according to local needs, variety of agencies available for liaison, and the level of interest maintained by the committee after original enthusiasm has worn off.

**Organization Structure of TVI Committees**

There are two basic organizational structures for the amateur group which appear to be in general usage. (1) Where a number of amateur clubs are situated in close proximity in a metropolitan area, the usual approach is to pool individual resources into one unified amateur committee. From its own interference committee, each club provides one or two voting representatives to serve on this amateur steering committee. A chairman directs its numerous activities. All TVI complaints or calls for assistance, are referred, recorded, assigned and ultimately cleared through a committee "coordinator." (2) In more isolated areas, each individual amateur radio club may provide its own committee on a purely local basis.

The following are listed as examples to show the type of representatives usually serving directly with the amateurs on a TVI committee, or in an advisory capacity as a cooperating group: Representatives of broadcast and television stations, local power companies, ARRL, RTMA, NARTB, local airways, police radio, television manufacturers, distributors, service organizations, independent service personnel, the military, Civil Air Patrol and Civilian Defense. A Commission district office representative or the Regional Manager may also serve in an advisory capacity.

**Usual Committee Objectives**

Each committee will usually be found to outline its own version of the following primary objectives, all of which aim toward a better mutual understanding in relations with the general public, and providing the basis for self-regulation in TVI for the amateur:

1. To provide assistance for those amateurs who are restricting their amateur radio activities because of TVI or in the fear of TVI.
2. To investigate amateur TVI complaints where the amateur is known or accused.
3. Crusade for a better understanding between all parties concerned with TVI. Integrate this with an educational program for both the general public and TVI personnel.
4. Provide a clearing house for the coordination of the cooperative efforts of all concerned directly or indirectly with TVI.

**Committee Policy**

First reports indicate only slight divergence from the over-all plan suggested by the FCC Field Engineering and Monitoring Bureau in the writer's January QST article. Most committees appear to be gratefully accepting the fullest extent, direct cooperation, liaison, or mutual assistance volunteered from all possible sources.

There are a few amateur committees tending to "spell out" policy in definite terms, ostensibly to preclude chances of overwhelming workload. Most committees, however, appear to realize that, in view of the unpredictable nature of TVI, no hard and fast rules should be formulated, and each case must be handled on its own merits.

**Results Obtained**

In a review of the information available at this time, the following improvements appear to have been effected in varying degrees: (1) Gain in confidence and mutual respect between amateur and complainant. (2) TVI cases are resolved in a cool-headed, cooperative manner. (3) Military Reserve Units (such as MARS) and Civil Defense amateur units are able to maintain continuous operations. (4) Decline in petitions against amateur operations. (5) Reduction in number of interference cases coming to attention of members of Congress and FCC.

One of the reasons for the effectiveness of these committees is the arrangement which the Commission has worked out with major receiver manufacturers to cooperate with the receiver owner through the use of high-pass filters when the interference is due to receiver deficiencies. Although committees by no means act with FCC authority, the liaison they have established with our Regional Managers places them in an ideal position to obtain full cooperation from the manufacturer.

**Examples of Committee Effectiveness**

The value of Committee handling of TVI investigations can be demonstrated by several examples of previously outraged complainants who, following an unexpected show of sympathetic attention on the part of a local TVI committee, become interested in amateur radio. More than a few amateurs, after prompt and congenial settlement of a TVI problem, now find their neighbor on the way to becoming a member of the amateur fraternity.¹

Many neighbors, having learned the friendly way that television and amateur radio can live side by side, soon take advantage of the message-handling services of the amateur station.

One complainant, whose interference problem had been solved by the installation of a high-pass filter at the television receiver, called upon the amateur to install a switching arrangement for the filter so that amateur's conversations might again be heard when desired.

Committee handling of complaints has resulted in a surprising number of pleased receiver owners who offer to pay for installations of a filter, or for other receiver modifications where indicated. This was an almost unheard of occurrence before the birth of TVI committees.

Most committee members have reason to appreciate the service they are rendering others. For example, in the Washington, D. C., area a considerable number of committee members who

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¹This is not always the ideal solution! — Ed.

(Continued on page 188)
MARS Now in Fifth Year of Operation

The Military Affiliate Radio System observed its fourth anniversary on November 26, 1952, with numerous local and area open houses and demonstrations. Highlights of the System celebration was the transmission of a special anniversary greeting from the then Secretary of Defense, the Honorable Robert A. Lovett. Member stations copying this transmission received the special 8 X 10-inch photo-montage acknowledgment shown below. The text of the message follows:

On behalf of the Department of Defense it is my pleasure to extend congratulations and best wishes to the Military Affiliate Radio System on the occasion of its fourth birthday. As a result of your splendid program you encourage private citizens to become interested in military communications methods and practices. Furthermore, and as a result of your unstinting efforts you assist in the organization and operation of radio nets for morale and training purposes and for possible use by military commands or local civil authorities in the event of disaster or emergency and also during any situation which causes existing official and commercial communications channels to become overloaded or inoperative. The members of MARS are to be commended for their excellent record of public service and I extend them every good wish in their future endeavors.

ROBERT A. LOVETT, Secretary of Defense

A reproduction of the acknowledgement earned by MARS member-stations who copied the Secretary's message.

Naval Reserve Visit

During November approximately seventy members of the Dade Radio Club, Miami, Florida, made a tour of the local Naval Reserve Training Center, Capt. Frank B. Hoselton, USNR, W4ADP, of the local unit, was in charge of the tour. Electronics equipment was demonstrated and the use of training aids and instruction kits was explained during visits to the electronics laboratory and classrooms.

Forest Fire Emergency

During the November forest fire emergency in the Charleston/Bluefield, West Virginia, areas, a Naval Reserve emergency communications network was activated and prepared to furnish communications. This network consisted of the Fifth Naval District Reserve Master Control Station, Norfolk, Va., and Naval Reserve Training Centers and Electronics Facilities in the West Virginia area. Amateur radio station W4USN at the Reserve Master Control Station, Norfolk, cooperated with W8CLX, the West Virginia Fire Control Station near Charleston, on 3800 kc., in providing assistance on amateur frequencies. Operators at the Reserve control station were: W9BYV/4, Cmdr. E. J. Beall, USNR; J. C. Pulliam, RMC, USNR; W5COX, G. E. McClelland, RM1, USNR; and W8CTI, J. F. Whishey, RM2, USNR.

Helpful Service

The Eleventh Naval District Reserve Electronics Program now provides a helpful service to amateurs in the San Diego, Calif., area. K6NCB, located at the district headquarters building, maintains a continuous loudspeaker watch on 20.5 Mc. daily from 0800 to 1000 local time Monday through Friday. Local amateurs may contact K6NCB during this period. A directory service is provided for out-of-town amateurs driving into the city with mobile equipment. Operators at K6NCB are W6HYA, Bill Munoz, ET2, USNR; K6DY, Cmdr. J. G. Pickens, USNR; W8W0Y, Cmdr. B. A. Wandfluh, USNR; and W6XNV, Marvin Fair, ET1, USNR.

Code Practice

Naval Radio Station NA-1-I, located on the east coast, sends weekly practice code transmissions, Monday through Friday, for training purposes. These transmissions are made simultaneously on 4205 kc. and 8410 kc. at these times and speeds (w.p.m.): 1000 to 1500; 1100 to 1450; 1200 to 1450; 1300 to 1500, 12; 1400 to 1500, 8; 1500 to 1530, 12; 1530 to 1545, 25; 1545 to 1600, 30; and 1600 to 1615, 35. This code practice is available for use by all amateurs.

Here and There

Anthony J. Gibilaro, RMC, USNR, W4QEL, is licensee, operator and stationkeeper at K4NAY, Naval Reserve Training Center, Portsmouth, Va.

Charles V. McNeil, ETNSA, USNR, W7RFP, the operator at K7NAE, Naval Reserve Training Center, Spokane, Washington, recently made a training cruise on the USS Gilligan.

K6NRR, Volunteer Electronics Company 12-8 of Redwood City, Calif., has three active amateur members. They are W6GBX, Cmdr. Norton C. DeWolfe, USNR, commanding officer; W6XBD, Cmdr. Arthur C. Adams, USNR; and W6GWF, Lt. Cmdr. Charles E. Finn, USNR.

The Anderson Radio Club meets the first and third Thursday at the Naval Reserve Electronics Facility (K4NBY), Anderson, S. C., C. J. Walker, Jr., BAL, USNR, W4SSN, is club secretary.

Merrill D. Randall, RMC, USNR, (W1JRB) stationkeeper at K4NBN Naval Reserve Training Center, Newport, R. I., was recently elected as Communications Manager of the ARRRL's Rhode Island Section, New England Division.
The newest country to show up on s.s.b. is Switzerland, thanks to HB9HF. W4INL worked him on 20, for the first HB-W s.s.b. QSO. Other single-siders that W4INL scared up include G2IG, KT1DD, VR2CG, G2ALN, KP4HF, KH6-AJH, OE13CC and G3COJ.

The Hamfester Radio Club is proud of its two active s.s.b. stations, W9KNP and W9DKA, both using phasing rigs. . . . W4GL uses a phasing rig on 20 to drive the final of his Collins KW1. . . . Latest figure on W6 s.s.b. activity is 44 on 80 and 8 on 20, to refute our figures of a few months ago.

**Grounded-Grid Linear Amplifiers**

With the current interest in grounded-grid linear amplifiers, you will probably be interested to see how W2EAS has his rigged up. Bill uses a pair of 805s, as shown in Fig. 1A, and the heart of the thing is the low-capacity filament transformer, $T_1$, that makes it easy to keep the filaments above r.f. ground. The transformer was one that was kicking around in surplus, with about 3/4-inch spacing between windings and core. Originally with a 5-volt secondary, it was rewound for 10 volts to keep the 805s happy.

The resistor $R_1$ has no particular significance except to limit the d.c. voltage appearing at the end of the cable, if the link is disconnected. The 1/2-turn link, $L_1$, is part of the converted BC-606 driver. Peak plate input to the driver runs around 75 watts. Idling current to the 805s is around 85 ma., kicking to 300 to 400 ma. on peaks. The linear worked right off, after a minor oscillation was killed by the parasitic suppressors in the plate leads, and no neutralizing is required, of course.

![Diagram of Amplifier]

**High-Level Converters**

There has been a need in s.s.b. circles for a good high-level converter, to aid in band changing at powers above what the small receiving tubes will handle, and W6EED has come up with what looks like a neat solution. Shown in Fig. 2 (p. 118), it can be used as a Class A grounded-grid amplifier or as a mixer, depending upon how the plate circuit is tuned. W6EED has used a 6Y6, 6V6, 6LB and 6AQ5 in the circuit, all with equally good results. As an amplifier, the plate current runs around 15 ma. (at 300 volts), with no variation with signal. As a mixer, the plate current idles at around 15 ma. and kicks to 30 ma. on peaks. It requires less than 1 watt of drive, and its output is sufficient to overload a heavily-loaded 807. The heterodyning signal has no effect on straight-through operation. Norm uses the device straight-through on 75, and a 10.4-Mc. oscillator and a new coil at $L_2$ put the output on 20 meters.

(Continued on page 118)

![Diagram of Converter]

**Fig. 1 (A)** — The grounded-grid linear amplifier at W2EAS uses a pair of 805s in parallel. A special (surplus) low-capacity filament transformer solves the problem of keeping the filaments above ground for r.f.

- $C_1$, $C_2$, $C_3$ — 0.01-mfd. 600-volt mica.
- $C_4$ — 0.004-mfd. 2500-volt mica.
- $C_5$ — 300-muf. variable, 0.05-inch spacing (Cardwell MO-129-BD, both halves in parallel).
- $C_6$ — 15-muf. 1500-volt filter condenser.
- $R_1$ — 800 ohms.
- $R_2$, $R_3$ — 100 ohms, 1 watt.
- $L_1$ — 4/5-turn link on ARC-5 driver.
- RFC₈, RFC₃ — 30 turns No. 30 enam., wound on $R_2$, $R_3$.
- $T_1$ — Low-capacity filament transformer, surplus.

**Fig. 1 (B)** — W4PIX uses the excitation link, $L_1$, and an r.f. choke, RFC₈, to keep the filament above ground in his grounded-grid amplifier.

**February 1953**
Notes on V.H.F. Converter Design

Some Practical Hints for Improving the Performance of Crystal-Controlled Converters

BY JOHN P. VAN DUYNE,* W2MLX, AND KURT E. TREPATAU,** K2CEM

-- Crystal-controlled converters are becoming more popular among v.h.f. men every day, but unless they are carefully designed their considerable response to signals outside the intended frequency range may make them something less than an unalloyed blessing. Here the authors describe simple means for reducing spurious responses in v.h.f. converters, while at the same time maintaining uniform high sensitivity across the desired tuning range.

The basic reason for the use of a converter is to extend the frequency range of a communications receiver to bands where the owner of the receiver wishes to operate. Various forms of v.h.f. converters have been used with amateur receivers for many years, but only recently have they begun to achieve a high state of perfection.

A major drawback of v.h.f. converters in general has been instability in the local oscillator, resulting from mechanical vibration or long-term thermal effects. In order to circumvent this difficulty the use of crystal-controlled injection sources has come into vogue. The higher the frequency the more difficult it is to design a variable-frequency oscillator, so though crystal-controlled converters for all amateur bands have been described, their greatest use has been found on 50 Mc. and higher bands.

The use of crystal control in the converter, though it makes possible a high order of stability, introduces other complications. These revolve around the fact that, with a single injection frequency, the intermediate frequency must be varied to effect a tuning range. The r.f. portion of the converter must thus be broadbanded in some way, so that its gain will be constant across the band for which it is designed, yet it must be made to reject signals on all frequencies outside the desired range as far as possible.

Some crystal-controlled converters that have been described make use of rather inefficient broadbanding methods. An example is the use of single-tuned coupling circuits damped with shunt resistors to broaden their frequency response, as shown at the top of Fig. 1. This is simple circuitwise, but it produces a passband that is far from the ideal. It achieves broad response at the expense of gain, and the passband is such that interference from strong signals outside of the desired frequency range is a problem. On the other hand, we have found that use of several double-tuned-overcoupled circuits as shown in the lower portion of Fig. 1, results in an almost ideal flat-topped passband characteristic. High-Q coils of proper form factor, oriented for minimum capacitive coupling between stages, make possible this desirable response without an excessive number of circuits. It is obvious that this technique is going to be effective in reducing the amplitude of adjacent-frequency signals from strong local stations and interference from the unwanted harmonics of the crystal oscillator or doubler stages in the converter. The tendency to cross-modulation from stations located outside the passband is reduced, and higher gain is obtained at the desired frequencies.

Probably even more annoying than the cross-modulation trouble that is found in many crystal-controlled converter designs is their spurious response to signals outside the desired frequency range. It is quite common, in tuning the four-megacycle range covered by the 2-meter band, for example, to find many interfering signals in addition to the desired amateur stations. These may be the sound or video carriers of local television stations, taxicab or other mobile service stations, operating in the frequency range that serves as the intermediate frequency, or unmodulated signals resulting from harmonics of the receiver oscillator. All except those in the last category can be minimized or eliminated completely by employing suitable converter design techniques.

One of the purposes of this article is to describe means of overcoming these weaknesses of crystal-controlled converters for 144 Mc, while at the same time achieving a high order of sensitvity and stability. The 2-meter band is used as an example for several reasons, though the same principles may be applied to other frequencies in the v.h.f. range. Reception at 144 Mc requires multiplication of the crystal oscillator frequency. A converter for this band is quite susceptible to the spurious response troubles mentioned above because of its location in the spectrum between two high-powered broadcasting services, i.f.m. and TV, and close to many aircraft and mobile frequencies. In addition, it requires the use of low-noise r.f. amplifier techniques, as the frequency is high enough to make receiver noise one of the major limiting factors in weak-signal reception.
**R.F. Amplifier Circuitry**

It is well known that the first r.f. amplifier in a good design controls the sensitivity, or more accurately, the noise figure of the entire system. In the specific design in question it was decided to use one of the new low-noise dual triodes, such as the 6BQ7A, the 6BK7 or 6BZ7. The first r.f. amplifier circuit is the so-called cascade or driven grounded-grid arrangement shown in Fig. 2. This provides high gain, low noise figure, excellent stability and ease of adjustment.

Many variations of this circuit have been devised, and nearly all show complicated neutralizing methods for achieving the lowest possible noise figure. In the case of a circuit to be used only over a narrow band of frequencies (it should be noted that the 2-meter band is actually narrower than a single television channel) fussy neutralizing arrangements can be dispensed with, and a single small coil used to advantage. This inductor is connected between the plate of the first triode section and the cathode of the second, and is designed to be resonant with the input capacitance of the grounded-grid section. This dual-triode circuit has a noise figure under 4 db.

Above thermal, when it is used with a suitable pentode r.f. amplifier following, the over-all noise figure can be just slightly in excess of 4 db., which is quite good at these frequencies.

Note that a second r.f. amplifier using a pentode (6AK5 or 6CB6) is suggested. If the mixer follows the first r.f. amplifier directly, the noise figure will not be as good, and the operating conditions for the mixer become more critical. The intermediate r.f. amplifier also permits the use of more tuned circuits at the signal frequency and hence improves the rejection of adjacent signals and those on the intermediate frequency. In this respect, the additional pentode r.f. stage is superior to the use of an i.f. amplifier stage in the converter as a means of building up the gain. The latter tends to increase difficulties with signal pick-up at the intermediate frequency, whereas the second pentode stage is effective in reducing it. If control of the over-all converter gain is desirable, it can be accomplished by means of a cathode-bias gain control in the pentode stage in the same manner as is commonly used in i.f. amplifier stages.

Double-tuned circuits are used between the triode and pentode amplifiers, and between the pentode amplifier and the mixer. This is a very important feature, making possible the highly-desirable over-all response shown in the lower portion of Fig. 1. The coupling circuits can best be aligned by the use of a sweep-frequency generator, but this is not necessary. Entirely satisfactory performance can be obtained by judicious use of a grid-dip meter and a final touch-up using on-the-air signals. The gain of the unit is adequate to give very good performance, even with some mistuning.

**Pentode or Triode Mixer?**

Triode mixers are commonly used in v.h.f. converter service in preference to pentodes because of their generally lower noise figure. This is an important consideration only when no r.f. stage, or an ineffective stage, is used. The performance of the triode-pentode combination already described is such that the mixer following
it has substantially no effect on the noise figure of the system, so the following desirable features of a pentode mixer can be made use of.

Properly designed, the pentode mixer is less susceptible to oscillation trouble than a triode. It affords better isolation between r.f. and i.f., and consequently contributes to the ability of the converter to reject signals on other than the desired frequency range. The better pentodes have higher conversion gain, making an i.f. amplifier following the mixer unnecessary. Pentodes generally require less injection voltage than triodes, making the work of the oscillator-multiplier chain easier.

The design of a mixer to follow an effective r.f. amplifier system is not critical. Generally speaking, the principal consideration is to set up the operating conditions of the pentode so that it draws the lowest plate current consistent with satisfactory output.

Oscillator-Multiplier Consideration

The oscillator portion of the converter uses a crystal operating on its third overtone, permitting selection of the crystal from readily-available frequencies in the 7-to-8-Mc. range. The actual frequency is dependent on the intermediate frequency selected. Choice of the i.f. is a matter for later discussion. The final multiplied output should be 144 to 148 Mc. minus the desired tuning range of the low-frequency receiver. An example is in injection frequency of 130 Mc., allowing the receiver to be tuned from 14 to 18 Mc. to cover the 144-Mc. band. This is achieved by a 7222-icr. crystal operating on its third overtone, which is then multiplied by a factor of 6.

Many other possibilities exist, though this one provides for the use of a low-cost crystal and a simple multiplying chain. It is desirable to keep the frequency multiplication to a minimum, as the more multiplication there is involved the more complex becomes the signal fed into the mixer tube, and consequently the greater the danger of mixing the incoming signals with frequencies other than the desired one, resulting in "birdies" across the band. A typical case develops if high-order harmonics, other than the desired 130 Mc., get into the mixer tube together with the sound or picture carriers of TV Channel 7, which can be very disconcerting if a transmitter is operating on that channel locally. There are many other possibilities, of course, but suffice to say that it is highly desirable to minimize the presence of other than the desired frequencies at the mixer grid.

Occasionally, it will be found that local interference problems can be solved by suitable choice of multiplier frequencies following the crystal oscillator, selecting these frequencies so that none is higher or lower than a local service by the amount of the intermediate frequency. Normally the stage following the overtone oscillator multiplies the frequency by 2, and another stage runs as a tripler. This sequence is desirable in the presence of a strong TV signal on Channel 7, but there may be other cases where the order of frequency multiplication can be reversed to advantage.

In addition to choice of frequency multiplication according to local conditions, it is important that adequate filtering of unwanted harmonics of the crystal is provided in the plate circuit of the last frequency multiplier. This can be done with undercoupled double-tuned circuits, but in this instance it has been found adequate to use a high-Q plate circuit loosely coupled to the mixer grid by means of an inductive link.

Mechanical Layout

Several desirable objectives can be attained by proper layout of components for a crystal-controlled converter. There are two general approaches to the problem of adequate isolation and reduction of feed-back. One is to build compactly and resort to rather complicated shielding and filtering. Another is to build somewhat larger, in order to provide space for a layout that will achieve the same ends.

Stability, that is, freedom from feedback, is accomplished in the r.f. portion of the converter by careful positioning of the r.f. inductors, and phasing of the windings for minimum unwanted coupling between stages. Capacitive coupling between r.f. stages is held to a minimum by designing the r.f. inductors so that their hot connections (to plate and grid) occur at opposite ends of the coil structure. Components in the oscillator-multiplier chain are so placed as to prevent strong local fields therein from adversely affecting the performance of the r.f. portion.

Complete shielding from strong external fields is important, as is the prevention of signal pick-up at the intermediate frequency by any portion of the converter circuitry. This is achieved in a very simple manner by building the converter entirely on a metal plate that is then fitted to a chassis or metal-lined box to complete the metal enclosure. Connection from the converter to the communications receiver should be made with coaxial line, the outer conductor of which is connected to the case of the converter and to the receiver shielding. In the case of extremely strong local signals on the intermediate frequency, it may be necessary to add a shielding box around the receiver antenna terminals.

Desirable Receiver Characteristics

The communications receiver with which the converter is used plays an important part in...
the over-all performance of the v.h.f. receiving system. Desirable receiver attributes could be stated in general as follows: The receiver should have very good image rejection in the frequency range that is to be used as the i.f. band for the crystal-controlled converter. It should be well-enough shielded to prevent direct pick-up of signals in the i.f. range. The receiver oscillator and best-frequency oscillator should be stable, if maximum advantage is to be derived from the use of crystal control in the converter. The tuning range that is to serve as the intermediate frequency should have sufficient bandwidth so that signals may be tuned in easily and spotted readily as the receiver is tuned across the i.f. range. Some receivers are deficient in this category, particularly those that have separate bandspread and general-coverage dials.

The local oscillator of the communications receiver should be of low amplitude, be thoroughly shielded and of low harmonic content, and preferably applied to an inner grid of a pentagrid type mixer. When this is done, the oscillator voltage is effectively isolated from the signal input grid voltage by means of the screen. It is especially important that there be no oscillator voltage appearing at the antenna input terminals of the receiver, for such voltages even at very low amplitude will cause “birdsies” in the tuning range.

It is not necessary that the receiver be outstandingly sensitive; in fact, it may be desirable to have less than the usual sensitivity, as the converter has quite high gain in its own right.

If the receiver has inadequate image rejection (less than 1000 times) at the frequency chosen for the converter output, repeat signals will appear at twice the receiver i.f. away from the main response. That is, if the communications receiver i.f. is 455 kc., the 2-meter signals will repeat 910 kc. away from the proper frequency. This is a characteristic of the communications receiver, and nothing can be done about it in the converter. In general, it may be said that single-conversion receivers having one r.f. stage or none at all will have inadequate image rejection in the 14- to 18-Mc. region. Single-conversion jobs with two tuned r.f. stages will be much better, but double-conversion receivers with a higher first intermediate frequency are the best of all.

If the converter is to be used with inexpensive receivers having poor image rejection at 14 Mc., better results will be had with a lower converter i.f., such as 7 Mc. Using 14 to 18 Mc. has a special advantage for 144-Mc. converters, however—it allows direct reading of frequency from the receiver tuning dial, 14 Mc. being 144, 15 Mc. 145, etc.

Where energy from the receiver oscillator is radiated through leads to a separate power supply, or as a result of inadequate shielding, harmonics of the oscillator frequency may cause many fast-tuning birdsies in the tuning range. The rapid-tuning characteristic identifies them as harmonics, the speed of tuning being related to the order of the harmonic. One otherwise excellent receiver that is troublesome in this respect may be corrected by the use of shielding over the power supply cable and filtering of the individual leads where they come out of the receiver. A simple low-pass filter such as is shown in Fig. 3 may help in minimizing this trouble in cases of inadequate oscillator shielding. This should be inserted in the line between the converter and the receiver input terminals.

**Performance**

A typical 144-Mc. converter based on the design thoughts here discussed will have a noise figure of 4 to 5 db., depending on the tubes used. Rejection of spurious signals will be a minimum of 1000 times, and will be that low only on signals around 116 Mc., a little-used frequency that should cause no particular difficulty. Response to signals in the 14- to 18-Mc. range, often troublesome in crystal-controlled designs, is too low to be measured; in other words, in excess of 100,000 times.

The response in the region of the 144-Mc. band, shown in Fig. 1, is essentially flat across the band itself, dropping sharply a short distance from either band edge.

Though the 144-Mc. band is used as an example, the same principles have been applied successfully to bands from 28 to 420 Mc. By suitable attention to minimizing spurious responses, the stability of crystal control and the advantages of broadband design can result in a quality of reception on these bands that is available through no other means.

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**Quiz Quiz**

A has just completed a beautiful little converter for 6 and 2 meters, and its measured noise figure is as good as or better than anything the local v.h.f. men can produce. He feeds the output into a surplus radar i.f. amplifier, and claims he now has the finest receiving set-up in the county. B won't go along with this, says that a slightly poorer converter working into a good communications receiver would give a better signal-to-noise ratio. Who is right?

*(Please turn to page 189 for the answer)*

February 1953
NEW F.C.C. REGS

Editor, QST:

I wish to register a protest against the decision of the FCC to open all bands to permit 'phone operation by General and Conditional licensees. It shows bad faith indeed to have required additional examination elements to qualify for additional privileges and then to discover that no such privileges are granted. . .

All in all, surprising thoughtlessness and consideration of the licensee has been shown. I do hope reconsideration is still possible.

-- Herbert Greenberg, W2EEJ

1212 Gage Blvd.
Lawton, Okla.

Editor, QST:

I protest against the new law giving all amateurs the same privileges without working for them. There is no incentive to try for a higher class of license.

-- Gilbert Butler, W5QD

Spencer
Iowa

Editor, QST:

. . . In the first place the proposed regulation will completely kill the incentive of obtaining a higher class ticket, because a General Class will have the same advantage and privileges as an Amateur Extra Class.

Our personal solution would be to leave the General and Advanced Class as they are, with the same privileges and restrictions. The new 'phone allocation on 40 meters, and possibly 15 meters in the future, should be given to the Amateur Extra Class with the same restrictions for obtaining that license as are in effect now.

This would give the amateur something to work for, from Novice to Amateur Extra Class, with increasing privileges for each license. . .

-- Dr. D. P. Schmidt, W5GEL

640 Milwood Ave.
Venice, Calif.

Editor, QST:

. . . It would appear that the Commission is far too readily swayed by a minority pressure group purporting to represent a large segment of the amateurs concerned. I believe further that they should be brought to realize that it is actually a minority group that is promoting the bulk of these changes that are not desired by the majority of the amateurs.

-- Ren F. Myers, W6ROP

770 Davis Ave.
Akron 6, Ohio

demand to be heard in the formulation of these policies as was done before World War II when the amateurs were permitted virtual self-regulation.

Perhaps it is too much to expect to return again to the days when a man was deemed wise enough to govern himself instead of being dictated to by a group of power-mad bureaucrats who consider themselves the only recourse when it comes to making decisions affecting thousands. . .

-- R. K. Belles, W6DIY

11014 Durand Ave., N.E.
Seattle, Washington

Editor, QST:

. . . Based on the storm of protest this has aroused, my letter is undoubtedly one of many ARRL will receive on this subject. I surely hope there will be sufficient to cause the acting aside of action that so many amateurs feel is both unnecessary and ill-advised. . .

The gradual step-up from Novice to B and eventually to A license has furnished worthwhile goals for the beginning amateur. This is definitely true in my own case in going from B to A and I have even heard disappointment expressed by amateurs now holding a B license and contemplating on taking the A examination. They who have been working toward it now feel something has been taken from them. . .

-- Lloyd Peck, W7BI

539 Eastern Dr., Rte. 6
Memphis, Tennessee

Editor, QST:

I strongly urge immediate action to keep Generals out of Class A 'phone bands.

-- W. Betterworth, W4ITY

1043 Sidney Avenue
San Antonio, Texas

Editor, QST:

. . . I believe that this action has completely undermined the amateur licensing procedure. If the Commission would have continued issuance of new Advanced Class licenses rather than authorizing Conditional and General Class licenses the additional radiotelephone operating privileges, the stimulation for persons to advance in their studies of radio could have continued and at the same time the number of stations operating with the additional privileges could be limited to a practical amount.

-- Albert Jerry Balusek, W9SAL

Morrisville
Vermont

Editor, QST:

. . . These bands are in rather tight shape now afternoons and evenings. The increase in QRM ought to be something to see. But how about the increase in transmitters not adjusted for optimum performance? The increase in b.o. and other forms of interference? Will our advertising public stand for it? . . .

Understand also 7200-7300 is to be opened for 'phone. If Class A, 1 for one approve.

-- Gray Jenneold, W1ETE

1428 W. 15th St.
Casper, Wyoming

Editor, QST:

. . . There is a swelling tide of resentment against this decree and the FCC will so find in their mail. . . . It serves no good purpose, and it is about the rottenest deal thus far perpetrated against the amateurs. . . . Let all earn alike the right of higher achievement.

-- A. F. Pickett, W7GON

(Continued on page 116)
Strays

The attention of old-timers will be drawn to the appearance of several familiar names among the recent ranks of Silent Keys.

A former ARRL Director, M. B. West (ex-SAEZ) pioneered in the field of transmitting theory and practice. His classic discussion on power factor, "Some Whys, and Speculation as to Some Possible Wherefores" (QST, Feb., 1921), remains memorable as well as his part in the famous debate on that subject which developed at the first ARRL National Convention, held in Chicago in 1921.

A. L. Groves (ex-3BHD) preferred the considerations involved in receiving techniques and his numerous contributions to QST during the early Twenties established him as a leading authority of the day.

Enthusiastically active in League affairs, Issiah "Ike" Creaser, W1UD, joined the roster of QST authors in May, 1936, with his provocative description of "The Preselector Antenna."

Frank M. Murphy, WSML, may easily be remembered for his lucid accounting of the problems met and solved in "The Murphys Build a Mast" (QST, May, 1923).

FEED-BACK

In the circuit diagram of the "Tur-Key" on page 19 of the December issue, the connections to the diodes $D_1$ and $D_9$ should be reversed in each case. In other words, the cathode connections should go to $R_{14}$ and $R_{15}$, while the plate connections should go to $R_{37}$ and $R_{38}$.

In the answer to the December Quiz Quiz, the figure 923 should have been 906.

A number of readers have pointed out to us that there is something obviously wrong about the oscillator plate circuit in the 6146 transmitter described in December QST ("75 Watts with an 'Economy' Power Supply"). Since it is easier to show a schematic than to describe the changes in words, the correct tank coil wiring is shown in the accompanying drawing, which should replace the corresponding section in Fig. 1, page 21, December QST. Note that the neutralizing link, $L_5$, is coupled to the hot end of $L_7$, and that $S_2$ is on an open position for 80-meter operation.

ARRL Appointments:

OFFICIAL BULLETIN STATION

Here's a post in the ARRL field organization that renders a service strictly "of, by and for the amateur." Stations designated as Official Bulletin Stations by SCMs transmit bulletins from ARRL Headquarters containing the "latest and most important news concerning amateur radio." These OBSs receive the bulletins by mail, or where possible copy them directly from the League's headquarters station, W1AW. Through repeated transmissions of these bulletins at different times and in the various bands, reliable and early information concerning regulations, activities and matters of interest to amateurs is provided.

The general qualifications for OBS appointment are: ability to give good local coverage, ability to make a minimum of three bulletin transmissions per week, adherence to bulletin transmission schedules agreed upon with the SCM, compliance with certain requirements for reporting OBS activity to the SCM.

The ARRL Official Bulletin program is performing a valuable service to amateurs. Hundreds of OBSs are assisting in this worth-while activity. There's room for additional stations that can give certain types of coverage. Especially needed are those that can give broad local coverage such as can be obtained on the 2- and 6-meter bands. Stations working other bands in some instances are needed to fill vacancies or extend service to bands not already covered. If as a member of the League you can help as OBS, your SCM (address on page 6) will welcome your application. Where there are openings, preference will be given to stations that can provide the greatest number of transmissions and give best signal coverage.

ARE YOU LICENSED?

- When joining the League or renewing your membership, it is important that you show whether you have an amateur license, either station or operator. Please state your call and/or the class of operator license held, that we may verify your classification.
SAFE KEYING OF A.C.-D.C. MONITORS

A safe keying of a.c.-d.c. monitors can be keyed safely and simultaneously with the transmitter if a microswitch is used to activate the monitor circuit. The control arm of the microswitch should be slipped under the regular key knob so that the switch will be actuated when the key is closed. — E. M. Brownlee, VE2APO

SIMPLE AUDIO LIMITER

A simple audio limiter that can be installed in almost any receiver in a few minutes' time consists of a pair of 1N34A germanium crystals connected across the secondary of the last i.f. transformer. The crystals should be connected in parallel with opposing polarity. Clipping depth for the system is adjusted by the r.f. gain control of the receiver.

I use the system principally as an "ear-saver" on break-in c.w., but it also performs effectively on phone signals. One of the nicest features is that it can usually be installed without necessitating the removal of i.f. cans or other components — Ralph W. Stewart, W9KTR

IMPROVING THE 14-MC. PATTERN
OF 7-MC. ZEPFS

Many of us have to rely upon a 7-Mc. half-wave Zepp antenna as a general purpose antenna. One disadvantage of this practice is that the radiation at right angles to the line of the antenna is practically nil with the system tuned for 14-Mc. operation.

This disadvantage can be overcome without affecting performance at any other frequency by dropping a 14-Mc. half-wave section from the center of the horizontal flat-top. Connected at this point the new vertical member will have no noticeable effect on the loading at any frequency but will cause the antenna to radiate an omnidirectional vertically polarized signal at 14 Mc., so eliminating the previous gap in the coverage.

It needs to be said that one does not get something for nothing, and that the amount of power radiated at right angles to the modified antenna is subtracted from the power formerly radiated in other directions. — W. A. Roberts, G2IRO

MANUAL CONTROL OF GENERATOR CHARGING RATE

A simple method for control of the charging rate of an automobile battery is shown in Fig. 1. The system has three features that should be of interest to the mobile enthusiast: (1) the generator automatically charges at full rate whenever the transmitter is activated by the push-to-talk switch; (2) the generator charging rate may be manually controlled by the operator; (3) voltage regulator noise is eliminated because the regulator is removed from the circuit when desired.

In Fig. 1, K1 is a 6-volt relay and S1 is a s.p.d.t. toggle switch. The relay is installed with the field winding connected in series with the 6-volt lead to the microphone switch and with the normally-open contacts connected between the rotor arm of the s.p.d.t. and ground. When installing the system, the generator lead that connects to the "F" terminal of the regulator is disconnected and then returned to the toggle switch. The remaining contacts of the toggle switch are connected to the "F" terminal of the regulator and to the 4-ohm wire-wound potentiometer, R1, respectively. When the switch is in the up position, the charging rate is controlled by the regulator and when the switch is snapped down, the charging rate is controlled by the potentiometer.

Any surplus relay with a 6-volt field can be used as K1. The contacts need not be of the heavy-duty variety, because the generator excitation current that flows through them is not of great magnitude. The points of the relay simply ground the generator field lead, thus adjusting the generator for full output for the duration of a transmission. — L. H. Beckwith, W8O6K

CARE OF SOLDERING IRONS

When the tip of your soldering iron becomes pitted, instead of filing it smooth, thus wasting copper, draw the copper tip by squeezing it in a vise or with a ball peen hammer. The elongation of the tip not only restores the length, but the cold working will make the tip last longer. Any small irregularities remaining can be smoothed with a few light strokes with a fine file.

— Warren S. Lincoln, W6EYP, ex-W1JFA
BC-459A CALIBRATION CRYSTAL
FOR CONVERTER USE

Anyone who has the 8000-kc. calibration crystal
from a BC-459A transmitter kicking around
may be interested to know that it can be put to
good use in a crystal-controlled, 10/11-meter
converter. When the crystal is operated at the
third harmonic in the oscillator section of a con-
verter, the resultant i.f. permits use of the calibra-
tion of the main receiver with as simple a correc-
tion factor as possible. Complete coverage of the
28-Mc. band is had by tuning the receiver be-
tween 4 and 5.7 Mc., and the 11-meter band will
be tuned by the receiver range of 2990 to 3230
kc. — John W. Watson, W7GHB

POLYSTYRENE MOUNTING BOARDS

A commercial appearance can be lent to that
new piece of gear by mounting capacitors and
resistors in bank form. One quick and easy
way of making these assemblies is to lay the
components flat on a narrow strip of polystyrene
and then curl the wire leads over the edges of the
sheet.

If the leads are then heated with a soldering
iron — no solder, please — they may be forced
down into the polystyrene as the latter melts.
After the material has set, it will maintain a
permanent grip on leads of the component.
Mounting holes for the finished assembly may
be drilled at each end of the strip. — Roy R.
Campbell, W4DFR

MODIFIED SWITCHING CIRCUIT FOR
THE ELMAC TRANSMITTER

As delivered, the 3-band Elmac transmitter
does not include a switch for cutting off the
audio tube filaments during c.w. operation of the rig. However,
the manufacturer does wire the filament circuit so that a control
for this purpose may be added. Recently, when this addition to
the rig was being considered, it was decided that the new switch
could be mounted on the panel just to the right of the power-
amplifier on-off switch. Furthermore, it became apparent that a
little more input to the amplifier could be obtained by re-routing
the high-voltage wiring around the secondary of the modulation
transformer whenever the transmitter was switched to the c.w.
position.

Section A of Fig. 2 shows part of the original Elmac schematic,
and B shows the revamped circuit that uses a d.p.d.t. toggle
switch to handle the filament and the high-voltage switching.
Notice that S1 disconnects the secondary of the modulation
transformer when the switch is snapped to the
C.W. position, and that it turns on the audio fila-
ments only when set at the 'phone position. Of
course, the original filament on-off switch re-
mains in the circuit.

The compactness of the transmitter makes it
difficult to do any soldering at the switch ter-
inals after the latter has been mounted on the
panel. Therefore, it is advisable to equip the
switch terminals with 2-foot wire leaders before
the unit is mounted in place. — William G. Grelia,
W1DFR

INEXPENSIVE HIGH-CAPACITANCE
VARIABLE

When looking for a truly inexpensive high-
capacitance variable condenser, don’t over-
look the b.c. receiver field. Some of the dual-
superhet tuning units offer a capacitance of ap-
proximately 400 μfd. per section for a cash out-
lay of only a dollar or so. Sometimes, you even
find these variables on the bargain counter —
marked down to 29 cents! — John J. Schultz,
W2EED

MORE ABOUT THE MONITONE

After a Monitone had been constructed and
installed here at W7LGS, considerable diffi-
culty was experienced in obtaining enough recti-
fied voltage to bias the 6J5 to cut-off. The diffi-
culty was eliminated by obtaining bias voltage
for the monitor from the grid circuit of the trans-
mitter final amplifier. A lead connected to the
junction of the r.f. choke and the bias resistor of
the amplifier may be terminated at an insulated
jack on the rear of the transmitter chassis, so that
the bias line to the Monitone may be a plug-in

![Diagram]

Fig. 2 — A before and after wiring diagram of the filament circuit for the
Elmac transmitter. S1 is a d.p.d.t. toggle switch.

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affair. With the bias for the monitor so obtained, it is necessary to remove the input r.f. choke and the crystal diode from the Monitube circuit. Bias from the transmitter is then fed to the junction of the grid resistors for the 6J5 monitor tube.

The above system is, of course, not applicable to transmitters that use fixed bias. In the layout described above, the transmitter uses a 6Y6G protective tube that tames the 829-B final during the keying process. — Henry A. Heller, W7LGS

[Editor's Note: In instances where inadequate r.f. pick-up for a Monitube is experienced, it is usually possible to remedy the condition by experimenting with the position of the pick-up link with respect to the transmitter antenna tuner or the antenna feed line. This is not intended to imply that W7LGS's stunt is not an exceedingly good one, but the information may be of assistance to those who cannot obtain bias from the transmitter for the Monitube.]

A SIMPLE LACING SUBSTITUTE

Short lengths of plastic spaghetti spaced along a group of wires make a good lacing substitute. Slide the spaghetti over the wires prior to fastening or soldering of the cable ends. Many colors and diameters of spaghetti are available so it is nearly always possible to achieve a secure, attractive job. — Merritt F. Matern, W2ORG

SIMPLE FREQUENCY ADJUSTMENT OF MASTERMOUNT ANTENNAS

Owners of 3.8-Mc. Mastermount mobile antennas can lower the resonance frequency of their systems by as much as 25 kc., merely by attaching an alligator clip to the bottom of the loading-coil shield can. The clip should be oriented with the jaws pointing toward the top of the shield, so that the body of the clip will extend downward below the can in a line parallel with the lower section of the whip. If a small metal tab is soldered to the body of the clip, it will effect a still greater reduction in the resonance frequency of the antenna. — Thomas N. Park, W6SYX

CHARACTERISTICS OF KRYLON SPRAY

A readily available acrylic spray carrying the trade name of Krylon seems to be ideally suited for the spraying of coils and other radio components. The characteristics of this material are quite similar to those of polystyrene as shown by the following comparison:

<table>
<thead>
<tr>
<th>Material</th>
<th>Dielectric Constant</th>
<th>Permeability Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polystyrene</td>
<td>2.4-2.6</td>
<td>1000 cycles</td>
</tr>
<tr>
<td>Krylon</td>
<td>2.8-2.4</td>
<td>400-800</td>
</tr>
</tbody>
</table>

*In volts per mil (0.001 inch).

This crystal-clear liquid spray is easily handled. It is sealed under pressure and requires only a few moments of drying time after being released from the self-expelling container. — Wendall S. Johnson, W2HYL, DL4MK

[Editor's Note: Several other plastic sprays are also available on the market. One of these — a product called Crysta-Flex — has been successfully used in the ARRL Headquarters lab to preserve the finish on copper v.h.f. plate lines.]

SUPPORTING FORMLESS COIL WINDINGS

Masking tape, wound sticky-side up on a temporary form of the correct diameter, will provide a permanent anchorage for windings placed over the tape. After a winding has been completed, it may be covered with a layer of tape for additional reinforcement. Links wound over the primary assembly may be held in place by another layer of tape.

When laying the tape in place make certain to overlap as the length of the temporary form is encircled. If the form is covered with talcum powder before the masking material is wound in place, it will facilitate the removal of the completed inductor from the form. — Walter L. Petersen, W2JII

HIGH-VOLTAGE PROTECTION IN WAVEMETER CONSTRUCTION

An absorption wavemeter can be a most useful and helpful gadget to have around any ham shack. However, if it is constructed in a metal box and is used near high-voltage circuits, it can be a most dangerous gadget to use.

This peril may be avoided by constructing the meter in a manner which provides adequate insulation and physical separation between the tuned circuit and the control knob of the unit. An ideal example of how this preferred type of construction may be worked out is shown in Fig. 3. Circuit constants for the tuned circuit of the meter can be found in the Handbook. If the shaft-support plate, F in Fig. 3, is made large enough, it may be used as the mounting surface for a calibration dial. — David M. Sanders, W6BGR

Fig. 3 — An absorption-wavemeter layout that protects the operator from accidental high-voltage shock. (A) Right-angle bracket. (B) Shaft coupling. (C) Tapering capacitor. (D) Insulated shaft. (E) 12-inch length of 1-by-2-inch board. (F) Shaft-support plate. (G) Control knob. (I) Dial-lamp assembly. (L) Tank coil.

60 QST
How's DX?

CONDUCTED BY ROD NEWKIRK, * WIVMW

How:

Well, this is it, gua. The month, we mean. ARRL's 19th International DX Competition gets under way in a cloud of ionospheric dust!

If you're out to cop a section or country award, consult 1952's October QST (results of last year's Test) to get a line on the guys and scores you'll probably have to beat. If it's a new country or two you're after, arm yourselves with the DXCC Countries List and set out to call your shots. In either line of endeavor, or both, we wish you the best of luck!

Jeeves emitted a rich chuckle this month when he hailed an interesting contrib out of the "How's" mailbag and found this postscript appended thereto: "First time I've ever sent anything in and sure feel like a big braggart for doing this."

Brother! It's a good thing this viewpoint isn't widely held or we might just as well skip the prospect of future DX columns — there wouldn't arrive enough printable stuff to make up a miniature Stray.

That goes for most QST departements, for that matter. They make up ham radio's historical diary. The furnishing of an account of your individual amateur activities for documentation in this, your ARRL organ, is no more "boastful" than showing a fellow philatelist your mint album or flying your pet model plane at the town hobby meet.

So, would-be contributors, fear not to be considered vaunting by a deluded few if you've ever a notion to slip us a bit of gist for this DX mill. Those who would scoff are kidding themselves with misdirected modesty — the bright lights they thus make off to be hiding under their own bushels may be about the size of birthday candles, anyway.

What:

A few sessions of short skip have made twenty sound a lot more jivey. Didn't help DX sign much but one could at least hear one's competition in the pile-ups. Is that good — Jeeves? - This list of W9HZN's c.w. catches makes us wonder why we ever left Illinois: AP2K (14,089), CP1BX (090), CR1CZ (088), 7ECK (000), 7LU (056), CT3AA (055), DUSCO (012), S48AD (084), F88SBB (069), BZ (050), ZZ (048), FE8SA (034), AI (045), FOSAC (044), FQSAAP (000), AR (050), FY7EA (022), YX (020), G3JUB (025), H3FL (040), HRIAT (020), IS1CXF (057), KAAA (070), KRAIT (040), KE6WAZ (012), KK6AI (047), LB8XD (018), L4U4Z (058), LZ1KAB (050), M72AG (100), OEC1HL (013), QG5RA (016), TA3AA (015), TG6AC (106), VPS 200 (019), ZMD (054), 8AE (054), 8AN (039), 8AP (012), VOS 2ID (045), 2EK (030), 3BM (025), 4CW (024), YR2BZ (034), VU2JG (022), ZB2A (017), ZC4GT (020), ZD2DCP (010), 2FFB (080), 4AB (082), 4AE (054), 7A, ZK1BC (064), ZPS SCL (050), 6CR (020), 9AW (038), ZS3HK (090), 4X4DE (054), 8AT2S (040), and 9S4AX (017).

Jeeves, check the accumulation of 1000 miles of coax and then rent us one of Van's guywires.) - WATG was AP2R's first W. Buck also mentions M3AT, SU1HS, V89A9W, Z8s 7C 7D 9G, 4X4BT, an L21 and a T3A.

- MP44HK (123), SUSEB (125) and 54JAG (058) swelled W5AGS's collection. Bill prefers the 14-Me. long skip in the a.m... CIB3UB was a welcomed addition at W2TKG and W2AYU. The latter nabbed EA8AW, FFS8AN, KV44Q, TFF3T and 5A3T1 in addition.

Fs-Novice W4USM tried twenty for KV4AZ (100), T2IC (002) and VP6FSt (050) while W6LW finds VQ2HR holding court in the late p.m. on 14,088 kc. - YL W4JS,R awaits QSLs from 110 worked countries to clinch her DXCC.

ZS7F, a CR7 and ZD7A are among Dottie's most recent scores...

- W4KE tallied a GDS, GC4LQ, OK6QP, TGB9B, YU1AD, ZE3JP, S4ATU, a T3A and L6X to keep his list growing. - We find FK58BC (072), OB13RN (037), VU2ZK (069), UY1C (065), ZC4RX (050) and 9S4AR (090) accounted for by W8DLZ...

- W1NL, of the Brulle Technical Post, has his DXing time limited by other activities but Jan Mayen's L8BYD was recently worked. Ey found that W7PND is operated by W6TYF.

- W3MPF got that L6, too, as well as an L21. FF8E8B (098), FFM7WF (132), J6AC, VQ53BU (110) and 4A6 (110). "YQ5BUI was on phone and we gave him a call on c.w.; he came back right away and then VQ4A left both of us." Same guys just live right!

- F88SSB was No. 213 for W2QHSL. Howdy added 5A3TY and ZD2HAI (089) for good measure. - C4N96K (015) was grabbed by W8ALN while W2REY sailed away to FFS8AP (015) and FYY7C (060).

- A 112/91 record is possessed by W9HN after successful encounters with CRS5D (060), F88s AJ (095), Ag (050), VQ4RZK (070) and an EA9. Chuckle speaks of chasing T11TP1. All should bear in mind, however, that Sicily is just a different prefix and not separate from Italy on the Countries List. - The Northern California DX Club's DXe files us in on CRS 5JB (025), 5A8 (010), CT2BO (076), E46 6AP (010), 9AC (085), FQVQPC (052), FBB8EI (042), FN4RD (050), FRR7A (020-032), HASFA (067), IS1CYN (020), KC6GL (118), M1L3K (001), MP4s BBD (048), KAE (020), OY3GIO (050), P7J2AD (060), SP67KA (022), STG3L (023), VQ5SA (020), VRs 2CK (005), 4AE (002), Y1KAIH (022), ZD9AA (035), ZS2MI (032) and 4X4BN (075).

On twenty's phone, VR4BE (14,110) has been mighty popu-
Hundreds of W/VE DXers recorded their first Sardinia QSOs through the courtesy of Fausto Ravenna, IS1AUK.

5A2 and 5A3 prefixes now both used for Libya. The Bulletin reveals that 11HR and IS1AUK were intending some December, 1952, 20-meter ‘phone activity as 9A1B in San Marino. Lucky if you nulled ‘em! Enthusiasm for fıfties is definitely not on the wane. W3AYS: “Twenty-one Mc. sure fun — when it’s open. Lot of stuff on and, out of all, they call you!” He backs this up by listing G4AFL, EH2MY, TA2EPA, TF8SF, VQ4DX and VR2CG as recent victims; ZD9AA and ZE62AA were heard. Beams for 21 Mc. are sprouting throughout the land and the 2-element job at W3AYS brought him up to 44 countries on the band. — We see that W4COK is now well over sixty countries, W6VX received 45 and W6QG’s 3-element beam brought back a fast 34 countries on fıfties — — V7TAH rigged up a stacked pair of 3-element 21-Mc. beams and is cleaning up on people like CS8AC. VR3CO, ZE2TV and this quickly worked WAC starter: K2A2OL, YK3GW, VQ4D7, H8OLO, PY8SI and VP9GX — — TVH haunts W2QHH on fıfties, but Howy raised CT3AV, EA9AP, OA4C, VQ4HJP, ZS3JP and 5Z9K (thanks to long time commercialist) — — W3MFW reached 40 countries on 21 Mc. and W4KE worked E8A0U, FP8AQ, a ZE3 and many others — — CE3AG (21,035), CP1B9 (030), GC3EML (060), KH6A0A (060), VK4PJ (005), VFNH (031), TE7TG (030), VR2CG (030), ZB1BJ and ZD7AY heard W6HUZ — — From KP4K we hear of QSOs with CN3AF, CT3AV, EA9AP, VK8INM, VP9IG, YU2BC and 4XRE. VKs and others normally plentiful on other DX bands are uncommon catches right now on 21 Mc.

We’ll have a new paragraph headed forty ‘phone ere long and it should help out ‘phone DX enthusiasts no end in view of spotty conditions on Twenty. That first 7-Mc. ‘phone WAC will look good in any log! Meanwhile, forty c.w. was used by W3JFN for FM7WD (7040), V86AP (020), VR2CG and Z99I (040). That VR2CG really gets around on all bands! ... OP DXer W2DOD (ex-W8DOD) nailed IS1AUK, MP4BAU (011) and Z99I to reach that coveted 100-countries-on status. Elmer’s first 91 were worked with a 60-watt BC-459; he switched to a 400-watt S13 rig for the last few — —- W2QHH made it 96 7-Mc. countries by way of FF8HQ (006), O213RN, YTV6DE (022) and ZB3I (035) — —- W4KE did a job on EA8BE, FP8AQ, HJ2LQ, PJ3AD, VK0SA, VF4UN, ZS3JP and 5A3TR while SP6KKK gr aded KP4KD — — A1MPAU and YJ1AB are good ones at W420; W5DLI caught PJ2CE young QR X around 700 kcs. W9XZ specifies CE3D9 (016), CN3AF (041), CJ6BC (058), KJ6FHA (010), K81RB (030), TS6 3MB (011), SV (036), Y6A ZCB (050), 3CV (050) and ZD2DPC (010) as good locations for QSOs. — The DXer has us watching for CO4AH (022), FK6AJ (004), KC6OL (055) and ZCVS (016-021).

Quality is obviously enjoying a full before the DX Test storms. OE1IRN (3000-3511) and VR2CG (3511 — there is he again!) made it 95 countries on 3.5 Mc. for W2QHH — —> VK5KO and sundry Europeans kept KP4KD busy while W6HUZ was knocking off VP9DF (3510) and ZD4AB (3504) — —> KH6ARA has been giving east coast Wa a good shot at Oceania — W5QYR and W9AIW were also pleased to catch Pat around 3510 kcs. — ZB1BJ and FP8AQ are new ones lately on 80 and we hear that W6CX pulled a good one out of the last — —> VU2EJ (3550).

The 100-Meter Transatlantic Tests are up to bat and as we write Europeans are being worked by W6s and Ws. March QST should contain some juicy details!

Where:

Many QSL cards for Canton [island] hams are being mis sent to Canton, China, and are subsequently forwarded from there via surface transportation. It will help to include 'Pacific Oceania' in the addresses for cards destined Canton Island, and underline this part of the address. The complete address for all Canton Island hams: Amateur Radio Station K95O — (operator’s name if available). Canton Island, Pacific Ocean. U.S. Post Office 99999. Also advise your friend K6BA5 (ex-KM6AH-VZ6WJ-VZ2DE).

APR, Box 151, Karachi, Pakistan
CRK9, Box 102, Lancaster, Kansas, USA
E3AF, B. Rivas Diaz, Ing. Manuel Becerra, Las Palmas, Canary Islands
E2ABQ, A. Ramires, Moris Alta 1, Santa Cruz de Tenerife, Canary Islands
E2AP, P. O. Box 213, Melilla, Spain
E2AS, Berrizade de la Encalad, Pabellon 1, Ceuta, Spain
E2AT, P. Aragon, Palacios de la Hues 8, Ceuta, Spain
ex-E2CSSM, Samuel G. Morrison, 909 Weldon Ave., Oakland, Calif.
F4D4A, Box 185, Lome, French Togoland
F8SN, QSL via FK4HQ
J1AH, T. Fujimoto, 359 Shinmachi, Shimoda Chuki, Kamiygo, Kyoto, Japan
K16WU, APO 105, % Postmaster, San Francisco, Calif.
K7LDP, Phil Argeli, % CAA, Box 2421, Juneau, Alaska
A4ADW, Box 2916, Lima Peru
P2ACE, M. J. Huich, Curacano, Netherland Antilles
SUHFS, (QSL via W4TO)
TASA, A. Birisals, USN, TUBING-JAMMAT, APO 206A, % Postmaster, New York, N. Y.
V6RBD, % Eastern Arctic Patrol RMS, Ottawa, Ontario, Canada
VK1HM (VK6HH), % Department of Civil Aviation, Cocos Islands
VP21L, Box 170, St. Lucia, Windwards, British West Indies

OE13JR, Salzburg, Austria, works plenty of DX on 14-Mc. ‘phone and c.w. Stewart has held the calls W1JKO and W4NCW. Some neat collection, too!

QST for
There are at least 3200 worked contacts accounted for in this group photograph of last October's second formal meeting of Massachusetts DXCC members, held at Cambridge. Local line voltages have been at all-time highs that night!

VQ2BH, Box 109, Livingston, No. Rhodesia
VQ2W, Box 210, Chirehu, No. Rhodesia
VQ2AW, P.O. Sakhalin, Aden
WP4TP, Chris S. Scott, Naval Base, Box 53, San Juan, P.R.
ZC4RS, Roy R. Sullivan, Haralicks, New York
ZC3VR, Vic Randall, P.O., Sandakan, British North Borneo
ex-ZM6AK, Norman Wilding, ZL1FT, Aeradio Stn., Kaiitaa, via K2DWS, N.Z.
ZS3N, Gordon, P.O., Box 10, Lebechi, Southwest Africa
Z86L, Maum, via Francistown, Bechuanaland (QSL via SARL)
5A3TR, (QSL via W6JDB)
5A3TU, (QSL via W6JDB)
For the preceding QTHs we are indebted to W1A WPS WFO W2CJJ, W2DL LXE, W4TO, W6DI LW, W6s CFT HHU 1HN, G2FEM, K17W, K95KD and NCDXC's DXVr.

Tidbits:
Asia — "Although there should be an evening opening here to the States, the 14-Mc. band is useless after 1800 our time so the only chance [for W6s] I have is around breakfast or 1700 to 1900 EST. I find such openings 10 or 12 days per month and manage to contact quite a few of the boys then.
So writes KAOAA (W4VE). Fred says there's a chance that KAs will be authorized use of 7 Mc. soon and this should help fill in the 20-meter hole.
W1WFO (ex-W2WNN) of the DXCC Desk finds that ZC4XR (ex-MDX7X) collected the first DXCC membership ever awarded a Cyprus applicant.
Remember W2OAJ/ J8 who was very active just after WWII from Korea? His calls may yet be W1D1V for everlasting now moves to Syracuse where he intends to put W2OAA on the air.
Africa — VQ1KIF notifies us of the passing of VQ4KTB, one of East Africa's pioneer old-timers.
W1HEN worked VQ1NIZK while the latter traveled with an African safari shooting wildlife photography. George was expecting to beat the bush through Tanzania, Uganda and Zanzibar before calling it a day. Could be some VQ1 QSOs in the making?
VQ2HR informed W6LW of a change in mail QTH (see "Where") and we learn that VQ2AB hasn't yet returned from Europe to tackle that QSL backlog.
Oceania — In the case of ZC5VR, everybody was curious about the sudden switch from the regular 80 prefix for North Borneo. ZC5VR first popped up in last December's "How's" and he says all SQV and V5s are okay although G2M1 tells W1WFO that something is awry with the label. Art recalls similar difficulties with V9JH/V85JH some years ago.
K86AX QTUId in favor of a new CAA assignment of Rock Springs, Wyo. K86AZ is newly ticketed on Canton and K86 AO, AQ and AV are quite active. "Ten meters has been showing a little life lately with west coast W stations beginning to put in fair signals for short periods each day. Fifteen meters continues to be rather spotty with little activity noted. K36AY will be active on ten and fifteen, as well as twenty and forty," writes Fred. K36AY
Yipes — W3DII's local TV station changed to Channel 2 from TVI-free Channel 3. Walt learned from V6SKX that V65HIM (VK5IM) will operate regularly from the Cocoa Islands on a fairly permanent basis. Can anybody in Vermont, Rhode Island and Georgia help V6SKX complete WAST? Arch has a solid 7-Mc. signal when conditions are decent. The 75-foot Cangarda, a two-meter bound from Bismark for the Mediterranean, has VK40A aboard operating maritime mobile. VK4SG adds that the skipper is an ex-ZL1. VK2YC assures us that VK1s FG and YG have QSLs 100 per cent via bureau. Jim's friend, Dr. Bob Black, VK3QZ, uses the call VR4AF in different parts of the Solomon. Bob works for the Tropical Medicine Section of Sydney University and has had a little difficulty obtaining cards on order from the printer for his VR2QI/PB operations — patience requested.
Try the QTH in "Where" if you still are owed a ZM6AK QSL. Norm tells W2CPT he's eager to clean up any backlog outstanding.
I had approximately 80 QSL cards stamped and ready to mail when the typist struck W1X Island on Sept. 16th. As a result I have no record of those amateurs who sent QSLs and requested mine in return." reads a letter from KW6AE. So, if you haven't chatted up a W6XAZ card for your QSO prior to that date you'll have to reapply. Louis (ex-W5'REC-W2LDD-W5LDD) strives to maintain a spotless QSL record and his Call Book QTH is all okay.
Europe — Although he knows it has no separate-country status, D1ALQ thought it would be interesting to operate from the island of Helgoland in the North Sea and he gave it a try during December. D1ALQ/P used an 807 at 85 watts, e.w., and 50 watts, phone. Bud has a 200-watt gridsound there; his news was previous ham activity there. His earlier efforts to try some Leichtenstein and 954 DXing bore no fruit. D1ALQ is also looking into the possibility of a small Corsican DXpedition. WT9MQY, who had no luck in attempting to land a K9LZ license, says that W7T40I is about to get on in France with an F7 call. How's QRP scores again — W2QHI has captured the first Helvetic 22 sheepskin awarded a non-European amateur.
Alec of ZB2A writes W1WQC (ex-WA5WQC-W1WQC) regarding the trials and tribulations of Gibraltar's ham club. It seems their policy of QSLing three times yearly has brought ZB2A a poor rep in that department and the boys are digging in to do something about it. Use of the following address may get you your overdue ZB2A QSL:
401733 S.A.C. Allan, Room 114, Signal Block, R.A.F., Devil's Tower, Gibraltar. L901C caused W3M32E to do a double-take but Andy Island turned out to be barely off the Norwegian mainland a la Key West.
South America — Cherrv news for those awaiting VP8P confirmation: K2BU has it that 8AP was momentarily expecting delivery of 750 blank pasteboards. This should more than take care of his logjam in that respect. W4HYW hears that VP8AP still pursues Nevada, New Mexico and Utah for you-know-what and looks for these states around 1700 MST daily on 14,030 kc. From W5CPT we understand that W90WE is in Panamity and hopes to put a ZP call on the air behind a Harvey Wells exhaler. W1OB is another ham heading down that way and Dag may have a chance to give the bands a whirl from the vicinity of Peru. From HC2JR via
DX CENTURY CLUB AWARDS

HONOR ROLL
W1FH... 250 W3TXO... 242 WJ7TC... 237
W5HGW... 235 W6QHNI... 211 W3JT... 230
W5VPFR... 214 G3PL... 211 W3CWP... 235
W3BES... 213 W5AM... 238 W8BN... 235
W5QIH... 217

RADIODERPHONE
W1FH... 223 W1WNO... 204 Z66W... 197
W3YLX... 221 W4HR... 200 W6DDI... 195
W9QERR... 216 W9RBI... 200 W2APU... 194
X51AC... 213 W3JWX... 200 S55KP... 194

From November 16, to December 15, 1952, DXCC certificates and endorsements based on postwar contacts with 100 or more countries have been issued to the amateurs listed below.

NEW MEMBERS
W5CDT... 333 DLIAV... 106 W2IHA... 100
DLIDX... 120 G3BAX... 105 W6BRR... 100
OS2SM... 117 G5RFP... 100 DLJRA... 100
DLJFE... 114 W2KPV... 102 V25Y... 100
W5QHB... 102

RADIODERPHONE
W4KAE... 117 Q57SM... 110
P4AJA... 114 K7AFR... 103

ENDORSEMENTS
F0BB... 221 S56WJ... 149 ZL6BO... 124
W2JSN... 221 G3AEK... 117 W6RQR... 119
W6FMD... 302 W7KDX... 117 W6CZ... 117
W4NHF... 192 K5LI... 141 UF4AD... 117
W4AY... 170 W7JXO... 112 W5AEA... 145
W1BFT... 183 W1BGR... 110 W5JCL... 111
W6RJX... 152 W5X6Q... 101 V6EIX... 111
HP1BR... 150 Z60K... 140 W6KQY... 110
HIF6... 123

RADIODERPHONE
W5GHD... 170 W6NFP... 130 K44CM... 117
V6EKF... 182 S56WJ... 123

W1WPO comes a clarification concerning HC0M1 QSLs floating around. HC0M1 now operates from a fish refrigeration plant on the island of San Cristobal and uses, in some instances, the HC0M2 cards which were previously designated for maritime-mobile operation. Depending on the dates of QSOs, they may be perfectly okay for DXCC.

Hercules - A phonix FGTX4 fooled the boys for a while during August and September of last year. FGTX4 does hit the air at times but travels much in the interima. W4LVV, who has an opportunity to keep close tabs on the Guadeloupe situation, has rigged up a 2-element rotary affair after knocking dead over 200 countries with a half-wave vertical. If you are long overdue for a KJ6AJ c.w. confirmation, take a closer peek at the log to see if you might have worked C06AJ instead. It’s an easy mistake to make if you have no beam because C06AJ frequents 14 Me. in the early mornings and is very QRQ. It’s an unpleasant task to record here the passing of two well-known DXers, Bob Blankens, W4DRZ, and Jack Dodman, W6GCA, Bob, whose big sig will easily be recalled by the prewar gang, was a budding of DXCC when countries were relatively few and far between. Jack was a strong competitor in postwar ARRL DX Competitions and won the award for those in the ‘58 Tes. W1WPO notes that K7AFR’s postwar DXCC diploma is the first earned by an Alaskan phone. W2BBK (FP8AK) speaks of plans for a bigger and better DXpedition to St. Pierre come summer, in conjunction with W68EX and W2ZBO. W5NDA, who has his large DX telephone log, has sprouted a floc of new skyrooks and we understand that OT DXer W2BMX is rolling up his sleeves for the fray once more.

Joeves just laid aside his slide rule and trig tables after calculating that if all verbiage pertaining to rumored rare-DX expeditions that never pan out was hooked end to end we wouldn’t need a boat to get to T9.

A.R.R.L. QSL BUREAU

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. Its operation is made possible by volunteer managers in each W, K, and VE call area. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 4 1/4 by 6 1/4 inches in size, with your name and address and the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner. For a list of overseas bureaus see p. 62, Dec., 1952, QST.

W1, K1 — J. R. Baker, Jr., W1JOQ, Box 232, Ipswich, Mass.
W2, K2 — H. W. Yalnck, W2SN, Lake Ave., Holmetta, N.J.
W3, K3 — Jesse Heierman, W3KT, Box 34, Philadelphia 5, Penna.
W4, K4 — Thomas M. Moore, W4HTY, Box 144, Municipal Airport Branch, Atlanta, Ga.
W5, K5 — Oren B. Gambill, W5WTI, 2514 N. Garrison, Tulsa, Okla.
W6, K6 — Horace R. Greer, W6TT, 414 Fairmount St., Oakland, Calif.
W7, K7 — Mary Ann Tatro, W7FWR, 513 N. Central, Olympia, Wash.
W8, K8 — Norman W. Alken, W8JS, 701 East 210th St., Euclid 23, Ohio
W9, K9 — John F. Schneider, W9CFQ, 311 W. Ross Ave., Wausau, Wis.
W8, K8 — Alva A. Smith, W8DMA, 238 East Main St., Caledonia, Minn.
VE1 — L. J. I. Alder, VE1QF, 125 Henry St., Halifax, N.S.
VE2 — Austin A. W. Smith, VE2UW, 6164 Jeanne Mance, Montreal 8, Que.
VE3 — W. Bert Knowles, VE3QB, Lanark, Ont.
VE4 — Len Comf, VE4LC, 386 Rutland St., St. James, Man.
VE5 — Fred Ward, VE5OP, 890 Connaught Ave., Moose Jaw, Sask.
VE6 — W. R. Savage, VE6PO, 329 15th St., North Lethbridge, Alta.
VE7 — H. R. Hough, VE7HR, 1330 Mitchell St., Victoria, B. C.
VE8 — W. L. Greer, VE8AW, Box 78, Whitehorse, Y. T.
K4P — E. W.f. Mael, K4PK, Box 1066, San, P. R.
K25 — P. C. Combs, K25PC, Box 407, Balboa, C. Z.
K9D — Andy H. Fuchikami, K9D9A, 2543 Nampa Dr., Honolulu, T. H.
K7 — Box 73, Douglas, Alaska

If you’ve worked Costa Rica, you’ve undoubtedly worked one or more of these Tls (1 to r.): 2DL, 2BR, 2TY and 2PZ.
SEEMS like every winter it's the same story. Along about two weeks before Christmas the short skip starts booming in on 10, and finally things get rolling on 6. But not right away, because too many of the gang who work the 50-Mc. band in the summer months take it for granted that it's all over until the following spring when the DX openings dwindle out early in August. Despite all that has been written about sporadic-E skip being a sure thing in December, the few boys who are around for it always express surprise at finding the band open in the winter months.

Not that DX is the end and all of living for the 50-Mc. enthusiast, but a shot of sporadic-E skip is relished by us all now and then. We could have a lot more fun on 6 the year around if more fellows would just keep trying on the band, instead of making it a summertime pursuit only.

And winter isn't so bad for the higher bands, either. To be sure, there isn't an inversion every night, and it is not often possible to equal summer distances even when conditions are at their best, but when there is a good night in the winter signals are steady and strong over extended-local distances in a way that summer seldom produces.

How about the rest of the cold months? January turns up its share of sporadic-E, though it will be largely over by the time this appears in print. February and March are the aurora months. Some of the most pronounced examples of this intriguing form of propagation have occurred then, and there can be good tropospheric conditions any time of the year. You got a shot of v.h.f. enthusiasm during the 6th Annual V.H.F. Sweepstakes early in January — how about sticking with it through the rest of the winter? You'll be in just that much better form for the spring and summer openings if you do.

Using Crystal-Controlled Converters with the 75A Series Receivers

Some time ago, W8N0H, Grand Rapids, Mich., built the 2-meter crystal-controlled converter described in QST for September, 1951, and in the 1952 and 1953 editions of the Handbook. It was fine so long as Lou kept his general-coverage receiver, but when he acquired a Collins 75A-2 the crystal-controlled converter went back on the shelf. The converter was designed to tune upward from 7 Mc. on the communications receiver, and that meant only 500 kc. of the band could be covered on the 75A-2.

A tunable converter that had seen service prior to construction of the crystal-controlled job was hauled out, but it took only a few minutes' struggling with its wandering oscillator to convince W8N0H that this approach to v.h.f. was no longer for him. Once you've used crystal-controlled reception you're not likely to be satisfied with anything less — but how to do it with the limited tuning range of the new receiver?

Ah — how about the two highest ranges on the 75A-2? To cover both 11 and 10 requires movement of the band-switch, but it gives a tuning range of 28 to 30 Mc., the four megacycles needed for 6 or 2. That would require an injection frequency of 118 Mc., which could be reached with the same order of frequency multiplication originally used by changing the crystal frequency to 6555.55 kc. Next, a check of the surplus crystal stock turned up one at 6540. A few swaps on the ground glass moved this to 6580; close enough.

No changes other than returning the circuits of the converter were needed to get oscillation on 19,688, and multiply progressively to 59,026 and 118,008. The discrepancy was within the range of the zero-set adjustment on the 75A-2, so it was possible to read frequencies in the 2 meter band right on the meter.

Next, and last, all that was needed was to remove a few turns from the mixer and i.f. amplifier plate windings so they would resonate at 24 Mc., and Lou was ready to go. Not a birdie in the whole tuning range, stability like on 7 Mc., and a 12-db. improvement in signal-to-noise ratio over that of the woobly old tunable job. Say — this 2-meter c.w. is really something!

The Transistor Transmitter at K2AH

Last month we reported the first use of a transistor in an amateur transmitter by K2AH, Mountain Lakes, N. J., crediting it as the low-power record for v.h.f. transmission.

Even though the 2-meter transistor rig at K2AH is an experimental last-up equipped with pots and trimmers of conventional size, it is still only a medium-sized handful. The transistor is the tiny object at the center of the chassis.

Here are the basic facts, in case you'd like to challenge George's claim to the record.

The transmitter used an experimental RCA transistor connected as an overtone oscillator, working on the 8th overtone of a 16-Mc. fundamental crystal intended for use on its 5th overtone, 80 Mc. The “power supply” was a single 221/2-volt hearing aid battery, dropped to 8 volts through a variable resistor. The input was 3 mls, or about 24 milliwatts. Output, difficult to measure at this level, was estimated to be in the vicinity of 50 microwatts!

Only the single transistor was used, and it was keyed for c.w. directly in the oscillator. For the moment, George was unable to find a small enough audio system to modulate the thing safely, though W2UK, 25 miles away, reported the signal strong enough to have been readable on voice. What a portable for the next v.h.f. contest?

Here and There on the V.H.F. Bands

The week before Christmas produced some fine 6-meter DX, including the first double hop reported during winter months. Contacts too numerous to report in detail were
12-METER STANDINGS

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W7QAP worked W8ZJ from 1408 to 1430 the following day, and on the evening of the 21st he was in three-way contact with W4N5J and W4LAW for more than an hour, with signals still strong when they quit at 2100 for lack of more stations. W8ZJ was hearing W4N5J at the time, but not the others.

Would anybody like to make a transcontinental contact on 144 MHz? Now wait a minute before you start the horse laugh—remember he might have reacted to the suggestion of a 1000-mile two-way contact on 144 in a few years ago; yet scores of contacts have been made in the past couple of years over this and greater distances on 2. All the evidence indicates that even the 1400-mile record was not the maximum distance that could have been worked, and practically every haul over 1000 miles has been limited in distance only by lack of activity in two more widely-separated areas.

The first real shot at a transcontinental 2-meter mark will be afforded us next summer as the result of a series of tests to be sponsored by the VHF Research Society of Ireland, according to word received from the president of that group, Harry Wilson, EI29W-E192. A 2-meter station will be maintained in constant operation from Mayo on the West Coast of Ireland, from the latter part of July through early August, and liaison with this country will be maintained on 60. Other Irish stations will also participate in the tests, and the cooperation of 2-meter operators is requested. The nearest point on the North American Continent is about 1900 miles from Mayo, and the nearest in this country is about 2500 miles, but nothing tried, nothing gained.

While we are in the international DX department, OS6LL, Leopoldville, Belgian Congo, writes that his 500-watt 50-Mc rig is about ready to go. While it is unlikely that much of DX will be worked on 2 meters next year, the QRP predictions for next spring show higher 2-meter DX in some localities than was indicated on the predictions for the same period last year. Sporadic-E DX around the African Continent should be possible, and there’s no harm in trying for something better, either.

And by the way, 50,010, and he’s working this country regularly on 14,110 to 14,120, if you want to talk about with him. Saturdays at 2000 GMT he skeds W5FXU.

Look at you, we may have eroded the wrong fellow with the new 220-Mc record between W5R1 and the Houston boys. W5PEK says that W5AXY worked W5R1 first, and was followed by W5Dub, and W5Dub nominated the two Houston operators as co-holders of the 850-mile record, with AXY having a slight edge in distance.

Until recently, the state of New Mexico was nearly devoid of v.h.f. activity, but now, thanks to the efforts of the Albuquerque V.H.F. Club, things are different. The club is doing some excellent work, and W5WU lists the following as among the more active 2-meter stations in the state: Albuquerque - W6S FJ E LQW RFF RQQ OLN FAP FGG Tijeras - WSSACA Santa Fe - W6NS FJ E LQW KCM Los Alamos - W6WZJ E LQW ABQ. Among the more than 20 others get on less frequently. W6S DAI CTG and LQW are on 430.

W5WU would be glad to keep DXVU skeds with stations in West Texas or elsewhere. He calls QV on e.w. each morning at 0600 on 144.1. He has a pair of 4x4s, a 15-element array and a crystal-controlled converter - plus a 7200-foot elevation with a clear shot to the east.

The Albuquerque V.H.F. Club is sponsoring a 144-Mc. activity competition, with points scored according to the distance covered: up to 10 miles, 1 point; 10 to 75, 5 points; 75 to 150 miles, 10 points; and over 150 miles, 25 points. Points may be claimed for contact with a given station only once in any 24-hour period, and all must be twofold for 144 Mc. The contest is open to any New Mexico amateur, and logs should be submitted to W5OLN. A total of 1000 points is needed to qualify for the award.

Did you see that antenna item of the December issue of QST? W7VY, that wasn’t enough for W3RE. Reports are that Robbie now has a 32-element array for 420 on a separate tower, rigged with a hydraulic hoist, so that its height above ground can be varied between 20 and 75 feet. This one should produce some interesting reports...

W3QED, Seabrook, N. J., is back on 420 after a serious illness, and is keeping 420 skeds each Thursday night. The morning skeds on 144 Mc. with W4HDQ have been redesigned, the present plans being 0730. In addition, W3AHR has been experimenting with a dish reflector on 420, and he has found that the best orientation of the array
changes from time to time, even during a single transmission. Sometimes maximum signal has been received several degrees off the true direction, and on occasion filling the dish as much as 15 degrees upward produces the strongest signal.

In the hope of promoting greater interest in the region around Fitchburg, Mass., the Region 9 Amateur Radio Club is sponsoring a V.H.F. Night to be held at the Elks Club, Fitchburg, Feb. 20th. Invitations are being mailed to all amateurs within a 30-mile radius, and others beyond are welcome. An extensive program is being planned, to include an equipment and parts trade (bring your salable gear; the club will share in proceeds), snack luncheon at small cost, and other features, including a talk by your present correspondent. There will be no admission charge.

OES Notes

W1CTW, Arlington, Mass., reports completion of a Control Center rig for 50 Mc., using a 12AT7 and a 2456. The method of stabilizing the latter is of interest. The 2120 stage didn’t take off when drive was removed, but neither was it as stable as Cal would like, the reaction on the grid drive when the plate circuit was tuned being excessive. The screen inductance method Cal showed in his article on the CD portable in May, 1952, QST was then tried. A ¾-inch-diameter coil of 3½ inches turns between the 2456 screen and a 470-mu, by-pass to ground did the trick. All the cathodes and plates of the 2456 socket were grounded, and the turn spacing of the coil adjusted for optimum stability.

Reporting for the Rochester V.H.F. Group, of which he is now Secretary (W2OWF, Chairman, W2QF, Vice-Chairman), W2UAD says that “off-season” activity on 144 Mc. is at an all-time high in the Rochester area. The Finger Lakes Net now includes stations in Greece, Irondequoit, Webster, Chili, Perry, Spencerport, Hilton, Walworth, Auburn, Greece, East Bloomfield, Newark, Savannah, Ontario, Bristol, Center, and several other towns, and new calls are being added right along. Plans are being made for a long-range v.h.f. contest under Rochester V.H.F. Group auspices.

W2UHY, also of Rochester, has gear for 50 Mc. now, but is not having much luck finding stations to work on that band.

W7RJG, Billings, Mont., reports success in his 144-Mc. activities with W7NHI, Gillette, Wyo. This is a 181-mile path between elevations of 3551 feet and 4388 feet, with two runs over 5000 feet lying in between.

V.H.F. Net Schedules

<table>
<thead>
<tr>
<th>Name or Area Served</th>
<th>Frequency Control</th>
<th>Time and Date</th>
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<tbody>
<tr>
<td>Minute Men (E, Mass.)</td>
<td>50 Mc.</td>
<td>W1IN</td>
</tr>
<tr>
<td>Worcester, Mass.</td>
<td>50-56</td>
<td>W1DJ</td>
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<tr>
<td>E. Mass., N. H.</td>
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<td>54-71</td>
<td>W1VPT</td>
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<tr>
<td>Swampscott, Mass.</td>
<td>53-44</td>
<td>W1XK</td>
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<tr>
<td>Mass., CD, Region 9</td>
<td>50-55</td>
<td>W1D</td>
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<td>Providence, R. I.</td>
<td>144-148</td>
<td>W1HQ</td>
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<td>Homesteaders (W1, W2)</td>
<td>50-51</td>
<td>W1HDO</td>
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<td>N. Y. Area</td>
<td>220-225</td>
<td>W1AXA</td>
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<td>Brookhaven, N. Y.</td>
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<td>W1VX</td>
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<td>W1TD</td>
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<td>’Phila, High Freq. Club</td>
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<td>Intensity (’Phila)</td>
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<td>Radium</td>
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<td>Oak Ridge Univ. Net</td>
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<td>W1NDE</td>
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<td>2 Meters &amp; Down Club</td>
<td>144-138</td>
<td>W1HIK</td>
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<td>144-148</td>
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<td>146-96</td>
<td>W1GSI</td>
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<td>144-148</td>
<td>W1NF</td>
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<tr>
<td>144 Megacyclers (St. Louis)</td>
<td>111-118</td>
<td>W1KX</td>
</tr>
</tbody>
</table>

Strays

W9ROX needed a nonmetallc alignment tool in a hurry. He quickly manufactured one by filing the end of a plastic drinking stirrer rod.

If your young son is already fed up with his Christmas-present mechanical construction set, W2FDE recommends that you file the remains in your junk box — many handy gadgets of the mounting and strip variety are usually contained therein.

National Bureau of Standards has under construction a major laboratory at Boulder, Colo., where complete and modern facilities are to be provided for research on radio-wave propagation and other projects. By mid-1954 a staff of some 500 scientific and clerical personnel will be employed on the 210-acre site.

February 1953

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67
Let's Work Some DX. DX Contest time is here, and ARRL's '53 DX test (Feb. 6th - 8th, 20th - 22nd - c.w.; March 6th - 8th, 20th - 22nd - phone) should be the best ever. Advance notices by airmail to some rare DX points as well as to all foreign amateur societies were sent out in December. All amateurs are cordially invited to get in the swim and have some operating fun and DX, such as the occasion will make possible.

A few pointers to the fellow not regularly looking for DX may be of interest. Don't get in there and call indiscriminately. Try to follow practices indicated best in past experience. (1) Listen first for DX stations instead of calling. (You have to hear them before you work them, as a rule!) (2) Make calls short; for best results judge carefully the time to start your calls. (3) Call DX only after it signs OK, calls CQ or sends QRZ? (4) Make the reports and power figures correct and true in formulating the serial number exchanges. (5) Follow tuning indications of the DX, such as 20U, 10D or the like, meaning to put your transmitter up 20 or down 10 kc. from the frequency used by the DX, a practice that helps to prevent QRM drowning out the DX completely. HM, HLF (high-to-middle, low-to-high) indications are sometimes given to help you know how the DX will tune in looking for you when you need to transmit.

How one operates has an important bearing on the score; also, it is more important in other ways than what the score is since it determines how other amateurs feel about us. Try to avoid the type of operation that jams the frequency of the DX unnecessarily as by calling to no avail when numbers are being sent. Sending frequent or insistent CQs is not generally as productive of DX for us as listening for and calling the DX at the proper time, using break-in to minimize unnecessary calling. A reputation for sportsmanship and clean operating is more admired than score itself. Avoiding poor practice also avoids the label of being a ruthless and disreputable DXer.

Copies of the ARRL DX Operating Code (Operating Aid No. 5) are available on request. You can send request by letter or radiogram. In the DX test scoring competition is on the basis of true geographical equality, a certificate award for the leader using phone and the leader using c.w. in each one of the ARRL field organization sections. In the same way, the conditions vary from country to country. It wouldn't be fair to compare a score or results of a fellow in Mexico with one in Peru, for example, so there's a certificate as always for each country-leader, one for the 'phone period, one for c.w. Use our convenient DX Contest log forms for reporting and be the score large or small, let us know how you make it over wherever you are located.

There are bound to be plenty of good surprises and new DX contacts if one puts in some time and chooses his bands of operation carefully. We hope for the best conditions possible. It will not be safe to ignore any band but we caution amateurs who have been off for two or three years that they may have to make a new operating plan. Some of the lower frequency bands may be good while the hours for use of ten and twenty meters will be more limited than before. However it may be, here's luck and best DX in the annual ARRL 'phone and c.w. DX fray.

Off-Frequency Citation Dangers. February and March are always months of heavy activity in FCC monitoring, since these months probably mark the greatest volume of operating by amateurs for the entire year. Official Observers will be active as customary trying to note off-frequency deviations ahead of FCC to warn careless amateurs and help keep us all out of trouble, as well as keep our amateur service reputation for frequency observance high. As in past DX contests, disqualifications will be made this year where contestants are reported by FCC or by two or more Observers for operating out of the assigned amateur frequencies.

Attention is invited by W9IA to improper operation by amateurs on the military (MARS) channels 3497.5 and 6997.5 kc. He wants to caution amateurs that they subject themselves to FCC citation by any attempt to zero-beat stations such as WAR, AIR, and AF-authorized MARS as an accidental or deliberate matter. Just a word in time, he says, may help some to avoid spoiling a good amateur record through the FCC citation process.

Civil Defense and Our Future. A recent FCDA successful test (Exercise Nor'easter) won praise for W1LPM, W1RVA and W1TPX. In the course of the test, the operations were made an occasion by some amateurs operating on the 75-meter 'phone band for exercising on-the-air gripes and jibes. Just how does name calling and over-the-air griping help our amateur fraternity does someone ask? The obvious answer is that it doesn't. Not only does it NOT help, but it is a two-edged sword that might cut our own throats. The amateur groups serving the public interest are helping to keep the flag high for all amateurs;
more, not less, should strive to add something to the stature of their amateur radio. No one has a moral right to decry this work. Constructively inclined amateurs will aid in such AREC/RACES efforts, and monitor the frequencies if it will help in the short-time of a test. Interference between individual amateurs and groups of amateurs is a normal that we have learned to work around when busy in our amateur bands. At times we all suffer, but we come out in ability better communicators as a rule. We must bear in mind that RACES is also part of our own amateur service. It is that part of our service that is expected to give us an important operating place should another armed conflict come along; our big chance to be an asset under these circumstances.

So let us each take the long-range viewpoint. Let's listen (excellent practice at all times!) before we transmit. Surely none of us has an exclusive use or right to one frequency. There's everything to gain in the long run through cooperation. What matter if we move a few kilocycles for a few hours? Let's watch our operation, our language, and the future of amateur radio. It is our respected relationships with the public and others, our capabilities and self-training, the especially constructive rather than the wholly casual things we do, which constitute our surest claim on the future.

— E. F. H.

FREQUENCY-MEASURING TEST, FEBRUARY 11TH

All amateurs are invited to try their hand at frequency measurement. W3DMC will transmit signals for the purpose of frequency measurement starting at 9:30 P.M. EST (8:30 P.M. PST), Wednesday, February 11th. The signals will consist of dashes interspersed with station identification. These will follow a general message sent to help listeners to locate the signals before the measurement transmission starts. The approximate frequencies used will be 3529, 7386 and 14,006 kc. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 9:36 P.M. It is suggested that frequencies be measured in the order listed. Transmissions will be found within 5 or 10 kc. of the suggested frequencies.

At 12:30 a.m. EST, February 12th (11:30 P.M. PST, February 11th) W3DMC will transmit a second series of signals for the Frequency Measuring Test. Approximate frequencies used will be 3011, 7210 and 14,034 kc.

Individual reports on results will be sent to all amateurs who take part and submit entries. When the average accuracy reported shows error of less than 71-45 parts per million, or falls between 71.43 and 357.15 parts per million, participants will become eligible for appointment by SCM's as Class I or Class II OOs respectively.

The AARRL Frequency- Measuring Test will be used to aid qualification of AARRL members as Class I and Class II observers. Present observers not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the above-stated minimum required accuracy. Class I and Class II OOs must participate in at least two FMT's each year to hold appointments. SCM's (see address, page 6) invite applications for Class III and IV observer posts, good receiving equipment being the main requirement. All observers must make use of the cooperative notices (mail forms provided by AARRL) reporting activity monthly through SCM's, to warrant continued holding of appointment.

Any amateur may submit measurements on one or all frequencies listed above. No entry consisting of a single measurement will be eligible for QST listing of top results; at least two readings should be submitted to warrant QST measurement as based on overall average accuracy, as compared with readings made by a professional frequency-measuring lab.

HIGH CLAIMED SCORES 1952 SWEEPSTAKES

The Nineteenth AARRL Sweepstakes, held during the week ends of November 15th—16th and 22nd—23rd, was an exciting spurt that conforms to one of our well-established annual activity. Stations galore were on the air meriting engaged in swapping contest preambles. Some bands were almost completely taken over by the classic call "CQ SSB" and the non-participant was hard put to find anyone willing to engage in routine contacts, which certainly attests to the popularity of the Sweepstakes! Preliminary examination of the huge stacks of entries that have reached Headquarters shows a fine crop of high scores.

W3DGM, 1065 points, and a total of 191,700 points, which may turn out to be a new record when the final tallies are made. Right behind Mel was veteran W9IOP, a top entrant in previous Sweepstakes frays as W2IOP and W5IOP, with all sections worked, 1052 contacts, 186,606 points. Another battle-scarred veteran, W3BES, managed third place with 181,800 points, all sections and 1016 contacts. In the 'phone category, where top honors have been taken for years by western contestants, the outstanding entrant was Al Pichitino, W6EDX, who scored 105,972 from contacts with 505 stations and all sections. Westerners W6OOGZ, 102,666 points. Fifty contacts and 71 sections, and W7FPM, 94,255, 405 QSO's, 69 sections, were next in line.

Listed below are the highest claimed scores received. The listings show score, number of contacts, and number of sections worked. All figures are claimed by the contestants and are subject to further checking. Final results will appear in an early issue of QST.

C.W.

W3DGM, 1065 points, W3KST, 121,015—672—72
W9IOP, 105,972—502—72
W3BES, 102,666—702—72
W4KFC, 101,106—872—72
W5FZC, 100,740—901—72
W5IOP, 100,470—472—72
W3GHM, 158,580—881—72
W3AGU, 157,480—806—72
W3EA, 154,680—566—72
W5IOP, 151,184—406—72
W3JLR, 147,588—393—72
W9ERU, 145,680—406—72
W3JRU, 144,910—1023—72
W3JLC, 142,910—872—72
W7GEB, 141,120—782—72
W5YCR, 138,213—796—70
W3PZ, 132,788—705—71
W3JG, 132,440—705—72
W5LAQ, 128,175—727—77
W3LVP, 127,440—705—72
W3GKB, 126,458—755—67
W3ZC, 125,650—718—70
W3CAJ, 121,694—702—71
W2NN, 121,373—697—72
W5MCT, 122,670—685—72
W5BYF, 121,500—678—72
W5SSM, 121,547—725—67

PHONE

W3EDX, 105,972—502—72
W3DGM, 102,666—722—71
W4CJC, 102,475—383—78
W7FPM, 94,255—383—72
W4DJD, 91,972—638—72
W4PU, 83,283—391—71
W6AM, 78,130—548—72
W5XZ, 77,548—491—65
W8ZB, 71,418—353—70
W7KZ, 67,470—361—66
W8GHY, 67,260—165—65
W5LCY, 66,310—491—65
W9HAD, 58,854—349—71
W8NSD, 56,282—367—63
W4HUIW, 46,940—321—70

* Multiple-operator station.

February 1953
During the week of October 19th, many forest fires broke out throughout West Virginia, with the most serious ones centered around the Kanawha-Bourne-Lincoln county area. Members of the Charleston Radio Club offered radio facilities to the Conservation Commission, and after demonstrating that they were capable, they received the bulk of the radio communications job. W8PNR was appointed Chief Radio Operator, with W8PNR/0, W8PP/6, and other locals assisting. The stations began to handle emergency traffic from the Charleston Fire Control Center, using the West Virginia Net frequency, 3890 kc., and approximately 40 watts input. W8PNR/6 relayed traffic through mobiles, and later through W8COE/8 set up in the Kanawha State Forest, and W8UER/8 on Cabin Creek. Ten meters proved inadequate because of the terrain. The entire communications job was shifted to 3890 kc., with c.w. operators standing by on 3570 kc.

Other areas were reported in with emergency facilities. The Huntington Radio Club station, W8KEG, was moved to Handlin; W8UFM/8 reported from Logansport; W8KFW, with W8BSI assisting, from Williamson; W8VPO from Beckley; W8QV from Parkersburg; W8JUS from Summersville; and another group moved in and set up at Madison. Throughout the remainder of the campaign, the Conservation Commission based its entire fire-fighting plans on information sent in twice daily from these stations.

At 2:05, October 31st, FCC authorized voluntary clearance of 3890 kc. for the southern one-third of the state of West Virginia. Adverse conditions made it impossible at times for W8CLX to communicate directly with portable and mobile stations near the fire lines, and traffic had to be relayed through points as far away as Connecticut and Missouri, particularly W1OND, W3BIIK and W9RNM. Many others assisted in policing the emergency frequency.

By the end of the week, the situation was under control enough so that most of the field stations were able to secure, but when strong winds arose and threatened to erase new outbreaks the Conservation Commission requested to maintain their watch for 24 hours another 24 hours. On November 7th, it was decided that the situation had improved enough to allow the amateurs to secure their facilities, and the emergency frequency was re-licensed as W8CN. Net Control Stations WSPNR/8 and W8CLX had handled 535 messages, besides much more not in message form. W8CLX showed a total of 93.5 hours of actual transmitting time.

There is no doubt that as a result of this incident ham radio moved ahead 20 years in West Virginia in the eyes of the public. The following stations are known to have participated: W9A EAFB AQP BNL BPI BWD CCF CTZ DAR DHX DNN DPF EKO EKF ELJ EMQ EOA ERN ESQ ETP ETZ EVR PVL FMI FUM FTU FYD GEC GIO GIW (GII ORO HNC HRZ HXZ IBE IBI JDF IJL MCR MRV NET ORZ IPV PRD SDU SHU SKO SIIQ RFD TRES UUM UUR YUR YAP VPO VPR WCF YDL YDP YPR ZES ZEK ZMG. W1OND; W9 MEH EBY ZQA: W8E BET BIIK BRC KSF LSU OKU: W9S BQA IQQ PSU TBX PSU: W9S BCY GIC GIC: W9S AOB FVL KRG XNN RNX: W9S IQW GIC HIA GIC. Also, from W9USN were W9WY/4, W9CLT and W9HRO. W7YPR. SEC West Va.

On Nov. 3, 1952, the Royal Canadian Mounted Police requested W7EBV to assist in locating a missing small commercial plane near Ocean Falls, B. C. Unable to make contact with Air Service headquarters in Vancouver due to skip conditions, W7EBV called the Oregon Emergency Net on 3850 kc, W7BTF at Portland contacted the plane dispatcher at Vancouver, relayed the needed information to W9VBV, a boat was dispatched and the plane located. No one was hurt. — W7BTF.

When calls were made for volunteers to help fight forest fires on October 22nd, W9KDV and W9VY reported to the National Guard and offered their services. An officer pro-
trolled the fire-fighting areas in the east of W9KDV and maintained communication with W9JYN at headquarters where helpers were organized and dispatched from National Guard units. These two officers, as well as TV, radio and press releases, expressed sincere appreciation for the service rendered. W9NTA at his fixed station acted for the Martinsville area in maintaining communications to the mobiles.

On Sunday, October 23rd, W9DUD mobiles on 75 maintained communication between fire-fighting headquarters and Martinsville through severest QRM from 1800 to 1930. W9JTA, W9JWEU and W9N5WIC also assisted. — W9DUD, EC Morgan Co., Ind.

On Sunday, Nov. 9, 1952, at about 0700, at the request of National Guard, Forest Service and Civilian groups, EC W4FYM of Chattanooga sent three mobiles—W4JJJ/H, W48M/P, and W4FYM—to the forest fire areas in the vicinity of Chattanooga. W4JJJ/H worked from Dunlap, Tennessee; W48M/P worked from Eldred Mountain and W4FYM/M worked from Raccoon Mountain. At all three locations fire-fighting crews of the Tennessee National Guard and volunteers were working feverishly to extinguish the flames. Base stations were W4QT, Chattanooga; W4IB of Red Bank; and W4AL of Signal Mountain. Traffic handled pertained to dispatching of crews, supplies and instructions from National Guard Headquarters. About 10 or 50 messages were handled, some verbal. Other stations who assisted the group were W4s PAF HSQ and ABE. Operations were suspended when the rains came around 1600 that day.

When mobiles W4FYM and W48M had trouble “getting in” with their mobile whips, a quarter-wave wire clipped to the base of the whip and strung out to a tree or truck body boosted their signal to 89 as far away as Nashville on 3060 kc. — W4ABE, SEC Tenn.

A new section put in its first 1952 appearance in the SEC reporting column in October. We welcome the SEC of Missouri. Fourteen other SECs submitted reports, representing 2072 AEC members. We now have received reports from the SECs of 29 sections in 1952.

**NATIONAL CALLING AND EMERGENCY FREQUENCIES**

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<tr>
<th>C. W.</th>
<th>Phone</th>
</tr>
</thead>
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<tr>
<td>7100 kc. (day)</td>
<td>3875 kc.</td>
</tr>
<tr>
<td>3850 kc. (night)</td>
<td>14,225 kc.</td>
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<tr>
<td>14,050 kc.</td>
<td>29,640 kc.</td>
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</tbody>
</table>

During periods of communications emergency these channels will be monitored by stations of the National Emergency Net for personal-inquiry traffic. At other times, these frequencies can be used as general calling frequencies to expedite general traffic movement between amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be vacated immediately to accommodate other traffic.

The following are the National Calling and Emergency Frequencies for Canada: c.w.—3535, 7050, 14,060; “phone”—3915, 14,160 kc., 28,290 kc.

**OPERATION SNOWBOUND**

In late November, a surprise snowstorm hit a large area comprising roughly the states of Virginia, Tennessee, Kentucky, and to a lesser extent the immediate surrounding areas; this while the Northeastern States, where one expects such things to happen, were getting off with nothing more calamitous than a drenching rain. The snow was of the wet, heavy, sticky type which clings to things. It stuck to wires which would withstand just such much weight before snapping, or dragging poles down; or it stuck to trees which, when weighted down, would crash across telephone and
Rev. C. Lynn White, W4NBY, was the sole contact with Harlan, Ky., during a part of the snowstorm emergency. His tireless operation gained for him the admiration and respect of his fellow townsman, and much favorable public favor. W4NBY is the former Kentucky SCM.
TRAFFIC TOPICS

These days when conditions are so poor on 80 and 40 meters, at least from the standpoint of us traffic men, some of us switch our receivers to the 160-meter band. There, much to our surprise, we hear signals loud and steady from the very areas in which signals are almost entirely washed out on 80. Not only that, but a little more listening reveals that many of these folks, some on "phone and some on cw," are using pretty makeshift equipment with pretty makeshift antennas.

True, there isn't much room on 160 these days, but maybe it or 6 meters is the answer to our late-evening skip problems, problems which are making it increasingly tough to maintain any late-evening traffic schedules. How about some of you pioneering trafficners giving these short-haul bands a whirl? We're going to, as soon as we can throw together some kind of a booster for 160.

If every net submits a monthly traffic report, and we try to tabulate it in this column, we won't have room for anything else. The tabulation each month of data in NTS nets has attracted similar figures from other nets, and we will attempt to enumerate them separately until they become too numerous. This month we have figures from three transcontinental nets.

The Early Bird Transcontinental Net, operating three times per week on 3845 kc. at ground 0445 CST, reports a November traffic total of 126 by 24 stations, averaging 10.5 messages per session. W6BKL is manager.

The Transcontinental Phone Net (3870 kc., 1730 EST daily) handled 2447 messages in November, with 30 sessions, an average of 82 messages per session. Thirty-eight stations participated, 28 of them every night. This per W1SJO for Manager W1SS.

On the Transcontinental Relay Net (7042 kc., 0115 EST daily), W3CVE reports 5030 messages handled on 40 November sessions, an average of 169 per session. Nine regular members participated.

National Traffic System. The response to our postcard offer to send complete information on NTS to all ORS on request has been most gratifying. We made this offer specifically to ORS because they, as traffic-handling appointees, should be well informed. But the information is available to anyone, appointee or not, and participation in NTS is open to any licensed amateur except Novices and Technicians; we haven't figured a way to include them yet.

A few points of NTS policy should be cleared up. Correspondence from certain traffic men indicates some doubt, even an occasional incorrect conviction, on these matters: (1) NTS nets are not "closed" nets. Anyone with traffic and the required net savvy for the net into which he is reporting is welcome. Since NTS nets have their normal outlets for all traffic reported in, there is usually no traffic for a casual station who reports in QRU on regional and area nets.

But everyone is urged to QNI his own section net, whether QRU or not. (2) The normal routing procedure can appear ridiculous in certain isolated instances, like in the case of adjoining sections which fall into different regions and/or different areas. In such cases, an agreed-upon system of direct interchange between those sections is, far from being frowned upon, all to the good. In most cases following normal routing procedure is the path of least resistance, requiring no liaison link instead of several. (3) The NTS framework at section level alone provides for and urges 72 section nets each meeting ten times a week (twice daily Monday through Friday). Assuming ten stations per session, that's 720 stations. If we have different stations each day of the week, that's 3500 stations, and if we have different stations every session, that's 7800 stations. How, then, can it be said (as it often is) that NTS restricts traffic work to a chosen few? There's room for everyone, and a lot more.

November reports:

<table>
<thead>
<tr>
<th>Net</th>
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<th>Traffic High</th>
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<td>(Kans.)</td>
<td>20</td>
<td>304</td>
<td>30</td>
<td>15.2</td>
<td></td>
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* Out of 30 sessions held.
** Out of 40 sessions held.
*** Out of 40 sessions scheduled

W8SCW's December EAN Bulletin was a corker, outlining seven points on EAN procedure. EAN NCS, Monday through Friday respectively, are: W3EGQ, W4WMH, W1NJM, W1CWR and W2ZYW.

W1CB reports that operations is difficult due to QRM from TV sweep oscillators.

W1BVR has only one comment — conditions are terrible! Latest recipients of hard-earned 4RN certificates are W3ZT, W4TVI and W4UWW.

In the Pacific Area, ORS has decided tentatively to stay on 3300.

W6TQ took three weeks' vacation, and on returning found TEN IN much good shape that he now wonders if he has been holding them back.

W6BEV has been designated an assistant manager of TCC, to sparkplug the central area Transcontinental Corp staff. W5WY serves a similar function in the Eastern Area. Another assistant is needed in the Pacific Area.

Although W5MRK is resigning as manager of RN5, we want you traffic boys and gals to have a look at him. Forrest did a stellar job during the year and a half he served, and we are sorry to see him go. W5MRK is ORS and holds a 25-w.p.m. code proficiency certificate.

QST for
CODE-PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. You will qualify if you can send and receive at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate if your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

Code-practice transmissions are made from W1AW each evening at 2130 EST. References to texts used on several of the transmissions are given below. These make it possible to check your copy. For practice purposes, the order of words in each line of QST text is reversed during certain of the slow-speed transmissions. To get sending practice, hook up your own key and buzzer and attempt to send in step with W1AW.

Date Subject of Practice Test from Dec. QST
Feb. 3rd: 75 Watts with “Economy” Power Supply, p. 23
Feb. 5th: The Tune-Up Loop, p. 37
Feb. 8th: A High Powered Amplifier... p. 11
Feb. 13th: The “Tur-Kay,” p. 18
Feb. 16th: The Hetromon, p. 32
Feb. 19th: A Bargain (?) Noise Station, p. 15
Feb. 25th: Carrier Generators for S.S.B. Reception, p. 35
Feb. 27th: Low-Cost Low-Pass Filters... p. 38

ELECTION NOTICE

(To all ARRL members residing in the Sections listed below.)

You are hereby notified that an election for Section Communications Manager 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 have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year prior to his nomination.

Petitions must be in West Hartford, Conn., on or before noon on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, and station call of the candidate 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 additional signatures may be found invalid by reason of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

The following nomination form is suggested: (Signers will please add city and street address to facilitate checking membership.)

Communications Manager, ARRL [place and date]
38 La Belle Road, West Hartford, Conn.

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.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates. You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

— F. E. Handy, Communications Manager

BRASS POUNDERS LEAGUE

Winners of BPL Traffic for November traffic

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<tr>
<th>Callsign</th>
<th>Orig.</th>
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<th>Ret.</th>
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<td>386</td>
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The following made the BPL for 100 or more originated-plus-delivered:

K4WBC ... 289
W0LNF ... 127
W2RCD ... 102
W1HBD ... 112
W7HDN ... 101
W5YJ ... 100
W0YBY ... 109

A message total of 500 or more or 100 or more originated-plus-delivered will put you in line for a place in the BPL. The Brass Pounders League is open to all operators who qualify for this monthly listing.

February 1953 73
**ALL ACTIVITIES**

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

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**ATLANTIC DIVISION**

**EASTERN PENNSYLVANIA** — SCM: John H. Du Bois, W3BE — SEC: IRE, RMs; AAW, BIP, E. Pa.; NFR: 3601 kc. On December 4th, the Northeast RC of Philadelphia enjoyed its second annual banquet at All Sun & Dividends. The North Branch ARC of Bloomsburg is now an ARRL affiliated club and the SCM would welcome reports from that area. The Lurdy Radio Club was formed in 1930. The Lurdy name is derived from the Lurdy Mountains along the Susquehanna River. Those interested in starting an E. Pa. phone net should contact P. Y. E. The five time positions are for 3010 kc. Mon. through Fri. at 1500 EST. With a list of stations 72 in 39 states and with E. Pa. c.w. net for complete coverage. P.I. is now NCS for E. Pa. Emergency Net, with meets set for 3010 kc. at 2030, Mon. Thanks to EAKT, the former NCS, for a job well done. KEW (ex-W9LEZ) now is signing W3LFZ, competing for low bands. KEW is long time, with all over 80 watts on 75-meter mobile. QAQ is in the Army and hopes to be on with a KA call soon. EX-3NDQ now is EX-9NB and is an engineer at W3GW in Hagerstown, N.J. RFM will be QRT because of enlistment in the USAF. TEZ is corollary equipment for 220 and 400 Ml, and would like to be used. The interest is increasing, and the reports indicate that E. Pa. was well represented in Field Day and SS Contests. Traffic: (Nov.) W3UL 4001, BIP 3901, EAKT 2901, K2PZ 2901, N5PI 2901, W3SN 2901, W3JJ 2901. NTS calls are being answered by KEW. DUL 25, NOK 25, CDA 19, MER 16, CHU 7, VFT 6, QSW 3 (Oct.) W3OQLI.

**MARYLAND-DELAWARE-DISTRICT OF COLUMBIA** — SCM: James W. John, W3OMM — Phil Rand gave talks on TVI in Baltimore on Nov. 12th and in Washington on Nov. 20th. More than 800 of the section amateurs at these two lectures were acquainted with the technical problems of TVI. An informal dinner party was held by WRO and WTVT-7, with Director GEG before the TVI meeting in Washington. Air Force Reserve, presented an honorary life membership in the Rock Creek Amateur Radio Club to CORPON, RGM 108, and OW 108, and to a member of the Pima Amateur Radio Club, Tucson, Az. During the November meeting, the club members held a contest to determine who could type the best. "Quick Typing" was the topic covered at the Nov. 3rd meeting. On Nov. 16th, the Club, at the Chesapeake Amateur Radio Club meeting, discussed "Common Carrier, Mobile Radio, Telephone System." WUJ covered "Practical Mobile Installation" at the Nov. 24th meeting. The Washington Radio Club held an auction and showed motion pictures at its meetings in November. 1 Lab members visited CDQ’s station after the Nov. 22nd meeting. LUL discussed their meeting at the November 1st meeting of the Rock Creek Amateur Radio Assn. PZW has a new T-32 receiver and 4-125 final for 80 meters. ONB is operating restricted because of inability to operate. The following is a list of those who are participating in the installation, CVE enjoyed a trip to the Midwest in October. SBF and T2K made Rag Chews with Club with QTB. Traffic: W3U 550, W3SN 550, N6OW 540, K2PZ 510, K3N 400, 1350.

**ONTARIO CANADA** — SCM: E. J. Ginley, W2IGC — SEC: K2BKG. A mobile emergency net has been formed in the Princeston area with five units participating. We request to note the closing of the meeting of the RCA meting on Dec. 4th, the newly formed Princeston Amateur Radio Club, N5AO, and the local old-timers in this section knew their work well. ZR is returning from a well-earned vacation on the high seas, traveling to the Far East with the U.S. Maritime Service. Traveling with the Samoan Islands, some of the crew are in order of arrival, "N," ABQ is operating mobile on 10 meters with a new Laocox transmitter. The KBA Outstanding Amateur Award for 1951 went to W9JF. It is the first time that this award has been given to more than one ham in any one year. The amateur fraternity can use many more hams of this caliber. PIG had a demonstration of the new equipment at the Oroontown Friends High School. The FFC is anxious to line up some volunteers in the Atlantic City Area for a local TVI committee. Anyone who cares to contact the SCM, the South Jersey emergency nets gave considerable assistance to the City of Camden at the recent air raid sirens test. Both mobile groups were on the air on 2 and 10 meters. Traffic: K2BKG 264, W2RQ 127, ZI 31, ASG 28, ZQ 7, HAZ 3.

**NEW YORK** — SCM: Edward G. Graf, W2JSV — SEC: UTH, RMs: KUF, COU, PAM; GSS, NYS meets on 3615 kc., 7 and 10 P.M.; on 3990 kc., 8:30 P.M.; WNY meets on 3615 kc., 9 and 3993 kc., 9 A.M. SUN. DRQQ is on 80 and 30 meters with 381 final. COU, new NYS, can be heard on 3615 kc. at 1830 on 3993 kc. at 1830. There is a new group of BIF in the Buffalo area. The Rochester v.l.f. group officers are OWF, chairman; Q1, vice-chairman; UAD, secy. New calls on 2 meters in the Rochester area are Z6I, Z6A, and Q2F, which is Advanced Class. Members of KBT were addressed by OZT, of Cornell Lab., on Miniaturization of Radio Equipment and by SKR on Radio Control of Traffic Signals. The air is designed after a model constructed by Dick Smith, formerly of ARRL and QSOed W6BNL with VQ20S at the Ken. New officers of the WNY 2-meter club are: WVU/2, vice-pres.; SLU/2, vice-pres.; PWN, treas.; VQ, secy. Meetings are held the third Fri. of each month. The code squad contest of the club was won by K2NBDP, K2BHD, and K2PST. A testimonial dinner was held for PUV, ex-SHVO, supported by the Batavia Area. "2K8CBE is on 80, 40, and 20 meters and 15 and 10 meters. The club is General Class and is on 80 and 40 meters with a Viking I and an SX-42. EMW has 10 watts on 80 and 40 meters with an indoor antenna but is active in NYS and worked 151 stations in the NY. NYS phone net certificates have been issued to DFR, CEF, JPE, PWN, DHF, ZIU, and YPF, ORS very active in the S.E.T. With a type direct to Washington Headquarters of the Red Cross. GSS and RUF report cooperation between WNY phone and NYS c.w. has increased. TRAF has rescheduled SEC; QQ hurt both legs when his horse crashed after being weakened by wood-eating ants but has recovered. Traffic: (Nov.) W3UL 4001, BIP 3901, N5PI 2901, W3SN 2901, W3JJ 2901. QSOs now are 40 meters. K2QEG is on 80, 40, and 20 meters, and 15 and 10 meters. IFC is General Class and is on 80 and 40 meters.

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**Continued on page 60**
Recently, this page was used for a discussion of receiver gain and signal-to-noise ratio. Noise Figure was not included in this discussion as this parameter of a receiver is not particularly important at frequencies in the H.F. range (3 to 30 mc.) normally covered by the usual communications receiver. The reason for this is that any reasonable antenna attached to the receiver will develop enough noise to mask completely the internal noise developed by even a receiver with only a mediocre noise figure. Of course, as the received frequency is increased this becomes less true. Over most of the VHF range (30 to 300 mc.), Noise Figure becomes important due to the lower amount of noise developed by the smaller antenna. At micro-wave frequencies, Noise Figure becomes all important.

Now suppose that a desired signal is hidden down in the noise somewhere. We know it is there but it is buried too deeply to read. Perhaps it is buried only part of the time as in the case of a badly fading signal. Or perhaps the signal is steady but just too weak to assert itself. What can we do to make it fully readable?

Of course, we may do all we can to the receiver first. The Signal-to-Noise ratio can be improved by sharpening the receiver selectivity and turning down the Tone Control. This can be carried only to the point where it affects the fidelity of the desired signal. The power of the transmitting station may be increased, if possible. Having done all this, suppose we find the signal still is unreadable. Now what?

In the case of the fading signal, a remedy that is used extensively by the commercial interests is Diversity reception. This is based on the idea that the signal cancellation that causes the fading does not occur simultaneously under all conditions or locations of reception. If two receivers are used with two well-separated antennas, the signal may peak at one antenna while it fades at another. By connecting the receiver outputs into a single output unit and providing a means to use the receiver that has the strongest input, the signal can be made fully readable. Usual commercial practice is to use three receivers. In addition to "space" diversity, there is also "polarization" and "frequency" diversity. The latter method requires two or more transmitters. This system, of course, is rather expensive and works very well as long as the fading signal is readable part of the time on each receiver. If the signal is entirely below the noise level at all times, Diversity reception does not work. But there is still a relatively simple method to make the signal readable.

This method is the use of a "beam" or directional array for the antenna system. It can be shown that the signal-to-noise ratio of a receiving system is directly proportional to the gain of the antenna. Assuming that noise is received equally from all directions, thereby excluding man-made noise, it is obvious that a dipole picks up a certain amount of noise over a wide area. If the dipole is replaced by a high-gain array, much less noise will be received in directions "off the beam" but noise "on the beam" will be received more strongly. The net total noise power is about the same as with the dipole but the signal power has increased in direct proportion to the power gain of the array. For example, suppose the antenna gain is 10db. If a signal received by a dipole is 5db below the noise level, switching to the beam should increase it to 5db above the noise level. It is now a perfectly readable signal.

If you still cannot hear the guy by now, better turn off the lights and go to bed. Perhaps conditions will be better tomorrow night.

CAL HADLOCK, W1CTW
70E-8A Permeability Tuned Oscillator — The versatility, accuracy, stability and voltage coefficients that distinguish good VFOs are standard in the 70E-8A. Every component is highest quality — meets strict specifications. 16 turns of the vernier dial cover the linear range of 1600 kc to 2000 kc. Use in exciters or measuring instruments for truly professional performance. You can depend on it to give you long service free from trouble.

32V-3 VFO Transmitter — A controlled bandswitching, gang-tuned amateur transmitter. Rated at 150 watts input on CW, 120 watts phone, this little receiver-size rig has the kick of a kangaroo, and its excellent audio provides extraordinarily good readability. The 32V-3 covers the 80, 40, 20, 15, 11 and 10 meter ham bands. It is thoroughly filtered and shielded to minimize the possibility of TVI.

KW-1 Transmitter — Engineered for maximum power allowed by your license. Its input is a full 1000 watts on phone and CW. The entire transmitter, including power supply, is integrated in an attractive cabinet. Complete bandswitching of the exciter, driver and power amplifier by a single control on the front panel. It covers bands 160 through 10. TVI reduction is accomplished by well engineered shielding and filtering. It’s as easy to handle as the 32V-3.

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75A-3 Receiver — Makes use of the new Collins mechanical filter which represents an entirely new approach to the attainment of selectivity. The 75A-3 is a double conversion superheterodyne for top performance on the 100, 80, 40, 20, 15, 11 and 10 meter bands. Only the hand in use is shown on the slide rule dial — accurately calibrated directly in 1/10 mc. Vernier zero set control is on front panel.

3SC-2 Low-Pass Filter — Designed to reduce harmonic radiation. Can be used with any 52-ohm-output transmitter though especially built for use with Collins 32V-3 (left). 3SC-2 has coaxial fittings to make installation easy. Provides about 75 db attenuation at television frequencies with an insertion loss of only .18 db. The filter’s three sections are individually shielded and the use of low-loss capacitors insures excellent performance under all conditions.

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The Eldico SSB Jr. is patterned after the amazingly effective unit developed by Don Norgaard, W2KUJ, and described in the November-December 1950 G-E Ham News. Now with the advanced improvements incorporated after amateur field tests — it is available immediately in either kit form or completely wired and tested.

Everyone can now enjoy all the benefits of single sideband transmission. Tremendous effectiveness of low power; QRМ minimized or eliminated entirely; QSB has less effect...complete phone contacts with "c.w. reliability," Eldico's SSB Jr. is a complete 6-tube 5 watt single sideband transmitter. Tube complement consists of 12AU7 combination speech amplifier-oscillator; 12AT7 twin-channel amplifier; 6AG7 final; 12AT7 twin-speech pre-amplifier; 6116 bias; 5Y3G rectifier.

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Listen on the amateur bands for the Eldico SSB Jr., or stop in at your local distributor for a demonstration.
LOOK AT THESE OUTSTANDING FEATURES OF THE SINGLE SIDEBAND JR.

- Simple enough for the newcomer to Single Sideband Transmission to assemble, sturdy enough for years of trouble free operation.
- Uses the time proven W2KUJ General Electric Ham News audio phase shift network.
- Circuit permits use of any 80 meter crystal for operation anywhere on the 80 meter phone band.
- Fully assembled and pre-adjusted audio phase shift network eliminates necessity for elaborate test equipment.
- Husky internal power supply furnishes all voltages needed.
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- Furnished in attractive grey crackle finished cabinet size 8 x 14 x 8. Complete (less crystal). Not another bolt or nut to purchase.

SSB JR. complete kit with Instructions $79.95
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A rotary turrent, uniquely incorporated into the “SP-600-JX,” makes possible the placement of the coil assemblies of the two RF Amplifier stages, Mixer stage and First Heterodyne Oscillator stage directly adjacent to their respective sections of the four-tang tuning capacitor and the individual tubes.

Coil assemblies are mounted on the turret. Turning the band selector switch to any one of the six frequency bands places the required coils immediately in their correct positions. This arrangement increases receiver stability, provides uniform maximum performance from band to band, and simplifies servicing.

For more details about this magnificent 20-tube receiver write to The Hammarlund Mfg. Co., Inc., Dept. Q, 460 W. 34th St., New York 1, N.Y.

HAMMARLUND

80

(Continued from page 74)

KP4NY to help father and son keep in touch with one another. JSJ can sleep in peace after working an 80, 40, and 20 meter FM contact on W7RMA’s 15 wpm. The West Coast AR Field Day net was well attended and good operating was reported to the operators involved.

K4𥠼 and K4JG are working hard to contact TVI, the West Coast Amateur Radio Club sends in its Field Day bulletin. NWD has new QTH in Florida. RXT has a six-element 2-meter beam giving good results. KIWH, UTB, and UVD are most consistent on the WPA Net. SWV has passed his General Class exam and is operating on 20-meter phone. The WPA Traffic Net operates Monday through Friday at 7 p.m. on 3585 ke. NUG reports that the WPA Net handled 90 messages during November. SYZ, Mercer County RA treasurer, who is handicapped by total blindness, got a swell write-up on his accomplishment in obtaining his General Class ticket. Traile: Nov., WN2CND 11D, UN5 75, NRE 69, NUG 39, MZL 6, ASR 9, LCS 2, (Oct.) WN2CND 144, NRE 12.

CENTRAL DIVISION

ILLINOIS—SCM, H. F. Lund, W9EQK — Section Nets: ILN (c.w.) 3515 ke; IEN (Phone) 3940 ke; SEC: QLZ, Asst. SEC: HPG; RM: BUK, PAM; UGT. The Section is planning an event and publicity to interest the public in Amateur Radio. The Waukegan and Midway Clubs participated in the full-scale Lake County c.d. drill; local c.d. officials had high praise for the operation. Communications, 4CVO/9 was one of the spark-plugs for the Virginia call license bill — we will need his help here in Illinois, too. IDA is organizing an emergency net in Henry County. Activity also is picking up in Fulton County. A club has been organized with MUL as president, RRT, secretary, and AOV in charge of emergency work. OKI made WAS. MTR signs/8 while at college. OKQ works the mobiles now with a new 25-Mc. ground plane antenna. BBN has returned to 40-meter phone and during TVI by working on the TV sets. Another new radio club, York High at Elmhurst, has elected ORG, pres., OKQ, vice-pres., and ORG as trustees. 2MU has graduated to AD. CI ticket. SKR had a good time in the 88. The Starved Rock Club officers for 39 are VOK, pres.; ZEN, vice-pres.; and QLZ, secretary. 88 is sending a report on the emergency work. OGY made Gen. CI, but can operate only when home from college on vacation. Antennas damage from the 80-m. B. I. wind are reported by MEL, ORG-97, OGA, WFS, and 4CSW. QSW has a nice traffic total and is in a new ORS. Traffic: W4CWS 35E, YLX 92, SSL-71, BUK 65, W4MXU/9 63, W4ST 75, WECD 49, W4WA 35, W4WG 35, BGN 38, LKJ 38, OKQ 30, W4WDS/9 29, W4MRQ 20, TBI 20, IDA 18, OKI 13, FPP 5, WFS 3, CTZ 7.

INDIANA—SCM, R. C. Muncie, W9BDGA — ZIB reworked his 10-meter beam and put up a new one for 2 meters. R2S is back on after his fire with a 35W-2 transceiver and an HB5-V for receiver. NRJ, from Indianapolis, is a new ORS. MDW is in the Dental Corps in Germany. KLR has built a cascade crystal-controlled converter and an a.m. modulator. AJZ monitors 147.3 Mc. nightly. WWT is a new OQ. BKJ reports IFN traffic as 191. DKR built a 80-meter converter and reports good results. YW6S reports his old SSB. VGD is a new ORS. JBQ reports RFN traffic as 78. PPS, OWZ, and RKX are new members of RFN. LXi and TT have 147.3 Mc. A. L. The rig. JBQ has moved to Jeffersonville. SKP works for the Nickle Plate Railroad. EUC reports the New Albany group is becoming more active. DIL is handling Harbert traffic on 86-meter c.w. DJU built band-switching VFO for 160, 80, and 40 meters. New EC for Clinton County is SKP. LOZ has rotor on his 70-foot tower now. SLJ joined the Silent Keys. The Key and Mike Club of New Albany has 26 members and sponsored a transmitter hunt. DPI gave a talk on his 30 years in amateur radio to the Tri-State Amateur Radio Society and, as usual, was well received. KVE has new grid-dip oscillator. RIT, OBO, QAV, QFR, and TTIU received their General Class licenses. FJL enjoyed the leg. Contest very much. CWH has moved to New York. UNT received his Advanced Class license. MZE is with the Air Force in Germany. QOS has Viking transmitter and HQ-129 receiver. LOJ from 2 meters almost every night. 5ZC has emergency net for Henry County. Sun is 1330, on 80-meter c.w. OLX schedules IFG and KGV. The 621st TVI meeting (New Castle, Richmond, and Muncie) on the AREC activities. LQE is very active as OBS. DJH is in the auto parts business. BRD is a member of M1S. KGA is building new TVI-proof rig for 20-meter DX. NJR is a new member of QIN. DEJ reports the Calumet Area Emergency Net on 100 meters was very active during October. WN2E7Z 372, YVE 237, BKJ 197, TT 180, TG 174, DEJ 92, FYM 86, WBA 69, JBQ 63, VNY 59, DOK 46, PPS 45, HUV 44, LVD 44, NLQ 32, (Oct.) TPS 22, YVS 32, MUR 25, OLX 25, QID 19, BDP 17, CMT 6.

(Continued on page 82)
More than 30 years of capacitor manufacturing experience has produced "know-how" at Hammarlund that includes thorough understanding of nearly every method of capacitor design and construction. Because of this important background, the company's engineers can select from experience, as well as theoretical factors, the design for each specific capacitor type that fulfills all requirements.

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DRED 6, FSA 6, KLR 2, WNOUQP 2, (Oct.) WOZIP 19, RZB 5, IZC 4.

WISCONSIN — SCM, Ron W. Geesboch, W9ROM — SEC: OYO, PAM: ESI, RM: IQW, SFL, C.W. Net (WIN) meets on 3065 kc. at 7 p.m. daily. Mon.-Fri. Phone Net (BEN) meets at 3090 kc. at 6 p.m. daily. State mobile and c.d. frequency: 29,620 kc. CTY is planning a 15-watt doubling for 3.5-Mc. operation. After a summer of remodeling, ESI is getting back to a state of normalcy again. Net certificates (BEN) were issued to ANS, HZS, MWQ, and PZC. W6KAP, former WRM and ORS at Bangor, Me., now is located at Middleton, Wis. In addition to traffic, UCR also is on 7 and 14 Mc. changing DX. LSK has varicoustic transmitter, and has been checked into the slow-speed WIN net in November, according to an FB report submitted by SFL. With 85 watts, RUI has worked 38 states on 3.5 and 7 Mc., since he was licensed in January. REQ and DSP claim a first in Wisconsin with 6-mile coverage on 438 Mc. A3 with 30 watts to BC648. LEE is 3rd region NCS of the Trans-Wis. A-4, net which meets at 9 p.m. Tues. and Thurs., on 25,648 kc. W9N5RB's 144-Mc. Texas QSO turned out to be a phony. QSO has converter and antenna going on 144 Mc. For 1 trying to help the blind who are interested in ham radio. DSP adds a 15-ATH r.f. stage for improved signal to noise ratio on 430 Mc. WFEA, was represented in the following net: (1) 22670 kc., 1830, Mon.-Sat., W2IBQ-NCs, (2) 3845 kc., 1800, Mon.-Sat., WBE0Q-NCS, (3) 1920 kc., "No. Sat.," Mon.-Sat., W81AP, (4) 1980 kc., "Goose River." Sun. only, 0000, W9DRL. Reports here will indicate all word received from active hams. Be sure to report your activity radio-wise to the SCM the first of each month, Support our nets.

NORTH DAKOTA — SCM, Everett B. Hill, W6VBP — All North Dakota amateurs are invited to take part in the following nets: (1) 3670 kc., 1830, Mon.-Sat., W9KDF-NCs, (2) 3845 kc., 1800, Mon.-Sat., WBE0Q-NCS, (3) 1920 kc., "No. Sat.," Mon.-Sat., W81AP, (4) 1980 kc., "Goose River." Sun. only, 0000, W9DRL. Reports here will indicate all word received from active hams. Be sure to report your activity radio-wise to the SCM the first of each month, Support our nets.

SOUTH DAKOTA — SCM, J. W. Sikorski, WRRN — SEC: GC, RM: OLE, PAM: UYV, With YLV's acceptance of the appointment South Dakota has its first time in years, a PAM. South Dakota has a superior "phone net. Much credit goes to Trot for his past activities and support, and cooperation will be appreciated. W9B, Centerville, has purchased HAT'S rig, running 300 watts to M5. A new call at Emery is W9NL3F, PAV, Selby, is a new winner on 180-meter "phone. O'Verville, J.P., has joined the 75-mobile gang, CQK is in the TV antenna and service business. KVB has been transferred to Omaha by the telephone company. After talking about it for two years, PWM installed a 45-90 antenna, and after a two-week trial went back to the center-fed on the second day of the SS. UYV and HWS landed press for A7 with letters using the 160-meter band by a sleek storm. Traffic: (Nov.) K9EAS 75, W6LOB 38, FRR 38, E9O 38, W15FXW 10, 1AEN 10, GCP 6, RZN 2, CSB 1. (Oct.) KMDC 1.

MINNESOTA — SCM, Charles M. Bove, W9MBC — Associate SCM, Jean Walter, KXE, SEC: BOL, RM: DQG and IZC, OPE: UYV and HWS. The MN Radio Club now holds transmitter hunts the fourth Friday of each month. A v.h.f. steak dinner was held at Anoka. Most of the 2- and 6-meter boys attended. 17 in all. Among the 2-meter equipment on display was ATD's 9-watt ether-hunter. (OVO now is Advanced Class and soon will be checked into the MN. On Thanksgiving night, it is scheduled into the MB 'Phone Net. The St. Paul Mobile Corps, affiliated with the Red Cross, now is tiring in with the Ramsey County auxiliary. RA now is on the air with an Elma. PCV has been reporting as missing in action in Korea. Its radio operator on a 209-A is now. RA is operating K9FGR. Did you know that T7W was SCM back in 1937? T7W has move to Minneapolis. KDEA's XYL received her Netbook with the W9WMPF on their wedding anniversary. JNC rides all right for himself in the Sweepstakes. OAZ is back checking into the "phone net. He is on the 177 cc. UHCEC is building a new 2-meter converter. CCLC is selling communications equipment in South Dakota. BRA now has a 224-Y, which got rich with the 177 cc. DL4HM is on the highest hill in Western Germany. Art's setup is a 32V-3 and a 75A-2. He now is Major Monosea. HRH is building a rig very close to Red River station in St. Paul, DKL, has a new Viking II. The Minneapolis Radio Club has published a vest-pocket call book covering the Twin Cities and suburbs. DXF now is in the Navy. BUQ has built a new "phone patch that really sounds good. QWM has a new 8X-71. We would like to see all (Continued on page 84)
W1FH reports on Eimac 4-250 A's...

In a recent letter
CHARLES MELLEN
says:

I've been enjoying the operating convenience of Eimac's 4-250A tetrodes for two years. The elimination of hi-power driving stages and the resultant ease with which TVI problems were solved have made my operating that much more a pleasure.

73 or DX
Chuck Mellen
W1FH-

EITEL MCCULLOUGH, INC.
SAN BRUNO • CALIFORNIA

Export Agents: Frazar & Hansen, 301 Clay St. San Francisco, Calif.
More Safety...Less Guesswork When You Use
— PRECISION—
TEST EQUIPMENT

Stay On The Air
With "PRECISION" SERIES 85
AC-DC
Circuit Tester
(20,000 Ohms per Volt)
SELF-CONTAINED TO
6000 volts,
60 Megohms,
12 Amperes, +70DB

A compact, laboratory type, high sensitivity test set indispensable for test and maintenance of modern amateur communications equipment.

20,000 Ohms per Volt D.C. — 1000 Ohms per Volt A.C.
VOLTAGE RANGES: 0-3-12-60-300-1200-6000 A.C. & D.C.
CURRENT RANGES: 0-120 microamps; 0-1,2-12-120-MA; 0-1,2-12 Amps D.C.
RESISTANCE RANGES: 0-6000-600K—6 Meg—60 Megohms.
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Complete with batteries and test leads $99.95

PLUS superior physical features:
★ 4 1/2", 50 microamps, Easy Reading Meter.
★ Heavy duty bakelite case 5 1/2 x 7 1/2 x 3".
★ Deep etched, anodized aluminum panel.
★ Recessed 6000 volt safety knobs.
★ Only two pin jacks for all standard ranges.

LC-1 LEATHER CARRYING CASE—Custom designed, top-grain cowhide case with tool and test lead compartment. $9.50
See Series 85 and other famous "Precision" instruments, on display at leading radio parts and ham equipment distributors. Write for latest catalog.

Precision Apparatus Co., Inc.
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Oscillator Switching with the MALLORY 152L 6 Position Switch

It is surprising how much the sensitivity of the average communication receiver can be improved by the use of a simple variable frequency test oscillator, to "touch up" the I.F. section or to peak the R.F. stages.

An oscillator suitable for most amateur work need not be complicated or difficult to build. It should consist of a reasonably stable circuit similar to the one shown here, and should be roughly calibrated over a range from approximately 400 KC through 30 MC. Some method of modulating its output should be employed, although this is not a necessity if the receiver to be tested is equipped with a carrier level "S" meter.

Bandswitching should be employed for convenience in switching from one range to another. Mallory type 152L is admirably suited for this purpose. It consists of 2 sections and 6 positions. A unique feature of the Mallory 152L switch is its automatic shorting mechanism which shorts out all unused coils, thus eliminating the possibility of harmonic "suck-out" points. In addition, this switch is equipped with an adjustable "stop" so that any number of positions may be used from 2 through the full 6.

Circuit constants and modulation methods for the suggested oscillator schematic may be found in most of the late Amateur Handbooks. The 152L band switch and other parts may be purchased at your nearest Mallory authorized distributor.

You can rely on Mallory Precision manufacturing to supply you with the most dependable line of: ham band switches, push button switches, controls—rheostats—potentiometers—pads, tubular capacitors, transmitting capacitors, dry electrolytics, dry disc rectifiers, vibrators, and vibrator power supplies—practically every component you need to keep your rig in A-1 condition.

P.R.MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA
ENGINEERING OPPORTUNITIES AT JOHNSON

We invite QST readers to consider technical employment in the following categories made necessary by an expanding products development program.

COMMUNICATIONS ENGINEERS . . . With EE DEGREES
... or equivalent professional experience in the communications field.

MECHANICAL ENGINEERS . . . with design experience on small mechanical and electrical parts similar to those used in electronics equipment.

DESIGNER-DRAFTSMEN . . . for diversified work on equipment and components.

These openings are the result of steady growth of our company over 30 years. The excellent reputation and wide acceptance of Johnson products have been the result of sound engineering, close control of manufacturing, conservative but progressive management and adequate financial strength. These factors, plus widely diversified lines, lead to job security that is unsurpassed in the industry.

Waseca offers an attractive small city environment, ideal for family life, close to work, to good schools and recreational opportunities in the Land of Ten Thousand Lakes.

If you feel you are qualified and interested in working with a compatible and highly respected group on projects ranging from component items to broadcast and amateur equipment and without the disadvantages of over-specialization and resultant boredom, write to A. M. Pichilton, Chief Engineer. We would appreciate a resume of your education and experience in your first letter together with a recent photo. All responses will, of course, be held in strict confidence.

E. F. JOHNSON COMPANY
210 2nd Avenue, SW
Waseca, Minn.

(Continued on page 88)
VIKING II TRANSMITTER KIT

The JOHNSON Viking II is an expertly designed transmitter, furnished unassembled, but complete. All amateur bands from 10 to 160 meters, 100 watts phone output, 130 watts CW. Includes all necessary parts, hardware, tubes, wiring harness, cabinet, and step by step instructions.
- TVI Suppressed
- Dual Power Supplies
- Instant Bandswitching
- VFO Input Provision

240-102 Viking II kit with tubes, less crystals, key and mike

AMATEUR NET $279.50

VIKING VFO KIT

The JOHNSON VFO kit is accurately calibrated for all amateur bands from 10 to 160 meters. Stability is excellent, assured by rigid construction and temperature compensated ceramic padders. Vernier tuning, clean keying, and perfect "break-in" on all bands. Assembly is simple. Kit complete, less tubes.

240-122 VIKING VFO KIT

AMATEUR NET $42.75

JOHNSON KEYS

SEMI-AUTOMATIC KEY WITH SWITCH
Compact, light model. Circuit closing switch. Die cast base, 6"x21/2"x3/4". Black wrinkle enamel finish. 1/4" coin silver contacts. Fully adjustable from eight words per minute to highest rate desired.
Cat. No. 114-510 . . . . . . . Net Price $10.50

STANDARD MODEL KEY
Cat. No. 114-310 . . . . . . . Net Price $3.00

PRACTICE SET
An inexpensive practice set for beginners. Constant frequency buzzer and key mounted on a 4"x6" molded brown Bakelite base. May be used singly or in pairs for code practice.
Cat. No. 114-450 . . . . . . . Net Price $3.60

Complete information on JOHNSON semi-automatic, standard and practice keys included in General Products Catalog 973. Write for your copy today!
Hudson Division

Eastern New York — SCM, Stephen J. Nesson, W2LLI, RM: TYC, KBT, PAM: IJD, K2CA. W2CA and K2LW are rebuilding and will be on 1.8 Mc. soon. EWO is having trouble with her rig on 1.8 Mc. K2NC has formed a TVI-BCI committee. K2W will be more active on the nets now that the MARS contest is over. PSH reports that the Ozone on 10 meter is very intense and that the band is not open on 10 meter. New officers for SARA are FTU, PSH, VU4, vice-pres.; VIV, secy.; GTT, treas.; GTC, ACC, and UKL, directors. The following have received Section Net certificates for activity on NYPSEP: TRE, NOC, CFU, MHE, K2CA, and ILL. NYSS: APh, HFE, DWE, WSS, and DGW. New members of AARA include VUG and JWC. My sincere thanks to those who supported me in the recent election for Director of the Hudson Division. Our best wishes for a successful term go to our new Director, and Vice-Director, OBU and KAD. UQW has returned from a three-week Florida vacation and may be heard on 1.4 Mc. with a full signal. UQK is sending his time between 3.8 and 29 Mc. these days. NYS meets on 3815 kc. Mon.-Sat. at 3 p.m., Mon.-Fri. at 10 p.m.; NYSQ on 3598 kc. at 8 p.m. on Tues., and NYSQ on 3898 kc. at 8 p.m. Sun. Please make sure to include a complete break-down of your traffic when issuing in your report. YXE has erected a new antenna for operation on 2.8 Mc. Avoid loss of your endorsement; check your endorsement date now. Many appointments are now available; a note to the SCM will bring full details.


New York City and Long Island — SCM, George V. Cooke, jr., W20BU — Asst. SCM; Harry K. Muc- nalls, STUK, SEC; KTF, RM; VNJ, PAM; YBT. The New York Radio Club meeting featured the Hon. George E. Storlitz, FCC, and was excellently attended by representatives of 22 clubs from the N.Y.C.-L.I. and N.J. sections. The committee for the evening was V01, K2DW, A2MB, ZC, and WB and a really fine talk was enjoyed by all. The club announces GKF, NSH, and FBT are chief operators at their Red Cross station. GTE, and seek more operators to maintain an extended schedule. GDF after many years in flying, fell in a Broadway store and broke his arm. The Nassau Club boasts a membership of 65 and is running a member sweepstakes with special prizes offered to members in various licensed grades. The LL unit of the YLRL has all the paperwork for the Braille Technical Press to take charge of voluntarily and is bending every effort to help this worthy cause. VNJ, RM for the NLI Traffic Net, which meets at 1500 on 3630 kc. Mon. through Fri., announces that BRAT awards, patterned after the West Coast, will be issued to any amateur in this section who complies with the points store reeled in by attendance and traffic counts. A teleype station was set up in a New York City store and free messages were solicited for all everywhere, RYE, VNJ, ECM, BG, AEZ, and others handled the traffic on-going channels. The North Nassau Club now meets in the Rocklyn High School the 2nd and 4th Tues., of each month and invites all amateurs to attend its meetings. YQF for particulars. The Jamaica UHF Club is building up a 420-Mc. net and asks, "Why not a mobile 420-Mc. net?" BIV, Brooklyn EC, reports 7 c.w., BW, Brooklyn EC, reports 20 percent of his AEEC members are emergency members. DUF, Bronx EC, reports drills in the Bronx are held Mondays on 10 and 2 meters, with 12 mobiles active. In Suffolk County, KNA EC, installation of a control station at Riverhead is going ahead, 6 of the 10 townships there are reporting in, and KNN requests more AEEC stations at the farthest end of the county to get on 2, 0, or 10 meters. ADO is extremely active on TCPN and is building up some nice traffic. LGR finally got Class A after 14 years, and asks for QSLs on his arrl bulletin on 80, 10, and 2. The Lake Success Club has a new mast and gear and now is installing 2-meter rigger for c.w. use. W20MC has been appointed OBS. IVU received OBS appointment. KN2BPM is a new Novice in Center Moriches. The QWCA Net meets Sundays at 1100-1200 on 3810 kc. PAA (Continued) worked (flushing) for best DX on 420 Mc. with skel at 2100 on Tuesdays. Let's set more, in for round tables. IVU has new 500-watt rig, antenna, and electronics going to town on traffic scores. OJU piled up 110-210 points in the Sweepstakes Contest Traffic: (Nov.) W2BG 420, VNJ 203, EC 215, ADO 199, LPR 160, HKS 199, JAM 117, GP 117, IVS 89, OBU 81, OMA 50, LGR 47, ZPK 47, DF 22, GCX 31, BGU 10, UYX 9, EY 6, IN 5, IVU 3. (Oct.) W2ADO 274.

Northern New Jersey — SCM, Lloyd H. Man- nom, W2QR — Asst. SCM: D. Reid, 2FMG, SEC: NLD, RRD, WC2P, and NRD, W2A, CAM: CUE, Raritan Valley Amateur Club. QSL notes: GUZ assisted 4 men in the New Brunswick Area to obtain Novice licenses. GCF had a successful Advanced Class test, as did COQ. K2RCC reports joining the club, Net and has received ORS appointment. UGI is busy with nets and traffic activity. TJC reports his brother now is KN2SNK. TFJ, CO, reports 500 Sweepstakes contacts (Continued on page 80).
Specify Bliley... For 22 Years
The Foremost Name In Crystals

* * *

Types AX2 and AX3, designed especially for this service, bring price and precision together in the ham bands. Bliley's packaged oscillator, Model CCO-2A, is a favorite for 2-6-10-11 meter home built rigs. Price and details are given in Bulletin 44.

Types MC7, SR5 and SR8 are suggested for shipboard dependability. Price and details given in Bulletin 44.

Types BC46T, MO35B, TC92 are first choice for automatic temperature control in AM, FM and TV transmitters. Consult Bulletin 43 for basic details.

Types SR10 and MC9 provide wide range frequency choice for TV service, diathermy and citizens band. Request Bulletin 44 for price and description.

Type BH6A is the predominant choice for land mobile and airborne applications. Consult Bulletin 43 for basic information.

Types KV3, MC9, SMC100 and MS433 cover reference frequencies from 100 kc through 10.7 mc. Price and "stock tolerances" given in Bulletin 44.

For reference in this broad category, see the "Specification Index for Military Crystal Units" in Bulletin 43.

Custom built fused quartz delay lines provide high stability and precision time intervals for manipulation of pulsed or pulse modulated signals. Consult Bulletin 45 for technical information.

Model BCS-1A is a high stability instrument for precision reference at 100 kc. Ideal choice for research and development laboratories. Descriptive information given in Bulletin 43.
with 64 sections for a score of 80,000. DXD is active in
TCPN and MARS daily. JKH is going back on c.w. for a
while. Reason? He went to the hospital for a tonsil-removal
job. EAS, ORS, has 400 watt input to a pair of 568s Class B
linear grounded grid on s.s.b., also 70 watts on c.w.
HXP, working 10-meter mobile rig, reports in the AREC
at 140.9 Mc. at 8:30 p.m., Tues. ATE, at Westwood,
reports plenty of c.w. activity with new equipment and
up. New DXCC members: GNQ, EQU, COG, and ATE.
The Ridgewood ARC had one of its best years. N1Y, OQ,
reports 2 violations logged. GYZ, 0Y, had 11. TVL, 0Y,
reports 14 second-harmonic discrepancies. The Garden
State ABA's new officers are DME, pros.; K2BX, vice-
pres.; FZ, treas.; OPH, VHF chairman; GUM, club
engineer; Howard Parker, sergeant at arms, CCS, active
in TCPN. NJ 75 km, and Bergen County ENG, wants daily
phone net on 75 meters. CEF skeds DJ, Hornell, 3665.6
kHz, Mon., Wed., and Fri.; NJN c.w. 1900, 3995 kc.;
and CDNJ, 1930, Tues., 3595.5 kc. HIA, EC, handles traffic
on NJ 75 'phone net' and Middlesex County Net. T8, 18
Mc. ABL works random skeds with K5FBB where his son,
W2ZEP, is stationed. During November and December your
SCM represented the N. J. amateurs at Area C.D. E. meetings
called by the Director of Civil Defense in Trenton, Free-
hold, Toms River, New Brunswick, Bridgeton, Atlantic
City, and Cape May. VOR had as a visitor SPT, formerly
of No. N. J. and now on the air from Rome, N. Y. NJ State
CD C.W. Net has been changed to 7:30 p.m. each Tuesday
night on 3595.9 kc. NCS ROY CVF reports successful opera-
tion on the part of Bergen County ARRC in "Operation
Palisades," conducted by Area C.D. Director. The NJ
amateurs volunteer their services for defense by furnishing
communications for Military Bomb Disposal Teams
which were sent out to various industrial sections of
the State for the purpose of simulating bomb disposal op-
erations. The following Explosive Ordnance Disposal
Squadrons and areas of activity out of Fort Dix were the
44th Squadron covering Camden, Gloucester, Salem,
Cumberland, Atlantic, and Cape May Counties; the 69th EOD
Squad covering Mercer, Monmouth, Ocean, and Burlington
Counties; the 72nd covering Sussex, Passaic, Bergen,
Essex, and Morris Counties; the 143rd covering Hudson,
Union, Somerset, Hunterdon, Middlesex, and Warren
Counties. The authorized RACES frequencies were used exclusively for
these first tests. Trenton Net Control Headquarters for
the State was operated by ZL at Z4. FMG was located at
Camp Dix; Military Base operations. Area Coordinators
directed their traffic nets on 10 and 2 meters in their respec-
tive zones throughout the State. K25I reports a Squad
being done by the amateurs in Fair Lawn in c.w. work.
ZDH reports mobile operation in Dumont c.w. organization.
SMX is on the air work ends from the U. of Mary. EMM
returned from a cruise to Bermuda and points south, GUM
enjoying a stay in Phoenix, Ariz., operates on 20 and 40
meters from there. NIE is back on the air after a summer
aboard his new cruiser. Traffic: (Nov.) W2DXD 354, CSS
239, CUI 232, EAS 140, NEK 117, K2BCK 62, W2HIN 10,
ZDN 7, FMG 6, HIA 9, CFB 5, N1Y 2. (Oct.) W2DXD
208, (Sept. and Oct.) W2CSS 360.

MIDWEST DIVISION

FOWA, SCM, William G. Davis, W2PP — The Sioux
City Club now has its own station with the call ERG.
An auction with a record turnout of 52 was held by the
Club to obtain money to buy a Viking. The Club was very
active in the SS Contest and expects several members to
place right up there in the top bracket. CXN has a new 80-
foot tower. The boys at Sioux City have been having their
75 kilowatt troubles, being 100 miles from the nearest TV station,
but they are resolving these difficulties in fine shape. The
Central High School Radio Club is turning out the WNs
like the "simmon." It is reported. DSP is the instructor. ATA
again is building up his traffic score after being off all the air
because of illness. A new ham in Burlington is WPVY/A.
WVP has his Advanced Class ticket. WNBGQW now is
WGGW. Ex-MVE now is MDJ since returning from the
Navy. GZ attended a well-attended contest in Mississippi.
According to the new TLCN roster there are 45 active
members. YBY makes BPL the hard way, originating 101.
SCA and BDR did it with a higher traffic count than ever.
SCA has made BPL twelve times consecutively and 24 times
since Aug. 1950. PTT now has Advanced Class ticket. The
Indians no longer bother BLR. VTA sits aces for more
stations on 2 meters. BDR visited at BBZ's after the
Director's Omaha meeting. Traffic: W2BDR 718, SCA 603,
KZ 216, YBY 142, CW 718, NYX 33, BBZ 20, BLH 20, BQJ 13,
ATA 11, DD8 8, SEF 8, KANSAS — SCM, Earl N. Johnston, W6HCV — SEC:
K6, E1X: The major activity of most Kansas amateurs this month was "Operations Snow-
bound" Nov. 26th and 27th involving many of our emer-
gency-minded operators who operate only on emergency
bands. Another outstanding activity was the AREL Mid-
west Division Convention in Topinka Dec. 6th and 7th
which, from reports, was the best in many years. W6HCV,
Colby, reports that a new ham, WN6LOW, is on with 20
watts to a 2B29 and has a new Viking II under construction.
(Continued on page 92)
The new Belden Weldohm, 300-ohm Transmission Cable is the greatest advancement in television installation since television began. Reducing TV lead-in conductor breakage to a minimum is easy. The new Belden Weldohm Cable has overcome the breakage point by 162%, that's 1 1/2 times the strength of pure copper wire.

In actual test, Belden Weldohm Cable will withstand 254% more whipping or severe flexing than the average installation of 300-ohm copper lead-in wire.

There is no difference in the electrical characteristics between an all-copper conductor and the Belden Weldohm copper-coated steel wire. The web is 72 mils of 100% virgin polyethylene.
now . . . a
new converter designed to
fully meet all requirements of the exacting
mobile operator. Significant improvements over previous units include . . . even better
sensitivity and stability . . . the addition of the 40 meter band with real bandspread . . . improved bandspread on 20
. . . coverage of the 19 and 49 meter short wave BC bands for casual listening.

- Built-in BC trap .
- Easily accessible RF gain switch on rear.
- Separate isolated antenna inputs for converter and BC set.
- "Zero corrector" oscillator compensator knob now moved to rear of chassis . . .

Have you noticed that the "Super Six" and other Gonset products designed for rugged mobile service are housed in heavy, one-piece drawn aluminum cases? Compare this housing against any other.

$52.50
Amateur net

GONSET CO.
801 South Main St.
Burbank, Calif.

VDF is active with a pair of 6146s on 80 and 40 meters and has a.s.b. caller under construction. CC plans to rebuild his mobile rig, AXZ (the highway patrolman out there) has been transferred to Hayes. WOB holds his skeds with Kansas 75-meter net with 100 watts to a pair of 6146s and WNBML, YL, reports the following new members of the Field Kindley Hf Club: WNBML, MJO, MIF, MIK, MLI, MIL, MNL, and MIM, YLZ is back on the air and bands with a Viking II and HR0-5TA receiver and worked 67 stations and made over 50,000 points in the SS Contest. BFF is working 100 meters with his Viking II into a 500-watt wire. HA5M made 10,000 points in his first SS Contest. LF4F and CWB are on 10 meters. L1J, of Overland Park, is building a 2-meter converter set and will be on the air soon. L1J is planning on 430-Mc. work with KRGK, Tr又好: K88KU 532, W8BLI 143, NY1 116, W8QY 58, PA19 46, FI7J 42, F8T 38, W8OM 24, V8F 30, IC7 27, LIX 22, B8O 13, V8O 9, B8O 3, DZV 1.

MISOURI — SCM, Clarence L. Arandale, W8CBJ — The Central Missouri Radio Club has been organized at Columbia and is training 8 prospective hams. The operators and engineers at WDIA/TV have organized a club and will operate under the call L6, using VHF transmitter at present. We regret to report the loss of VDG, who passed away Nov. 16th. He was well known in this area and had been quite active in the SMP, holding the position of 1st Vice. R8R reports from Korea that he will be home in January. L5M is returning from Germany. R8X has a 522 and is going to try two meters. R8R and his wife operate the station. L6S is now located in St. Louis. Operators at 68WBD are Joe and Charles. ZL8N is running 750 watts to the BC-630. ITX lost his modulation transformer. FXJ has received his Adv. L1G the 2-meter Area reports much activity on 10 meters, among new as well as old hams. CFI makes BPl even though time out was taken for a vacation trip to Texas. FXJ makes his rounds again, QSO lost some operating time because of a broken-down of his rig, but still is making BPl. New SCM members are EPO, KUI, and K8AI. New Novices: WNBKE and W8NLQ. Thanks for the reports that were sent early so that your SCM could attend the Convention at Tomska. Traffic: (Nov.) W8CPJ 698, Q8X 644, JXJ 646, CX6 221, BYL 177, GB9 140, ZL8N 134, K8FY 120, W8KBD 94, W8CD 84, LQY 41, MS7 30, JR8 28, CT8 26, ET8 22, RMX 20, CLO 18, OUD 13, L1O 10, G8Z 9, B8U 8, QA8F 8, B8Y 7, 6S7 7, P8X 7, P8F 6, NNH 4, C1A 2, (Oct.) W8MPW 4, W8MPW 4.

NEBRASKA — SCM, Floyd R. Campbell, W8CBX — Welcome to WN5MO of Lincoln. RYG finally is back on the air after a lot of time spent changing the YL to an XT, VYX and his new 99.90 percent VHF-proof rig is one of the best in the State. V8C, ASE, and OHF are on the air on 20 meters, and OHF has 45 kw. Some new names and old ones alike are invited to do something about that rusty e.c. LARC (Lincoln Amateur Radio Club) has been activated and is now beginning with the no-nonsense plan, using the rotating chairman concept at present. FQB, K8D, and TGQ renewed their ORS appointments. ATU is new for the North Platte Area. K6P has an appointment. EUT renewed appointment as PAML VYX is the NCS for Nebraska. "Phone Net for 1953 kw. LJO has been appointed RM for the east net. New-color L8K (North Platte) has new vertical rhombic and is using EIMAC. ASI has a new rig and a swell signal. AIK is still on air. Z8J has a new band and a new call. V6T has a new rig and a new call. AIK is still on air. Z8J has a new band and a new call. V6T has a new rig and a new call. AIK is still on air. Z8J has a new band and a new call.
BUD Condensers

Wont Guarantee TOPS in Mobile Operation!

We don't claim that putting BUD Condensers or other BUD products in an inefficient rig will magically improve your results. We do know BUD products will aid in building efficiency. Now that Spring is approaching you will have more opportunity to enjoy mobile work. You can expect improved performance if you install BUD component parts in your rig.

THREE-GANG TINY MITE CONDENSERS

Hams, Radio Constructors and Experimenters can find many uses for these compact, three-gang condensers. Designed particularly for high frequency use, they are adaptable for use in converters, preselectors and receivers covering the Amateur, Television and F.M. bands. Well constructed with soldered brass plates and ceramic brackets. Rotor shaft extended 1/2" at rear. Height 1 5/8". Width 1 3/4". Length behind panel 3 5/8". Mounting holes 3 5/8" apart.

<table>
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TINY MITE TUNING CONDENSER SINGLE SECTION

This series of condensers has been designed for applications where space or weight are limiting factors and for tuning of ultra-high frequency circuits. Rigid construction, close fitting bearing, positive rotor contact and Steatite insulation are the outstanding features. Cadmium plated, soldered, brass plates and rods insure high frequency efficiency.

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* Denotes double bearing.

MINIBOXES

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There are thousands of uses for this box, for its design permits installation of more components than in the conventionally designed box of the same size. Made of heavy gauge aluminum of two piece construction. Plunge type construction assures adequate shielding. Available in etched aluminum finish and grey hammerloid finish.

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Switch type Compentrol shown above.
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In Canada, 635 Queen Street East, Toronto, Ontario

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FOR THE MAN WHO TAKES PRIDE IN HIS WORK

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at his QTH for his e.d. group. Among those present were BDU, CMW, PBX, MQB, DNI, QUX, UOG, SBG, HFJ, LVA, WJE, and DJ, and their C.D. Director, Harold Katz. HRJ has portable rig. DNI demonstrated some real microun

ture equipment. LVA gave a talk on rectifiers for meter
work. The Hingham Radio Club is going to WB2V-TV for a meeting. WE has a Viking 1 on the air. WMN has an AM
183. Sorry to have to announce the death of SXX of Lynn.

Traffic: (Wroc.) W1PVO 316, MX 205, UE 146, TV 81,
J8G 56, WU 5I, AVY 38, UTH 25, TV 15, QON 13, LM 12, RRP 8, HGW 4, HWE 4, TOS 3, UPY 3, ALP 1, WLY 1. (Oct.) W1FFH 21, (Sept.) W1FFH 16.

WESTERN MASSACHUSETTS — SCEN. Roger E. Currier.

WILX — SEC: KUE, RM, BPM, AWI, BIS, WMN meets on 3560 kc. at 10 A.M. Mon., through Fri.

WUMS (slow speed net) at 8 P.M. Mon., Wed., and Fri.

New officers of Quinque Valley Club are PQZ, BAN, new members: WNNY, WSV, ORP, WZ, E8, and one

Southbridge AREC has 7 mobiles and main station on

26 for emergency work. WNNY is new to the section. Welcome! UJK, SAS, GLL, SUL, UJF, and RIQ hold new Advanced Class tickets. Wecsett has 5

YL operators. Let's hear from some of your guys through

the QSL. Perhaps a section YL net is in order. The

Central Mass. Club has a class of 35 ready to take exams.

BVR again leads the section in traffic. EOB, PIU, VBG, BVR,

TVJ, YK, MNG, DVS, MVF, TCM, RXX, JYH, CJK,

NY, SAS, and TSY took part in the SS, EOB and JYH each

missed only one section. CJK, a leading 'phone judge, made

a good score on c.w.1 MUN has now frequency measuring

equipment. TVJ has 22 states on 60-meter c.w. and has

had 10% per cent attendance on WNNY since Sept. 1st. EOB has a new six-element on 144 Mc. KK, DFR, SXX, and QWJ

have joined the ranks of s.a.b. enthusiasts. RRW has a

new Viking and is pleased with the lack of TVJ.

RRW is new active on 7 Mc. as is OAZ on 150 Mc. ACW, BNO,

E1H, GJ0, GUN, JTL, IPZ, PRS, OYU, UDK, YBS, YBT,

and ODB are active members of the 6-meter Ham Civil

Defense Net which meets Wed. at 6:30 P.M. EOB has

built a 25ke. QV, strip which gives him real selectivity and

which helped him roll up the highest SS score in the

state. KFV has a new HRO and a new, quiet location. MVF,

home from the Navy, renewed his OBS appointment.

Traffic: W1DFR 5I, H1V 49, DVTW 44, TVJ 38, EOB 4, JYH 3, SPJ 3, HBC 2, MVF 2.

NEW HAMPSHIRE — SCEN. Carroll A. Currier, W1G,

W1HJ — RM: CRW, Dartmouth College Radio Club is

doing a great job on 20 meters with kw. rig. Ten hams are

attending college there. The Port City Radio Club has

erected the following officers: PTE, RXX, vice-president;

Norman S. Freedman, treasurer; UEB, secretary. The Club has the

call WQ1. Two new WNH certificates are held by UX6S

and RXX. CJK now is mobile on 25 meters. WBM has a

fine 50ft. tower up for new sky wires and 10-meter beam.

W1HJ has a new GTE. 1P now is Advanced Class. BXX has

TVVed his Viking 1. The Test Exercise went off in fine

style Nov. 14th and APK with LJD, along with those who

participated, should be congratulated. UNV has now some

good time in working conditions. Many of the New

Hampshire will miss the voice of BDJ, who recently joined

the Silent Key. It is gratifying to note the improvement

in the traffic reports that are coming in. One thing that

would be a great help also is to have some news items

sent in to help make this report interesting enough to you.

C1G has a Viking II. Traffic: W1WHC 785, W1CRW 28,

QX 24, GMH 23, HZ 11, C1K 1. (Oct.) W1CRW 323,

SA5 157. (Sept.) W1GIS 58.

RHODE ISLAND — SCEN. Merrill D. Randall, W1JBB

— SEC: MJ, RM: BTV, PAM: BFB, BBN. Bristol is very active with OAM, SJL, DDD, T.opens, UDI, and UDA

looking for contacts on all bands. A lecture on antennas was

given by CBR, ably assisted by Admiral, to members of

the BCRC and was enthusiastically received. On a recent trip
to New York, CBBXX passed his examination for that

call and will be on 10-meter mobile in this section for some

time. If you are interested in a section 75-meter net, get

in touch with OIK or TRX and we’ll start one. A very

painless and educational evening was spent with N2R

(RJ, RO) and MJ (SEC). Rhode Island’s e.d. plans mainly

are clicking but we still can use the help of your fellows in

the various communities. A look at the files indicates that

many certificates are in need of endorsement. Send ‘em in
to me at your club — I’ll be there sooner or later. If

any of your fellows are rebuilding, remodeling, rechanneli-

ing, or in any way changing your rigs, let me know so I can

pass the word along. Club news also is needed. Traffic: W1BNB 54, QX1 51, OIK 22, BTV 21,

TOD 18, TFX 5.

VERMONT — SCEN. Raymond N. Flood, W1FPS —

SEC: JEN, PAN: AXN, RM: OAK. ASST: RM: TAN.

Thanks for all the activity reports sent in. UOM was in

UGW works DX on 40 meters when home work ends. 

AD, TXY, and UIN are active on 6 meters in Bellows Falls. 

WHLYWL is a new ham in that town. W1N1WL is now

ham in Bradford. He is the father of UWV and grandpappy of 

UFW. Junior operators are arriving by the wagon load. 

According to NLO the following have passed around

(Continued on page 98)
Here's How CRITICAL QUALITY CONTROL Assures You

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Midland Quality Control is Midland's own system of making sure you get a crystal that takes the beating of extreme heat without excessive drift. Quality control starts with exacting selection of quartz and extends through every step of processing.

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The American Radio Relay League, Inc.
West Hartford 7, Conn.
mobile with success. JPH now is located in Seattle. MTX is building an all-band TVI-proof rig. OIC, MTX, and HMQ are building 6AG7 YFO. OEB joined MARs and cleaned up TVI with its ORK, from FOY. FXD was stopped twice from its call. VARC held a card party and a Christmas party, due to the efforts of the auxiliary. LQT, JNH, and LVB are still in 144 Me. PFX reports the formation of the WA 9010 Amateur Radio Club with 30 active members in the Seattle area. The club station call is KB. Meetings are held at the 1st and 3rd Thursday at the Western Electric building, Belltown. Traffic: WBA 13A, 10Q 760, C2X 270, FLX 217, FTV 117, DPO 53, PET 35, ETO 17, FWT 17, MYL 12, NBF 11, ABB 4, IG 4, HMA 4, ZU 4, APS 2.

PACIFIC DIVISION

NEVADA — SCM, Ray T. Warner, W7TU — SEC: HCI, KCC; KOA, LOB, WX, NUV, OXC, SBU, SKX, TOT, OEB; JIO, Nevada State Fairgrounds: 3600, 7225, and 2390 kc. Nevada's 1965 "ham" license plates have a green background with orange-colored lettering. Boulder City's newest Novice is WN7B9R. KEV, 38X, CX, JU, and BKS were active on cw. and JIO was active on phone during the last; SS was active on the last. NWU recently was appointed EG for Nye and Esmeralda Counties. ZT is active on 75 meters and MARs whenever his tractors don't keep him away from home. He is working on his TV channel 13. In operation in Las Vegas some time in April. News is scarce this month. Why not drop a card to your SCM news service on Front-Rankers, a group of hams who want Nevada for AWS has clicked 100 percent. Contact JU for skeds.

SANTA CLARA VALLEY — SCM, Roy I. Courin, W6ZL — The NPEC recently elected the following: NVQ, pres.; MINQ, vice-pres.; FCR, secy.; NFM, treas.; MIV, secy.; GYF, liaison. The QSTX selected JEO, pres.; GBE, vice-pres.; QBO, secy.; APY, treas. New board members are LKY, JZU, and YXQ. Board members carried over are NYX and NKP. JEO, QSO, and the regular drills are in progress in San Mateo and Santa Clara Counties. A sectional meeting is being planned for January at the request of the SCM. JEO reports using vertical antennas without success. K6RJ is planning to put up a vertical. YSOQ now is active on 14-MHz. Phone FHC is now on with a Viking II. KFX, with its very powerful transmitter, visited Las Vegas and Death Valley during a recent vacation. WNEW6W and his XTLL, all are operating now from a house with a 144-Mc. vertical. K6FQ is finishing up 829-B final for 144-Mc. net. WWM reports he worked 14- and 28-Mc. DXers and found the latter不少 on the air. SSB is being worked by W6CH, who is getting lots of attention. W7S is keeping on the LSQ net in spite of working long hours; he also is planning on more power in the near future. QEB now is using 80-Mc. transmitter for bulletins and in SS Contests, and single sideband the rest of the time when not using UHF mobile. N6M reports on 432-Final. The Stanford Radio Club was host to the PAARA at a joint meeting recently and Dr. Allen Peterson, FOH, gave an informative talk. Contact: W6YM, 118, OTP 39, MMQ 12, WMM 4.

EAST BAY — SCM, Ray H. Cornell, WD6Z — AREC and c.w. work are making heavy impacts. The Nov. 23rd c.w. drill pointed out many weaknesses in the present radio communications system which will be worked out as soon as possible. A group is interested in working the hams. A meeting of sectional officers was held at the Oakland Radio Club Nov. 23rd, to attempt to integrate the Sections AREC into a good, strong group. The following were in attendance: N6C, B, and D-meter equipment has been working wonders under the direction of EKF, TUN, UXX, and others. These boys are shaping up an FB organization. PXL notes that more 6-meter activity resulted from the Nov. 23rd. The hams have been around these parts in years. The East Bay Radio Club has decided to meet the 2nd Fri. of each month. Hams in the Berkeley-EF Berkeley-Albany Area especially interested in attending. New officers of the Club are YSV, pres.; DNX, v.p.; VNQ, secy.; RLB, treas. DNX has just completed a Viking II. The big blow brought in by Santa Clara brought PAZ a new Viking II. FXX has been loading up a Bay antenna with his 32-V and reports FBR results TVI-wise and QSO wise. RXS was another ham who suffered antenna casualties from the big blow. MSS and EFD recently received their Advanced Class licenses. The Piedmont Amateur Radio Club meets in the Red Cross Building, the 1st and 3rd Fri. of each month. WTT is getting ready to go on 2 meters. AJL is experimenting with a new design in beam antennas. YPO is building a single band selector for c.w. QSS, MXZ, QSV, and RLB were engaged in an impromptu 2-meter ham transmitter at midnight. The Berkeley amateurs have started and stopped QES twice. YDF is helping to organize the Boy Scouts Jamboree to be held in Southern California early July. BJS is spending a lot of time at the Russian River. SARO visitors participated in the Radiant Lab meeting for the November meeting as the guests of UTM. If your favorite subject is not covered here, why not send some news? It isn't
23,698

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Paterson, N.J.

says about

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Here’s another record of the long life and operating stability of Federal Tubes!

Still on the job after 23,698 broadcast-hours! That’s the record Federal’s F-5680 has scored to date for WPAT, popular 5,000-watt station of the North Jersey Broadcasting Company, Inc.

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TERRIFIC TRANSMITTING
TUBE BUYS!

For our Special Bulletin, listing Red Hat Limited Quantities and our new and used on post
this card, and send it TODAY to Dept. 4-2.

Get on our SPECIAL BARGAIN BULLETIN MAILING LIST!

Concord Radio
55 Vesey Street,
New York 7, N. Y.

(Continued on page 104)

easy to get it any other way, so how about it? The ARRL is back on the air a year after with no TVL. Traffic: K6FAL 570, W6PW 239, JOH 68, WHC 95.

SACRAMENTO - CCM, R. F. Cacelcowitz, W6ATO

-Sacramento, Cal. Cacelcowitz, W6ATO, announced

their attendance at the new Club. Congratulations to the new officers of the Humboldt C. R. Club. The executive committee of the new Club is: President, W6BO, V.T.L.; vice-pres., W6BO, V.T.L.; cir., W6BO, V.T.L.; and TWT. The new Club is located at 19-20 W. 12th St., Sacramento, Cal. Cacelcowitz, W6ATO, and his wife, are expecting a baby, a son, T.W.T. L. LE for B.C.L. KTV for c. d. with SLX and CWR working together on publicity. Z6K is building a c. d. all-weather transmitter, and E6K is building an all-weather transmitter while building a new r.f. and has received his new R.F. between the second and third rooms, rear of Municipal Auditorium, entrance on "E" St., Eureka, San Francisco. B.V.: B.O. The San Francisco Naval Shipyard Amateur Radio Club handled the communications for the Northern California Outboard Motor Association regatta on Lake Merritt. Two meters was used exclusively and very successfully. Among three openings were CHF/MMP (in a rowboat) and mobiles BSY, GQK, LOZ, NGS, W66s FAA, S6U, and S6M and from the North Peninsula. Zeppos listened from the Thurs., and Friday, from the Castagnola Club, provided and operated for the Mare Island Navy Yard one set of speakers and a p.a. system. Two of the other p.a. systems were provided by the U.S. Naval Shipyard. The p.a. systems were located at the foot of the boat house, and the far end of the lake, where the viewing party gathered. The new rule for OTY is that the Bay area net frequency is 145.35 Mc. 147.15 Mc. is used as an alternate station. Excellent coverage was maintained in the c. d. emergency test of Nov. 23rd. The weather was city-wide. WB had an excellent talk at the SFRC on the new Collins mechanical f.s. system. The High-frequency Amateur Mobile Society is meeting Monday nights.

604-

The SFRC meets the fourth Fri. at 51 Lakeshore Plaza, opposite 34th Ave. and St. Chop. The Hawaiian meets the second Wed. at 1038 Van Ness Ave. The NVYAR meets the first Fri. but, being on a Naval Reservation, only club members are permitted in the Navy Yard. The Shipyard Club is featuring a school for radio theory and one on oxide filters. The meeting place and night of the new Cathay Radio Club is as yet unknown. Marjory Clearfield: EC: KNZ, Tanacamp Clearfield: EC: STB, RZK, the Tanacamp Club of Mines, which has been appointed Phone Activities Manager and all phone stations are asked to cooperate with Bill, who comes to us from the East Bay section, where he also had the JAM Job. The Marin Radio Club meets the second Fri. at the American Legion Hall, Larkspur. The Tapestry Radio Club meets at 7 Loma Ave., Tiburon, on the second Fri. Santa Rosa Area: EC: LOU. The Sonoma County Radio Amateur Club, which was in the Wad. in St. Board of visitors room (temporarily), County Court House, Santa Rosa. Traffic: W6ATO 6.

SACRAMENTO V. W. - Acting SCM, Willie van de Kamp, W6RA, is going 10-meter mobile. REP is now located in Sacramento. GTG won't visit in W. Land. JTY moved to Redding. Carborundum moved to Redding. FKJ has all-band mobile. OME has opened a radio shop in Mt. Shasta. IOM has a special radio room in the new house. New officers of the 10-Meter Club are: HOB, sec-ter., AIE joined the AREC. CTRR has turned to 2 meters. MUN is back in Roseville, CMY is in the Navy. The obtained Extra Class license. DLA lives in the NVYAR. PJV is back from Alaska. JTV has a 2-kw. generator for emergency use. KTP is busy with c.d. Traffic: W6JDN 30, GTG 5.

ROANOKE DIVISION

NORTH CAROLINA - SCM, J. C. Gausden, W4DLX -

No news like the North Carolina boys have given the W4C a workout lately. We'd like to have a list of
line. New tickets are held by the following: Advanced Class
EDJ, Fiquay Springs; NTS, Raleigh; SAK, Charlotte; S36, Statesville; GAC, Charlotte; VEG, Albany; VCR, Charlotte; VGH, Charlotte, Technical Class - WND, Sanford; WMZ, Spring Lake. The Atlantic Net, meeting Tues. and Thurs., at 7:30 p.m. on 3060 kc. New officers of the Mecklenburg Amateur Radio Society of Charlotte are UEG, pres.; VAC, vice-pres.; QOC, sec.; and Kinkowski. We hear about all affiliated clubs not calling the SCM and ARRL of the name and address of your new secretary so we can be in your files up to date. QOC, Rose Beach, and others from Wilmington, MDA, MVP, VNLK, WNS, NTQ, and YHY, took a jeep and barge trip to Bald Head Island off the Coast. They took along some 3- and 6-meter gear and did much better with Panama and Argentina than back to Wilmington. QGS also is on 2 meters now so
THE NEW ELMAC PMR 6-A RECEIVER

Designed by Amateurs... for Amateurs!

PORTABLE MOBILE RECEIVER - 6 BANDS A (AMATEUR COVERAGE)

Here is a complete 10 tube, dual-conversion, communications receiver that packs more performance and value into a six-inch wide cabinet than anything you've ever seen! Designed and manufactured by the makers of the famous ELMAC, all-band mobile transmitters, the PMR-6A is a six band (INCLUDING BROADCAST) receiver designed for either mobile or fixed station use. You new car buyers will want to include this receiver in the deal. It will be your car radio supreme... from now on! Compare these specifications and then order your ELMAC PMR-6A from your nearest dealer.

- 6 Bands
  (1) 600 kc to 2000 kc
    (Broadcast and 160 meter band)
  (2) 3.5 to 4.0 Mc. (19 and 80 meter band)
  (3) 4.9 to 7.4 Mc. (40 meters)
  (4) 13.95 to 14.45 Mc. (20 meters)
  (5) 20.55 to 21.55 Mc. (15 meters)
  (6) 28 to 29.7 Mc. (10 meters)
- Dual-Conversion eliminates images.
  1600 kc first I.F., 455 kc second I.F.
- Ten tuned circuits provide high selectivity.
- Built-in highly effective noise limiter.
- Built-in Beat Frequency Oscillator.
- Full 3½ watts audio output with less than 1 micro-
  volt signal.
- Tuned R.F. ahead of converter on all bands.
- Voltage regulated to local oscillator, BFO, and second converter.
- Temperature compensated separate oscillator tube
  for high stability.
- Black background dial gives full vision but does not
  blind the mobile operator at night.

- AVC "on-off" switch located on front panel.
- Antenna input designed to match 50 ohm coax.
- Power requirements: 6 volts A.C. or D.C. at 3.3
  amperes. 125 volts D.C. at 90 milliamperes.
- Power supplies available for 6 and 12 V.D.C. or
  110 V.A.C.
- Cabinet finished in gray hammered-cast 4½" H.
  x 6" W. x 8½" Deep.
- Weight: 6½ pounds.
- Uses 10 tubes:
  1 - 6B16 R.F. Amplifier
  1 - 6B6G First Converter
  1 - 6C4 Local Oscillator
  1 - 6B5C Second Converter
  1 - 6B16 First and Second I.F. Amplifier
  1 - 6AL5 Detector and Noise Limiter.
  1 - 12AT7 First Audio and B.F.O.
  1 - 6BKS Audio Output
  1 - 0B2 Voltage Regulator
- Price: $134.50

MULTI-PRODUCTS CO., 559 East Ten Mile Road, Hazel Park, Michigan
how about some of you boys Down East giving him some competition? If you do, don’t forget to report it to the SCM. Traffic: W4QVL 150, ARK 115, PIC 51, PE 20, KQD 20, PEY 17, AJT 14, REE 14, DLX 10, HUW 9, SGD 8, CAT 7, LWU 5, NYE 9.

SOUTH CAROLINA — SCM, T. Hunter Wood, W4ANK — OHN is on all bands from North Charleston. WN41BJ is a new ham in Gaffney and is operating on 2 meters. C6Z is on 2 and 4 meters and has a 2-meter power. WN4YLT is a new ham in Mullins. GIT, MFR, E4Q, UPZ, and P19 are active on 75 meters. E4Q and 4TZ have new DXCC National awards. W4BML is planning affiliation with the ARRL. W4CDW is being planned for early spring. UQO has his General Class license. W4WKL and W4YKI is a father-son team at Fort Jackson. W4ISW has a new Viking. W4ISW is working the 10-watt low power and has ordered 160-meter crystal on Atlantic Net frequency, 1855 kc. The S.C. net, net operation now is on 8025 kc. throughFri, with UNO as Net Manager and QGC, ANK, and UNO as NCS. You are urged to QNI and provide outlet for your community and get in e.w. practice. The Pickens Radio Club has become affiliated with the ARRL. Traffic: W4ANK 127, PMQ.

VIRGINIA — SCM, H. Edgar Lindauer, W4FF — Virginia is very proud of its part in furthering the candidacy of MWII, of Lynchburg, who was the first to set for a 1 year term as Roanoke Division Director. Andy is very active in all phases of our hobby, including both e.w. and phone. His participation in all types of operating makes him well qualified to represent us. Andy is assured of this section’s full support and cooperation. WFN was alerted for the recent emergency caused by a heavy snowstorm that cutoff power and communications lines, isolating many communities in Washington, Lee, and Scott Counties. COK, CPY, ITY, JFC, RKG, and M2H were on the air in a few hours and furnished the only means of communications for their respective areas. The facilities thus established were utilized by the telephone company, Western Union, L&N RR, power company highway dept., state police, and county police. The power company went out of way to assist our emergency power for KRA, who was able to keep going at times when the local police were without power. Forty-four WFN stations assisted in handling traffic. Out-of-state stations were very much in the picture included LECX, 2SZ, 2MQB/1, TRV, 86TF, and 9NDA. SDK leaves us at the request of Uncle Sam and his duties have been taken over by UHJ, who has advanced in less than a year from Novice to RA assignment and is one of Virginia’s most active traffic men. TVX continues to do a fine job from Florida. QTH #1 is up to his usual capacity of BPI. DVE net certificates were issued to JAU, J2G, LJK, PAF, Q6L, TBA, and 3HDY. The Rotarian QSL, ASQ, and DXLW which were afavorite source for that type of traffic, OWV says there was an error in that XLT statement — it’s YL. The Rappahannock Valley Radio Club’s application for ARRL affiliation has been granted. KMB is secretary-treasurer. Recent appointments are HQN and UHJ as RNQ; ODG and RDO as EC; JAC and NV as PM; JAC, OVG, and YHD as GPS; HQN, NV, and SR as OQ; E3BZ, FOR, JJK, JUK, MHC, MIR, OWE, OVG, SB, SPE, T7Y, TVX, UHJ, UVE, WRC, and DVE as OBS. Traffic: W4SIU 328, REO 400, FV 146, 1JK 145, KFCC 105, W4KRX 104, CFV 86, SF 82, NV 81, FV 85, UWE 55, UGG 58, SPE 50, KFC 49, JAC 48, QF 35, HJH 28, KX 25, RWA 10, W4SNH 19, ITY 15, TVX 12, HQN 9, JUJ 7, LK 3, (OEL) W4PFX 17.

WEST VIRGINIA — SCM, John T. Steele, W5MCR — A copy of the Princeton Amateur Radio Assn. Bulletin contains some interesting news. DBC is busy working 10-meter cross-band; TVX has had some nice QSOs with South Africa really going off DX. GGC still is on 80-meter e.w. QCX sold most of his gear and bought a Viking. YMM still is busy building. YPB, our SSEC, was really busy in the recent emergency, HNC now has a new NC-183D. KBU has a new Viking II. GEF is checking into both phone and e.w., notes and handling lots of traffic. Is your radio on your belt? A five-member committee has been appointed in Charleston to draw up plans for RACES. It consists of CIX, E7T, DLX, SFJ, and CCF. CCF, as chairman, has been sent to Maryland to attend c.d. school. FUS now is active on MARS frequencies. A new ham in Ritchie County is W5NSLL. AUJ again made BPI in November. Traffic: W5AQU 322, FUS 57, DFC 11.

ROCKY MOUNTAIN DIVISION

UTAH — SCM, Floyd L. Hinshaw, W7UTM — The past month has seen skip round its ugly head — this occasion on CARS Monday night sessions. A California k.w. would have had no chance of getting through SP and TVX have done a swell job for Utah Section Net and deserve a great deal of credit for keeping interest up and tempers down. QAC, of Provo, is a new full member in the Amateur Radio Emergency Corps. The Novice net meets at 4 a.m. Thurs. and Thurs., with W7NTP as NCS. All novice operators are invited to join for some fine practice in (Continued on page 106)
ALLIED has it!

the new RME* MC-55 MOBILE CONVERTER
for 10-11, 15, 20, 40 and 75 meters

Here’s the new mobile converter with FIVE BAND coverage. With the possible opening of 15 and 40 meters for phone operation, the MC-55 is ready to do a fine job on these bands as well as on 10-11, 20 and 75 meters.

MC-55 FEATURES: High Sensitivity—1.25 mv. on all bands; 3-gang tuning with individual slug-tuned coils for each band; built-in noise limiter all ready to plug into car radio, with handy “in-out” switch; separate input connections, with input connector for regular car antenna switched from front control knob; ratio of 25-to-1 worm gear drive assembly for smooth, solid tuning; all-miniature low-drain tubes; 4 tuned circuits in 1F output stage; large edge-lighted dial with clear band calibrations.

The MC-55 is small, compact and rugged (only 5½ x 4 ⅛ x 5 ¼”). It’s easy to mount in any handy location, and the attractive cabinet blends nicely in any car. Complete with all tubes, connecting cables, underdash mounting bracket, and instructions. Shpg. wt., 6 lbs.

No. 98-032, RME MC-55 Converter. Amateur Net.................. $69.50

RME* MC-53 CONVERTER
Covers 2, 6 and 10-11 meters. Separate coaxial antenna connectors are provided for each range so that individual antennas may be used for top performance. Built-in noise limiter. Requires 200-250 volts DC at 30 ma., and 6.3 volts at .82 amps. In attractive grey case, 5¾” x 4⅝” x 5¼”. Supplied complete with tubes. Shpg. wt., 6 lbs.

No. 98-031. RME MC-53. Amateur Net... $66.60

FREE 236-Page Catalog
Refer to your 1953 ALLIED Catalog for all of your electronic needs, including complete stocks of station equipment and supplies. Save time, effort and money at dependable ALLIED RADIO... If you haven’t a copy of our latest 1953 catalog, write for it today.

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"TOTE-LITE" PORTABLE LAMPS
An amazing lamp with fluorescent lighting and power
boosting control. Less batteries...........$4

PHONE HANDSET SPIRAL CORD, NEW
Normal length 23 inches, extends to 6 feet. 3-core rubber
covered, complete with connecting lugs...........$1.45

MARINE SIGNAL LAMPS
Complete with 3 lamps, 4 color filters, power-line, fixtures
and case. Less batteries..................$8.75

ARC-4 VHF TRANSCEIVERS
OK for 2-meter or civil defense, with instructions for
AC operation.........................ONLY $19.95

TU-10 TUNING UNIT
Full of coils, choices, etc. Complete..............$3.50

40-METER TRANSFORMERS, UR-10A
R,F, porcelain coil, mounting-strap, 5 banana plugs. Complete
with chart..............................$1

HS-30 HEADSET
Lightweight hearing-aid type. Complete with cable........$2.25

COAX CABLE
Okonite, RG-29/U, 52 Ohms. In 25 ft. lengths...........$1

NEW N. ELECT. 1-F-1 TELEPHONE HANDSET
Complete with connecting cord..................$2.25

ANTENNA MAST SECTIONS
Set of seven MS49-MS55 in bags (SG-56) per set........$6.50

ANTENNA MAST INSULATORS
Heavy-duty type.........................$7.30

ARC-5/2-R8 RECEIVERS
100-160 MHz, 4-channel crystal modem switching. Less tubes
and dynamotor..........................ONLY $29.50

W.E. NO. 703A 3-PIN CRYSTAL UNITS
Contains 2 crystals, 142.3XX to 145 XX. M/C.
$2.75 each. Five for $10.

SLIDE RESISTORS, ADJUSTABLE
150 Ohms, 50 watts, heavy-duty type................$1.30

DE LUXE RADIO CABINET
Famous make. Cabinet only and cabinet. 9” H x 16½” L x
109° W.......................................$3.25

STEPDOWN ISOLATION TRANSFORMERS
Input 220-240-V, output 110-120-V.
100-VA..................$5.00
500-VA..................$5.00
1000-VA..................$11.75

GIANT 35-FT. PLYMOUTH ANTENNA TOWER MAST
Type AM-223. Complete..........................$49.50

7-HENRY FILTER CHOKE
For receiver and lower-power transmitter supplies..................$1.00

VOLTMETER A.C.
0 to 150, Diameter 2½” and....................$3.00

VOLTMETER D.C.
0 to 500, Diameter 2½”.........................$3.20

MILLIAMMETER D.C.
0 to 500, Diameter 3½”.........................$2.95

NEW SOHAR SR-9 Mobile Receiver.............$72.45
SOHAR MB-26 Transmitter.....................$72.45
SOHAR SAT-120 100-watt Xmitter.............$198.50

ILLUSTRATED SPECIFICATIONS WITH PLEASURE
Prices F.O.B. Newark, N. J.

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Always Right With Earl White
RADCOM Engineering Co.
8 LIVINGSTON ST NEWARK 3, N. J.

preparing for their General Class exams. Amateurs in this
section eligible for Emergency Coordinator appointment
(Leasee membership) are urged to send a completed form
and a short note for such appointment to the SCM. Registra-
on in ARC is not dependent on Lease membership but
such membership is desirable. Traffic: WUTX 128.

SOUTHEASTERN DIVISION

LABAMA – SCM, Dr. Arthur W. Woods, W4GWJ –
ARNW regularly answers AHB, AEP, and AENP.
PPK is looking for a 4192 to help with
KX2. KX2 answers phone and c.w. nets in Alabama and also
K66. AENB handied 120 messages last month, with an
average attendance of 5.2 stations. AEP, AENP, and
AENB, VN, and DON, AENP needs a Huntsville station.
AEP meets at 1720 nightly on 3995 kc, and AENB meets at
1900 nightly on 309 kc, and ADNB meets on Wednesdays
and Thursdays at 1900. Traffic: W4KX1 135, UHA 118,
KX2 24, PPK 18, G4W 4.

EASTERN FLORIDA – SCM, John W. Hollister, jr.,
W4FWZ – Heartly congratulations to P7U on being the
first recipient of the Hawkins-Knight-Gordon Post 4855
of Clewiston, Good Citizenship Medal. Many of you
will recall reading in this column of the many fine operating
acts performed by P7U for the benefit of the activities.
Clewiston: FZT just returned from the traffic ga where it has
been more rest periods. Jacksonville: NRC is moving to
Birmingham. FRP is using a Viking. FJC’s new rig uses a 4-126
drum by a Miniature. RGQ is the jungly one with a Viking since he has his, Advanced Class license.
GZQ and other officers did a nice job running the AR By
this past year. Pt. Lauderdale: All known members in the county,
except one, are ACREB members. Does IN top all other
ECs on that score? (And thanks for the Honorary mem-
bership in HENI). Miami: TFY is The Territorial. The was plenty
activity in Miami. The big four were SAT, LVV, LQ 5, and
AEK. Others active were OVE, TFP, SPK, WGB, \(\text{F}^{5}\) and UXJ, plus TRA and TXJ. The first two
were running on 60 feet with a bow and arrow! IEH is busy on his
new double-sideland reduced carrier rig. (Who else around
the state?). Traffic: W4MW 299, WAN 126, LMT IT, 71 HWA 57,
KJ 31, TKD 29, RWM 23, NAK 10, FQX 9, TRG 14, LMT 7, AYK 3, LMT 3.

WESTERN FLORIDA – SCM, Edward J. Collins,
WAMS/RE – SEC; PCW; EC; FLE. WNAF/HF is the
newest ham in the section and made his WAB on the
first six months of operation. 3CDK/M visited UTB.
3NKD/4 keeps 10 meters hot, MUX keeps 7 Mc. hot.
UTQ has a radio club going in the high school where
he teaches. RZV and SZH are exclusively 75 meters, PCW
is rebuilding. FQH has the Viking II going PB on all bands.
SFX, Erida AF6V 9 station, is going PB. SFV has Extra
Class ticket. JM, NJG, VAG, and UCY are on 10 meters.
NN is s.d. communications officer. KWM keeps 20 meters
hot with a key as does MFZ. PCW is still building. KJ2H is
110-v. supply for mobile rig, SMH is working on audio.
SQO keeps things humming at his shack. SMF meets the Alabama News, and its FBC; County; QSO, and
GFQ, CJC, RF, and CW. KLXK has his Advanced Class license. UVR worked
on audio without an antenna (hmm). UOQ now is mobile.
UT1V is converting equipment to computer. UFU is
a project. UTB/4 is meeting the Hair Net from Mary
Eather. JPD has been active on 10 meters. ART keeps 2 meters
going. WNYTP is now a captain in the USN. USB is
meeting MARS skeda.

GEORGIA – SCM, James P. Born, jr., W4DBZ – The
new officers of the Atlanta Radio Club are FIP.
press.; SOV, vice-press.; RV1, sec.; NWS, treas.; KFL.
act.; KFL is the new editor of The Atlanta Ham.
YM2N is a new ham in Dublin. The ARBC in Georgia is
being completely reorganized and all hams are requested to
contact their local EC, SEC, or SCM and take an active
part in the emergency preparedness program in their
community and state. The following is a list of ECs con-
tinued from last month: POW as EC for Putnam and Jasper
Counties; FPO as EC for Clayton, White, and Clinch Counties;
DND as EC for Clark, Jackson, Madison, Hart, Elbert, and
Oglethorpe County; GSP as EC for Chatham, Liberty,
Leon, Dougherty, Stewart, Webster, Quitman, Clayborn,
Randolph, and Taliaff Counties; K7Z as EC for Coffee, Jeff
Davis, Appling, Bacon, and Atkinson Counties; RDP as
EC for Chatham, Ellingham, Bryan, and Liberty Counties;
RGC as EC for Baldwin, Hancock, Warren, Glascock, and
Washington Counties; GVX as EC for Chattooga, Whitfield, Murray, Gordon, and Bartow Counties;
OHF as EC for Upson Talbot, Pike, and Lamar Counties; G6D
as EC for Carroll and Heard counties, the place after ten months in Germany. KWC has joined the
merchant marine. Congratulations to USA on the FB
transfer total of 2093 for the month. The ARRC needs a
new ham in Millen. BOC is building a 500-watt K5 for
all bands. Traffic: W41BHS 2093, UGR 73, ACN 59,
Q6 52, 2D 40, N9K 20, NHQ 20, KOY 20, EAC 20, KOY 20,
NHQ 20.

WES TS INDIES – SCM, William Wernier, K4P4J
– SEC; HS; HS is new SEC, while CN takes over as San Juan
District EOC. ES and OS are new ECs for Sons and Aquas.
(Continued on page 108)
to the E.E. or PHYSICS GRADUATE with experience in RADAR OR ELECTRONICS

Hughes Research and Development Laboratories, one of the nation's large electronics organizations, is now creating a number of new openings in an important phase of its operation.

Here is what one of these positions offers you:

THE COMPANY
Hughes Research and Development Laboratories is located in Southern California. We are presently engaged in the development of advanced radar devices, electronic computers and guided missiles.

NEW OPENINGS
The positions are for men who will serve as technical advisors to the companies and government agencies purchasing Hughes equipment. Your specific job would be to help insure the successful operation of our equipment in the field.

THE TRAINING
Upon joining our organization, you will work in our Laboratories for several months until you are thoroughly familiar with the equipment you will later help the Services to understand and properly employ.

WHERE YOU WORK
After your period of training (at full pay), you may (1) remain with the company Laboratories in Southern California in an instruction or administrative capacity, (2) become the Hughes representative at a company where our equipment is being installed, or (3) be the Hughes representative at a military base in this country—or overseas (single men only). Compensation is made for traveling and for moving household effects, and married men keep their families with them at all times.

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You will gain all-around experience that will increase your value to the company as it further expands in the field of electronics. The next few years are certain to see a large-scale commercial employment of electronic systems—and your training in the most advanced electronic techniques now will qualify you for even more important positions then.

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Hughes Research and Development Laboratories
Engineering Personnel Department
CULVER CITY, LOS ANGELES COUNTY, CALIFORNIA

Assurance is required that relocation of the applicant will not cause disruption of an urgent military project.
Maximum Performance Minimum COST!

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Absolute minimum size, without reduction in performance—sturdy featherweight construction—"Climatized" treated for resistance to moisture. That's why TRIAD Audio Components will get top efficiency from your gear—at a low price! See your jobber for these and other TRIAD items.

INPUT Transformers, Line or Microphone to Grid

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Application</th>
<th>Frequency Response Primary Impedance in Ohms</th>
<th>Turn Ratio</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1X</td>
<td>Line or single button microphone</td>
<td>500-3000 1000</td>
<td>31.4</td>
<td>2.40</td>
</tr>
<tr>
<td>A-2X</td>
<td>Line or dual button microphone</td>
<td>300-3000 1000</td>
<td>15.8</td>
<td>2.00</td>
</tr>
<tr>
<td>A-3X</td>
<td>Single button microphone</td>
<td>500-3000 1000</td>
<td>84</td>
<td>3.80</td>
</tr>
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</table>

DRIVER Transformers

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Driver tubes</th>
<th>Output tubes</th>
<th>Frequency Response</th>
<th>Primary Impedance in Ohms</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1X</td>
<td>50, 115, etc.</td>
<td>P. g. 10.5 A, 150, etc.</td>
<td>500-3000 1000</td>
<td>2.66</td>
<td>15</td>
</tr>
<tr>
<td>A-2X</td>
<td>48, 42, 45, etc.</td>
<td>P. g. 66, 66, 65, 67, etc.</td>
<td>70-2000 133.1</td>
<td>40</td>
<td>1.70</td>
</tr>
<tr>
<td>A-3X</td>
<td>48, 42, 45, etc.</td>
<td>P. g. 66, 66, 65, 67, etc.</td>
<td>10-10000 133.1</td>
<td>40</td>
<td>2.00</td>
</tr>
</tbody>
</table>

MODULATION Transformers, Tube to RF Load

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Primary</th>
<th>Frequency Response</th>
<th>Secondary</th>
<th>Frequency Response</th>
<th>Audio Watts</th>
<th>Sheet Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-1X</td>
<td>10000 C for 19, 135, etc.</td>
<td>500-3000 10000</td>
<td>10000</td>
<td>50</td>
<td>5</td>
<td>3.80</td>
</tr>
<tr>
<td>M-2X</td>
<td>10000 C for 19, 135, etc.</td>
<td>350-3000 10000</td>
<td>10000</td>
<td>100</td>
<td>20</td>
<td>2.20</td>
</tr>
<tr>
<td>M-3X</td>
<td>4500 C for 80's</td>
<td>500-3000 10000</td>
<td>8000</td>
<td>200</td>
<td>60</td>
<td>12.20</td>
</tr>
</tbody>
</table>

WRITE FOR CATALOG TR-52D

SOUTHWESTERN DIVISION

LOS ANGELES—SCM, Samn-T. A. Greenlaw, 6W6SH—Los Angeles, 1st. SCM, Kenneth L. King, K5JX; SCM, Robert E. Harko, KF4A. F, WY, GF, QJ, LQ, Section Traffic Net: LSBN, Mon. through Sat., 2000 to 2300, EGN, Mon. through Fri., 3050 to 3060, BTL, this month and May, KFY and KB4XV, this month and June. Attention all California hams: Time is fast approaching for presentation of our license plate bill to the State Legislature. If you want those plates, now is the time to move. It is our belief that California is one of the few states that do not allocate call-letter plates to hams. If it doesn't work this time, it may be your fault! Want further information? Contact PIB, Pat-on-the-back Dept.; To Hindon, EIU, for now again helping us. this time by handling the legal aspects of our license plate deal, and to PIB for sparskugging the whole deal. VHF is QSL — seems the phone company refused further support for his antennas! Glad that KA is on the air. AIB worked all 27 sections on the phone in the SS, HKD is going in for power on 2 meters, FMG, RAI, asks "what's new with the LIMN" and has been receiving good DX on 60. AIB was DXing a QSL in on test net on 60. PERCA: ZEV is now in Burbank, QRT but very mobile; VPD is fully "Collinized" in new QTH; NNTA really is DXing away; WQRX in new QTH; KVY is on 2 and 20; WFR de is now in new QTH. Thanks, Tom, BUK has troubles with tank flashover, VCF is NCS of California, MARSH Net, KB4XV is on company orders now. WDI is on Motorola; MJA is still sleeping off the SS Contest; GTL handled Christmas lighting for Whittier, Thanks, Ir. But you didn't mention your all-time activity in c.d. Such modesty! HP has been bitten by the traffic bug. Ever notice how YBF mentions his town in every transmission? He must own both! C of CAJN just completed a classic new ham shack. The Mission Trail Net is going places under the leadership of JILZ. COZ reports he is back on 10 again; HAG is down now 10 and 15 are wide open; and JMB are back from the Air Force. Gruesco, GSC, ERK is on 40 now that the 75-meter antenna fell down. Goal-of-the-month Dep has a ham radio club for the I 1 woman to church, parked outside, and in a QSO explained that, being a ham, he was going to heaven anyhow — all to the delight of the congregation because she was a bishopess. Thanks to WRT for the report that the YLRC is giving a certificate for 10 members worked since Jan. 1, 1932 (see KAS for information) and that LAG is now CL A. AIB now is taking traffic in 1000 lots! PANS and DRI have had 2690 contacts on 75, EYF says AGB is boosting 350 new DX cards. For VCF: OTX says QRM on 10; now W8 is TMI (ex-7WLAQ); ORW and ORI have new Pannap-decorator; ORW is crowding on 250 watts; ZDK has two emergency supplies — hard power and gas. L8 is going nuts trying to locate frequency of c.w. signals from family store (ats, hot one!). AREC now, Whitter is off. CALAU is doing a bang-up job as NC. HALCiti (DC8): All control stations now are Viking equipped. Long Beach (Continued on page 110).
HENRY RADIO offers YOU:

LOW PRICES: You can't beat my wholesale prices.

FAST SERVICE: You get fast service. I have big stocks of Collins, National, Hallicrafters, Hammarlund, RME, Johnson, Harvey-Wells, Lysco, Gonset, Millen, Morrow, Mallard, Elmac, Master Mobile, Hy-Lite, Babcock, all other receivers, transmitters, parts at lowest prices.

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TIME PAYMENTS: Get what you want and pay by the month. I give you better terms because I finance all terms myself. Write for details.

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Filament Transformer P-2943

Designed for highpower use in both Amateur and industrial applications.

Specifications:
- Sec. Volts, 5 - Sec. Amp., 30
- Insulation Volts, 3000
- Center tapped with primary taps for 110; 115-120 volts, 60 cycles - Dimensions, 3/8 H. x 3-3/16 W. x 4/5 D. - Mounting...
- Will handle a pair of 250 TH's, . . ., 250 A's,..., 4-125 A's,..., 4-400 A's, etc.

Net Price - $6.60

Merit Transformer Corporation
4227 North Clark Street
Chicago 40, Illinois

(Continued on page 118)
HARVEY FIRST TO STOCK... FIRST TO DELIVER

NATIONAL
NC-183D RECEIVER

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HT-20 Transmitter

The New SONAR Transmitter
Model SRT-120

A completely TVI-suppressed transmitter with complete band-switching from 10 to 160 meters. Power output 1.15 watts CW or 100 watts on phone. TVI radiation is at least 90 db. below output. Has provision for external VFO head, plus many other new features. Complete with Tubes $449.50

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Central Electronics Units
Increase Phone Power 8 Times
With
SINGLE SIDEBAND
VIRTUALLY ELIMINATES TVI


COLLINS 32V-3 Transmitter

A VFO controlled bandswitching, gang-tuned amateur transmitter. 150 watts input on CW and 120 watts on phone. Covers 80, 40, 20, 15, 11 and 10 meter bands. Dimensions: 21 1/2" wide, 12-7/16" high, 13 7/8" deep. Complete with tubes $775.00

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111
Crystal Controlled Converters

**For 2, 6, 10-11, 15 or 20 Meters**

**MODEL RC-1B**

$45.00 **NET**

(Complet with power supply, crystal and all tubes)

**Designed for the ultimate in performance on any one amateur band, these converters have been widely accepted and very popular, giving all the benefits of dual conversion at low prices.**

**Features:**

- Tube line-up: 2 band-pass 6BQ7-A grounded grid R.F. stages, 1—6J6 push-pusher mixer, 1—6BA6 L.F. amplifier, 1—6J6 crystal oscillator-multiplier.
- Built-in transformer type power supply using selenium rectifier.
- Built-in L.F. amplifier, one stage.
- Built-in gain control.
- Output frequency 7-11 Mc. on all but 20 meter model.
- Output frequency 3.5-3.9 Mc. on 20 meter model.
- Available for either 52 ohm or 75 ohm coax or 300 ohm line.
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- Ruggedly built—RTMA guaranteed.
- 21 1/2" x 6 1/2" x 8" overall. Weight 4 lbs.
- Not a kit—completely wired, tested and ready to use.
- More than 500 converters now in use.
- For further information, write Dept. Q-2.

Converter for any one band, complete with built-in power supply, crystal, tubes, output cable and input fitting for 52.75 or 300 ohm line, $45.00. Available at leading distributors. Specify band and input impedance when ordering.

Oklahoma City Armistice Day parade. CKQ is going whole hog; his home rig now is on the active list and he is thinking about a mobile. AGM is back on the air with 150 watts. RDE is back on the air with the big rig. BLX and NQV have 70 cm. rigs going. EHC was elected Washington Division Vice-Director. OQT is busy with traffic and checking modulation for the gang. The Tulsa Club had a two-page write-up in pictures in the magazine section of The Tulsa World. BUX has new SB exciter. K.Y. and CKQ were heard giving the Kansas gang an assist during their emergency. YMV has a new ham in Lawton. Long skip has been giving the NTO net lots of trouble but, because of the fine work of those who could hear, traffic has been moving along in good shape. Traffic: W9ZK 210, ROZ 125, QAC 46, GVS 31, PML 30, KY 31, MIG 23, SVR 22, RHC 16, PA 19, GVY 14, QVY 14, OQG 10, LGS 9, RST 8, ADC 7.

SOUTHERN TEXAS—SCM, Dr. Charles Fernagud, W5JFF—Your SCM has just returned to a meeting in Austin and Lt. Arthur. Emergency communications were discussed with the emphasis on 2-meter mobile. The Austin Club is going to standardize on 2-meter converters. Amateurers are going to produce these units for their own use. Port Arthur and Beaumont Area hams will have to like it. I expect to visit a similar program. Details may be had from NZE, pres., Austin ARC or CVFD. Austin EC. I wish to thank CVFD for a swell lunch for DCE, DVC, AXQ, GYQ, OM, POL, NZE, CVO, and DJF. DJF, DVC AXQ, GYQ, OM, POL, NZE, CVO, and DJF. DVC decided that the important role of hams is not only in the field and visits to Port Arthur was indeed a pleasure. Thanks to BUZ for arranging this meeting. It was gratifying to see such interest by present and new hams. Freeman, TPD, PXX, WPW, OWL, YOM, UQX, WNSWRY, TEH, WRE, FCC, EZQ, UTR, WNS5PC, PK1, CCT, QYQ, a new 370-ke. c.w. net has been forming the last two Wed., Fri., and Sun. 5:30 P.M. CST. All interested are urged to participate. WPL recently joined General Class License. WNSWRY is active on 20 meters. YOM is doing PSY on 5 watts. TEH has WAS, WNS5WY, worked Rhode Island with 30 watts. Ten-year-old Robert Heanes passed the exam and is the youngest in Beaumont to do so. WNGY 13 is 12 years old, WNSWRY is building a new rig. The South East Texas mobile group meets on 386 ke. Thurs. 7:30 P.M. Active stations: 4SQ1, 5QY, QIO, KWA, KBY, GNY, ONX, PXY, SAI, and CWS. They are looking for new members. NRY is coming PB on 21 Mc. OXQ is interested in c.w. traffic nets and reports in N. Tex. Net, OK. Net, and NNN. BUZ is another active State Guard member. FXN reports NGE got his UXCC phone as well as WAC, WAS, and A-1. OQ5LL is on 20 meters every Sat. Supplying TV sets cutes his time on the air; he reports. A new JR. operator as of Nov. 1st, NMB reports 430 works like a charm. NBB, AXQ, GYQ, HPC, PK1, QMY, ONS, and AXQ are active on 430 Mc. K6WAS had two antennas blown down in November. UMY reports Brazoria County ARC coming on. EKQ set up portable 10-meter phone rig so that VDE could attend over the air. WNSYLP is a new ham in Angleton. SAP says WNAJOL now is WB6LPL. WBA is General Class. AQN still has busy rolling pills in Maddexville. Ex-SBN1E is going up for his new license soon. YVK has a new WX 12-15 and has re-modulated his V with 2 meters; his dad is going up for Novice Class test soon. Y.V. F. Note: OQ5LL has been active twice daily from Dec. 15th on 25.00 ke, with 500 watts. Listen for him for 1600, 2100 GMT. Traffic: K5WAC 1326, K5FKE 1106, WSMN 443, QFA 98, UMY 64, OY1P 25, FX 12, NNY 7.

NEW MEXICO—Acting SCM, Dick Matthews, W5BV—LDG was Acting NEC for New Mexico 5-Meter Emergency Phone Net while BIW was in Houston during November. Unusually long-skip conditions are curtailling net activities. However, on Dec. 2nd we were able to check in 21 on the roll call and handle a number of messages before the skip took us out. Traffic: W5NKG 207, 1Z 42, 1E7 T.

CANADA

**MARITIME DIVISION**

MARTIME—SCM, A. M. Crowell, VE1IDQ—SEC: FQ, EC: KE, RL: OM, Newly-elected officers of the MARC are OM, OXQ; DJ, Viborgs; CF, secy; PT, treas.; FQ, bulletin editor. Under the able guidance of the two officers OMs we should have a very good year in 1983. Your SCM hereby extends best wishes to all for the New Year. A successful fire in Conception, Newfoundland, saved several of the gang, including YY, HC, and DW, assisting with emergency traffic. Several of the XYL and YL members of the Halifax Ladies Dtt and Duk Club are active in their group which meets regularly at members' homes, the old L&D&D Club being inactive as such. HJ reports activity on all bands, as does ME, who is doing time as a soldier. XM reports 16256. FQ continues his northern skeds. PT reports great luck with the new 14-Mc, two-element beam. DB says he will report to all. Remotie lid all time low this month. Traffic: VE1FQ 95, OM 52, JA 26, DB 3.

(Continued on page 114)
Make Your Dollar Go Farther!

The father of our country made a dollar go a long way but your dollar will go a longer way when you get a Walter Ashe "Surprise" Trade-In.

IS THAT RIGHT, OLE TIMER?

IT'S THE TRUTH, JUNIOR. IT'S PROVEN EVERY DAY AT WALTER ASHE BY THE CONSTANTLY GROWING AMOUNT OF REPEAT BUSINESS

S-t-r-e-t-c-h those dollars and be money ahead by taking advantage of the one and only "Surprise" Trade-In Allowance on your used (factory-built) communication equipment. For fast action use the convenient coupon to tell us what you have to trade and to indicate your choice in new equipment. Don't delay. Get your trade-in deal working today!

JOHNSON VIKING II TRANSMITTER KIT. Complete with tubes. Shpg. wt. 85 lbs. Only $279.50
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Less spkr. Shpg. wt. 90 lbs. Only $483.50

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ONTARIO DIVISION

ONTARIO - SCM, G. Eric Farquhar, VE5HA - SCM, with deep regret we record the passing of Wes Mitchell, of Brantford. His call, BA, however, is still with us as it was a case in which two brothers were assigned the same identification signal. Appointments for the mem- ership in ARIEL were 01, 02, 03, 04, AAR as SS, DOC as EC for Fenwick. It would be appreciated if holders of ARIEL appointments would check the date of their last endorsement. Please advise if any of your call changes include 2AD to 2GJ, BVC to KJHE, DEU to HZB. The Ontario Forty Meter Net, now operating on 7285 kc., solicits your traffic for Northern Ontario, Maritime, and West Coast. AFO, BYV, and ZA were seen roaming among the cattle and horses at the winter fair. Hamilton Club members were treated to a splendid talk and demonstration on "Pulse Techniques in Radar and Television." The courtesy of ZCAB, Clinton, AVEZ reports four hams to be working on boats. BBW active on 5.5 and 7.7 mc., reports his bags of DX. The Mohawk Club now is settled in new- acquired quarters. AFO with 35-ft. vertical atop a 20-ft. windmill tower, consults Beaufort's scale every time a blow comes up. Good luck to KW, with 31 countries and 5 continents on 21 Mc. to his credit. OW is heard on 21 Mc. Ottawa Club election results are as follows: BFW, pres.; CAX, vice-pres.; LX, secy.; DY, treas.; CMW, technical adviser, solicits your votes. The 6-meter group is making every effort to make the load lighter for him. Traffic: (Nov.) VE3WW 128, ATR 181, DAK 20, 2A5 85, EAM 168, G0UZ 67, BJU 42, DOG 12, EAU 124, KM 33, CP 35, AR 24, BSF 70, D8 18, DOC 12, DF4 4. (Oct.) VE3NG 30, DQA 4.

QUEBEC DIVISION

QUEBEC - SCM, Gordon A. Lynn, VE2LI - WH has worked 48 counties on 21 Mc. RW and ADR are build- ing new rigs with 813. BK has TVI in his own TV set and is running it down but finds time for AEC demonstration from his car with radio and BD as part of the Lakeshore Emergency group, with portable rig set up in the church hall. BK also has new ground plane erected for 21 Mc. NB is working on 14.5 Mc. VE3V reports the St. Maurice Valley gang is doing lots of rack- ing on the air but that TVI has them all worried, as they were in LACD. AE6, A9C, ZC, APE, and ZG continue active on 75 Mc. 'Phone in that area. DK took part in the 5G Contest and slots QN6 each Sunday. CA reports he is still QRL work but that PHL is holding the fort with northern phones and handling considerable traffic. CK has opened a new office and has a new board. The area is rebuilding to remove a bug (TVI). We regret to report the death of GJ. A late report was received from YS and his family is requesting his friends to send their greetings to the BCAHA. Reports are received by the SCM. Amateurs are ready to join to get the SCM. AEC is a separate group of amateurs and the call of the AEC members is given. QLZ is working 7285 Mc. Traffic: VE2AMB 79 CA 65, EC 15, LO 10, DR 8, GI 6, NT 4.

VANALTA DIVISION

BRITISH COLUMBIA - SCM, Wif Moorehouse, VE7US - Little written news was received this month from British Columbia hams. Guess that our 1100 amateurs must do something better with our time than writing to and from our hams. WM is on 2 meters every night with converter from Feb. 3Q QST. DH sends news from Nanaimo concerning VE7s UL, BF, AGN, ABP, AHP, AOB, and SH in that area. AV mobiles 750 miles with 11 watts input. The three B.C. nets are re-registered for another year. All E9s except TANKS are relieved for 1965 and endorsement has been filed with ARRL. AE7N writes that an interesting paper was written in the SEC. TM is rebuilding to remove a bug (TVI). We regret to report the death of DO. A late report was received from VE5V, EC is reported to be active with all the agencies and the ECs' names and addresses have been provided. KB is busy in New York. The minutes of the BCAHA were received by the SCM. Amateurs are welcomed to join the AEC. AEC is a separate group of amateurs. The two are to be kept as separate. AE7N is looking for an amateur. QC reports a traffic total of 130. He is an OBS, AO, and EC. ARI is very QRL. AE7K sends a report in a letter. QC reports added positions in All K9. The AEC reports new hams in training. Will all amateurs please note that the last of the month is the deadline for monthly reports. The SCM must file its report postmarked by the 7th of each month. Traffic: VE7YC 150, DLH 25.

PRAIRIE DIVISION

MANITOBA - SCM, A. W. Morley, VE4AM - Acting SCM, Len Cuff, VE4AC, with SCM, I will endeavour to carry on for him this month. We will all wish Art a speedy recovery. VE4D has been endorsed for (Continued on page 118)

It's Engineered for TOP PERFORMANCE... in Production NOW!

This new DX 90° Deflection Yoke has everything a television receiver manufacturer wants... a sharp full-screen focus, a minimum of pincushioning, the ultimate in compactness and a price that's downright attractive. Because this yoke has been brilliantly designed for mass production on DX's specialized equipment, it warrants immediate consideration in your 27" receiver plans. Write us today.

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ION TRAPS... TRANSFORMERS...

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114
HARRISON Points the Way to Increased Selectivity... Better QSO's with Single Sideband

MILLEN AUDIO PHASE SHIFT NETWORK
Precision, 90-degree differential phase shift unit for use in receiving or transmitting service (see Oct. 1952 QST). ±1.3 degrees over range of 225 to 2750 cycles. Contains two independent networks, precisely adjusted and sealed at the factory. No readjustments necessary. A single sideband transmitter using this unit will show 40 db suppression of the unwanted sideband. Completely shielded can is 7/16 x 2 x 4" and mounts like an IF transformer. SSB transmitter with phase shift network is no more difficult to construct and start operating than simple conventional transmitter. With schematic and mounting dimensions. MILLEN No. 75012........................................ $7.50

EDICIO SSB TRANSMITTER-EXCITER
Here is practical single sideband at an amazingly low cost! A complete 6-tube, 5-watt SSB transmitter available in wired or kit form. Each kit is complete with all parts, wired or kit form. Each kit is complete with all parts, punched chassis, cabinet, tubes, power supply and full instructions for assembly and operation. It's no more difficult to construct and adjust than any simple transmitter because the audio phase-shift network is laboratory assembled and adjusted. The transmitter provides 40 db sideband suppression by using a simplified phasing method which requires only standard components and no special technical skills. Can also be used as a driver for a high power linear amplifier or in conjunction with a VFO. Tubes: 12AU7 speech amplifier; detector, 12AT7 twin-channel amplifier, 6AQ7 final, 12AT7 speech preamplifier, 6H6 bias, and 5Y3GT rectifier. EDICIO SSB Jr. TRANSMITTER-EXCITER KIT.............................. $79.95
Same as above factory wired and tested.......................... $129.95

NEW COLINS 75A-3 RECEIVER
Featuring Sensational New Collins Mechanical IF Filter
Gives a practically straight-line, flat-topped selectivity curve. Greatly improved signal-to-noise ratio. Plug-in provision for two mechanical filters. 3 kc filter used as standard equipment. 1 kc plug-in unit available as optional accessory for even greater selectivity on CW. Other known features of 75A-2, such as crystal controlled front-end, highly stable VFO, accurate dial calibration, etc., have been retained. Here's a natural for the single sideband operator!

COLINS 75A-3. With Speaker.................................. $560.00
1 kc mechanical filter.................................. $75.00
BR-1 plug-in crystal calibrator.......................... $25.00
148C-1 plug-in NBFM adapter.......................... $22.50

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We can have the factory install the new 3 kc mechanical filter in your receiver. The charge is $125, and also includes either adjustment or complete realignment. Ask us for details.

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NEW BACBOCK 6-BAND BAND SWITCHING TRANSMITTER
All band changing and frequency changing (including antenna switching) handled by one switch... a "tick of the wrist" selects your band! Input 35-50 watts. Covers all ham bands—80 to 10 meters. Crystals located inside transmitter. Tubes: 6A9Q oscillator-multiplier, 6146 straight amplifier, 12AU7 PP driver, 2-6A9Q class AB modulators with automatic speech compression and clipping. Complete metering, even RF output wattage. Push-talk antenna and receiver relay. With tubes, plugs and instruction manual. Excellent for either mobile or home station use. Om 5 x 9 x 7/8" D. Weight 8 lbs. ORDER NOW!

BACBOCK MTSA TRANSMITTER........................................ $59.50
6V, DC Power Supply—PS4A.................................. $67.50
115V, AC Power Supply—PS18.................................. $49.95
LS1 Two-band antenna tuning unit......................... $15.00

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Barclay 7-7777
JAMAICA BRANCH: Hillside Ave. at 172nd St.
'phone. Rl renewed his or appointment for another year. 
Hl has taken over ors and has been appointed rm. Jrk 
now is ec for the minnesota district, mx will be ncs for 
monday evenings. Jrp has been appointed to represent the 
amateur radio league of manitoba (inc.) on the amateur 
committee of the provincial civil defense communications 
committee. Jrp was presented with a life membership in 
the arl of m. at its november meeting. Tn would 
expect donations of parts for his boy scout club which he has 
recently formed. Jrp has been promoted and will be operating 
shortly for ♫33-land. 1933 officers of the amateur radio 
league of manitoba are sr, pres.; ni, vice-pres.; dp, 
sec.; lc, treas. in response to inquiries, a. w. net will be 
set up if enough of you make application to the scm. 
also we still can use a few more active stations on the 
phone net. Traffic: vE3RL 102, er 16, am 5, jf 3, lc 2. 
SASKATCHEWAN — SCM, Harold R. Horn, vE3HR
— Not many reports were received this month, fellows. 
Please forward news of your doings for this report. Trunk 
line "fl" made a start and so far has been able to do quite 
well. Tc says a. w. net is tough to get going and needs 
members. Jrp rebuilt his rig and TVied it and says it does 
work wonders for bci, too. Ifc now runs 325 watts to an 313. 
fa has a new nC-1832. Our sympathy to lc and his xyl on 
the passing of her father. Sc and eu are heard regularly 
on 80-meter e. w. 7SJ is back at home, while ev underwent 
a serious operation and will be qrt for some time. We all 
will wish you a speedy return. Len. Jrp has been transferred to 
clarenith with a VEO call. Are you interested in your call 
for car license plates? If so, let q1 know immediately as a 
brief is being prepared to present to the government. 
Congratulations to d2 and his xyl, GW, on the new addition 
to the family. Fs received federal inauguration for LC6. 
Melfort-humboldt constituency. Good luck, alex. lu is 
going to try a vertical for 75 meters. It would be a big help 
if stations watched net frequencies and times and kept the 
channels clear. Traffic: vE3HR 42, te 14, qL 7, go 4. 
lu 4.

Correspondence

(Continued from page 88)

DISINTEREST

Kellogg Star Rte.
Oakland, Oregon

Editor, qst:
I just want to mention how disappointed I was to learn 
how many hams in the W7 area did not even read the part 
"It Seems To Us" in qst regarding the FCC plans for 
our bands. At least twenty worked by me never had time, 
and just didn't notice the item.

— John R. Barrett, W7PXS

SPURIOUS RESPONSES

220 James St.
Scotia 2, N. Y.

Editor, qst:
Re the current quiu quiz . . . with rare exceptions the 
number of spurious responses present in superheterodyne 
receivers is astounding. If f is the r-f frequency, f is the local 
crillator, and f the f-t, some of the responses which can be 
found are

\[ f_o = f_t \]

\[ f_o = 2f_t \]

\[ f_o = 3f_t \text{ etc.} \]

\[ 2f_o = f_t \]

\[ 2f_o = 2f_t \text{ etc.} \]

\[ f = n f_o = n f_t \]

\[ n f = n f_o = n f_t \text{ etc., where } n \text{ is any integer.} \]

— R. P. Howland, W2DA

REMEMBER?

Wilson Avenue
South Norwalk, Conn.

Editor, qst:
Your editorial, "History In The Making," november 
issue, is about the nicest thing that's happened to me in a 
lone time. and what a flood of memories it recalled. 
Sequit, despite the depression, that was an exciting era in amateur 
radio — and qst was its chronicle. The "new" regulations 
of the Federal Radio Commission (pre-FCC) imposing near-
repeatability transmitter stability requirements had just 
been ARL's highly successful Technical Development Program

(Continued on page 118)
NEW! FOR REMOTE CONTROL!
ROTARY, SOLENOID-OPERATED
6V DC MULTI-CIRCUIT WAFER SWITCH!
REG. $7.25
$3.95

NO NEED TO MOUNT XMTR. UNDER DASH!

Wonder solenoid that obsoletes manual switching. Remote selection of crystals, band changing, audio circuits, antenna switching etc. Solenoid (F) produces a rotary motion (from 6V DC source), transmitting this motion to rotor shaft of 4 gang wafer switch by novel ratchet mechanism, advancing switch. Cam-operated interrupter switch (E) attached to wafer (A) opens when solenoid nears end of stroke, de-energizing solenoid. By combining E and A, either stepping or rotary selective action is achieved. Requires 6V DC @ 10A for .03 seconds. Control wafer: Decks A, B and C are 1 pole 6 pos. Deck D is DPST. Resistance $1/4$ ohm DC, 25 degree rotary stroke; 8 lbs./in. torque. Size: $4\frac{1}{2} \times 2\frac{1}{2} \times 2\frac{1}{2}''$. Shipping weight 1 lb. Pictorial schematic included.
ORDER NO. RE-4519 .......................................................... $3.95

LOWEST PRICED MOBILE MIKE!
List $16.50
$9.70


E-V 602 DIFFERENTIAL DYNAMIC
Similar to model 600-D, but close-talking, noise-cancelling differential type. Available in all impedances. 8 ft. cable. Weight 8 oz. Order No. Q20-186 ..........................$26.45

E-V 205 DIFFERENTIAL CARBON

SHURE 101-C CARBON MOBILE MIKE
Push-to-talk, hand-held operation, with mounting bracket. $5 coil-cord. List $27.59. Order No. Q20-049 .....................$16.17

ASTATIC 10M5 CARBON HAND MIKE

NEW MOBILE RADIO HANDBOOK

WHEN ORDERING: Please send enough money to cover shipping charges, any overpayment will be promptly returned. COD orders (min. $4.00) must include 20% down payment.

NOW! CONVENIENT TIME PAYMENT PLAN
10% down, 1 year to pay balance, no interest if account is paid within 60 days. Time payment limited to items costing $45.00 or over.

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Replaces Tri-Band. Many added features ..............$52.60

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NEW GONSET CASCADE PREAMPLIFIER
Increases signal-to-noise ratio of 2 meter reys ........$19.95

GONSET 2-METER XMTR-RCVR.
With combination 110V AC and 6V DC power supply. $189.00

MORROW 6-10-20-40-75 METER CONVERTER
Includes choice of coil for any of above bands ..........$44.05

MALLARD 10-20-75 METER CONVERTER
Covers 27-29.5, 14-14.4 and 3-5.4 megacycles ..........$52.60

STANCOR ST-203A MOBILE XMTR KIT
Operable from AC or DC power packs. 27-32 mc. .....$47.50

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VFO or crystal control on 10, 11, 20, 75 meters .......$149.00

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Phone or CW. Crystal-VFO-oscillator circuit ..........$109.37

HARVEY-WELLS BANDMASTER, DELUXE
Similar to above, with built-in pre-amplifier ..........$184.75

Bandmaster Accessories
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Approved for G.I. training

under the late Roos A. Hull's able direction. Receiver audio-frequency selectivity had been a minor product of this program as a sort of auxiliary to remarkably improved transmitter stability, but left unanswered the question, "What's wrong with our c.w. receivers?" (Phone, as a major selectivity problem, was found amenable to the same treatment a little later.) Thus my invention of the variable-selectivity crystal filter and development of the "Single-Signal" receiver of twenty years ago was literally mothered by necessity. The necessity remains and it is, I must admit, especially flattering to me that the 1932 answer still serves a useful purpose.

Along with the variable-selectivity crystal filter with separate rejection control, the "S.S." receiver also introduced for the first time in a communications receiver electron-coupling of the mixer and c.w. beat oscillators, and air-condenser tuned i.f. stages in combination with effective intersectional and over-all shielding.

--- James J. Lamb, Dir. Electronics Research Remington Rand, Inc.

Single Sideband

(Continued from page 61)

KH6AJH uses a 6AQ5 in the circuit, driving it directly from his balanced modulators, and W6FYT uses an 807 mixer at 500 volts on the plate to drive a 307T7. W6EX

Fig. 2 — This simple high-level mixer/amplifier has been used by W6EDD and others. The heterodyning signal is present at the grid in either amplifier or mixer service — the tuning of the output circuit, LC\alpha, determines the function.

C1 = 50 µfd.
C2 = 0.001 µfd.
RFC2 = 2.5-mh. r.f. choke.
See text for suitable tube types.

uses a 6AQ5 in his all-band mobile rig. Successful tubes other than those already mentioned include the 2556 and the 6AR6.

Dual Oscilloscope Connection

W2NJR points out that it is often desirable to have a scope connected to a transmitter (for monitoring) and also

Fig. 3 — W2NJR uses this simple circuit to connect (without switching) the vertical deflection plates of his oscilloscope to the transmitter and receiver. C1 = 500 µfd.
RFC1 = 2.5-mh. r.f. choke.

have the scope available for use with a panoramic adapter or just the audio output of a receiver. He passes along the simple circuit of Fig. 3, which will permit such operation. You don't want any receiver or panoramic-adapter output when the transmitter is on, of course, or the pattern may become a trifle baffling. — B. G.
E. F. JOHNSON EQUIPMENT

VIKING TRANSMITTER KIT

Fig. 6. New version of the Viking I hand-switching 100-watt phone/115 watt CW transmitter. Includes all features of predecessor plus TVI suppression. Full 110 watt output on the 100, 80, 40, 20, 15 and 11 meter Amateur bands. Complete construction and detailed instructions. Weight 9 lbs. 279.50
97F445. NET

VIKING MOBILE TRANSMITTER KIT

Fig. 6. Provides up to 60 watts on 20, 40, 80 and 11 meter bands. Complete kit with provisions for one additional band. 4-position crystal select switch, with adjustable crystal in switch for external VFO. Requires local position for internal VFO. Works at 600 volts DC at 200 ma and 6.3 volts AC. Cabinet and instructions. Weight 18 lbs. 99.50
97F444. NET

VIKING VFO KIT

Fig. 1. Companion unit to famous Johnson Viking II Transmitter. May also be used as a separate transmitter. Only two controls: Frequency control and bandswitch. Requires DC voltage of 110 volt. Cabinet and instructions for 5 tubes.
42.75
97F451. NET

HAMILTON HQ-129X

POPULAR AMATEUR RECEIVER

Fig. J. Representative of Hammarlund’s precision craftsmanship, the model HQ-129X incorporates many outstanding features, such as high selectivity, sensitivity and efficiency at high frequencies, plus an excellent automatic noise limiter. Provides continuous frequency coverage from 540 kC to 31 mc in 5 steps, with calibrated main tuning dial and a special tuning condenser which permits full 310 degrees of handsband for each Amateur band—80, 40, 20 and 10 meters. Weight 2 lbs. 239.50
97F400. NET

MILLER 90651 GRID DIP METER

Fig. A. Accurate measuring instrument using calibrated RF oscillator principle. 20-600 megacycle readings. Sensitivity 1.7 mV per 300 mc. 7 direct-reading ranges, spanning 3000 mc. For 100-125 volt, 50-60 cycle circuits. With coil rack, 7 coils and tube. Weight 3 lbs. 61.50
97F208. NET

MEISSNER MODEL 2-CW

NOVICE TRANSFER KIT

Fig. B. Transmitter kit for the new Novice Class. May be used as transmitter with folded dipole antenna. 20 to 25 watts input. Terminals at rear of chassis for metering plate current, 600 volts AG or DC, 120 ma. Weight 4.5 lbs. With 40 meter coil, punched chassis, all parts and instructions. Weight 6 lbs. 24.50
97F062. NET

GONSEN AMATEUR EQUIPMENT

3016 "COMMANDER" TRANSFER

Fig. C. Multi-band transmitter covering 1.7 to 34 mc. 150 volt DC input. 5 volt AC. Weight 7.5 lbs. 124.50
97F111. NET

Fig. D. 2 Meter Converter. For fixed or mobile stations. Super bandwidth has twenty main tuning dial divisions for 144-146 mc well as 146-148 mc. Output 1 mc. Tube: 6A9. 5 watts on CW. Provision for all conventional feed lines. Weight 14 lbs. 44.50
97F110. NET

Fig. E. Clipper Noise Limiter. Reduces interference from ignition noise, power leaks, electrical storms, etc. Uses an amplifier in any receiver in which second detector and first audio is in one tube. With instruction book and cables. Weight 1/2 lbs. 9.24
97F014. NET

CIVIL PATROL

Hallicrafters

MODELS S-81 AND S-82

Fig. K. Complete new FM receivers covering police, fire, taxi cab, railroad and other industrial frequencies. Also used on aircraft and may be used in conjunction with the "Little Ranger" receivers or monitors. Have illuminated channel dial with main channels 12, 17, 22-220, 12AL, 12ST and 5000, etc., marked. Circuits: 12A17, 420, 12AL3, 12ST and 5000, etc. smoked. Includes speaker, headphones, microphone and built-in FM speaker. Weight 2 lbs. 49.50
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MOTOROLA P-69-13 or 18-ARS receiver with special noise limiter for use with any converter having 1440-3000 K.C. $60.00

The above comes complete with all necessary accessories and mounting hardware. Order direct or through the Motorola National Service Organization member in your area.

Note: This Receiver and Transmitter is equipment which has been returned from the field, modified and rebuilt for Amateur Service.

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A.R.R.L. ACTIVITIES CALENDAR

Feb. 6th-8th: DX Competition (phone)
Feb. 8th: CP Qualifying Run — W60WP
Feb. 11th: Frequency Measuring Test
Feb. 17th: CP Qualifying Run — W1AW
Feb. 24th-26th: DX Competition (phone)
Mar. 6th-8th: DX Competition (c.w.)
Mar. 13th: CP Qualifying Run — W60WP
Mar. 18th: CP Qualifying Run — W1AW
Mar. 20th-22nd: DX Competition (c.w.)
Apr. 3rd: CP Qualifying Run — W60WP
Apr. 11th-12th: CD QSO Party (c.w.)
Apr. 16th: CP Qualifying Run — W1AW
Apr. 18th-19th: CD QSO Party (phone)
May 9th: CP Qualifying Run — W60WP
May 15th: CP Qualifying Run — W1AW
June 6th-7th: V.I.F. Contest
June 7th: CP Qualifying Run — W60WP
June 15th: CP Qualifying Run — W1AW

The "Ultimatic"

(Continued from page 18)

LM11 would eliminate this adjustment which, incidentally, is the only one required other than setting up the mark-space ratio and the top speed.

With an ohmmeter connected to the output, $R_5$ is twisted for midscale reading on dots. It will read $1/2$ scale on dashes. The mark-space ratio holds within 2 per cent from 1 to 75 w.p.m. With 0.001-inch armature travel, the variation is 0.5 per cent, but with such small travel the relay current range is reduced from 1 to 0.25 ma., resulting in unstable operation if the line voltage varies more than $\pm$ 10 per cent. With 0.008-inch travel, the circuit is stable from 90 to 140 volts.

A value of 0.27 megohm at $R_3$ gives a speed range of 4 to 75 w.p.m. when $R_5$ is set for 50-50 mark-space. $R_5$ affects the top speed considerably. When a distorted mark-space ratio is set up to compensate for distortion in connected equipment, $R_5$ must be redjusted for the desired top speed.

Operating the Keyer

A detailed study of Fig. 1, with contemplation of what occurs when the key is closed at times other than those shown in the first line, will greatly help in getting the hang of the Ultimate. At first, the speed should be set at minimum (or lowered to a fraction of a w.p.m. by shorting $C_3$ with 0.25 ufd.) and games played on the knob. Rip off a 50-w.p.m. "A" before the dot shows up in the output, or an "N" before the dash appears, and listen to the stuff drag out while you fumble for smokes with the sending hand. Make a "K" by holding the dash side until the output starts, and then add the rest with the quickest flips possible. Convert it to a "C" as soon as you hear the dot, or anytime during the second dash. Make a "Y" by flipping dash-dot and immediately lay on the dashes (all before the first dash starts). The entire letter comes out while the key

(Continued on page 188)
Your Gateway
to Amateur Radio!

★ HOW TO BECOME A RADIO AMATEUR
★ THE RADIO AMATEUR'S LICENSE MANUAL
★ LEARNING THE RADIOTELEGRAPH CODE
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Anyone starting out in amateur radio will find these publications a necessary part of his reading and studying for the coveted amateur radio operator's ticket. Written in clear, concise language, they help point the way for the beginner. Tried and proven by thousands upon thousands of amateurs, these ARRL publications are truly the "Gateway to Amateur Radio".

Attractively packaged with a bright yellow band, they make an ideal gift for the newcomer.

Available at your dealer $1.25

The American Radio Relay League, Inc.—West Hartford, Connecticut
is held to dashes. Reverse this for an "L." These initial practices will check operation of all the circuits.

Then, with the speed set at 10 to 15 w.p.m., key at various (and varying) speeds. It will be found that the hand can move, on the average, somewhat slower than the output or a great deal faster. As the speed control is slowly advanced there will appear an abrupt point at which the output goes completely to pot. At this speed, determine whether the hand is averaging too slow or too fast. A few hours of operation, always just below the break-up speed, will acquaint the fist with the memory leeway effect, and the speed of easy perfect sending will climb and climb. In the meantime, what would ordinarily be drudgery is pure pleasure listening to the beautiful stuff coming out. Practice preferably from written copy.

Thirty-w.p.m. top-speeders have made it to 50 in a couple of weeks, with far less concentration than originally. The quality won't be indifferent or just good—it will be perfect. Now we can all sound like WCX.

3 But not without being able to copy 50 in the first place!—Ed.

Clapp Oscillator

(Continued from page 81)

have been a result of the increased current brought about by the by-passing effect of the coaxial cables. In his final circuit arrangement, the majority of the circulating current has been confined to the remote control box by placing the lumped capacitance of the feed-back condensers in that position, so that any losses in the coaxial cables should have been reduced.

In closing, here's hoping I'll be seeing you on 7023 kc. some time. Yes, I'm "rock bound," but not for long (I hope) now that I know where to look for some of the bugs that are going to arise when I build that new Clapp VFO oscillator!

Appendix

Suppose that an r.f. current, \( i_{1} \), is flowing around the circuit in the direction shown. The voltage developed across the terminals \( i-1 \), is equal to \( i_{1}z_{1} \), that is,

\[
e_{1} = i_{1} \left[ R + j \left( \omega L_{1} - \frac{1}{\omega C_{1}} \right) \right]
\]

Consider now the voltage developed across the feed-back condensers across the terminals \( 2-2' \). Let the plate current be \( i_{2} = g_{m}i_{1} = g_{m}(i_{1}X_{2}) \). The voltage developed across the feed-back condensers will be the sum of the voltages produced by the two currents which are flowing.

That is, \( e_{2} = i_{1}(jX_{2} + jX_{3}) + g_{m}i_{1}X_{2} \)

\[
e_{2} = i_{1}(X_{2} + X_{3}) - (g_{m}i_{1}X_{2})X_{2}
\]

\[
e_{2} = i_{1} \left[ -g_{m}X_{2}X_{3} + j(X_{2} + X_{3}) \right]
\]

If the two voltages we have found above are

(Continued on page 184)
"Sideband" is sweeping the country... progressive amateurs are going SSSC by the hundreds... and one night spent in listening to a "sideband" QSO will impress you with the terrific "punch" carried by this method of operation—voice control, fast break-in, no heterodynes, the sharpness of tuning... it really "gets the signal through".

Here's single sideband with all the headaches removed. The SS-75 has been field-tested for over a year and is a complete self-contained, factory aligned single sideband transmitter-exciters, designed for operational ease, reliability of performance, freedom from maintenance problems, ready to transmit a high quality SSSC phone signal alone, or to drive a Class B linear final to 1 KW input.

Check these specifications and you'll see why the SS-75 is now the one piece of equipment that places all the advantages of single sideband at your finger tips:

- Built-in stable VFO, with voltage regulation.
- Carrier Injection to receiver antenna terminals... tune in SSSC signals the same as AM, no other gadgets necessary.
- Illuminated VFO tuning dial provides 31 inches of bandspread 3800-4000 KC in 4 bands, with 5 to 1 gear reduction.
- Built-in voice control and receiver disabling circuit. Also provides for break-in CW operation.
- Specially designed crystal filter network for maximum stability and reliability.
- Carrier injection to transmitter available for working single sideband WITH CARRIER, for tune-up adjustments, or CW.

A partial list of enthusiastic SS-75 users includes W1BBA, W1GA, W1SP, 4AY, 4CM, 4PA, 4AY, 8FWT, 80YJ, 8JYU, 8LW, 8WHE, 8ARK, 8ELK, 9GSE. (Refer to By Goodman's article on page 42 Dec. 1952 QST)

WRIGHT T-R SWITCH
For break-in operation on CW, AM, or SSSC. Use one antenna for transmitting and receiving. It's instantaneous! No moving parts, no power needed to operate. Coxg fitting for connections to antenna and receiver. With 75 meter plug-in coil ................. $9.95
Extra coils $1.75 per band

PHOSPHOR BRONZE AERIAL
125 ft. of the finest aerial wire obtainable. 42-strand phosphor-bronze with fine center. Will not stretch, very high tensile strength, diameter approximately same as No. 14 copper, very flexible. Excellent for transmitting or receiving antenna, control cable, guy wire. Regular list $4.95 .......... 90¢

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Standard plug with 6 ft. rubber, 2-wire cord with spade lugs ................. 85¢

8/8/8 MFD
500 V. D.C.
Triple 8 mfd, 500 working volt D.C., oil-filled condenser, common negative, solder terminals, hermetically sealed. 5/8" x 3/4" x 2 1/4" ................. $1.95

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73, Jule Burnatt W8WHE

123
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The 240 is a 40 watt Phone-CW rig for 10 to 40 meters, complete with: 18 x 14 x 8” cabinet, self contained A.C. power supply, MOBILE connections, meter, tubes, crystal and coils for 40 meters, 1 tubes: 0V6, etc., 807 final, 6L7 crystal mix amp., 6N7 phase inverter, 2 6L6’s mod., 5UG rect. Weight 30 lbs. TVI instructions included, 90-day guarantee. Price $79.95.

$25 deposit with order — balance C.O.D.
80, 20, 10 meter coils $2.01 per set. 40 meter coils $3.60.
Also for CAP, Broadcast, MARS, Marine, State Guard, Novice.

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Valley Stream, N. Y.

exactly equal, we have the normal condition for stable oscillations in the circuit. If we equate the two expressions we have found for the voltages and cancel out the term i, since it is common to both sides, we get

\[ R + j \left( \omega L_1 - \frac{1}{\omega C_1} \right) = -g_m X_2 X_3 + j(X_2 + X_3). \]

If we equate the real terms in the above expression, we get

\[ R = -g_m X_2 X_3. \] (1)

Evaluating the imaginary terms now,

\[ \omega L_1 - \frac{1}{\omega C_1} = \frac{1}{\omega C_2} + \frac{1}{\omega C_3} \]

\[ \omega L_1 = \frac{1}{\omega C_1} + \frac{1}{\omega C_2} + \frac{1}{\omega C_3} \]

\[ \omega^2 L_1 C_1 = 1 + C_1 \]

\[ \frac{1}{2\pi\sqrt{L_1 C_1}} \left( 1 + \frac{C_1}{C_2} + \frac{C_1}{C_3} \right) \] (2)

VFO Rig

(Continued from page 28)

Operation

So far as the antenna is concerned, a coaxial plug may be connected directly to Twin-Lead to a folded dipole; one wire can go to an end-fed Hertz a; off-center-fed half-wave antenna; an antenna coupler can be added for feeding a Zepp or the T2FD recently described by the author. All varieties of antennas may be used effectively. The author is personally partial to the T2FD, especially since it will radiate on all three of the bands covered by the transmitter.

For operation on 80 meters all stages work straight through. For operation on 40 meters, the VFO frequency is doubled in the 6AG7 buffer-doubler and the 807W operates straight through. For operation on 20 the buffer-doubler remains tuned to 40 and the final 807W doubles to 20 with no apparent loss in output and with no chirp. With c.w. there is no objection to multiplying in the final and the necessity for an additional stage is avoided.

The author does not operate in the 15-meter band but, if output on that band is desired, it may be accomplished in either of two ways. Of course, the band-change switch, S1, must be changed to a 4-pole type, and additional taps for the new band brought out. The 807W triples beautifully and, with the VFO on 80, the 6AG7 on 40 and the final tuned to 15, excellent results are obtained. It is also possible to triple in the 6AG7 buffer-doubler and then double in the 807W final. However, this method requires a tap

3 Countryman, "An Experimental All-Band Non-directional Transmitting Antenna," QST, June, 1949, p. 54; Countryman, "Performance of the Terminated Folded Dipole," QST, Nov., 1951, p. 29.
Uncle Dave's Amateur Headquarters!

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FEATURES
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4. No chattering. Specially built for "Silent operation".
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Winnipeg, Canada

HY-LITE BEAMS

<table>
<thead>
<tr>
<th>#</th>
<th>MTR</th>
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<tbody>
<tr>
<td>4 E 2</td>
<td>4</td>
<td>Yagi</td>
</tr>
<tr>
<td>8 E 2</td>
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<tr>
<td>PD 3 E10</td>
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<tr>
<td>3 E 1O</td>
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<tr>
<td>3 E 10T</td>
<td>15</td>
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<tr>
<td>3 E 15T</td>
<td>15</td>
<td>T Match</td>
</tr>
<tr>
<td>2 E 20T</td>
<td>20</td>
<td>T Match</td>
</tr>
<tr>
<td>3 E 10-20T</td>
<td>3</td>
<td>2 T Matches</td>
</tr>
</tbody>
</table>

Complete catalog on request: Dept. Q2-3

ARRL Appointments:

THE EMERGENCY COORDINATOR

If one appointment were to be picked out as the most important of all ARRL/SCM appointments, that would probably be the Emergency Coordinator. The EC is the key man in the Amateur Radio Emergency Corps, the man whose actions and decisions at local level multiplied by 1700 (the total number of ECs at this writing) and leveled down to a basic average, shape the destiny of the Amateur Service's emergency establishment.

The EC is four kinds of people in one person. He is a leader, an organizer, a promoter and an administrator. As a leader, he establishes and

heads up the local AREC facility for public service. As an organizer, he puts into effect a plan of operation by means of which that facility can be most effective. As a promoter he "sells" public officials on the immediate value and potential of the amateur's services. And as an administrator he does the necessary paper work to keep his local organization active and interested. He may be a single amateur playing a lone hand in a small community, or he may head up a "team" of hundreds of amateurs in a city of millions.

Now we have civil defense, with many ECs taking on additional responsibilities as Radio Officers for the Radio Amateur Civil Emergency Service, and with a new phase of emergency communications to be considered. We need an EC in every community with an amateur population of one or more. Has one been appointed in your community?
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There are 8 TV sets within a quarter block but no one has trouble with TVI even though I use a ground plane vertical antenna.

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THE WRL GLOBE SCOUT
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The WRL GLOBE SCOUT is the latest triumph of the WRL engineering staff. It is a beautiful, compact XMTX, completely self-contained, including power supply — 8H X 14½W X 8½D. Contains new 6J16 tube in final; covers 160M thru 10M. Metering provided for final grid and final plate circuits. Complete kit includes all parts, chassis, panel, power supply, cabinet, tubes, meter and one set of coils. Can be used for mobile work with suitable power supply. (Auxiliary socket provided.) An ideal XMTX for the novice or the experienced ham.

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<table>
<thead>
<tr>
<th>Kit Form</th>
<th>Wired-Tested</th>
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<tbody>
<tr>
<td>$89.95</td>
<td>$99.95</td>
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All crystals mounted in FT-243 holders and checked for activity before shipment. Crystals will only be furnished within the range of frequencies shown above. Will furnish as close to desired frequency as possible. When these are gone, no more available.

RADIO REFERENCE MAP

25¢ HANDY WALL SIZE

WRITE FOR DETAILED SPECIFICATION EQUIPMENT SHEETS

PHONE 7795
the design of Fig. 2A is more efficient than the solenoid of B, it is to be noted that the solenoid may be easier to tuck into some corner of a crowded chassis.

The rectifier and chokes require some cooling, but less than that required by most power-handling resistors. Although almost any arrangement of parts will be satisfactory, it is well to remember that battery tubes are somewhat sensitive to the field produced by the transformer. The completed unit should first be tested with a dummy load. Such a load can be made of No. 30 copper wire which has a resistance of 0.1 ohm per foot. Fourteen feet will draw an amperage from a 1.4-volt supply. Any adjustment in voltage can be made preferably by changing transformer taps or the value of $R_1$. If two chokes are used,$ R_1$ may be connected in series with the second choke.

The total cost of such a unit should be less than ten dollars and should easily pay for itself in battery savings and convenience.

---

The core materials for the i.f. transformers described in "The Ultimate C.W. Receiver" (Sept., 1952, QST) are not too easily come by. However, we are informed by author W5FKQ that he has located a limited supply of core materials and shield cans for the 37-ko. units and all the 1700-ko. transformers. If interested, write him at 1447 Fleming Ave., Dallas 16, Texas.
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129
The INSTRUMENT FOR HAMS — has numerous transmitter applications such as preturning, neutralization, locating parasites, correcting TVI, adjusting antennas, design and many others. Receiver applications include measuring C, L and Q of components — determining RF circuit resonant frequencies, etc. Covers the 80, 40, 20, 11, 10, 6, 2 and 1½ meter bands. Complete coverage from 2 - 250 MC.

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Please include postage to cover parcel post and insurance for 4 pounds.

Happenings

(Continued from page 39)

PETITION FOR RULE-MAKING

The following petition is made pursuant to the instructions of the Board of Directors of the American Radio Relay League, Inc. As the Commission is aware, the ARRL Board of Directors is composed of sixteen amateurs nominated and elected by approximately 53,000 licensed amateurs in the United States and possessions, to represent them in the formulation of League policy.

Pursuant to § 4(d) of the Administrative Procedures Act and § 1.702 of the Commission’s Rules and Regulations, the American Radio Relay League requests that Part 12 of the Commission’s Rules and Regulations be amended in the following respects:

§ 12.111(a)(8) to read as follows:

(8) 50.0 to 54.0 Mc., using types A1, A2, A3 and A4 emission and narrow band frequency or phase modulation for radiotelephony; and on frequencies 52.5 to 54.0 Mc., using special emission for frequency modulation (radiotelephone transmission and radiotelegraph transmissions employing carrier shift or other frequency modulation techniques); and on frequencies 51.0 to 54.0 Mc., using type A8 emission.

§ 12.23(e)(2)(iii) to read as follows:

(iii) 51.0 to 53.0 Mc., radiotelephony or radiotelegraphy using only type A1 or A3 emission for a period ending — (one year from the effective date of this amendment).

Former subparagraph (iii) to be renumbered as subparagraph (iv).

The effect of the proposal to change § 12.111(a)(8) would be to extend the privilege of using type A8 emission between 51.0 and 54.0 Mc., thus permitting “duplex” operation.

The effect of the proposal to change § 12.23(e)(2)(iii) would be to permit Novice Class licensees operation on the frequencies 51.0 to 53.0 Mc.

The League makes these requests of the Commission in order to promote more efficient occupancy of the amateur bands. It is believed that greater occupancy of the upper portion of the 50 Mc. band would be promoted by the modifications now suggested, thus relieving congestion elsewhere.

Noting the League’s request for A8 emission on the 50 Mc. band would increase occupancy on those frequencies. As is well-known, the number of amateurs continues to increase and thus a large number of amateurs are using radiotelephony, creating considerable congestion on the lower frequency ‘phone bands. As has been demonstrated by those who operate on the 50 Mc. band, consistently, that band is suitable for carrying on many of the contests that now take place on lower-frequency ‘phone assignments. Up to this time, however, few amateurs have been willing to construct additional transmitting and receiving equipment in order to operate in the 50 Mc. band. But if A8 were permitted, many more amateurs would be attracted to the band in order to operate “duplex.” It was largely the duplex aspect of operation on the old 5-meter band in the early 1930’s which gave it a tremendous surge of popularity. By permitting type A8 emission above 51 Mc., no interference would be caused to the bulk of present amateur activity on the 50 Mc. band. It is a natural consequence that if more amateurs were to migrate to the 50 Mc. band for their routine activities, there would be less congestion on the low-frequency amateur ‘phone bands.

The League also feels that it would be advantageous to permit Novice operation between the frequencies 145 to 147 Mc., using both ‘phone and c.w. At the present time, Novice amateurs desiring to use radiotelephony are restricted to operation on the frequencies 145 to 147 Mc. It is believed that the 50 Mc. band would hold considerable interest for Novice licensees because the equipment is less costly and easier to build and adjust than is equipment for the 144 Mc. band. Additionally, the Novice would be attracted to 50 Mc. by the greater possibility of DX contacts on that band as compared with 144 Mc. A larger number of operators in the 50 Mc. band would promote occupancy of the v.h.f. and u.h.f. bands and encourage a greater amount of experimentation in the spectrum above 50 Mc.

AMERICAN RADIO RELAY LEAGUE, INC.

A. L. Budlong
By Paul M. Segal
Its General Manager
Its General Counsel
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CODE SENDING RECEIVING SPEED
Expedition to Brunei
(Continued from page 48)

through to start a procession of more than thirty
eastern U.S.A. QSOs.

Review of the logbook reveals that 232 con-
tacts, slightly over half of the total number of
QSOs, were with W stations. The first station
worked in each of the U.S.A. call areas is indi-
cated in the following list: W1FI, W2QKS, W3R2T, W4FU, W5LH, W6F6S, W7AMX, W8BBA, W9FDA and W5YXO. In the entire
five days nearly 450 contacts were established
with stations in nearly fifty countries on all con-
tinents.

Incidentally, the food in Kuala Belait was
entirely different from anything we had previ-
ously experienced. The Malay cook made
such dishes as Singapore curry and Malay
stew, both so highly seasoned as to be indolible
insofar as I was concerned. At various times we
had doubts in regard to what we were eating.
Perhaps Bill discovered a clue when he noticed
that there were fewer cats around the rest house
when we left than there had been when we ar-
ived. We were, however, able to obtain an orange
bottled in Singapore which tasted excellent.
We consumed gallons of this drink. The net ef-
effect of all this was that I lost fifteen pounds
during the expeditionary period.

On our last night in Kuala Belait, July 31st,
we operated the station until after midnight.
Then we dismantled the equipment until about
3:00 A.M. We slept for one hour and forty-five
minutes, and then had to arise to pack our
luggage and were aboard the launch at 6:00 A.M.
We then proceeded to Labuan Island. From
5:00 A.M. until 7:00 P.M., a period of fourteen
hours, we had nothing to eat. Needless to say,
we were in a state of exhaustion that evening.

The next morning at 6:00 A.M. we took off from
Labuan for Manila. Except for the long journey
back, that ended the VSSELA expedition. And
that ends the story of the first amateur radio
station in Brunei.

* * *

I wish to acknowledge with sincere thanks the
assistance given by amateurs in many parts of
the world, without which this expedition could
d not have been such a success.

---Answer to QUIZ on page 55---

A word to the wise: Never ask a question without
knowing the answer. But it is far better to ask a
question and learn something from it. Always
be prepared to learn from your mistakes, no mat-
ner how small they may be. The best way to
learn is by asking questions and trying to find
the answers. Always remember that learning is
a progressive process and it takes time and effort
to get there. The key is to never stop learning and
to always be open to new ideas and experi-
ences.

---END OF PAGE---
COMPACT—CONVENIENT—CAPABLE

THE TURNER 80

This is the new TURNER 80 — a crystal microphone so tiny it hides in the palm of your hand, yet so strikingly designed it is the very picture of symmetry. Weighs less than five ounces, but its high output and unusually fine response characteristics make it a natural for amateur communications, home recording, dictating machines, portable recorders and dozens of other applications. Finished in beautiful satin chrome.

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BIG issue. Every member
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are $4 per year in the
U.S.A., $4.25 in Canada,
$5 elsewhere.

Universal Shunt
(Continued from page 43)
branch in relation to the negative terminal
can be found by

\[ R = \frac{R_t + R_b}{n} = \frac{13.33 + 6666}{n} = \frac{20,000}{n} \],

where \( n \) is the multiplier factor for each tap. This
gives the total resistance between the negative terminal
and the tap. The value of each section can be determined by simple sub-
traction.

For the 150-ma. range in Fig. 1, \( R = 20,000/1500 = 13.33 \) ohms. Since
\( R_1 \) is 4 ohms, \( R_2 = 13.33 - 4 = 9.33 \) ohms. For the 50-ma. range,
\( R = 20,000/500 = 40 \), and \( R_3 \) is then 40 - 13.33 = 26.67 ohms, etc.

In a practical case, it would probably be found
permissible to make the resistance values greater,
if desired, because the dissipation requirement of
each multiplier resistor drops off rapidly as the
multiplier factor, \( n \), decreases. In the above
example, \( R_2 \) need dissipate less than 0.2 watts,
and its value could be increased to 44 ohms before
reaching the 1-watt limit. In this case, only the
500-ma. multiplier would need to exceed the
1-watt maximum selected. However, it should
be borne in mind that instrument multiplier
resistors should be operated well within their
maximum rating to maintain accurate calibra-
tion.

Following the same procedure, Fig. 1B shows
why the circuit is called the universal-shunt type.
It will be observed that for the same current
ranges, the multiplier resistances stay the same.
The only differences between the two circuits
are that in B the impossible (500- and 150-ma.)
ranges are omitted and that \( R_b \) and \( R_t \) are reduced
in proportion to the increase in meter scales,
I.e., in a ratio of ten to one.

From the foregoing, it is evident that values
can be shifted around within a rather wide
range, depending upon what is available for
\( R_b \), \( R_t \), and the multiplier factors desired,
provided only that the above relationships are
observed.
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<thead>
<tr>
<th>Antenna Type</th>
<th>Price</th>
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<tbody>
<tr>
<td>10 METER DIPOLE</td>
<td>$6.95</td>
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<tr>
<td>6 METER 2 EL-BEAM</td>
<td>$9.95</td>
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<tr>
<td>10 METER 2 EL-BEAM</td>
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<td>6 METER 3 EL-BEAM</td>
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<td>10 METER 2 EL-BEAM*</td>
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<td>10 METER 3 EL-BEAM</td>
<td>$16.95</td>
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<td>10 METER 3 EL-BEAM*</td>
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<td>10 METER 4 EL-BEAM*</td>
<td>$24.95</td>
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It’s easy to see why W8ATB, Esther Stuewe, is so well-known on 75, 20, and 10. She spends many hours at her efficient rig handling traffic and participating in the Overseas, Michigan Emergency, Buzzard's Roost, and various YLRL nets. During the day she monitors the Michigan Net on 3930, and with a mike in her kitchen and speakers all over the house, including the garage, she has no trouble hearing traffic calls for Flint. Esther is a member of the Flint Emergency Corps and holds OPS, WAS, and WAG certificates. Her OM is W8QBO.

YL News & Views

(Continued from page 47)

110th country. Dottie also had an FB QSO with G8LU, Lucia... From GSACC, Margaret, comes word that Jean, ex-G3IHSQ and ex-VS1T, is about to operate as DL2YL in Germany... After residing temporarily in Virginia, W4LEM, Annette, and OM W4GWV have returned to their permanent home in Ft. Lauderdale, Fla. ... Some new YLs are WN4AWX, Cornelia, Tenn.; 13-year-old WN4WPO, Jeannie, Louisville, Ky.; WN1WJW, Mary, Wantzouth, Mass.; WN1WNT, Evelyn, Braintree, Mass.; and WS8LZ, Joy, of Dayton, Ohio, the daughter of WS8TYF, Lillian... With the aid of amateur radio, W4WHL, Helen, of Shelbyville, Tenn., and OM WS8CF were able to locate missing heifers in California and thereby settle a Tennessee estate... The Long Island Unit of YLRL voted to sponsor a fund-raising project for W2JO, Bob Gunderson, and his Braille Technical Press, and to undertake the secretarial work of that organization... In two years W4SD, Katharine, has worked 140 mobile stations in 19 states... W9s DBH, Elythe, and KOY, Inga, call into the North Dakota 150-meter net daily... In December the Fasto-lant Amateur Radio Club (W4NPT, Naval Air Station, Norfolk, Virginia) set aside usual meeting matters and devoted time to tell nonlicensed women in attendance about the YLs of amateur radio. Substituting for W4LAS, Mabel, a talk was given by the XYL of W4OFL. The YLRL Photograph Album was displayed, and it was felt that the program had probably won new feminine recruits for the hobby.
More power for 2 meter mobile!

Introducing the "222"...a new two meter transmitter to meet the demand for greater power output and increased range from mobile units. The 222 is capable of power outputs from 5 to 7 watts with a 300 volt power supply yet satisfactory operation, at decreased output, is possible with 200 volt supplies. The output circuit includes a low-loss antenna changeover relay and an adjustable series-tuned, coupling link for operation into 52 ohm co-ax lines. High level plate modulation, (with P-P 6AQ5's) is used.

The basic intent of the overall design has been to produce a highly stable, (Crystal controlled) transmitter and to apply time-tried-and-proven commercial practice to a new and highly worthwhile piece of amateur equipment.

FREQUENCY RANGE: 144-148 mcs. (Also covers adjacent Civil Air Patrol frequencies)
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(300 V supply)
TUBE LINEUP: 6X8 XtL osc & multiplier, 5763 multiplier, 2E6 PA, 2-6AQ5 mods.
XTL FREQ. RANGE: 8 to 8,222 kcs, FT-243 holders.
MICROPHONE: F1 type required.

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TELEX HEARING AT ITS BEST

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TVI Committees Progress Report
(Continued from page 49)

are amateurs have at one time or other asked for
the cooperative assistance of their committee in
clearing TVI or BCI cases directed against their
own stations.

There are humorous aspects to all work con-
ected with human relations. TVI investigations
are no exception. The following case histories
were submitted by the WTVIC (Washington
D. C. Committee):

A complainant adamantly refused to allow an
amateur to install a high-pass filter at an affected
television receiver, at no cost to the receiver
owner, but instead purchased a low-pass filter
which he insisted the amateur accept for installa-
tion at the transmitter involved. The TVI com-
nittee, with the aid of Commission representa-
tives and a manufacturer’s agent, resolved this
case satisfactorily. The amateur station was
found “clean” of objectionable harmonics. Since
the low-pass filter was therefore of no use in this
case, the complainant, in a friendly gesture, of-
fered the filter for the future use of the com-
nittee.

One committee was asked to investigate an
interference condition whereby a local television
channel was affected by “an awful squealing
noise” every Friday evening during telecasting
of wrestling matches. It developed that on Friday
nights an elderly uncle regularly visited the fam-
ily reporting the interference. He alone watched
the wrestling matches. Investigation proved the
“interference” was actually due to weak bat-
teries in a hearing aid used by the uncle, resulting
in an oscillating condition within the aid.

Continuing Progress

The interference committee program has been
and should continue to be publicized as widely
as possible. The articles and editorials which
have appeared in radio magazines coupled with
the personal and written contacts by ARRL and
other amateur organizations as well as by radio
clubs and individual amateurs have successfully
launched the program and developed it into a
nation-wide coordinated effort. Let’s keep the
program rolling and acquaint everyone con-
cerned with it, including the TV set owners. The
Regional Managers and their staffs comprising
the Engineers-in-Charge of district offices and
other FCC engineering personnel of these offices
stand ready to explain the program to new
groups and to give all possible assistance. Pub-
licity alone is only the means of lighting the fuse.
The problem then resolves itself into plain hard
work by committee members. The examples of
such tireless work and the results accomplished
which have come to the Commission’s attention
have been extremely encouraging. It is predicted
that this cooperative effort will in the years to
come reduce TVI to the present minor status of
BCI.

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