S9

the citizens band journal

JULY 1962

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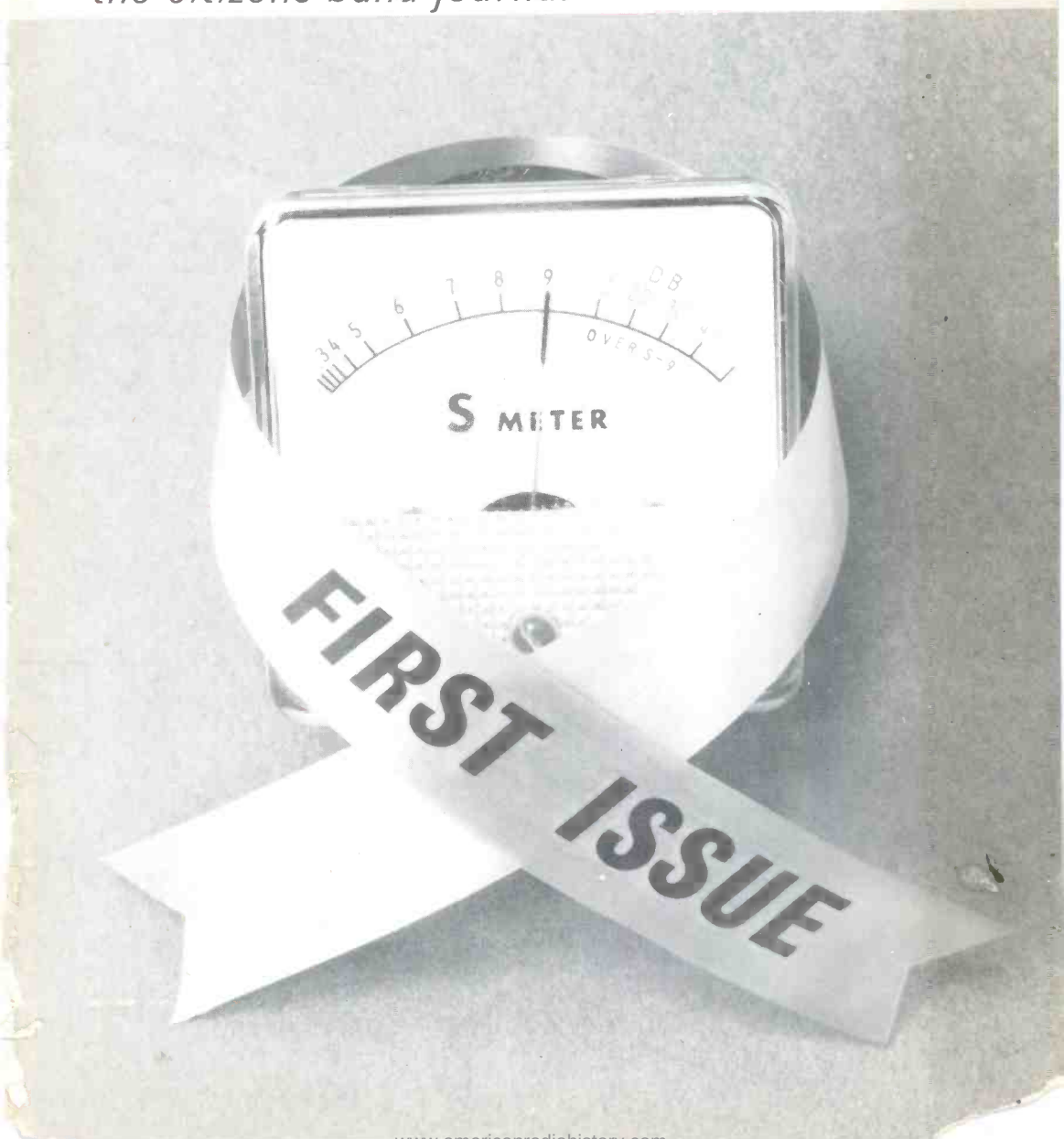

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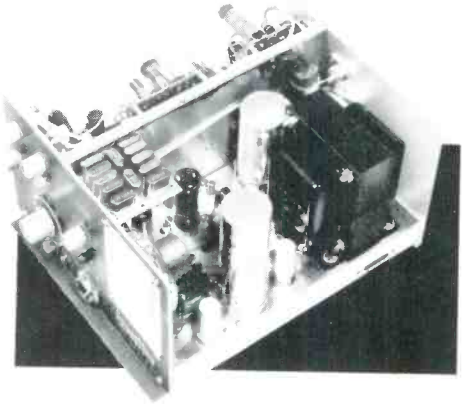

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transceiver model 100

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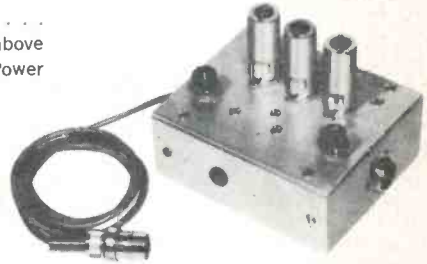

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the citizens band journal

Vol. 1, No. 1

July, 1962

S. R. COWAN, PUBLISHER

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FEATURES

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STAFF

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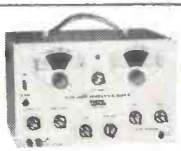

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Editor S9

Recently many newspapers and magazines have come on the market supposedly to be a benefit to CB'ers, but only to take on a pseudo-amateur aspect. This Association has subscribed to all of them only to be disappointed in the end after the periodical has been in circulation for a while.

The Citizens Radio Service NEEDS the advice and guidance of a sound publication; one that is for CB, understands it, and will publish the honest facts. We hope that S9 will be it.

Donald C. Ludwig, 19Q2436
Executive Secretary
Citizens Radiophone Association
Detroit, Mich.

Thanks for your interest in S9, Don. We, of course, are putting much thought into the forthcoming issues of S9 and we are certain that S9 will surpass your expectations.

One area in which we will be pioneering is unbiased equipment reviews. If the set is a lemon—that's what we'll call it. If it's good —we'll say so. This is the only way which you, the CB'er, can be assured of getting the most for your purchase power.

We will not be recommending methods of circumventing FCC rules and regulations by finding loopholes in Part 19—however we will probably take the FCC to task now and again for rules which we feel are not in the best interests of the Service or its users.

Editor S9

I hope that your new magazine will be a big success in a very short time.

Alton E. Glazier, 12W0420
Glazier Scientific Laboratories
Oakland, Calif.

Editor S9

Best wishes with this new publication. I hope that you will count me in as a regular contributing author to S9

Rufus P. Turner
Altadena, Calif.

Editor S9

Lots of luck in the new venture; I hope it will become as great in the CB field as CQ is in the Amateur. In a week or two I will submit several articles for your consideration to be published in S9.

Basil Barbee, 10W1256
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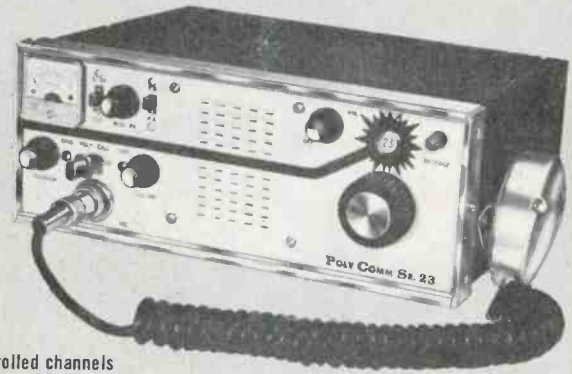

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We will be bringing you articles by well known and respected authors such as Tom Kneitel (now exclusive in S9), Don Stoner, Herb Friedman, Lee Aurick, Ed Noll, Len Buckwalter—men whose writings have appeared in all leading electronics publications.

Our goal? It is simple—to bring you interestingly written, useful information which will enable you to obtain maximum utilization from your CB equipment. Not just maximum utilization in the "nuts-and-bolts" department, but maximum utilization of the CB service within the limits of the FCC's Part 19.

The articles in S9 MAGAZINE are custom tailored to the interests of CB'ers—written so that all can easily understand each and every feature, and so that every CB'er will be able to build and use our construction projects.

S9 MAGAZINE will also be giving you articles on basic electronics so that you will gain a working knowledge of the equipment which you use. The information contained in these articles will enable you to become an FCC licensed Second Class Radiotelephone Operator if your interests lie in this direction. If you do not desire to become licensed thusly, the information will nevertheless supply you with a wealth of easily understood information on one of the most fascinating topics of our 20th century, electronics.

Clubs and individual CB'ers are invited to keep in touch with S9 MAGAZINE and we look forward to receiving your club papers, suggestions and comments, ideas for features, and we even invite our readers to write up stories on their favorite construction projects. S9 MAGAZINE pays top rates for original articles such as are appearing in this issue.

S9 is a quality publication, intent upon bringing you the kind of reading material which you have indicated you want. We will always support a "fair shake" for the CB'ers.

We look forward to a most pleasant relationship with our readers.

S. R. COWAN,
Publisher

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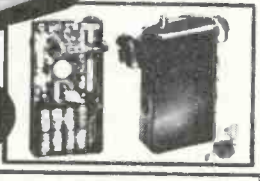

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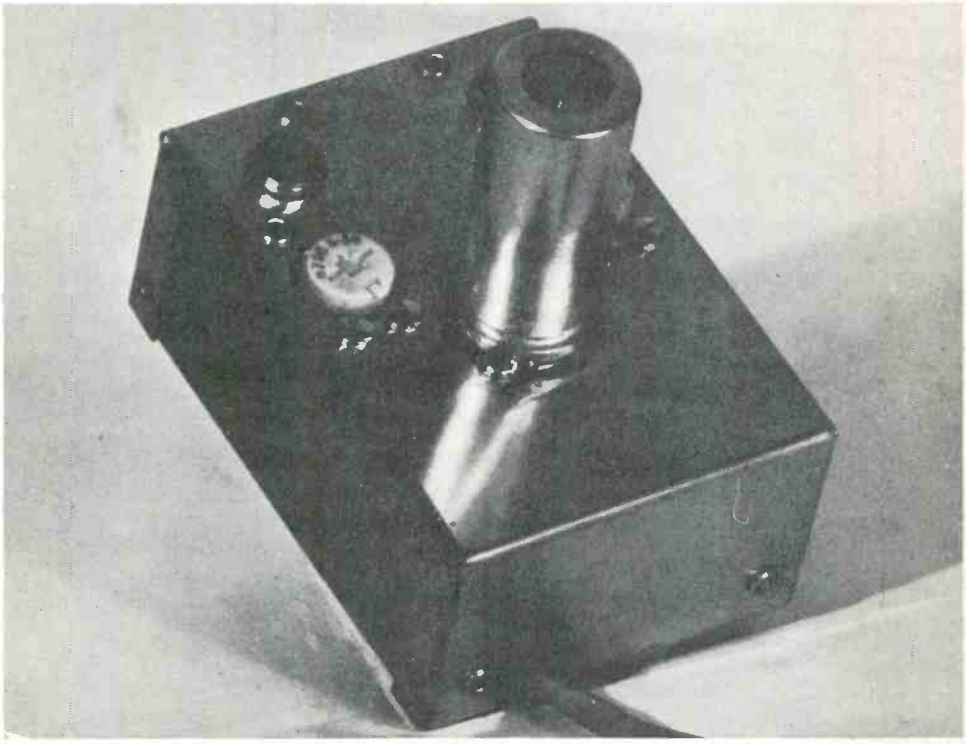
THE S-9 PREAMPLIFIER,

OR, PUTTING THE 6CB6 ON CB



by HARVEY HURWITZ, 2W2921

The desire of most CB operators to supplement and aid the receiver portion of their units is quite evident. Many methods have been proposed such as changing tubes, increasing voltages, and even coupling one or more units together. By far the best method of increasing the sensitivity of your rig is by the use of a tuned preamplifer. The 6CB6 pentode lends itself quite admirably to this service. It's inherent high gain (16 or more DB) and low noise figure make it an ideal tube for the purpose. The circuitry required and the relatively simple metalwork will allow even a most inexperienced builder to obtain excellent results.

The chassis consists of a Mini-box measuring 2½" x 3½" x 1½". The sample unit was built of copper plated steel, aluminum will serve although some modification will be required to permit effective grounding of the shield partition. In the wiring instructions that follow it will be assumed that either copper plate or any similiar solderable metal has been used for the chassis.

The first step consists of laying out and drilling the chassis as per the sketch provided. All holes are ⅛" unless otherwise specified. Upon completion of the drilling and punching, carefully bend the finished chassis starting with the outside flanges. From this point on we will proceed in numbered steps.

Soldering

1. Use a good grade of Rosin Core Solder, 60-40 alloy. If this is not available, 50-50 may be used, although more heat is required.
2. Almost any commercial soldering iron in the 50 to 100 watt category may be used. Be sure that the iron is well tinned.

3. Wrap or crimp the wire to the terminal to be soldered. Solder is NOT A GLUE, do not depend on it to hold everything together.

4. In soldering to the chassis you will note that the solder, when first applied, will form a small raised bubble. Continue to apply heat until the edges of the bubble suddenly spread and flow over the adjacent metal and the spot flattens out.

5. The symbol (S) means Solder. (NS) means do not Solder.

Step By Step Assembly

1. Using two 6-32 x ½ Binding head screws (with nuts and lock washers), mount the 6 lug terminal strip at the rear inside edge of the chassis.

2. Using two 6-32 x ¼ binding head screws, lock washers and nuts, mount the 7 pin socket as shown. The keyway must face lug D on the 6 lug strip.

5. Using the shortest possible leads, connect a .005 disc capacitor between lug B on the strip (NS) and the chassis (S).

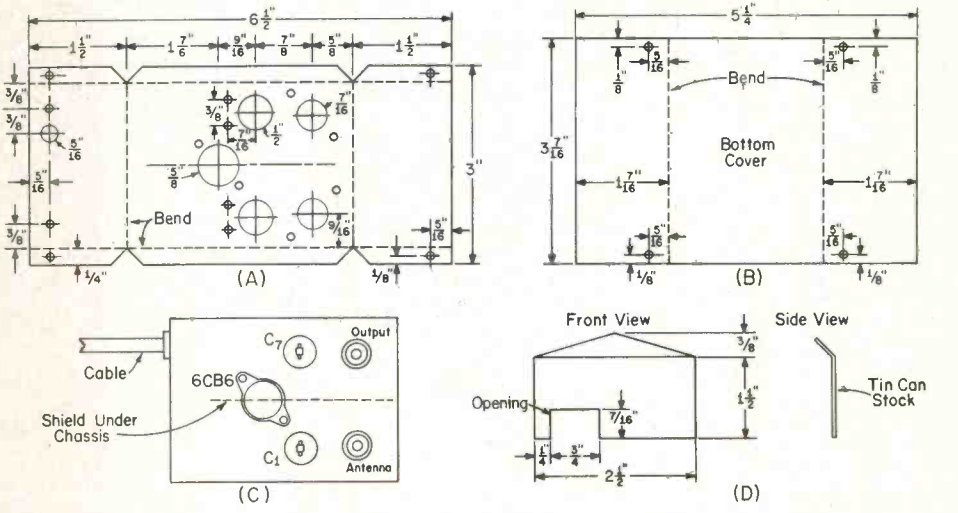
6. Select the 470 K ohm resistor R-1 and pass one lead through lug B and over to lug A on the strip (S) (S). Connect the free end to pin 1 on the Socket (NS).

7. Select the 100 mmfd tubular capacitor and using a ¾ lead connect one end to pin 1 on the socket (S). Connect the other end to the lug on trimmer C-1 nearest the terminal strip (NS).

8. Using the shortest possible leads, connect a .005 disc ceramic between the chassis (S) and pin 7 of the socket (NS).

9. Connect a short jumper between pin 7 (S) and pin 2 (NS). Be sure that this jumper does not short against the center post of the socket.

10. Using the shortest leads possible connect a .005 disc capacitor between the chassis (S) and pin 2 of the socket (NS).



These illustrations show the mechanical details of the preamp. Diagram (A) shows the mechanical specifications and layout of the chassis. (B) shows the dimensions of the removable cover. (C) indicates the proper layout of the parts through the punched holes of the chassis. (D) indicates the dimensions and proper preparation of the internal shield which goes beneath the chassis.

3. Using four 6-32 x ¼ Binding head screws, lock washers and nuts, mount the two variable capacitors C-1 and C-7 in the holes next to the tube socket.

4. Using four 6-32 x ¼ Binding head screws, lock washers and nuts, mount the two RF Jacks in the two holes at the front of the chassis.

11. Select the 10 ohm resistor R-2 and connect it between pin 2 of the socket (S) and the chassis (S).

12. Using a 2" length of brown hook up wire, connect pin 3 of the socket (S) and lug C of the strip (NS).

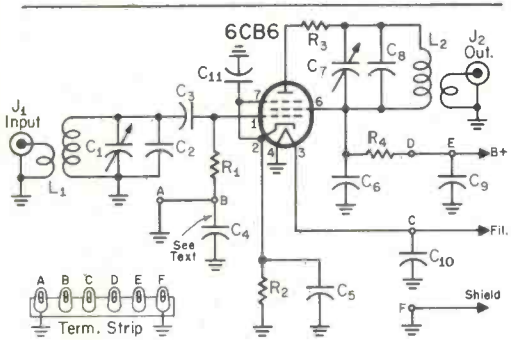
13. Using the shortest leads possible connect a .005 disc capacitor between lug C of

the strip (NS) and the chassis (S).

14. Connect the filament lead on the 2 conductor cable to lug C on the strip (S).

15. Connect the shield on the cable to lug F on the strip (S). The cable should pass through the 5/16 hole under the strip. Be sure that you have placed a grommet in this hole.

16. Connect the "B plus" lead on the cable to lug E on the strip (NS).



The schematic of the S9 Preamp, showing the connections to the terminal strip.

Parts List

C1, 7 8-50 mmf trimmer (Centralab 822-AN)
C2, 8 50 mmf disc ceramic
C3 100 mmf tubular
C4, 5, 6, 9, 10, 11 .005 mf disc ceramic
L1, 2 12 turns #20 DCC on ½" non-inductive form close wound with a 3 turn link of #20 plastic covered hook-up wire on the "cold" end.
R1 470K ½-watt
R2 10 ohm ½-watt
R3 100-ohm ½-watt
R-4 1K ½-watt
TS1 6 lug terminal strip
V1 6CB6 tube
X1 7-pin socket with shield clamp
J1, 2 Motorola-type jacks
Chassis is a 2½" x 3½" x 1½" copper plated steel or aluminum Mini-box.
Grommet is 5/16", cable needed is 18" of 2 conductor shielded type, also needed is a 7-pin type tube shield.

17. Connect a short yellow jumper between lugs D (NS) and E (NS) on the strip.

18. Connect a .005 disc capacitor between the chassis (S) and lug D on the strip (S).

19. Bend and solder pin 4 on the socket to the chassis.

20. Select a 50 mmfd disc capacitor and connect same between the two lugs on capacitor C-1 (NS) (NS).

21. Connect transformer T-1 as follows:

Primary winding, one side to each lug on capacitor C-1.

Solder the lug nearest the terminal strip.

Place a short jumper wire between the remaining lug and the side of the antenna Jack. (S).

Connect the link on T-1 with one side going to the centerpost on the antenna Jack (S) and the other going to the side of the Jack (S).

22. Select the 1,000 ohm resistor and connect it between lug E on the terminal strip (S) and pin 6 on the tube socket (NS).

23. Connect a .005 disc capacitor between the chassis (S) and pin 6 on the tube socket (NS).

24. Connect a jumper wire between pin 6 on the tube socket (S) and the lug on capacitor C-7 nearest the output Jack (NS).

25. Select the 100 ohm resistor and connect it between pin 5 on the tube socket (S) and the lug on capacitor C-7 nearest the terminal strip.

26. Select the remaining 50 mmfd disc capacitor and connect it between the two lugs on capacitor C-7 (NS) (NS).

27. Mount transformer T-2 as follows:

Primary winding, one side to one lug on capacitor C-7 (S). The other side to the remaining lug on C-7 (S).

Link, one side to the side of the output jack (S). The remaining side to the center post on the output jack (S).

28. This completes the wiring of the unit. There should not be any unsoldered joints remaining at this point.

29. Carefully place the center shield with the cut out over the tube socket. The bottom of the cut out should be touching the ground post on the socket. Hold the shield in vertical position and solder it to the ground post. At this point carefully check to see that none of the tube socket pins are touching the shield. Solder the far end of the shield to the chassis. Solder the near end of the shield to the chassis. The assembly of the S-9 preamp is now complete.

30. Check carefully for opens and shorts, attach the bottom cover, place the 6CB6 in the socket and place the shield on the tube.

Installation and operation

This unit requires 6.3 volts at 130 ma. for the filament and 100 to 250 volts at 8 ma. for the plate. The power required is small enough to be taken from your transceiver without any problem. The following precautions MUST be observed. For 12 volt operation. Replace the brown wire in step 12 with a 22 ohm 2 watt resistor, 27 ohms is recommended for 12 volt mobile use.

For power sources greater than 115 volts B plus, the yellow lead installed in step 17 should be replaced with one of the following values: (Caution) measure this voltage before you connect the preamp.

B-Plus	Resistance
115-135	2.7K ½ watt
135-150	3.9K 1 watt
150-180	6.8K 2 watt
180-200	8.2K 2 watt
200-250	2-27K 2 watt in parallel
250-300	2-39K 2 watt in parallel

In transceivers, a preamplifier must be connected between the receiver portion antenna coil and the antenna switch or relay. Under NO circumstances should you allow the transmitter to feed R.F. power into the preamplifier. If your unit, such as in the Polycomm utilizes a T.R. switch type arrangement, it will be necessary for you to add a relay or switch that will perform the switching function.

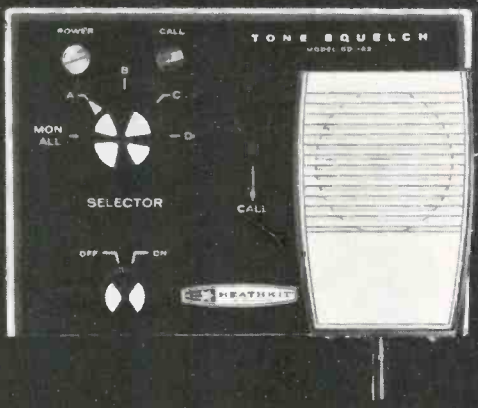
Upon completion of all the preceding steps you are now ready to tune up the unit. Connect your antenna line to the preamplifier input jack. Connect the preamplifier output jack to the antenna coil on the receiver. All cables should be made of RG58A/U with Motorola type connectors.

Tune the receiver to Channel 11 (or to the channel used for the local area) and adjust capacitors C-1 and C-7 for maximum output on a weak signal or on background noise. You may also desire to stagger tune these capacitors (one at channel 3 and one at channel 20) for relatively flat results across the entire band. When the notch in the ceramic disk is towards the mounting screws, the trimmer is set at maximum capacity.

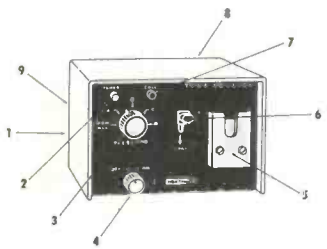
Should you be in an area where there are numerous strong signals it will probably prove desirable to add AGC to the preamplifier to prevent overloading of the receiver. To add AGC to the S-9 preamp, cut the bare wire between terminals A & B on the 6 lug strip. Using an additional length of wire, connect lug B to a point on the AGC bus of your transceiver.

Watch for next month's big issue

First new concept in citizen's band equipment in two years! . . . Heathkit 4-Position Selective-Call kit



an exclusive with Heath, this inexpensive unit converts your CB station from "party line" confusion to "private line" calling convenience



FEATURES

(1) squelch time-delay control, **(2)** power indicator, **(3)** tone selector switch (4 tones plus "monitor all" position), **(4)** tone squelch "defeat" switch for normal operation **(5)** "lift-to-operate" microphone bracket, **(6)** "call" lever **(7)** "call" indicator, **(8)** external alarm contacts to signal received call, **(9)** input and output level controls.

Here's welcome news for the serious user of Citizen's Band two-way radio. Heath's new Selective-Call Kit with tone squelch makes it possible for you to enjoy the calm of a CB station that is completely silent, yet ever alert for a personal call . . . makes it possible for you to call your choice of four specific units in your system at the touch of a button.

Using a unique new method, Heath's Selective-Call Kit features an *exclusive* 4-position rotary selected resonant-reed relay which responds only to calls transmitted by similarly equipped units using the same tone frequency. Upon receipt of the proper tone, your unit will automatically "come to life" permitting you to hear the call letters transmitted . . . you reply by merely lifting the microphone and acknowledging. At all other times, your station is peacefully quiet, allowing you to perform your job without one ear "cocked", for this unit does your listening for you.

To call another unit, just select the correct one of four tone frequencies, press the lever, and the called station will be waiting for you. Nothing could be simpler or more convenient. A "defeat" switch allows normal transceiver operation at any time. Equip all your CB units now with this economical new advance in communication ease . . . instructions included for installation with most popular CB transceivers using PTT.

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GW-12 Single channel all crystal controlled transceiver from **$39.95**

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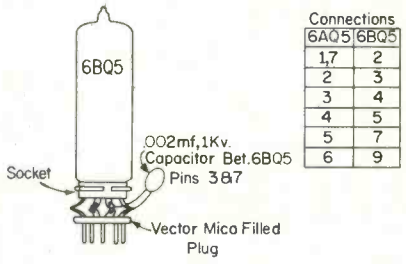
Plug in Surgery

by JIM GIBSON, 2W7610

There have been many occasions where a desired change in circuitry or choice of tubes has been neglected due to the natural reluctance of the set owner to perform major surgery. In many cases, insufficient space is available for the new components. A situation such as this was presented when the Polytronics Labs changed over to the Model G and all subsequent models. The original units used a 6AQ5 as a modulator tube, however the improved versions utilize a 6BQ5 modulator. The resultant increase in audio quality and talk power warranted making the change in existing units.

Due to the rather compact circuitry under the chassis, the thought of placing a punch and dismantling half the rig in the process brought a quick halt to the operation. A few days later while poring over our favorite parts catalogue a small item set things going again. There it was, a 7 pin plug, mica filled and only 1/16 of an inch thick. Slowly an idea came to the fore. Leave all the goodies under the chassis alone, mount the socket for the 6BQ5 on the plug and make all the necessary changes between the plug and new socket. An examination of the schematic disclosed that basically the wiring of both the 6AQ5 and the 6BQ5 were compatible. The tube elements had been wired in a similar rotary configuration.

The first step is to obtain an Amphenol 9 pin socket. Using a pair of cutters, carefully remove the mounting ring and discard same. Being careful not to damage the socket, remove the center ground lug and similarly discard same. Carefully bend the socket lugs down and out until they radiate out like the spokes of a wheel. At this point lugs 1, 6 and 8 on the nine pin socket should be removed entirely. This is easily accomplished by straightening the lugs and again bending them until they snap off. The clip portion inside the socket will then drop out. Carefully bend the lugs on the 7 pin plug until they are also fanned out like wheel spokes. Position the socket over the plug with lugs 4 and 5 of the socket directly over and touching lugs 3 and 4 of the plug. Solder these lugs together. Place a short jumper wire between lugs 1 and 7 of the plug. Solder lug 7 only. Connect lug 1 on the plug to lug 2 on the socket and solder them together. Connect lug 2 on the plug to lug 3 on the socket in a similar fashion. Connect lug 5 on the plug to lug 7 on the socket. Connect lug 6 on the plug to lug 9 on the socket. You will probably have to bend these lugs sideways to do this. BE SURE that you do not accidentally short lug 7 on the plug to lug 6 on the plug or lug 9 on the socket.



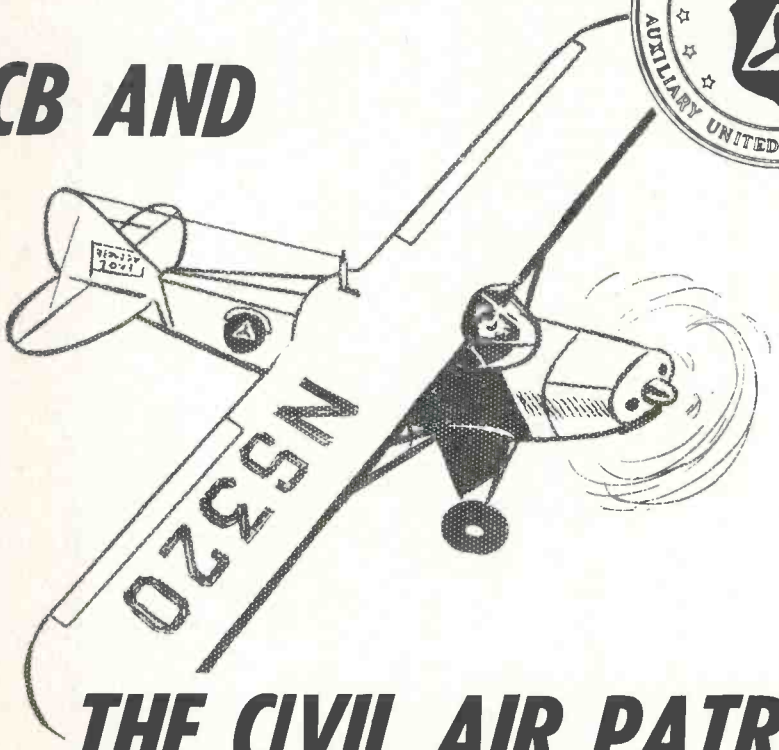
Connections	
6AQ5	6BQ5
1,7	2
2	3
3	4
4	5
5	7
6	9

Install a .002 1KV disc capacitor between lugs 7 and 3 on the socket. Use plastic sleeving over the leads and keep the leads as short as possible. The unit is now complete.

Remove the 6AQ5 modulator tube from its socket. Plug a 6BQ5 tube into the plug socket assembly and using the tube as a handle,

Continued on page 59

CB AND



THE CIVIL AIR PATROL

by TOM KNEITEL, 10Q3161/2

Well meaning CB'ers are continuously seeking ways and means to place their communications equipment at the disposal of organizations performing emergency operations. We've seen how CB'ers have aided police and fire departments, Civil Defense, The Red Cross, and rescue teams.

The most recent rash of CB public spirit seems to be directed towards the Civil Air Patrol, so say the newspapers and public information releases of many CB clubs. According to the clubs, CB'ers are adding their communications gear to supplement CAP communications.

While CB'ers should certainly be encouraged to continue their public service work, there are particular problems which are encountered when working with the Civil Air Patrol which should be taken into consideration and fully understood by all concerned.

The CAP is a volunteer semi-military flying organization composed of personnel who operate and maintain civilian aircraft, who are vitally interested in the advancement of aviation and who are sufficiently public spirited and patriotic to contribute voluntarily, in wartime and peacetime, their aircraft and personal time to the Air Force. Since the CAP is the official Auxiliary of the U.S. Air Force, the mission of the CAP is outlined in Air Force regulations and in Public Law 746 of the 79th Congress.

Members of the Civil Air Patrol are authorized to wear regulation USAF blue uniforms with distinctive CAP insignia. Regular USAF ranks may be earned by the members.

Watch for next month's big issue

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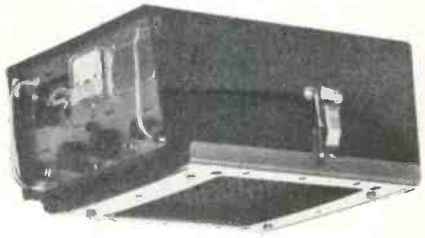

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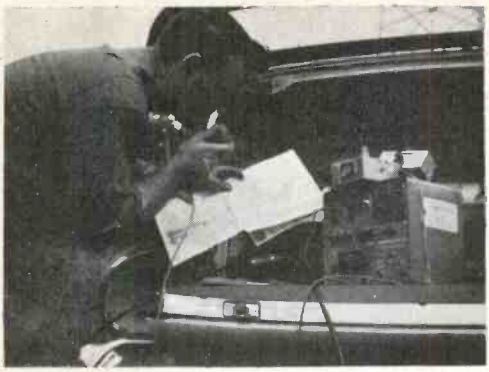


Catskill Mountain (New York) Group's Lt. Floyd Dallas operating "TOMCAT 303", a CAP mobile radio station on Microwave mountain during a recent CAP exercise.

The membership is comprised of 70,000 men and women throughout the 50 states, Puerto Rico and the District of Columbia. Each of the members belongs to one of the 3000 local squadrons, groups, or works at one of the statewide ("Wing") headquarters in his or her spare time.

The CAP functions in many ways, although the most well known would be in its search and rescue or mercy missions. During World War II the CAP pilots flew our coastlines spotting enemy submarines.

One of the basic laws of any operations of this kind is: "Without communications there can be no operations."

Towards this end, the CAP has established what amouns to the largest privately owned two-way radio communications network in the world, consisting of about 13,000 stations. The stations operate on special frequencies given to the CAP by the Air Force and each of the stations is assigned a coded ("tactical") callsign for its operations.

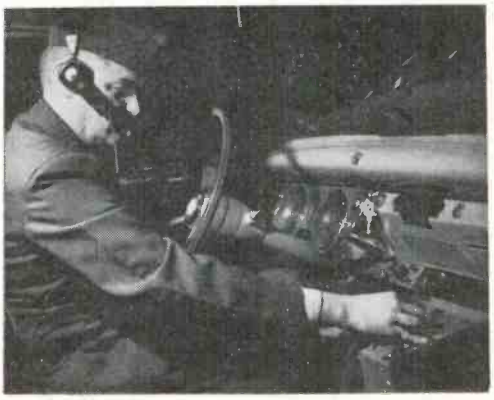
The operators of these stations are the civilian members of the CAP who have received qualified training in communications procedures. The operators are required to pass a relatively simple non-technical exam before they are permitted to operate a CAP station. Successful completion of the exam earns the member a CAP operator's license.

The stations themselves are operated in the homes, aircraft and autos of the members and at CAP meeting places.

Regular nets are maintained on the CAP frequencies so that the stations can check-in each week, although the real value becomes apparent when the CAP participates in an emergency operation. It is during these emergencies that the CB'ers have been pitching in.

Here's an example, as reported in a recent edition of the Williamsport (Pa.) Sun-Gazette: CB'ers were ordered by the CAP to participate in the search for a lost plane. The CB'ers allegedly provided radio communication between various CAP units participating in the search, and the CAP members themselves utilized communications on CB frequencies.

These CB'ers are to be commended for their service to the community, however they were apparently not aware of official CAP



Lt. William Wetzel, N. Y. Wing, C.A.P., tunes his VHF rig before checking into VHF net. Lt. Wetzel is also Amateur Radio Operator K2RHW.

Lt. William Wetzel, N. Y. Wing, CAP, checks into the VHF net via the rig installed in his car.

decisions on such activity and neither were the many other CB'ers who have participated in similar CAP activities.

In an effort to clarify the position of the CB'er and the CAP, we asked some questions of CAP National Headquarters. Here's what they had to say:

QUESTION—May CB frequencies be utilized by non-members of the CAP for traffic related to CAP operations during in an emergency?

ANSWER—The Citizens Band is not permitted to be used for either official or unofficial CAP traffic during search and rescue missions by CAP members. We do not exercise any control over traffic handled by non-members but discourage their participation except in emergencies. These situations are provided for by Paragraph 19.61(k) FCC Rules and Regulations.

QUESTION—May CB be used as part of routine CB activities by members of the CAP to supplement the regular CAP radio nets?

ANSWER—The use of CB by CAP during routine CAP activities is prohibited. The practice violates the restriction on CB that "they not be used as links in the physical circuits of other radio services." (SS Bulletin 1001, November 1959).

QUESTION—Suppose the CAP unit obtains a CB license in its own name? Wouldn't this place the CB units into the CAP radio network?

ANSWER—Specific instructions have been issued stating that CAP units will not be licensed in the Citizens service. The CAP has its own assigned frequencies and, honoring the intentions and purposes for establishing the CB, has no legitimate reason for encroaching upon that already overcrowded service. If CB licenses have been obtained they will be cancelled.

QUESTION—Suppose the persons wishing

These CAP Cadets get a briefing in how to handle a Gonset Communicator during a radio drill. They also get a thorough course in sending and receiving CW.

to furnish the CAP communications on CB frequencies were holders of CAP radio operator's licenses? Would such transmissions then be permitted?

ANSWER—Since CB stations will not be licensed to CAP units, the question of the requirement for a CAP radio operator's license needs no answer.

The CAP Headquarters has also stated that the mission of CAP communications is to provide a communications net capable of supporting the overall CAP mission. They feel that, to a degree, they already have this ability although they are constantly trying to improve the quality first and the quantity second. They said, "We do not desire to dilute the present situation with untrained and largely uncontrolled operations such as exists on the Citizen's Band."

All is not lost, however. CB'ers interested in putting their communications ambitions and abilities to CAP use are invited to participate in CAP by actually joining the organization and receiving CAP communications training. The CAP has said, "We are anxious to recruit present CB'ers into CAP provided they operate on CAP frequencies in a controlled net. We are not interested in introducing CB procedures and techniques . . . into the CAP."

Membership is open to American men and women over the age of 18. There is a cadet program for those between 14 and 18 years of age.

Although none of the official CAP frequencies permitted for use in the continental United States are close enough to the 11-meter Citizens Band to permit operation of CB rigs on CAP frequencies, there is a "Hawaii only" CAP frequency on 26.620 mc/s which could be attained by only slightly modified CB rigs. There is a possibility that this frequency might at sometime be allocated for CAP use within the continental United States (as suggested in "ON THE CITIZENS BAND," Popular Electronics, December, 1960). The CAP feels that if this frequency could be cleared for stateside use there would be a natural co-existence of trained CB/CAP'ers and the CAP nets.

Under such a plan, CB'ers would enroll in the CAP, receive instructions on CAP communications, then utilize their CB equipment for official CAP communications on a CAP frequency, while still being able to use the equipment for regular CB use on the CB channels. This is much the same as the Amateur Radio service and the Military Affiliate Radio System ("MARS").

The CAP can find a place for *you* in its ranks. If you're interested, contact National Headquarters, Civil Air Patrol-USAF, Ellington Air Force Base, Texas.

By the way, just in case you're wondering, you *cannot* be activated into military service on the basis of belonging to the CAP, although service in the CAP can obtain you a rank upon your entry into the military service in some cases.

Demonstrating proper radio procedure is Cadet Cpl. Patti Follender of the CAP's New York Wing. Looking on, left to right, are Cadet Lt. Joseph Petti, Lt. William Wetzel, and Cadet Sgt. Joan Traglia.

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☐ **COMMAND GP-1 GROUND PLANE**—(solid alum. radials, heavy duty) (reg. $16) SALE **$8.99**

☐ **COMMAND COMET ANTENNA** (top-loaded whip + trunk lid mount) (reg. $10) SALE **$6.99**

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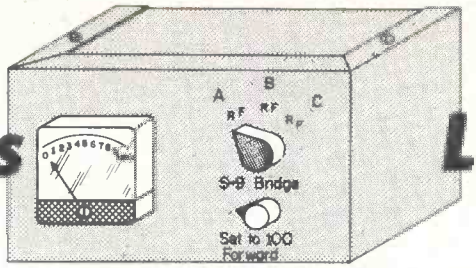
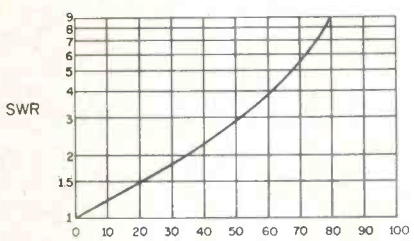
A Low-Loss  Low-Cost Standing Wave Ratio Bridge!

by HANK MILTENBERG, 2W9299

The art of antenna and feed line tuning has come a long way since the days of the *Zepp* and *curtain* antennas. It is common practice these days for an antenna and feed line to be as carefully matched as the components in a good high fidelity amplifier. The tool that has made this all possible is the *Standing Wave Ratio Bridge*. With this device it is a simple job to determine exactly how much of the output power is actually being radiated and how much is being reflected back down the cable (and lost). In simplest terms this is the definition of Standing Wave Ratio. The proper use of this instrument enables the operator to tune either the antenna, the line or both until the percentage of reflected power approaches zero. At this point the SWR is said to be 1:1. There are certain problems inherent in some of the use of commercially available instruments.

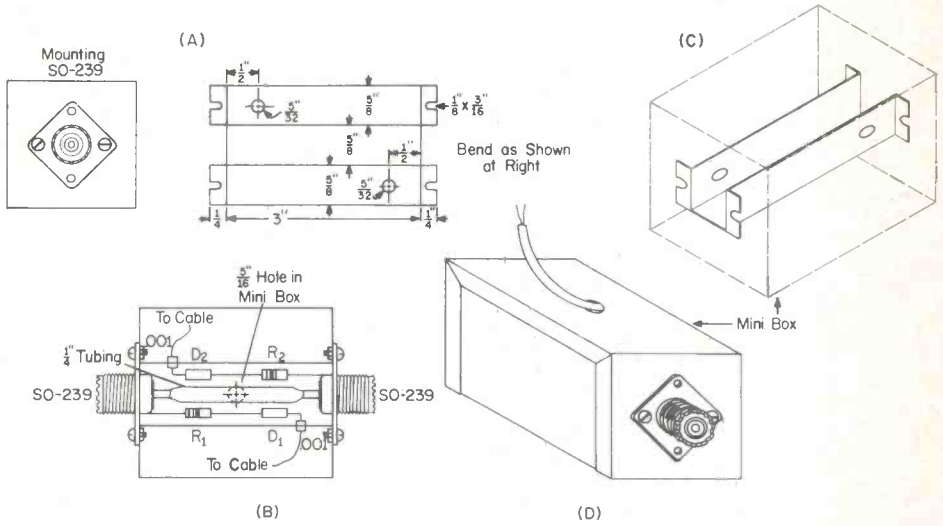


This graph shows how much of your signal is reflected back into your transmitter (and therefore not radiated) as SWR rises. Some CB installations have been measured as having an SWR rating of 7:1, indicating that about 75% of the potential signal was being wasted.

Foremost is the power loss experienced by the insertion of the bridge into the line. A second problem that is most often overlooked is the physical size of the unit itself. When a line has been carefully pruned to achieve a minimum SWR the removal of six inches of bridge results in a now detuned line. The obvious solution is the use of a permanently installed, negligible loss bridge. Since there is no reason why the meter and necessary switches must be enclosed with the bridge, remote operation is not only feasible but desirable. The final design exhibited such features as unmeasurable loss on 11 meters, small size, dependable operation up to 400 mc, remote operation of one or more bridges with only one meter, and best of all, low cost. The entire bridge assembly was built for under $5.00 and the box ran about $7.00 with the meter included.

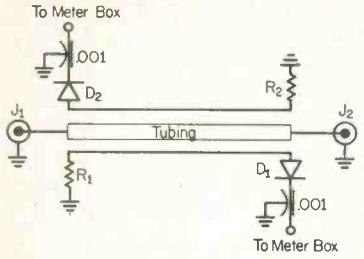
The SWR bridge itself is built into a 3" x 2" x 2" mini box. Punch two ⅝" holes at either end of the box for the SO-239 RF connectors. Cut and bend a piece of tin can stock per the drawing and carefully bend it into a trough as shown. Make all bends at right angles. Since the dependable operation of this unit depends upon symmetry, you must work carefully and neatly. Drill a 5/16" hole in the back of the mini box and insert a rubber grommet. Mount the SO-239 connectors on either end of the box with the mounting flange on the OUTSIDE as shown.

Using four 4-32 x ⅜ binding head screws, lockwashers, and nuts, carefully mount the SO-239 connectors and the previously bent trough. The screws will pass through the SO-239 flange, the box, and the slotted holes in the trough end flanges. The open portion of the trough should face up with the closed back being parallel to the back of the mini box. See the sketch provided. Solder the end flanges of the trough to the projecting sides of the SO-239 connector on the inside of the box. Carefully mount and solder a .001 feed through capacitor in each of the holes previously drilled in the trough line. The value of resistor R-1 and R-2 will vary according to the precise spacing used. At this point it is well to start with a value of 150 ohms ½ watt. Check the resistors carefully and attempt to use a pair of equal value as determined on a good VTVM. Do not kink or damage the pigtail leads in the subsequent steps. Cut one lead to a length of ¾ of an inch. Bend a ¼" right angle at the end of this lead. Solder this end to the side of the SO-239 connector where it touches the trough being sure that the resistor and its leads are parallel to and in line with the center terminals on the two SO-239 connectors. Mount the Diode CR-1 on the inside of the .001 feed through capacitor using the shortest lead length possible. Be sure to protect the diode by holding the lead with a pair of long nose pliers during this soldering operation. Connect the remaining diode lead and the remaining resistor lead and solder them together. Trim off any excess lead. Be sure that the resistor, diode and their leads are parallel to but not touching the trough. In a similar fashion, mount the remaining resistor R2 and Diode 2 on the opposite side of the trough. Cut a length of ¼" copper tubing and solder same to the center conductors of the 2 SO-239 connectors. Be sure that the tubing is centered over the center posts before soldering. Carefully adjust the two resistor diode combinations until they are equidistant and parallel to the center tube. If this is not done the finished bridge will not work correctly. Pass a length of 2 conductor shielded cable through the grommet installed in the mini box. Solder the braid to the OUTSIDE of the trough where it touches the SO-239 (either end). Solder one of the leads to the feed through that is connected Diode 1. Solder the other lead to the remaining diode feed through. This completes the construction of the bridge. Now for the Meter Box.



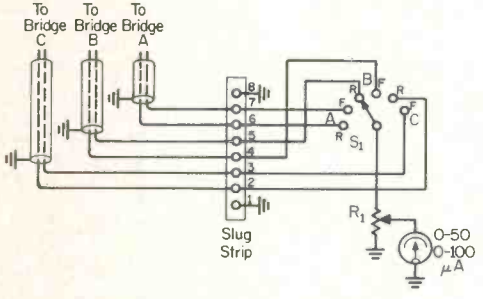
Several views of the "thru-line" part of the SWR bridge described in this article. Figures "A" and "B" show the construction of the units inner workings. Figures "C" and "D" show details of the cabinet. In figure "B," R1 and R2 are 50 to 150 ohms and matched (see text), D1 and D2 are miniature diodes (1N51, 1N34, etc., matched).

Mount a 0-50 or 0-100 microamp meter, a 25K or 250K pot and a single pole, 6 position switch on a Mini-box. The size and place-



Schematic diagram of the "thru-line" portion of the SWR bridge.

ment of parts is not critical. Mount an 8 lug terminal strip inside the box and drill a convenient hole with a grommet for the cables. Connect one end of the meter to ground. Ground one end of the pot. Connect the center arm on the pot to the remaining meter contact. Connect the remaining resistor contact to the center arm on the switch. Connect the switch contacts to the terminal strip as follows. Reading clock-wise from the back switch terminal 1 to lug 2, terminal 2 to lug 3 etc. Solder the connections at the switch only. Connect the cable from bridge A as follows. One conductor to lug 7 (solder), one conductor to lug 6 (solder) and the shield to lug 8 (solder). If only one bridge is being used, this completes the wiring. The choice of conductors in the bridge cable is not critical at this time. Any additional bridges will be connected in similar fashion to the remaining lugs. See the schematic for details.



Schematic diagram of the meter box which is attached to the "thru-line" unit.

OPERATION AND ADJUSTMENT

To properly adjust the bridge, you will require a 50 ohm non-inductive load. Suitable units for Citizens Band use are the *Cesco*, *Philmore* FS-1 wattmeter, or any comparable unit. Do not attempt to use another SWR bridge for this purpose. Insert the bridge in the line, perferably at the output jack on your unit. Key the unit and observe the meter. You should get a reading at this time. If the reading is too high, adjust the meter control until it is mid scale. The meter can be set on either forward or reflected at this time. If the meter reads backwards, simply reverse the meter connections. With the meter set at forward, key the unit and set the control for a midscale reading. Record the reading. Remove the bridge from the line and turn it over so that the jacks are now reversed. Set the meter switch to reflected. DO NOT DISTURB THE METER POTENTIOMETER DURING THIS SEP. Key the unit and observe the reading. It should be the same as the prior reading. If it is higher, you can adjust the bridge by moving the corresponding resistor and diode assembly away from the center tube (this movement will be very slight so do it gently). If the reading is lower, you simply move the assembly closer to the tube. Repeat this step of turning the bridge end for end a number of times until both resistor-diode units give the identical readings. The bridge is now in balance. For the next step, key the unit and flip the switch between forward and reflected. One position of the switch will give a higher reading than the other. This is the true forward position. If you observe a higher reading with the switch in the reflected position, turn the bridge end for end in the line. Once you have the higher reading in the forward position the bridge is properly placed in the line. With the transmitter on and the bridge set for forward, adjust the potentiometer until the meter reads 100 (the higest scale number if your meter is calibrated differently). With the transmitter still on, switch to the reflected position. The meter should drop to zero if you are using a 52 ohm load or watt meter. Should you fail to obtain a null reading you will have to experiment with the value of resistors R1 and R2. The exact value is dependent upon a number of variables in the

Watch for next month's big issue

construction process and will fall somewhere in the range of 50-150 ohms. Once you have obtained a proper null reading the bridge is set. No further adjustment is required. You are now ready to use the bridge as a test instrument. Since this unit is dependent upon symmetry for accuracy it is quite important that care be exercised in the adjustment steps.

The basic concept of SWR measurement entails the comparison of the RF power being used and the percentage of this power being reflected back down the line. Since the meter being used is not calibrated directly in SWR it will be necessary for you to compute same by using the graph provided. For example, with the control set to read 100 forward, then you get a reading of 20 on reflected this is an indication of 20% reflected power or an SWR of 1.5-1. Similarly, a reading of 100 forward and 60 reflected indicates an SWR of 4-1. The primary objective that we should hope to attain is an SWR below 2-1, or 35% reflected. It is interesting to note that many operators spend considerable time and money attempting to reduce an SWR of 1.2-1 to a perfect 1-1. The only comment that can be made is that the effect of this effort is nill at a listening station. The SWR bridge although quite accurate is best used as a simple go-no-go meter. Any reading above 35% reflected is cause for concern. Any reading of 20% or less means that all is well upstairs with the sky wire. The inbetween range, though not cause for concern is an indication that things could be improved. If you approach the problem with these thoughts in mind, you will not only end up with an excellent signal, but will also have peace of mind.

As this unit is designed to be permanently installed in the line, it is well to discuss the bonus features at this time. You now have a built in tuning meter and monitor. By setting the control below 100 forward, you can use the meter to peak the transmitter to maximum output by simply watching the meter as you tune. Modulation is indicated by a swing of the meter. NOTE, a downward movement of the meter DOES NOT indicate downward modulation. The mere fact that the meter moves, regardless of direction indicates that the carrier is being modulated.

Continued on page 59

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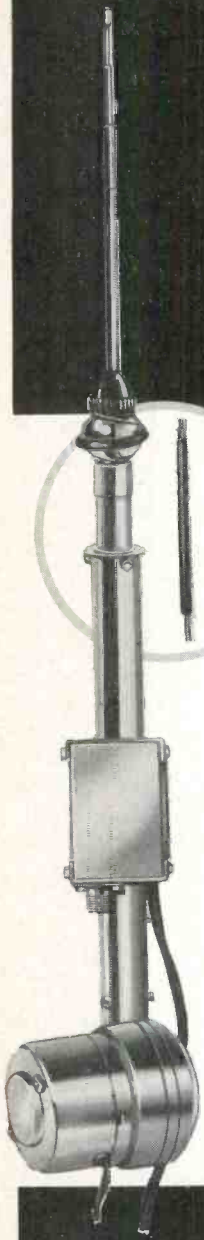

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C-BAM-2	Rear	CB-AM-FM

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Model	Mounting	Reception
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C-BEE-2	Rear	CB

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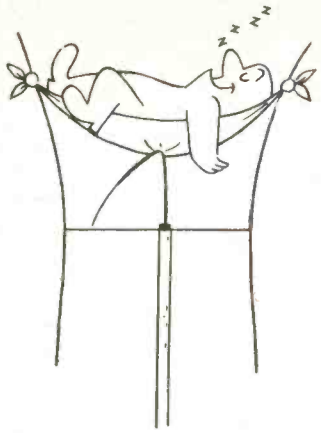

ANTENNAS

by COMMANDER PAUL H. LEE, USNR

One of the most important problems any CB'er must face is, "What type of antenna should I use for maximum coverage?" The frequencies used for Citizens Band work are high enough so that it becomes practical to achieve good gains with reasonably sized antennas. Since we are primarily interested in radiation at angles near the horizontal (along the ground) and not in DX work, this article will discuss only those antenna types which are designed for this kind of coverage.

The simplest of all, of course, is the quarter-wave vertical, used against a ground plane of some sort. If one has a sheet metal roof, or the top of a large water tower, for example, or an automobile roof, the quarter-wave is easy. Its base impedance, while not a perfect match for 52 ohm RG-8/U coaxial line, is close enough so that a match giving better than 2.5 VSWR is possible. This is

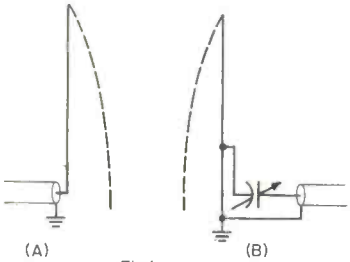

Fig. 1

tolerable at the low power involved. If one desires a perfect impedance match, the bottom of the quarter-wave can be grounded, and it can be fed with a "gamma match" type of feed with a series capacitor to tune out the reactance. The quarter-wave vertical has an inherent gain of 3 db over a dipole. The quarter-wave vertical, with both series and shunt feed, is shown in Figures 1(a) and 1(b). The vertical may be made of light-weight aluminum tubing, or it may be one of the commercially available whips with a spring-base mount. The ground plane, if of sheet metal, should be of at least a quarter-wave radius. If it is made of wires of tubing, these elements should be at least a quarter-

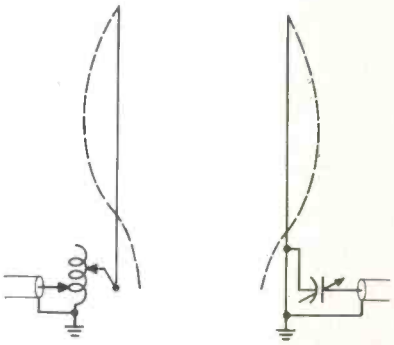

Fig. 2

wave long. They may be either horizontal, or drooped. If they are drooped, they can be used as portion of guys for the mast, thus serving a dual purpose. What I say regarding ground planes here applies also to those for the types of antennas to follow.

The next best antenna to use from the standpoint of gain is the ⅝-wave vertical, which has a gain of about 3 db over a quarter-wave vertical. Even at 27 mcs. this is still a reasonable size. Its base impedance when insulated from ground will be in the order of

45-150 ohms, which will require inductance to resonate it. It may be matched to 52 ohm coaxial line by the circuit shown in Figure 2(a).[1] It may also be grounded and shunt fed by the "gamma" match as shown in Figure 2(b).

If one wishes to become more sophisticated, a colinear antenna with a coaxial sleeve may be used. This type, shown in Figure 3, may be either series fed or "gamma" fed as before. The upper end of the quarter-wave

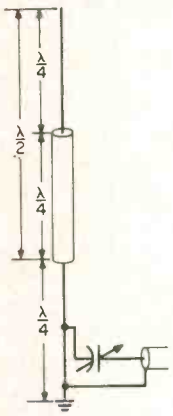

Fig. 3

Fig 4

coaxial sleeve is connected to the vertical element at a point one quarter-wave below the top as shown, and the bottom end of the sleeve, is left open. A 180 degree phase reversal occurs at the open end of the sleeve, which results in the current distribution shown in Figure 4. The top half-wave is in phase with the bottom quarter-wave. This results in a gain of 3.2 db over a quarter-wave vertical. The vertical element may be made of telescoping lengths of ¾" and ½" aluminum tubing, with the sleeve made of 1½" tubing, for 27 mcs. A colinear antenna of this type will have a base impedance which will be a bit higher than that of the quarter-wave vertical, but it should also be capacitive. I have never tried feeding one with 52 ohm line directly, but it is possible.

There is another way of building a colinear vertical, and that is to use a piece of rigid coaxial line for the vertical element itself, and to connect the phase reversal sleeves to the outer conductor of the coaxial element. This is shown in Figure 5. A decoupling sleeve must then be attached to the coaxial line at the proper point below the last colinear sleeve. The decoupling sleeve is a

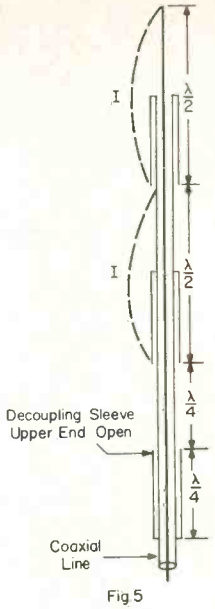

Fig 5

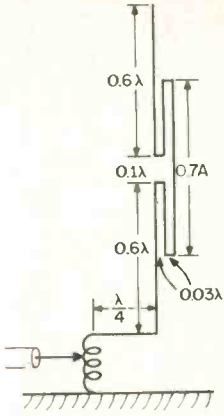

Fig 6

quarter-wave sleeve with its open or high impedance end up, acting as a choke and presenting a very high impedance to the antenna currents flowing down the outer conductor of the coaxial line. These currents are kept up in the antenna portion where they belong, and are kept off the remainder of the coaxial line. The bottom end of the vertical coxial member is terminated in a fitting which enables connection to flexible line such as RG-8/U. The upper end of the rigid line must be made water-tight by means of a seal fitting. The colinear made in this fashion from rigid line has the disadvantage of requiring pressurization with dry air or inert gas to prevent entrance of moisture under all weather conditions. This is feasible commercially, but may be beyond the reach or the desires of the average CB'er. It is described here for the benefit of those who may wish to pay for a commercial-type installation.

Another way of obtaining vertical colinear action is by use of a design which has been used in point-to-point high frequency service, called the Folded Franklin Array.[2] The design parameters are shown in Figure 6. It consists of a column of vertical, overlapping half-wave dipoles whose centers are 0.35 to 0.40 wavelengths above each other, and whose ends are joined by folded wires a half-wave long. Since the base impedance is high, it must be fed through a quarter-wave transformer to couple to coaxial transmission line.

A chart showing the vertical patterns of the quarter-wave, ⅝-wave, and 2½ element colinear antennas is shown in Figure 7. For the sake of drawing clarity the small high angle lobes are not shown, as they contribute nothing to our groundwave coverage. The

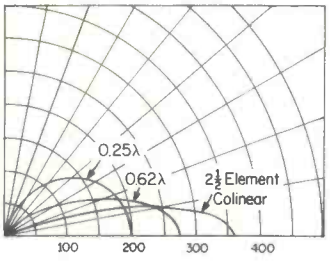

Fig.7

values of horizontal field strength shown are merely relative, and serve to demonstrate the gain in field strength that occurs with the colinear array.

In this article I have only wished to touch on the principles of design and not on mechanical details, in order to give you an idea of what can be done with fairly simple vertical arrays for concentrating the transmitted power at horizon angles for local groundwave coverage.

(1) CQ, July 1960, "Four Band Vertical DX Antenna, Mark II", by CDR Lee.

(2) "Antenna Theory and Design", Volume 2, by Williams, Pitman Co.

"I understand he was a CB'er."

PRE-HISTORIC CB REPORT

by TOM KNEITEL, 10Q3161/2

It seems that many are quick to chronicle the histories of their own interests. The Amateur Radio operators are steeped in history and are proud and quick to recall their humble beginnings as a handful of experimenters carefully hand-tooled most of the apparatus needed to transfer a feeble and wavering signal from one point to another.

CB'ers came a similar route although up until now very little has appeared in print regarding the formative period of the service.

The first official FCC mention of CB seemed to be in January, 1945 and in an effort to back-track the service for this report we obtained some tattered documents of this "prehistoric CB" period.

The first CB license ever issued had the callsign W2XQD and was assigned to Mr. John M. Mulligan, a radio engineer in Elmira, New York. W2XQD's license permitted operation in the 460-470 mc/s CB band with 4 units using modulated CW (A2), amplitude modulation (A3), and frequency modulation (A6). Inasmuch as the CB service wasn't called "the CB service" back in those days, Mr. Mulligan's license was for the "Developmental-Experimental" service. Interestingly, Mr. Mulligan is still a licensed CB'er, his Class D station, 20W0853, was the thirtieth such license issued in the 20W (now KIC) call area. His W2XQD license was issued on February 14th, 1947.

By the end of 1947 there were forty "CB" stations holding FCC authorizations. A complete listing of all of these stations accompanies this report.

FCC records indicate that these stations varied in power from 5 to 100 watts (high power is authorized in the UHF (Ultra High Frequency) Citizens Band. At that time the FCC would issue a license for a single unit,

The BC-645 transceiver

although one of the stations was authorized for ten.

Emission types were imaginative, to say the least. Some were licensed for AM, some for FM, some for CW, and yet others for radio-facsimile, pulse and other special types of emissions.

It's interesting to note that FCC records show the first 11-meter non-Amateur station in operation at the end of 1947. The station was 3-watt experimental transmitter W10XXD, which consisted of two mobile units operating on Channel 23 (27.255 mc/s) with FM emission. The station was licensed to The Firestone Tire and Rubber Company.

CB pioneer Frank Heubner, who appears on the accompanying 1947 CB station roster as W2XRV, was mainly interested in developing equipment for Boy Scout and maritime use, testing the marine equipment on Long Island Sound in New York. Some of his early experiments where what might be described as "touch and go." He reports that with his flea powered equipment operating in the tricky UHF band, "Even the sap in the trees affected the signals."

Mr Heubner is still active on the airways, holding Amateur License W2IQR.

Another CB pioneer was Mr. William S.

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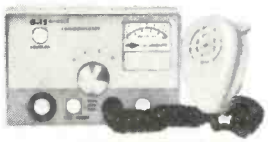

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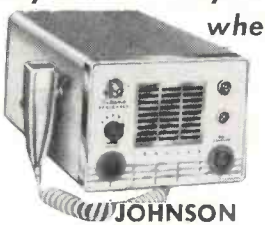

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Johnson "Messenger" 12 v mobile 110v base	144.95	11.91	6.50
Johnson "Messenger" 6 v mobile 110v base	144.95	11.91	6.50
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1947 CB STATION ROSTER

W2XQD	John M. Mulligan, Elmira, N.Y.
W2XRS	William M. Auld, Bound Brook, N.J.
W2XRV	Frank Heubner, New York, N.Y.
W2XSN	McGraw-Hill Publishing, New York, N.Y.
W2XVL	William S. Halstead, New York, N.Y.
W3XGW	Leo M. Connor, Brandywine, Md
W3XGX	The Electronics Co., Baltimore, Md.
W3XOK	Kenneth O. Kelly, Washington, D.C.
W3XOM	Kenneth O. Kelly, Washington, D.C.
W4XDP	George W. Gray, Jr., (portable station)
W4XER	Harold C. Lummus, Jr., Columbus, Ohio
W4XNB	Ross Bateman, Falls Church, Va.
W4XNC	Ross Bateman, Washington, D.C.
W4XND	Ross Bateman, Washington, D.C.
W4XWH	W.R. Burns, Columbus, Ga.
W5XAJ	William S. Martin, Sand Springs, Okla.
W5XAK	J.E. Surratt, Jr., Dallas, Tex.
W5XCV	James R. Franklin, Jr., Dallas, Tex.
W6XAG	City of Los Angeles, Calif.
W6XMZ	James W. Roy, Venice, Calif.
W6XNS	Remler Company, San Francisco, Calif.
W6XRQ	Harold B. McKay, San Francisco, Calif.
W7XMK	George V. Wiltse, Snohomish Co., Wash.
W7XML	John O. Warren, Seattle, Wash.
W7XQM	Frederick G. Hiscox, Seattle, Wash.
W7XQN	Frederick G. Hiscox, Seattle, Wash.
W8XAF	Irving A. Gross, Ohio (portable)
W8XAG	Irving A. Gross, Ohio (portable)
W8XAH	Irving A. Gross, Ohio (portable)
W8XJ	George H. Cryder, Delaware, Ohio
W8XRQ	James L. Hearn, Cincinnati, Ohio
W8XWI	Guy S. Cornish, Cincinnati, Ohio
W9XDN	Tower Radio, Indianapolis, Ind.
W9XLQ	Brooks H. Short, Anderson, Ind.
W9XMA	Farnsworth Radio & TV Corp., Ft. Wayne, Ind.
W9XYN	Motorola Co., Chicago, Ill.
WØXHN	M.D. Redlingshafer, Pueblo, Colo.
W10XEJ	Radio Corp. of America, (mobile)
W10XEL	Radio Corp. of America, (mobile)
W10XEM	William B. Lurie, New York, N.Y.

Halstead, formerly W2XVL. Mr. Halstead, who was also a pioneer ham radio operator (station 2LH), is well known for his developmental work in the field of multiplex broadcasting (the basis to today's FM stereocasting). Mr. Halstead is the President of United International. Back in 1947 Mr. Halstead's CB activities were largely centered around superregenerative receivers and directional antennas. Mr. Halstead envisioned the use of UHF CB along the nation's highways, using relay stations at intervals along the highways to bridge the distance between base stations and the limited-range mobile units.

The Vocaline JRC-400 CB rig

Of course, all equipment was "homebrew" in those days, with the exception of a piece of military surplus gear called the BC-645 IFF transceiver. At best, the BC-645 required extensive modifications to successfully operate in the CB service.

The rig had 12 tubes, a 12-24 volt dynamotor, and was operable over a frequency range of 460-490 mc/s. It was not a particularly pretty piece of equipment, looking like 1001 other pieces of gear taken from military aircraft and put on the surplus market for tinkerers, a far cry from the sophisticated looking CB gear on the market today.

Right after the war BC-645's were selling for as little as $16.00 but by 1958 the price had risen to $30.00, plus $8.00 for the dynamotor.

The only two commercially made low-cost communications units which achieved any national recognition were the *Vocaline* JRC-400 and the *Stewart-Warner* "Portafone", both making their appearance in the early 1950's. These units were FCC type approved for licensing in the Class B CB service, located on 465 mc/s.

The *Vocaline* transceiver was attractively styled in a small cabinet with a handle on the top so that the unit could be either carried or used as a desk-top unit. A small vertical whip antenna was also on top of the unit. Different models of the JRC-400 were available for all voltages.

The *Stewart-Warner* "Portafone" was housed in a bulky handset type case and required the user to carry along a rather heavy battery pack. The antenna was a collapsible dipole mounted atop the handset and horizontally polarized.

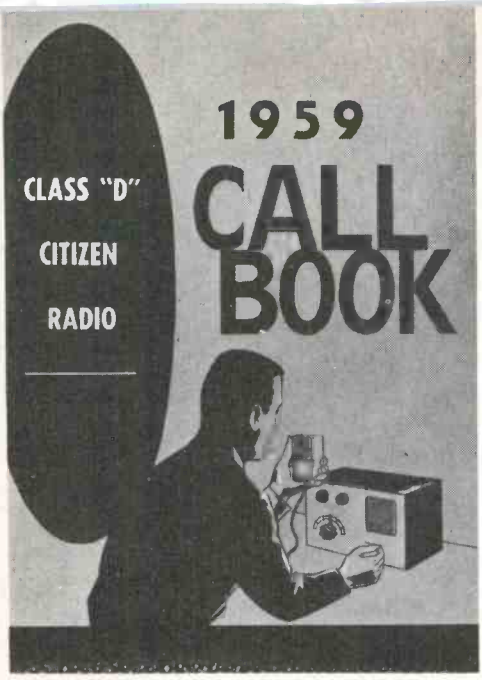
The price range for both of these transceivers was approximately $100.00 each.

We were using the old Class B CB band back in the early 1950's with the callsign 2A0305. Operation was difficult most of the time and even stations within line of sight were rough copy or completely unreadable, depending upon their surroundings. There were instances of two stations being less than one city-block apart and having no communication, but a change of location of as little as 5 feet by either of the stations would make for perfect copy. There were never any problems of interference from other stations on the channel though, in fact even though the sets were used in the heart of New York City no other licensee's station was ever heard.

Higher power UHF units were, and still are, available at relatively high prices as compared to the Class B transceivers. Class A stations, however, have considerably more range and their communications are very reliable. Class A stations may use 60 watts, while Class B (like Class D) stations are limited to 5 watts input.

Looking back, it seems that a combination of good and bad aspects of the Class B service went into the making of the Class D service we now use. The pioneers proved that there was a need for low-cost two-way personal radio communications, and the inherent trickiness of low-power rigs trying to operate in the UHF band proved that 465 mc/s was not the best place for such communications.

Apparently the FCC kept this in mind. In 1957 when it reshuffled its frequency allocations we were given the 27 mc band which was formerly assigned to the Amateur Radio Service.



THOSE "KOOKIE" CB CALL SIGNS

The only thing which exceeds the confusion among CB'ers regarding the various CB callsigns are the callsigns themselves. Under present licensing it would be possible for a CB'er in Chicago to hear the following prefixes operating on CB: 18W, 18A, 18B, 18Q, 18QA, and KHA.

There was a time, back in the late 1940's when the calls assigned to CB stations were from yet one more call "series". Back then, *before* the CB service was called "Citizens Radio", the stations were licensed as experimental radio stations and their callsigns were of the kind normally assigned to experimental stations.

This was before the 24 CB call areas were established and the call areas coincided with the ten Amateur Radio Service call areas, "zero" through "nine", with mobile stations in the "tenth" call area. Calls were similar to W2XRV, W8XAF, W10XEM.

The "W" indicated that the station was located in the United States, the number was the call area, the "X" stood for "experimental", and the one or two letters which followed were to give individuality to the stations identification.

Because of the fact that these calls were assigned to any different number of experimental stations, they were not assigned to CB stations in consecutive order.

By the early 1950's the CB service had come into being as an entity unto itself. The callsigns were revised to give the CB stations a more distinctive identification. The calls issued under this new system consisted of the prefix numbers "one" through "twenty-four" (each FCC district had a different prefix number), the letters "A" or "W", and four numbers.

At that time, if you wanted a CB license you had the choice of applying for it in Washington or directly with your FCC district office. District offices were then assigning "A" series calls (5A0021, 18A1002, etc.) to persons who applied directly to them, while Washington's calls were from the "W" series (6W0014, 11W1108, etc.).

In mid-1958 the Class D (27 mc/s) CB service was opened and station applications immediately began to flood into both district and Washington offices of the FCC. It didn't take long before there were so many applications pouring into the FCC district offices that the understaffed clerical departments were unable to cope with the burden. Only 11 of the old "A" series calls were assigned to Class D stations by the district offices when it was decided to shift the entire CB licensing responsibilities to Washington. At that time the "A" series calls were no longer issued and Washington continued handing out their "W" calls.

Things were going well with the Class D CB service by mid-1959 and a few hearty old-timers will possibly remember Interna-

TABLE 1

CB CALL ASSIGNMENTS

(1962)	1963	1964	1965	1966	1967	1968
1. KBA-KBB	KBC-KBD	KBE-KBF	KBM-KBN	KBO-KBP	KBQ-KBR	KBS-KBT
2. KBG-KBH	KBI-KBJ	KBK-KBL	KBU-KBV	KBW-KBX	KBY-KBZ	KCA-KCB
3. KCC	KCD	KCE	KCL	KCM	KCN	KCO-KCP
4. KCF	KCG	KCH	KCQ	KCR	KCS	KCT-KCU
5. KCI	KCJ	KCK	KCV	KCW	KCX	KCY-KCZ
6. KDB-KDC	KDD-KDE	KDF-KDG	KDK-KDL	KDM-KDN	KDO-KDP	KDQ-KDR
7. KDH	KDI	KDJ	KDS-KDT	KDU-KDV	KDW-KDX	KDY-KDZ
8. KEA	KEB	KEC	KEM	KEN	KEO	KEP
9. KED	KEE	KEF	KEQ	KER	KES	KET
10. KEG	KEH	KEI	KEU	KEV	KEW	KEX
11. KEJ	KEK	KEL	KEY	KEZ	KFA	KFB
12. KFC	KFD	KFE	KFL	KFM	KFN	KFO-KFP
13. KFF	KFG	KFH	KFQ	KFR	KFS	KFT-KFU
14. KFI	KFJ	KFK	KFV	KFW	KFX	KFY-KFZ
15. KGB	KGC	KGD	KGK	KGL	KGM	KGN-KGO
16. KGE	KGF	KGG	KGP	KGQ	KGR	KGS-KGT
17. KGH	KGI	KGJ	KGU	KGV	KGW	KGX-KGY
18. KHA-KHB	KHC-KHD	KHE-KHF	KHM-KHN	KHO-KHP	KHQ-KHR	KHS-KHT
19. KHG-KHH	KHI-KHJ	KHK-KHL	KHU-KHV	KHW-KHX	KHY-KHZ	KIA-KIB
20. KIC	KID	KIE	KIL	KIM	KIN	KIO-KIP
21. KIF	KIG	KIH	KIQ	KIR	KIS	KIT-KIU
22. KII	KIJ	KIK	KIV	KIW	KIX	KIY-KIZ
23. KJB	KJC	KJD	KJH	KJI	KJJ	KJK
24. KJE	KJF	KJG	KJL	KJM	KJN	KJO

Table 1. These are the probable CB callsign prefix assignments until 1968. In instances where two prefixes are shown with a hyphen between them, the second prefix shown is held in "reserve" in case the FCC "runs out" of assignable calls for the first prefix shown.

tional Crystal's now-obscure 1959 CB callbook. This was Volume 1, Number 1, of International's 4-book series. It had only 104 pages, a bright canary yellow and red cover and included all of the 2500 CB'ers licensed up to July, 1959. Now a collector's item and out of print, it is truly a piece of CB memorabilia. Although not too many were printed, now and again a few pop up and are snatched up by CB'ers. CB'ers interested in obtaining a copy of the rare "first CB callbook" should contact George Beyers (10W0376), 3213 N.W. 22nd St., Oklahoma City, Okla. George sometimes gets a lead on a few of the elusive volumes and might be able to help you dig one up.

By the midle of 1960 some of the more active CB call areas had exhausted all of the "W" calls which could be assigned (18W9999, 19W9999, etc). It was then decided that Washington would then resume assigning the "A" series calls, starting where the district offices left off. When they reached "9999" in the "A" calls they began "B" series calls (18B2202, etc.).

January 1, 1961, marked the first of the "Q" series calls. The "Q" calls were devised as part of a seven year plant to standardize the patchwork pattern of "W", "A", and "B" CB callsigns. The plan was that all CB stations were given a five year license; since 1961 was the only year in which the "Q" calls would be assigned, the FCC monitors could easily determine that any station operating with a "Q" call after December 31, 1966, was illegal.

To perpetuate the plan, 1963 licensed stations would have "R" calls, 1964 "S" calls, 1965 "T" calls, 1966 "U" calls, 1967 "V" calls, 1968 would return to the "W" calls, whereupon the cycle of "Q-to-W" would begin again in 1969. It had already been proven

impractical to permit Class D CB'ers to retain their original callsigns in the event their licenses were modified or renewed. It was (and still is) less expensive for the FCC to simply cancel the old callsign and start the CB'er off from scratch with a new one.

Despite this attempt at standardization of CB calls, the FCC again was faced with the problem of running out of calls in certain areas. This brought about the "QA" calls and faced them with the prospect of "RA", "SA", etc. calls in the future–further complicating the patchwork.

Another problem was that of the legality of the calls themselves. Under international agreement, Uncle Sam had agreed to assign callsigns using certain specified prefixes, namely "W", "K", "N", and "AA" through "AL". Clearly, the CB callsigns were in open nonconformity with international agreements.

It was then decided that Class A (460 mc) CB stations would kick-off yet another attempt to *final* conformity of CB callsigns. Starting in mid-1961 Class A stations began receiving calls from a series consisting of the letters "KAA" followed by four numbers.

Towards the end of December, 1961, the FCC made an "eleventh hour" decision to switch to a similar callsign system for *all* classes of CB stations, and this is the present system.

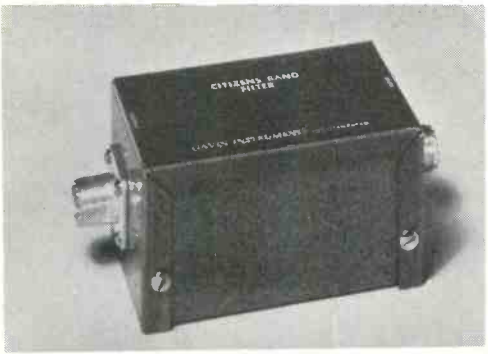
Is this the final answer? It would be foolhardy to hazard a guess in view of the FCC's prior record of decision reversals.

Based on *present* plans, you can probably look for the assignment shown in Table 1 to be doled out to CB'ers between now and 1968. The assignments listed in Table 1 have never before appeared in print anywhere and they do not necessarily represent the official FCC plans.

ON THE COUNTERS

Gavin Instruments, Inc. (Depot Square & Division St., Sommerville, N.J.) has announced a brand new CB-TVI filter designed to end television interference problems on 11 meters.

The device is factory tuned to cause essentially no loss to the power output of CB



rigs while at the same time reducing harmonics by a factor of 100,000. In construction, it is a multiple stage unit.

The filter is supplied with UHF connectors and is 4" x 2" x 2".

Webster Maunfacturing (317 Roebling Rd., South San Francisco, Calif.) has brought out a new coaxial antenna for fixed installations and also a new mobile antenna mount.

The VC-2 coaxial antenna is 17'2" high, having an effective length of one-half wavelength. It requires no ground radials. The manufacturer claims an SWR of less than 1.5 to 1 over the entire band and that its fibreglass and aluminum extremities will withstand weather extremes. The base is encased with a corrosion resistant gold finish.

For vehicles, the new "Hole-in-One" antenna requires a single 1 inch hole for mounting. The H-210 antenna mount has a heavy

chrome-plated ball-mount on a tenite base insulator.

The company will be happy to provide full details of these interesting new products upon request. Tell them that you heard about them in S-9.

The new Commaire ED-276 represents a total departure from all other Vocaline units, both in reliability of performance and variety of operating facilities. The entire unit mounts quickly for rugged mobile use or operates

as a handsome free-standing base unit. Receiver is a transistorized double conversion superheterodyne unit, with high receiver selectivity achieved through use of ceramic filters. Transmitter provides a full 5 watts input, with 100% modulation. Other features: 3-stage AGC, eliminates blasting and fading; harnessed assembly for easy servicing; transistorized power supply; combined "S" meter, frequency spotter and RF power indicator on front panel; 22-channel tuning; 5 fixed transmit and receive channels with 6th position on selector switch for front panel crystal; receiver fixed/tune switch; exclusive receiver fine tuning; combined squelch and sensitivity control . . . and many more features.

Columbus Electronics, Yonkers, N. Y., has announced more than 60 types of silicon rectifiers designed to permit direct plug-in replacement of vacuum or gas type rectifier tubes. Available in ratings to 40,000 volts PIV and 2.5 amperes, this CP series of rectifiers permits the replacement of tube types 5U4, 6X4, 3B28, 866, 8008, and many others.

Columbus Semiconductors are produced by Columbus Electronics Corp., 1000 Saw Mill River Road, Yonkers, N. Y. Further details on the new plug-in replacements for electron tubes may be obtained by writing Mr. Gus Bard, Sales Manager.

S9 REVIEWS THE SPEAKEASY

Did you ever notice that Rock 'n Roll records always sound loud-loud-loud, that even when the vocalist whispers it is a loud whisper. This effect of continuous high level sound is created in the recording room in order that the record be heard over noise. The next time you're in a restuarant give a listen to the jukebox, notice that regardless of how bad the noise level you will always hear the music(?). Now, speech (including singing) is not *loud-loud-loud*, it has dynamic range—loud at one moment and soft at others. If we establish a person's peak speech amplitude to be 100% (modulation), the average speech power is some 10db less, or about 30%. Recording engineers reduce dynamic range and increase average power through the use of a compressor, a special amplifier which reduces the peak power so that the overall level can be boosted. With only 6db compression the range would be 60-100% instead of 30-100%. In CB language, the "talk power" has been substantially increased.

By now you're probably getting the idea—the *Speakeasy* must be some form of compressor—well, you're right. The *Speakeasy* is a compression amplifier specifically designed for CB. The Deluxe model which S-9 tested

is a combination preamplifier-compressor with a *calibrated* percent modulation meter (*Communications, Inc.*, 33 Danbury Rd., Wilton Conn.).

The *Speakeasy* connects quite easily into any transceiver, above all it is not necessary

Watch for next month's big issue

to revamp the entire modulator circuit or change the mike. All you do is connect the power leads to the indicated points and the meter-control lead to the plate of the modulator tube. The transceiver's mike input lead is connected to the *Speakeasy* input and the Speakeasy output lead is connected to where the mike lead was orginally connected. The whole installation was "no strain" and took less than 20 minutes.

Two controls are provided. An On-Off switch which connects the *Speakeasy* or restores the transceiver to original operation and a Modulation Control which sets *your* transceiver to 100% modulation.

As shipped from the factory the *Speakeasy's* operation is averaged for most transceivers. However, internal adjustments are provided so that if you have an oscilloscope and audio generator (and know how to use them) you can adjust the *Speakeasy* to peak performance with your rig. When we tested ours we found the factory adjustments so close to perfect there was no need to tamper with the internal controls.

The *Speakeasy* is set-up by talking in a normal voice and adjusting the Modulation Control until the speech peaks reach 100% (as indicated on the modulation meter). That's all there was to it. The first thing we noticed was a decided improvement in audio quality. The *Speakeasy* has a shaped frequency response which results in a signal best described as having "sock". The modulation was maintained as a consistently high-level—and note this feature—with the percent modulation always reaching but *never* exceeding 100%, thereby avoiding overmodulation with its attendant distortion. Our final check was under severe noise conditions where we could hardly make out the general context of the transmission with the transceiver connected for normal operation. Switching in the *Speakeasy* resulted in nearly 100% copy.

We would like to point out that as far as we can determine the *Speakeasy* cannot salvage a modulator which has been wrecked by attempted modifications. The *Speakeasy* can only make a good (unmodified) modulator better, and because of its reserve gain, bring an older model transceiver which is shy on modulation up to 100%. Price category is $35.00.

THE INTERNATIONAL CRYSTAL EXECUTIVE 10

The *International Crystal* EXECUTIVE 10 always creates interest among CB'ers whenever it is displayed—not as many CB'ers seem to be as familiar with the Model 10 as compared with *International's* Models 50 and the deluxe Model 100. Nevertheless this smallest version of the EXEC is steadily making a name for itself despite being overshadowed by its two bigger brothers.

The EXEC 10 is unique in the fact that the set is actually three separate modular units—the transceiver, the power supply, and the speaker. This has its pros and cons. Pro: allows mounting of the very small transceiver on the desk with the power supply mounted on the floor, allows mounting the rig inconspicuously in a ventilated glove compartment of a compact or sports car with the power supply in the motor well, and allows remoting of the speaker from the transceiver. On the con side, if you decide to install the entire set of modular units in the same place, the sight of a bare power supply (a tube and

transformer on a chassis) with the interconnecting cable to the unit and the speaker with its cable can raise a few eyebrows if installed in the XYL's living room or in other "on-view" spots.

The transceiver itself is attractively styled in grey with white and blue lettering on the face plate.

In the performance department, because of the relatively low price of the EXEC 10, it does not have a built-in squelch or a push-to-talk, although such frills are available as accessories from International. The transmitter puts a healthy signal out on any one of three channels selected by the switch on the front panel.

The receiver is a tunable single conversion job which has a vernier tuning knob. Channels are marked off in alternate white and red strips on the tuning dial (which, surprisingly, has a dial light). Selectivity is average for a single conversion rig, with strong signals one or two channels to each side of the one to which you are tuned splattering a bit into the audio. The receiver warms-up into calibration in about 20 minutes and then is pretty reliable as far as denoting to which channel you are tuned. The tuning is easily re-calibrated by the adjustment of a trimmer, which can be accomplished through the top of the perforated metal cabinet with a plastic aligning tool.

Our conclusion: A good rig in the medium price field (about $89.50 *with* the power supply). Because of its interesting 3-unit construction it should have a number of applications for so-called "difficult installations". Construction is compact (chassis is a printed circuit board), lightweight, stylish. Adequate ventilation must be considered when mounting unit in cramped quarters.

AN OLD WORKHORSE GETS A SHOT OF ADRENALIN

One of the things which gave CB a tremendous boost was a rig known as *Lafayette* Radio's HE-15. When most of the rigs were superregens and a few high priced gold plated specials there appeared the HE-15, the first of the low priced superheterodynes. In a short while the HE-15 was the workhorse of 11 meters, if you worked two stations one of them was bound to be running an HE-15. Well, the parade passed the HE-15 by. From time to time a voice would be heard talking about its "poor selectivity" and "high drift".

But the HE-15 has been revamped, dubbed the HE-15*B* and is once more a strong contender for your money. *Lafayette* replaced the 1750 kc. IF amplifier with a 455 kc. amplifier, resulting in selectivity and performance comparable to rigs selling for much more. The drift has been virtually eliminated and after a short warm-up the dial calibration is quite accurate—when we tuned a channel 9 station the dial read channel 9. The receiver is extremely quiet. With the antenna disconnected and the gain full up we could barely discern any sound. (As a matter of fact for the first hour we thought something was wrong with the receiver.)

The crystal chamber has also been modified and the HE-15B now has eight switch selected transmit crystals all accessible through a slot in the front panel.

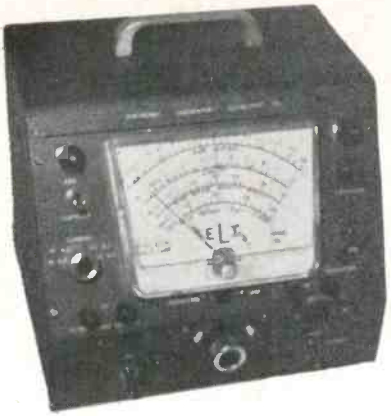
The superior noise limiter which was one of the outstanding features of the original HE-15 has been retained. Also retained is the excellent receive and transmit audio quality, as is the RF power indicator, and RF Jack which permits you to measure the final input current (plate power input).

The power supply is 110 A.C. only, but either a plug-in 6 or 12 V.D.C. power supply can be mounted on the transceiver's rear panel.

The HE-15B rates consideration whenever good performance at low cost is required. Price category: $60.00.

THE E.L.I. POWER SUPPLY

The *Electronic Laboratory Instrument Company* (381 Vermont Ave., Oceanside, New York) has come up with (in one package) an AC supply with a range of 95 to 140 volts, a DC supply with a range of 100 to 180 volts, both rate at 10 amperes continuous and 15 amperes intermittent. Both high voltage supplies feature power line isolation and the large meter uses the expanded scale showing only the range used for greater accuracy in reading. The low voltage supply provides 0-25 volts AC at 10 amperes, 0-30 volts DC also at 10 amperes continuous and in addition there is a special set of contacts providing 0-30 volts at 5 amperes continuous with extra filtering for transistor applications. Tests performed at this range indicated a ripple voltage of approximately .02% at 20 volts with a current drain of 2.5 amperes. Physically the



unit appears well built with no sacrifices being made in the quality of the components used. The large sloped meter face is quite easy to read. The placement of all the controls on the front panel is both practical and easy to use. All DC ranges utilize full wave bridge rectification. All in all this looks like a welcome addition to the test bench. Price categories: Kit—$80, Wired—$105.

A VERSATILE HYBRID C.B. CONVERTER

The American Electronics Company (AMECO) Model CBL converter uses a 12AD6 pentagrid converter tube which serves as both the crystal oscillator and as the mixer. In addition there is a 12EK6 pentode RF stage enabling the unit to work satisfactorily on weak signals and providing excellent image rejection by virtue of its tuned circuits. The CLB requires 12.6 volts at .35 amp for both filament and plate. The unit is wired so that the filaments are on at all times. It is suggested that a minor modification be made so that the switch mounted on the front panel will enable you to turn the unit off completely. There is a lead coming from pin 4 of the 12AD6 to terminal D of the 6 lug strip on the inside back of the unit. Move this lead to terminal C and the switch will now turn the filaments on and off as desired.

The CBL converter is available for Citizens Band, or any frequencies within the range of 2-50 mc. The versatility of this unit is such that by simply changing the crystal and adding or removing capacitance you can shift the frequency of the unit to any point between 20 and 50 mc without resorting to any major rewiring. Frequencies below 20 mc require new coils. These are available from Ameco at modest cost. Typical rewiring and retuning of the unit was accomplished in less than 20 minutes.

The CBL converter is quite compact and fits under the dash or in the glove compartment with ease. Connecting the converter to your auto receiver requires only a short length of auto antenna cable with a motorola connector at each end. Quite satisfactory results were attained with only the standard auto radio antenna being used. Citizens Band comes in between 975 and 1300 on the radio dial.

For ease of operation, sheer simplicity of installation and great versatility, this unit appears to be a excellent buy.

Base station use of this unit is possible by use of the Ameco PS-2 supply which provides 12 volts AC and 12 volts DC from 110 AC.

Scalp the Tennessee Valley Indians ... FREE!

One of the most frustrating experiences any CB operator can encounter is a complaint from a neighbor that he's interfering with television sets. TVI (Television Interference) is not a particularly new problem, but it's one that can be a consistent nuisance.

Basically, there are two fundamental measures that can be used toward remedying TVI. The average commercially built CB transceiver is normally designed by the manufacturer as well-shielded internally as possible, so there's little need to worry about this end of the problem. However, the CB operator would be most wise to use a low pass filter between his transmitter and antenna to further eliminate any spurious RF that the shielding in the transmitter failed to catch. In this way, the CB'er is absolutely free from blame in the eyes of the FCC, since he's done everything possible at his end to alleviate the problem.

Low pass filters are available commercially from practically every parts dealer of CB equipment supplier. They come in various sizes and power limitations, but since CB units have low power to begin with, the smaller filters will do an ample job. A few of the well known manufacturers who produce low pass filters are E. F. Johnson, Barker & Williamson, R. L. Drake, American Electronics (Ameco), and Gavin Instruments. Any and all of these units are recommended as suitable for the job.

Unfortunately, however, merely employing a low-pass filter in the line sometimes isn't enough to cure the TVI. In that case, the fault often lies with the television set itself, and here's where the fun begins.

Put yourself in the position of the average TV set owner. You're sitting at home, watching your favorite program on a TV set that costs anywhere from $250 up, and all of a sudden some guy down the block is shouting "Rodger-Dodger" while you want to enjoy the antics on Channel 2. In this situation you're not to prone to accept the idea that your TV set is to blame.

And yet, if the CB operator is to solve his TVI problem, he must do just that; he must convince the TV set owner that the fault is really in the TV set and not with the CB transmitter. His technique in handling the situation from the very outset will most often determine how successful he'll be, so we'd like to recommend certain basics of approach.

Firstly, the complaining neighbor will more likely be a stranger, since close friends are usually easy to convince and more willing to listen to reason. In that case, the first contact with the stranger complaining must be made as cordial as possible. Express complete horror at the thought that you might be disturbing him, and assure him that you wish to remedy the situation immediately. Try not to discuss the problem over the phone, but rather try to meet face to face to show him

TV DISTRIBUTORS FURNISHING FREE HIGH-PASS FILTERS

ADMIRAL
497 Railroad Avenue
Newark, New Jersey

CAPEHART
454 William Street
East Orange, New Jersey

CBS
% Mr. Roberts
Hygrade Electronics
9216 Church Ave.
Bklyn. 36, N. Y.

CROSLEY BENDIX
% Warranty Dept.
47-51 33rd St.
L. I. City, New York
Mr. J. Rigores

DUMONT
% Mr. Huemer
Igoe Brothers
35 Halsey Street
Newark, N. J.
(ALLOW 6 WEEKS DELIVERY)

EMERSON
14th & Cole Streets
Jersey City, N. J.
% Mr. Burnstein

GENERAL ELECTRIC
116 Washington St.
Bloomfield, N. J.

HOT POINT
% Mr. Harry Noll
TV Service Dept.
254 Elizabeth Avenue
Newark, N. J.

MAGNOVOX
% Mr. Chapman
Fort Wayne, Indiana

MONTGOMERY WARD
% Mr. Plue
19 Watchung Avenue
Plainfield, New Jersey

MOTOROLA
540 Burgen Blvd.
Cliffside Park, N. J.

PHILCO
% Mr. Mauro
Fineberg's
750 Dowd Avenue, Elizabeth, N. J.

R.C.A.
1573 Irving St., Rahway, N. J.
(MUST BE PICKED UP. SEE YOUR LOCAL DISTRIBUTOR)

SPARTAN
% Mr. Barnett
Fort Wayne, Indiana

SYLVANIA
700 Elliot St.
Batavia, N. Y., % Mr. Mooser
OR
1000 Huyer Avenue
Teterboro, N. J.

WESTINGHOUSE
% Mr. Ballantine
528 Ferry Street
Newark, N. J.

ZENITH
6001 Dickens Avenue
Chicago, Illinois

your station. In fact, you might even interest him in becoming a fellow CB'er, in which case a strong friendship might result.

Once you've explained to your neighbor what your CB rig is used for, the ticklish moment is at hand. You must now make friend neighbor understand that there are two basic pieces of equipment used in every radio contact, the receiver and the transmitter. In this case the receiver is his television set and the transmitter is your little pride and joy. Next explain that all electronic equipment is designed to work on specified frequencies, but that even the finest sets available can be so well made that they are capable of "pulling in" signals that they aren't intended to receive.

Remind him at this point that every once

in a while he's probably heard a far distant radio station slightly mixed in with the local broadcast programs, and that he might even be able to pick up TV signals from 200 or 300 miles away under certain atmospheric conditions. During this part of the discussion you begin to refer to TVI, not as *Television Interference* (which has the implication of a faulty transmitter) but rather as television *interception,* with the connotation that the TV set may really be at fault.

Date:_____

From:_____

_____

_____

Phone:_____

To:_____

_____

_____

_____

Dear Sir:

I have been receiving the transmissions of Station_____ on my_____television receiver.

Please forward the proper "Hi-Pass" filter to correct this situation.

My set was purchased new ( ) used ( ) in_____.

The model number is_____.

The serial #_____.

Signed:_____

Next, explain to your new found friend (and if you've got him to be patient this far, he should be ready for convincing) that all TV set manufacturers are supposed to install *high-pass filters* in their products, but that prior to 1953 they normally saved three to four dollars per unit by leaving these out at the factory. The savings to the set manufacturers on hundreds of thousands of sets per year was enormous. Post-1953 sets have the filters but often TVI still sneaks through.

But, and here's the important point, emphasize that these same set manufacturers will provide your neighbor with a high-pass filter absolutely free, since they recognize their negligence in omitting the filter in the first place. Sometimes the addition of a second filter does the job.

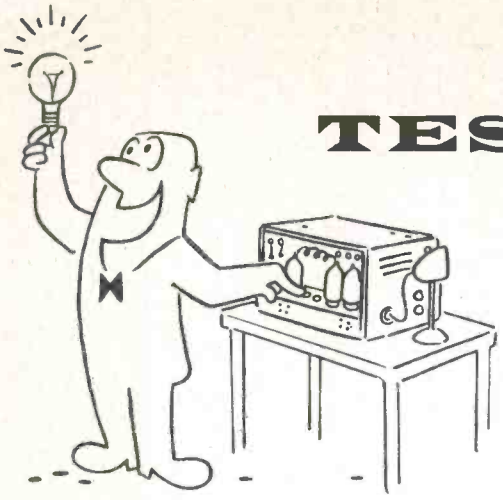
Most set manufacturers *will* provide filters at no charge *merely for the asking.* Listed here is a group of the larger manufacturers providing this service with the exact address to which the set owner should write. A sample letter is also shown here. You should not write the letter yourself, this is the responsibility of the set owner.

Be absolutely certain to explain to your neighbor that the filter can in no way possibly hurt his TV reception. At no time offer to make the installation yourself. If he's afraid to install the filter, suggest the local TV serviceman. *We repeat,* do not make the installation for him. If you do, you're sure to be blamed every time the slightest thing ever goes wrong with his TV.

Lastly, if he's too impatient to wait a week or two to receive his filter by mail, advise him that he can buy a high-pass filter of suitable quality at his local electronic parts dealer.

To finally convince your neighbor that the high-pass filter is a *must,* advise him that it will not only eliminate any interference from your transmitter, but will eliminate diathermy interference or signals from amateur radio transmissions as well.

Remember, those TV Indians can be put on the reservation once and for all.

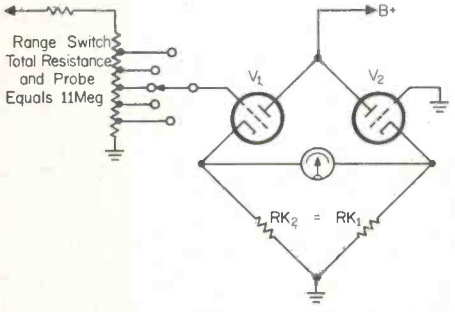


TEST GEAR

HERB FRIEDMAN, 2W6045
2271 KNAPP STREET
BROOKLYN 29, N. Y.

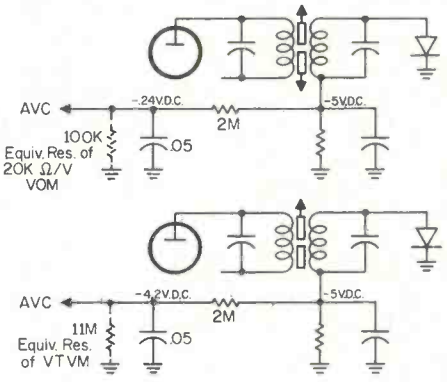
Among the most valuable equipment the CB'er can have is the Vacuum Tube Voltmeter (VTVM). While the VTVM is not a transceiver item (such as a speech compressor) or specialized tune-up equipment it can have possibly the greatest effect on final rig performance. You may well ask: "Why the VTVM? Why not the usual 20,000 ohms/volt VOM or maybe even a CB test set?" Let's take a look at what the VTVM is and what it can do and you'll discover the hidden value.

Figure 1 is a simplified circuit of a VTVM (DC measurements). The circuit is the familiar Wheatstone Bridge with the tubes V1 and V2 the upper arms and the balance indicated by meter M. Notice that the V1 grid is grounded, this is the reference tube. V2's grid is connected to the voltage divider. Assume V1 is matched to V2 and Rk1 is equal to Rk2. Since Rk1 equals Rk2 the cathode bias (and therefore the grid bias) on the tubes is identical. Since the grid bias is equal the meter reads zero.



If V2's grid is connected to a positive voltage (through the divider) the current through V2 increases. The increased current increases the voltage across Rk2; the bridge is unbalanced and current will flow through M causing a "reading".

Notice that the voltage divider (range switch) has a total resistance of 11 megohms. When the VTVM is connected into a circuit it is as if just an 11 megohm resistor was



connected. Compare this against the best of the VOMs, a 20,000 ohms/volt job. For each full scale range the VOM represents the voltage times 20,000 (The five volt range is 5 x 20,000 or 100,000 ohms). The VTVM on the other hand is always 11 megohms regardless of the range in use.

Figure 2 shows a typical effect of the two types of meters. When the VOM (on the 5 volt range) is connected across the AVC bus

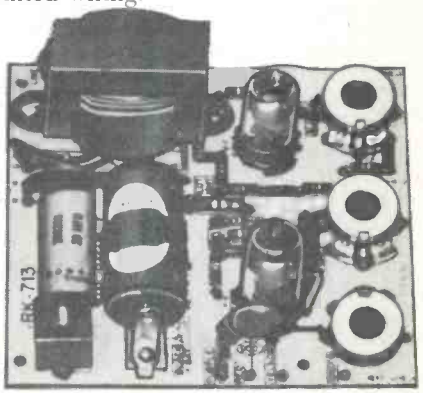
Kits with point-to-point wiring such as this EICO AC VTVM have the major components mounted directly on a metal chassis (or subassembly) and the minor parts (resistors, capacitors, etc.) wired directly to the terminals.

a voltage divider consisting of the 2 megohm AVC filter resistor and the 100,000 ohm VOM resistance is formed. Where a test signal generator may have been developing an actual—5 volts AVC it is now only—.24 volts —the AVC bus has been "loaded down" by the VOM. But look what happens when we use the VTVM. While a voltage divider is still formed the AVC voltage is—4.2—the bus is not loaded down. This advantage of VTVM high impedance bridging applies to all the critical circuits in the CB transceiver. Many circuits which would be loaded to non-operation by a VOM function normally when a VTVM is used.

Aside from the usual AC.DC, ohms measurements which can be made with the VTVM it can indicate virtually all the transceiver adjustments with reasonable accuracy. Just to name a few: receiver alignment on a carrier, oscillator and intermediate RF amplifier peaking, and even final peaking to the antenna when the VTVM is equipped with a diode probe. Further, the VTVM is able to "read" AC (audio) in the presence of DC and RF in a DC circuit. Many excellent "Hint And Kinks" publications (available from electronic distributors) cover a large variety of VTVM uses.

The CB'er has the option of purchasing either a completely wired meter or a kit. Most kits fall in the twenty five to thirty dollar price range with wired units up to twice the kit price. The completed kits are excellent meters and unless one is all thumbs they are not difficult to assemble. In fact, assembly can not only be enjoyable from the viewpoint of pride in accomplishment, but you can learn a great deal in assembly and construction techniques from kits.

VTVM kits come in two styles, printed circuit (PC) and point-to-point wiring. In the PC kits most of the components are placed into marked holes on a phenolic board. The underside of the board has "printed" copper wiring which connects the components. After the components are in place they are soldered to the PC wiring. Then the board is mounted on the meter movement itself and a few additional wires completes the project. The PC kit's greatest advantage is reduced error possibility since the PC board is accurately marked (in addition to the instruction manual). However, care must be taken during soldering as the PC board is sensitive to excessive heat, and, excess solder may short the printed wiring.



Printed circuit kits such as Allied Radio's "Knight VTVM" have most of the components, including tubes and transformers, mounted on a PC Board. The component leads are inserted into the indicated holes and then soldered in place. The board is then mechanically secured and connecting wires complete the instrument.

Point-to-point wiring, while not as simple as PC is not as boring. Each component is individually connected, dressed and soldered.

However, final performance does not depend on the wiring technique. Because of reduced error possibility kits probably have greatest attraction for the CB'er with limited construction experience. On the other hand, an experienced "builder" would probably find point-to-point wiring more "exciting". Either way the CB'ers best value is in a kit.

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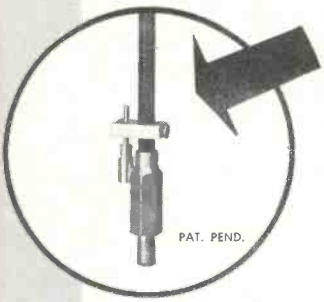

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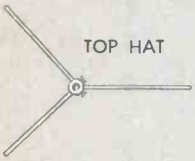

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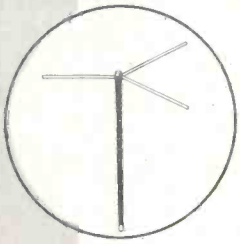

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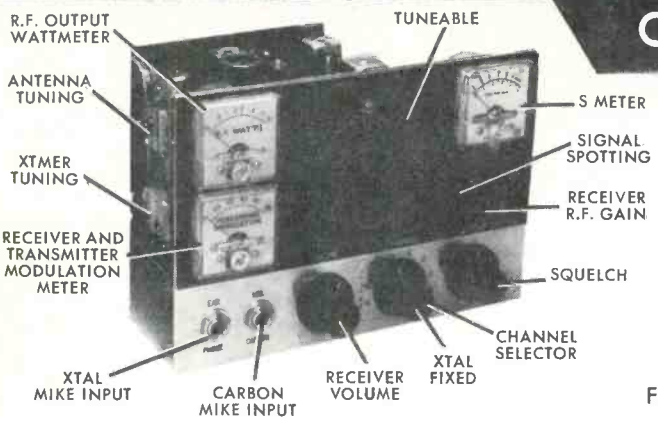

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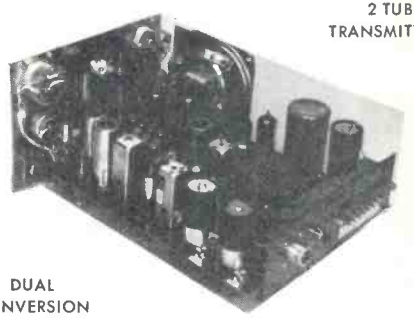

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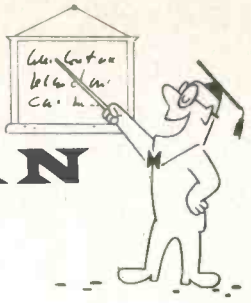


by LEN BUCKWALTER, 1W5733

Editor's Note: Readers are invited to ask the CB ANSWERMAN any questions which they have regarding the CB service. Address your questions to Len Buckwalter, 1W5733, Wilridge Road, Georgetown, Conn.

TOWERING TREES

Is it legal to mount a CB antenna in a tree?

The commission has juggled this question, but has stated no firm decision. One FCC-man we spoke to recently explains it this way: "Those in favor declare that a tree is a natural formation—so, why not? Those opposed say that a tree can be stripped of its branches and too easily it becomes a tower in disguise! In any event, a decision is apparently in the works. You'll probably see it in a rewrite of Part 19, scheduled to appear at an early date.

LIGHT CASE OF NOISE

Figure this one out . . . I'm riding in the mobile and listening to ignition noise in the CB speaker. Night falls and I turn on the headlights. The instant I flip the light switch, the noise level drops and stays there. Why?

You're not the first one afflicted with the "floating hash". It occurs since ignition noise can impress itself onto the wiring of the car. Acting much like the outer elements of a beam antenna, the wires can reradiate noise signals to your CB whip.

Why does the noise cut down when the lights are on? The answer is simply that the switch returns one of the hash-bearing wires to ground and shorts the noise signal. But you needn't suffer the problem during daylight hours. The noise can be bypassed with a couple of .001 mfd disc ceramic capacitors. Try connecting one capacitor lead to exposed tie-points of the car-light wires: at the dashboard switch, the headlight relay, fuse and terminal blocks. The other lead of the capacitor goes to the nearest car ground (frame, chassis, etc.).

It takes some experimentation to find the offending sources, but pays off in quieter reception.

DUAL CONTROL

I get tired of running up and down stairs to operate my base station. Can I remote control the rig say, between attic and basement?

Watch out for those words "remote control"—they're illegal for class D transceivers. However, you are not describing a true remote-control system. The FCC doesn't consider the set-up you propose as being illegal since all the equipment is on the same premises. Set up any number of wires, levers or gadgets, but keep them all at home.

Actually, a workable system is not difficult to achieve if you have a rig equipped with a push-to-talk mike. Make up an extension cord for the mike using the exact same cable as

the one already attached to the mike. You'll need matching connectors, too—easily available from the electronics parts catalogs. Long mike cables do invite hum pickup but if the extension is kept down to 20 or 25 feet, there'll be little problem. Another hum-reducing measure is a good ground at the transceiver case. So much for the transmitting end.

To receive remotely, a pair of leads made of ordinary lamp cord is run from the speaker terminals in the rig down to a small extension speaker in the basement (if the rig is in the attic). No need to work out a system for cutting out the main speaker since the set can comfortably drive two speakers at once with a small boost in the volume control setting.

After installing this simple, but effective, kind of remote control, save your lunch money and buy a second mike. Then you have dual control; the rig may be worked from attic or basement. When you're up in the attic, unplug the basement mike lead and jack in the second mike.

PATIENTS!

How can I find that joker who not only uses a VFO on the band, but has a carrier that's lousy with hum? I'll show 'em!

That's no joker, it's some poor soul receiving a soothing heat treatment from a doctor's diathermy machine. As these medical gadgets operate, they wander all over the 27-mc band causing much QRM. What can you do about it? Nothing, they're absolutely legal . . . or you could try some treatments yourself.

RELAY CONTACTS

What's the best way to clean dirty contacts on a send-receive relay?

Take a sheet of clean paper and slide it between the contacts. Then, press the contacts closed with your finger and draw out the paper. Repeat the process several times, but don't overlook the fact that there are upper and lower contacts on a CB relay. Thus, you'll have to perform the paper-sliding act above and below the moveable contacts of the relay. This simple cleaning operation can correct most faulty operation.

If the problem persists get some fluid that is labelled specifically for relay contacts. The old standby, carbon tetrachloride, invites trouble by depositing a film upon drying. Use a cloth wetted with the proper fluid much in the same manner as the paper described before.

Bad cases occur when contacts have pitted or oxidized through electrical arcing. It's a ticklish job to restore them. The key precaution is to smooth, or burnish, the contacts without changing their shape. One method is with crocus cloth, an item often stocked in hardwear stores. It is impregnated with jeweler's rouge and has gentle, abrasive action. Also there is a new 73-cent kit marketed by General Cement (G-C) which contains a special burnishing tool and fluid expressly for the job. A file or emery cloth should never be applied to relay contacts since they might seriously foul their operation.

Finally, check the relay spring; it should have enough tension to keep the contacts pressed together firmly when the relay is in its relaxed position.

GENERAL MANAGER APPOINTED

The appointment of Irving Koss as General Manager of the E. F. JOHNSON COMPANY of Waseca, Minnesota was recently announced by E. F. JOHNSON, President of the Company.

The JOHNSON COMPANY is the manufacturer of 2-way radio transceivers for private and business use known as their "Messenger" line.

ELECTRONICS 'N STUFF

DON STONER, 11W1507
BOX 7388
ALTA LOMA, CALIF.

Tony burst through the door of *Sam Seabee's Service Salon* with a look that would frighten even the most hardened of FCC monitors. "It's a bum rap"! he gasped through clenched teeth. "And good morning to you too, Mr. 11W3616", I replied, putting on my best customer greeting face. "What's eating you on such a lovely day, Tony"? "I just received a citation from the Fox-Charlie-Charlie this morning for off frequency operation. It was that *Johnson 'Messenger'* you sold me—I hope you can fix tickets as well as you do CB repair, Sam."

Sure enough, the paper Tony tickled my nose with was a bona-fide, A-number one citation. "How about that! 2100 cycles off frequency," said Tony with the look of a man about to go to the gas chamber. Something didn't ring true. "Tony, the boys in Waseca tune those *'Messengers'* up like fine wrist watches. There's something funny going on if your rig is off frequency," I said, assuming my best Perry Mason look.

"What about this, Tony? They measured your frequency as 26.96710. The rig I sold you was set up for Channel 9," I said. Tony squirmed a little. "Well, you know that *Gonset G-11* I had? I nipped the rocks out of it before I sold it and put them in the *'Messenger,'* " Tony said somewhat sheepishly. "They both use 13 mc. rocks for the transmitter and 27 mc. ones in the receiver, don't they?"

"Man have you got a lot to learn." I punctuated my remark by tapping his thick skull with an *Xcelite* wrench. "There are many different types of crystals and when you start swapping them around, you are courting disaster, Tony." "So I see" said Tony, as he examined the fine print in his citation. "There's not too much work in the shop this morning, how would you like to learn more about crystals, jailbird?"

"Fine," said Tony rising to the challenge by plopping himself squarely in the middle of my workbench.

What are Crystals?—Inside that tiny tin can you call a crystal is a small wafer of quartz. That's where the name crystal comes from. It is cut from raw quartz (usually Brazilian) which is silicon dioxide crystallized in a hard, glass-like six-sided prism. It is the physical construction of the wafer which determines if your rig is on frequency or not. Although you cannot see it, that tiny hunk of quartz is actually vibrating or flipping its molecules millions of times each second!

For an analogy of crystal action, try holding a steel rule over the end of a table. Twang the end with your finger and it will vibrate or oscillate. It will continue to vibrate until friction overcomes the force you applied with your finger. This *oscillatory motion* of the rule actually produces a sound which you can hear. If you hold the rule tightly it will always make the same sound (indicating the same frequency of oscillation) no matter if you twang the rule forcefully or lightly. About the only thing you can do to change the *frequency of oscillation* is to vary the dimensions of the rule by changing the length which extends beyond the edge of the table.

If you shorten the length, the frequency you hear will increase. If you extend the rule, the frequency decreases and you hear a lower pitched sound. Thus, dimension is the key to frequency. Try this little experiment. Your wife may think you are some kind of a nut but it will help clarify crystal operation.

There is one other thing you can do to change the frequency of oscillation. If you tape a penny or other light weight object to the end of the rule, the frequency of oscillation will decrease. Try it, you can hear the difference. We call this effect *loading* and the same effect can be observed with crystals. For years hams have been using tricks on crystals to lower their frequency, simply loading the crystal to slow it down.

The piece of quartz that makes up the crystal vibrates just like the rule, but at a much higher frequency. The frequency of oscillation is determined largely by the physical dimensions.

How Are Crystals Made? A trip through a large crystal factory, like International Crystals is an education by itself! The first step in preparing the crystal is cutting the wafer out of the raw quartz. Then angles and directions of the cut are carefully chosen just as if they were making a rare gem. This has at lot to do with the stability of the finished crystal and workmanship at this point pays off later.

The blanks are then sent to a lapping room where they are polished to remove the saw cuts and other rough edges. The lapping operator knows how much to polish to bring the crystal to a frequency slightly higher than desired.

Next the blanks are delivered to the etch room. By chemical processing any remaining imperfections are removed. Etching also eliminates any contaminants which might cause the crystal to go off frequency over a period of years.

Finally, the crystal wafer is sent to the plating room where electrodes are placed on the quartz. Remember the loading we were talking about earlier? This plating loads the wafer and by controlling the exact amount, a very close control over frequency can be obtained. Plating is done in one of three ways, by evaporation under high vacuum, sputtering with low vacuum, or by furnace firing metallic paints. After plating, the blank is mounted on a base. Spring loops on the ends of the mounting wires grip the electrode area and provide an electrical connection. The blank is then calibrated to frequency by adding or subtracting plating. The crystal is now coming down the home stretch. A technician then caps the can, removes the air inside and fills the can with dry nitrogen. This last process protects the quartz from future contamination and insures many years of faithful service.

Electrical Loading—Earlier we were talking about mechanical loading and its effect on frequency. The crystal company determines the mechanical loading and you don't have much control over it once the crystal is capped.

There is another type of loading that is probably much more important and that is electrical loading. Just as mechanical loading varies the frequency, so will electrical loading. Electrical loading of crystals is determined by the amount of capacitance connected across the crystal. As you increase the amount of capacitance, the frequency will decrease just the same as in the case of mechanical loading. Since the capacitance across the crystal affects frequency, the crystal company must calibrate the crystal with a standard amount of capacitance in the test circuit. The standard value which has been agreed upon is 32 micro-microfarads (mmfd.). The chart shows what happens to the frequency of a typical 14 mc. crystal when the shunting capacitance is varied from the nominal 32 mmfd. If the value is decreased to 20 mmfd. the frequency increases by 3.1 kc. If this had been a CB crystal on 13.5 mc., this change of only 12 mmfd. would have moved the transmitter off frequency by over 6 kc.! On the Citizen's Band, no more than 1.3 kc. frequency shift is permitted.

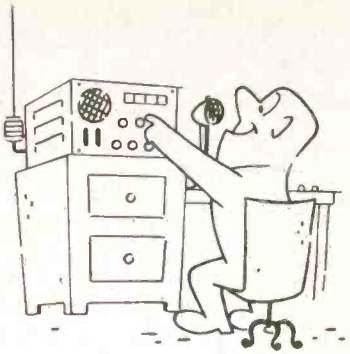
OSCILLATOR LOAD CAPACITANCE

	50 mmf	32 mmf	20 mmf	10 mmf
Measured	1999.950	2000	2000.060	2000.200
Crystal	2999.800	3000	3000.200	3000.600
Frequency	3999.700	4000	4000.400	4001.000
IN	6999.200	7000	7001.200	7003.300
KC	13998.0	14000	14003.1	14008.1

Continued on page 61

CB CASEBOOK

LEE AURICK, 2W2870
MT. PLEASANT RD. RFD 1
COLUMBIA, PA.



Met Jack Yundt of Akron, Pennslyvania, 3W12, radio and TV dealer and a real nice guy.

In his daily stint of selling and servicing every type of electronic device, as well as serving as a fountain of knowledge to CBs for fifty miles around, Jack has found one way to keep on top of things whether he's on the road, at home, or in his service shop.

An elaborately equipped shop, *set-up to monitor all 23 channels,* a top-notch mobile installation in his service truck, and a unit at home, place Jack always in command of the situation in a business that has been growing so fast, his major problem today is how to push out the walls.

DREAM LOCATION

Obviously by design, and not by fate alone, Jack's place of business lies on busy Route 222, near the summit of the highest hill for miles. It's the kind of location that anyone interested in two-way radio communication would dream about, and Jack is just the fellow to make the 475-foot elevation work for him.

AN URGENT REQUEST

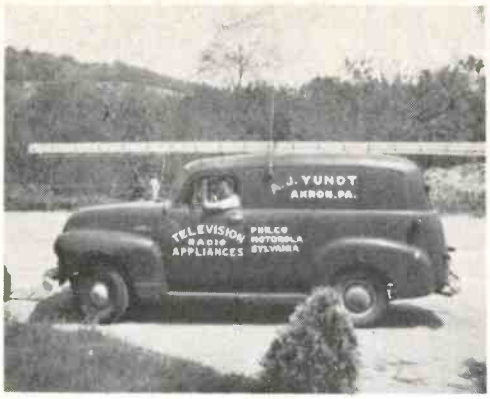
Jack and I were talking, when suddenly, the quiet of the store was broken as one of the many units in the service shop came to life with a crash of audio, *"3W0012, 3W0012."* The calling station identified before signing, as Jack excused himself and made for the service bench. It wasn't hard to evesdrop on the conversation that followed concerning an urgent need for two additional sets of crystals for another channel. Jack assured the calling station that they were on hand, and that he could pick them up as late as 11 P.M. Signing-off, Jack rejoined me in the front of the shop where I was now thoroughly intrigued in looking over the large display of CB units.

"That was Bob, in York. He's in the construction business and has a couple of new bulldozers equipped with CB gear and wants to get them on the same channel with his other units."

The fact that York was nearly forty-miles away didn't seem to impress Jack very much. It took some further questioning to discover that his *minimum* reliable range is about fifty miles. This distance is often exceeded when working stations operating from better than average locations.

INFORMATION PLEASE

Jack invited me to look over his service facilities, and while walking to the rear of the store, the crash of still another signal broke the squelch on one of the many units standing by. It was a station about 25-miles away asking for a comparative report. Jack advised him that he had never been stronger. The exultation in the other fellow's voice, as he signed-off, was obvious. Jack explained that this station has overcome a difficult communications problem through his advice and help, and that what had once been one of the weakest stations on the band was now one of the real "rock-crushers".



"Among other things, he was using the wrong kind of antenna cable. Then too, since he wanted to operate solely on one channel, I was able to align his units for peak performance on that channel. There sure is nothing wrong with that signal now." I had to agree. I also learned that checking with Jack was practically standard procedure, and that few changes in any CB installation in this area are made that Jack's advice isn't requested.

While I was still trying to digest the enormous demands this extra, *free* service must make on his time, another unit on the service bench erupted with a staccato-like din that was all but unreadable. This fellow was surely having trouble.

After numerous repeats, it became apparent that the other station knew something was wrong, suspected his microphone cable, and wanted to know if Jack could help him if he came right over. He was ten-miles away. Jack told him that he'd be in the store for at least another hour.

At this point I slowly began turning down the squelch controls on several of the rigs, hoping for just a few minutes of quiet conversation.

We stepped outside and examined the rooftop antenna forest: several TV antennas; a ground plane; a coaxial; and for pinpointing the weaker stations, a three-element rotary beam, vertically polarized.

"It took me many months to determine the best types of antennas for my location, and for the service I like to give," Jack told me. "It was certainly worthwhile though, as I've been able to put the experience to good use many-times-over in solving some really thorny problems for my customers."

We went back inside the store, where Jack began turning-up the squelch controls on all the rigs I had silenced.

"A few years ago, the bulk of my customers were people who just adopted CB radio as a new fad, and wanted to have a unit at home and one in the car. Something like a new toy. Today, I have units installed in more different types of vehicles than I can think of. From Bulldozers to fork-lifts, and everything in between—including two Deputy Sheriff cars."

"Everyone wants service fast, when he needs it," Jack said. "That's why I'm here most nights until about 11 P.M. I've been in business here since 1951, and people feel they can rely on me. That's why I can't let them down. After all, many of my customers are people who've known me all my life."

Jack reports not a few TV service calls come to him via CB radio requests. "One time I was driving in my truck when a fellow on the same street called-in and asked that I stop by and look at his TV set. By the time we had finished talking I was in front of his house. You should have seen the look on *his face* when he came to the door!"

One of the things that impressed me most about Jack Yundt was that no matter how busy he was he seemed to have time for everybody, including your S9 reporter gathering info about his use of CB radio. Not wishing to wear out my welcome, I thanked Jack for his time, and took-off. Closing the front door, I heard from the recess of the service shop, "*3W0012, 3W0012,*–––."

As I backed my car away from the entrance, another car swiftly braked and came to a halt near the door. I waited. Sure enough. The fellow was carrying a microphone, and the remains of a badly worn cable.

WASHINGTON OUTLOOK

BY EDWIN FREDERICK, 2W4580

We spoke to a high FCC official recently about this-and-that regarding the Citizens Band.

One of the subjects which came up was that of the relationship between U.S. and Canadian 11-meter band users. The apparent feeling at the Commission is that U.S. stations will not be allowed to communicate with Canadian stations, Canadian stations will not be able to communicate with U.S. stations, U.S. transmitters will be sealed upon being brought across the border into Canada and Canadian transmitters will probably be treated likewise when being brought into the U.S.

Another question which was touched upon was that of so-called "special identifiers" which CB stations have been heard using from time to time. A special identifier is a name like "Control 8," "Patrol 6," etc. used instead of the station's regular FCC assigned CB call. The FCC's feelings on this are that, other than for *authorized* transmissions taking place during an actual Conelrad *Alert,* the use of special identifiers *alone* (that is, without the assigned CB call) is *not* permitted. The proper use of a special identifier, therefore would be "2W4580—Control 8 to KBH2102—Patrol 6 or 2Q7575—Patrol 7."

We wish to remind CB'ers that Public Law 444 of the 87th Congress abolished the requirement for having a Notary Public sign applications for CB (and other) radio station licenses. This is quite a boon because notarizing applications was certainly a useless bit of red-tape and was the cause of most applicants being inconvenienced. New FCC Form 505's (CB applications) are being prepared —in the meantime, applicants may use the old forms, ignoring the requirements calling for notarization.

We checked with the FCC on the bill which was recently passed which enables the FCC to hit CB rule-violators with fines ranging from $100 to $500.

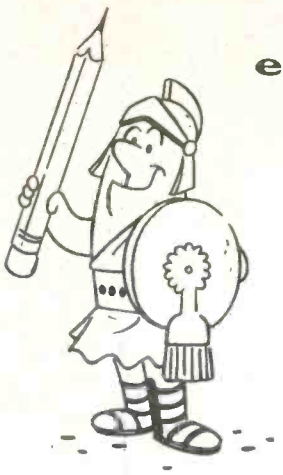
The fines can be imposed on CB'ers who fail to identify their stations with their proper callsigns, using excessive power, transmission of false signals, unauthorized communications, and interference with distress or emergency traffic—plus several other infractions of the rules.

It was the personal opinion of an official at the FCC that these fines would not be doled out without careful thought and that first-timers or seemingly innocent offenders would not get hit with both barrels. Presumably the ones who will be hit first and hardest are the habitual offenders who have been causing the biggest amount of ruckus over a period of time. From past performance, our guess is that persons who refuse to properly answer FCC "citations" will receive fines.

One interesting opinion to be heard was that, even though this new law affects other classes of radio stations in addition to the CB'ers, the CB'ers in particular should never say that they didn't see it coming. Repeated warnings have been issued to CB'ers to clean up their operations but, for the most part, they have gone unheeded.

(Editor's note: Mr. Frederick is an attorney practicing law in New York City.)

Watch for next month's big issue



editorial

50 OVER 9

TOM KNEITEL, 10Q3161/2, EDITOR, S9
300 WEST 43RD STREET
NEW YORK 36, N. Y.

Welcome to the world of S9/The Citizens Band Journal—an entirely new concept in reaching the CB'ers of America (and the GRS'ers of Canada).

It is our intention to bring you news of interesting and unusual methods of improving your CB communications, news of others who use CB, news of new products which will be appearing on the market for your use, and items of general interest to all CB'ers.

Having been around CB and CB'ers for a number of years we are keenly aware of CB's constantly changing scene. Because of this we never want to be charged with "sitting in an ivory tower" watching the scene from afar. Therefore, if you find that there are items in S9 which are more interesting than others we hope that you will do us the favor of dropping us a post card and letting us know about which type of features you like best (and least). If there are particular stories and features which you would like to see which we have not run as yet, let us know about these too.

And by the way, we hope that you will send us an article or two every so often—we will be pleased to consider them for publication. We pay for the articles used in S9 (except for public relations features submitted by clubs and manufacturers) and you have a chance to pick up some loot while telling everyone of your recent construction project(s) or thoughts.

Let's not forget our advertisers either! You will notice that this issue of S9 contains a sizeable amount of advertising for a "first issue." This did not "just happen that way," it represents the fact that the CB manufacturers of America have put their faith in our ability to turn out a quality publication, and in the hope that you will support them. They are most anxious to hear from you and many have told us that they have prepared special literature for the readers of S9. If you drop them a note, *mentioning S9*, they will be pleased to deluge with all sorts of interesting papers, books, charts, graphs, catalogues, goodies and paraphernalia.

Before we sign off for this session, we'd like to state that although many of the articles you will read in S9 will be of a semi-technical nature, none should be over the heads of the majority of our readers.

We have an ever-growing respect for the intelligence of CB'ers and feel that they have been fed far too much watered-down twaddle in the past. A good magazine must present articles of genuine and definite interest to its readers—in the CB field this includes some articles containing technical data. We know, from past experience, that such articles are the only way for the CB'er to expand his scope of knowledge within the field with which he works.

As we said—the articles should not hit over the heads of our readers. We realize that many CB'ers are still in the early stages of their electronics-knowledge development—so we'll explain any intricate points in detail.

So write to us, the manufacturers, to other CB'ers to tell them about S9—WRITE! (What are you waiting for?)

CB SHOP

Rates for CB SHOP are 10¢ per word for advertising which, in our opinion, is obviously of a non-commercial nature. A charge of 25¢ per word is made to all commercial advertisers or business organizations. A 5% discount is in effect for an advance insertion order for six consecutive months.

We do not bill for advertising in CB SHOP. Full remittance must accompany all orders and orders sent in otherwise will not be run or acknowledged.

Closing date is the 15th of the 2nd month preceding date of publication.

We reserve the right to reject advertising which we feel is not suitable.

Because the advertisers and equipment contained in the CB SHOP have not been investigated, the publishers of S9 cannot vouch for the merchandise or services listed therein.

TEN POSITION channel selectors for "Regency" transceiver owners base or mobile. $8.95. Spring's Radio Sales and Service, P.O. Box 144, Ticonderoga, N. Y.

CAROLINA'S Citizen Band Headquarters, Tommy's—Myrtle Beach, S.C.

CBer's DUAL CONVERSION ADAPTER KIT, all parts, schematic, pictorial; hear only the channel you tune. For HE-15, A; TR-800, 910 etc. $14.95, with tubes $16.95. For HE-20, A, B; Mark VII; 770, 1, 2 $15.50, with tubes $17.50. GW-10, $15.75, with tubes, $17.75, or $5.00 deposit plus C.O.D. Free literature Dept. 9, Bainbridge Radio, 2649 Bainbridge Ave., New York 58, N. Y.

SUPER DUPER
CB STATION

"The price is $150, $200, $250—it depends on what we allow you on trade-in."

PLUG-IN SURGERY

Continued from page 14

plug the entire unit into the 6AQ5 socket in your transceiver.

The rig should now show better modulation with a sharp increase in audio quality and talk power. Best of all, you can return the rig to factory-new condition by simply removing the unit and replacing the 6AQ5 in its socket.

Although this method has been developed for use with the older model Polycomms, there is no reason why you cannot use the same unit in any unit that uses a 6AQ5 as a modulator (Heath CB-1, Stoner, Philmore, etc.). This method of construction is quite similar to vector construction and can be used for a great amount of experimental circuitry requiring tube substitution. Do all your work between the plug and socket and leave the transceiver in its original saleable shape. Plugs are available in both 7 and 9 pin configurations thus let your imagination be your guide. You too can be a Plug In Surgeon.

SWR BRIDGE

Continued from page 25

Under normal operating procedure, the meter is left in the reflected position. The forward position being used for tuning, modulation and output checks. With the meter in reflected you will find some fluctuation in the SWR due to wind, rain or other antennas if a rotary beam is being used. The only cause for concern is a sharp rise in the reflected power. If this occurs you may be due for some antenna work. Once you have learned to interpret the readings, you will find it quite simple to maintain an efficient, effective station.

The SWR bridge used to be an expensive luxury. Now you too can have an S9 signal with the S9 bridge.

OUR FIRST SUBSCRIBER

As soon as word leaked out that S9 was soon to be a reality, we were deluged with mail asking about subscription rates, general information, technical information, etc.

No one to wait for formalities, Jean Paul DeVoy, 17Q2407, of Brookfield, Missouri, just sent in the amount he estimated a subscription would be—$5.00 per year—and said, "Add me to the subscription list!" Little did he know that he was to be the first name on the list.

Jean is in the real estate and savings-loan business in Brookfield, and he uses CB to communicate with his office (17Q2663) while he is out on business; which is most of the day.

He uses RCA MARK VII rigs on Channels 3, 4, 9, and 16—using Channel 9 as his monitoring channel. The mobile antenna is a 102" steel whip, his home antenna (17Q2750) is a coaxial sleeve, and his office uses a Hy-Gain CLR.

He has a dependable base-to-mobile range of 15 miles—but now and again makes a 40 mile trip and can communicate with his office on the entire trip.

Shortly after Jean's subscription arrived—many other CB'ers joined his name on the subscriber list—also by taking a guess at how much a *good* CB magazine would be worth to them.

ELECTRONICS 'N STUFF

Continued from page 53

Although most CB rigs *seem* to have the same circuit in the transmitter section, there are many subtle differences which can change the capacitance shunting the crystal. For example, the grid or input capacitance of a triode and pentode is entirely different. Even though you can't see this capacitor in the schematic, it's always there.

Of course, there are a few transceivers which have identical transmitter circuits and when this is the case, you can safely swap crystals. However, *unless you have some way of accurately measuring the frequency with the new crystal, it's risky business.*

"Here you go, Tony. While I was chattering away, I slipped a set of new crystals in your '*Messenger.*' According to my CB 'Analyst' your rig is within 200 cycles of 26.965. While I make out the bill, why don't you use my mill to type a note to the FCC and tell them what you did to correct the situation—namely get a expert to put your rig on frequency," I said with a twinkle.

"Thanks Sam, I will and I sure learned my lesson, yes sir—I certainly did. But you know, Sam, I was wondering when you were talking about loading crystals, why couldn't I take the cap off and fiddle with the plating." He saw me reach for the soldering iron and a look of mock terror spread across his face. With a skillfully executed sprint Tony grabbed the newly refurbished "*Messenger*" and disappeared through the front door. Almost as quickly as it had disappeared, a cherubic face reappeared in the doorway. "Sheeee—whadda grouch, how am I ever going to be as smart as you if I don't ask questions?" he said, grinning from ear to ear.

I had the last laugh though, Tony forgot his old crystals, I thought to myself. As Tony climbed into his *Falcon*, he thought "I had the last laugh, Sam forgot to collect for the repair job."

Electronic Research Library

Keep your CB shack up to date with the latest books of interest. Order your selections on the coupon below.

Citizens Band Radio Handbook, by David E. Hicks. A guide to choosing equipment, getting licensed, proper operation. Complete discussions of CB antennas (fixed and mobile), rigs, servicing, lingo, FCC rules and regs, circuits, etc. 192 pages, 5½" x 8½". **Order CBH-1** **$2.95**

Citizens Band Radio Manual. Famous Standard Notation Schematics and SAMS' PHOTOFACT Folders on forty-six 1961 CB rigs. Includes entire chapter on CB servicing with typical problems and solutions. 160 pages, 8½" x 11". **Order CB-1** **$2.95**

Electronics Experiments & Projects, by Len Buckwalter, 1W5733. Makes learning electronics not only easier, but fun as well. Learn circuits by actually building them in clever, easy-to-understand steps. All circuits are assembled from inexpensive parts and no prior knowledge of electronics is needed. 128 pages, 5½" x 8½". **Order ESE-1** **$2.50**

Eliminating Man-Made Interference, by Jack Darr. Covers the entire field of man-made QRM—what it is, how it's transmitted, tracking it down, eliminating or minimizing its effects in transceivers, TV sets, mobile units, hi-fi. Lots of photos and illustrations. 160 pages, 5½" x 8½". **Order MMD-1** **$2.95**

Electronic Tips and Timesavers. Contains over 300 clever time and money saving tips. No CB shack can afford to be without one. 96 pages, 5½" x 8½". **Order TSC-1** **$1.50**

S9 MAGAZINE, Dept. HWJS
300 W. 43rd St., New York 36, N. Y.

Please forward the following books circled below:

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TSC-1	CBH-1	ESE-1
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ADVERTISER'S INDEX

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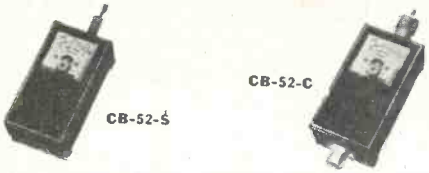
Cesco Citizens Band Products

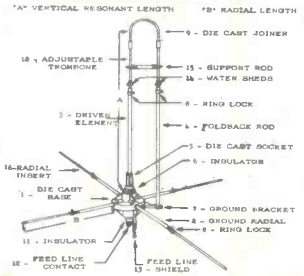
TRANSICHECK



Test instrument, designed for use with Citizens' Band transmitters, checks transmitter power output and antenna efficiency. Can be used for resonating or tuning power output plate circuit and adjusting antenna loading capacitor to assure maximum output. Ideal for determining accuracy of 50-ohm coaxial transmission line match to the antenna. Under scale on meter indicates SWR, match or mismatch of transmission line to antenna; lower scale, graduated 1–5, indicates power output and permits observing output when adjusting antenna plate circuit and loading capacitor. Comes complete with drawings and information on applications and use. Hammertone finish, aluminum case 4 1/4" h. x 2 3/4" w. x 1 1/2" d.

Cesco Model CB-52-C—With coax connector. Net Each. **$19.95**
Cesco Model CB-52-S—Auto spade connector. Net Each **$18.95**

DUO - POLE GROUND PLANE

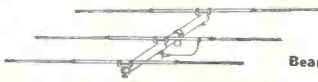


DUO - POLE GROUND PLANE ANTENNA

Delivers omnidirectional, equal, groundwave circular coverage for good communications even with low power output. Aircraft aluminum construction. Grounded quarter-wave foldback lightning safety factor. Adjustable element ring locks. Factory resonated at 27.085 or channel 11; works well over all channels with low VSWR, 1.2:1 or less. Special feedline terminals incloses in masting. Nominal base impedance, 52 ohms. Shipping carton only 68" long. Shipping Weight, 7 1/2 lbs. **$29.97**

Cesco Duo-Pole Antenna—Net Each.....
Industrial Version, 25-175 mc, Also Available at Same Price.

BEAM ANTENNAS

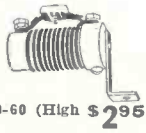


C-B BEAM ANTENNAS

Factory pre-tuned beam antenna has exclusive Acromatch for increased power output. Extruded aluminum tubing with 1 1/4" boom; elements have 1/2" dia. center sections, 3/8" dia. inserts. Elements mount either horizontally or vertically. Resonated at 27.085 mc; low SWR. Assemblies in minutes with permanently secured locking rings. Lightweight; will rotate with any TV rotator. Shipping carton only 86" long.

Cesco 3-Element Beam—Gain 7 db; boom 10' long. **$29.95**
Shipping Weight, 8 lbs. Net Each.....
Cesco 4-Element Beam—Gain, 8 db; boom 15' long. **$39.95**
Shipping Weight, 11 lbs. Net Each.....
Cesco 5-Element Beam—Gain, 9 db; boom 20' long. **$49.95**
Shipping Weight, 13 1/4 lbs. Net Each.....

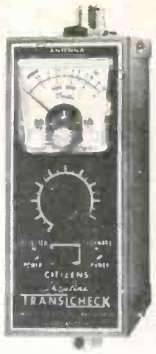
GENERATOR NOISE FILTERS



Tunable filter for 6, 12 or 24 volt generators; stops noise in mobile gear caused by generator brushes. For aircraft, amateur, C-B and industrial mobile uses. Conservatively rated at 30 amps. Phenolic coil form, brass hardware and die cast mtg. bracket. Easily installed.

Cesco Model 3-30 (Standard, 3-30 mc) or **30-60** (High **$2.95**

Thruline TRANSICHECK



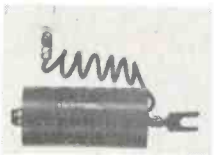
Model CB-52-T

LEAVE IN LINE CONTINUOUSLY WITHOUT POWER LOSS!

The new Thruline Transicheck is a patented development by CESCO employing a miniature coaxial cylindrical unit utilizing mutual inductance and capacity coupling between linear conducting ductors for conducting tests on Citizen Band transceivers operating in the 26 and 27 mc. Bands.

- ☐ Accurately checks VSWR
- ☐ Measures Power Output calibration **Design Patent 11029052**
- ☐ Can be ordered special calibrated to 25 & 50 watts.
- ☐ Sensitive Field Strength Meter
- ☐ No power limitations
- ☐ Continuous guard on transmitting conditions
- ☐ Helps you tune your antenna for maximum results
- ☐ Shows any defect in antenna
- ☐ Usable as an overmodulation indicator

VOLTAGE REGULATOR FILTER



Model VR-30

A fixed type L/C combination for the elimination of noise created by points of generator control relay in the voltage regulator which is prevalent in communication receivers. No turning or adjusting required. Unit is not voltage critical and works satisfactory on 6-12-24 and 32 volt systems. Installs easily to voltage regulator by placing spade lug to field terminal of voltage regulator.

CABLE ADAPTERS

Cesco Model CS—Permanent connector consists of 83-1R, SO-239 coaxial socket and auto radio type spade lug. One-piece construction. Net Each..... **$1.29**
Cesco Model SC—Rugged, permanent adapter connects auto radio spade plug to coaxial socket 83-1R or SO-239. No floating pins. Net Each..... **$1.29**

PHANTOM ANTENNA LOAD

Non-inductive 52-ohm substitute antenna load has adequate power rating for any C-B transceiver in the 26–27 mc range. Ideal for testing and repairing citizens' band units. Also useable as a coaxial line terminator. **$1.49**

Cesco Phantom Antenna Load—Net Each.....

field strength

HCE, HCE-20

MODEL MC FIELDOMETER

For mobile, amateur, police, aircraft and industrial uses. Ideal for tune-up. Indicates transmitted signal at all times. Has capacity wand, sensitivity control and μa meter. U-shaped mounting bracket fits dash at windshield rim or rear-view mirror. Pivoted case 3 1/2" h. x 2 3/4" w. x 1 1/2" d. **$24.95**

Cesco Model MC Net Each.....

MODELS HCE AND HCE-20 FIELDOMETERS

Portable hand unit of fixed-capacity type with 0–100 μa meter and sensitivity control on handle end. Capacity wand and components covered by screw-on 4 1/2" lg. plastic cover. Handle 4 1/2" long. Provision made for plug-in interchange for capacity wand to electrostatic, peak resonant broad-skirted wands (available on special order for any specified frequency). Case size same as Model MC.

Cesco Model HCE—Net Each..... **$29.95**
Cesco Model HCE-20—Same as above, but with ultra-sensitive 0–20 μa meter. Net Each..... **$44.95**

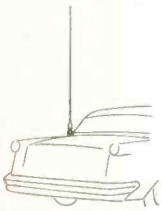
See your CB Equipment supplier or write direct for full line Catalogue.

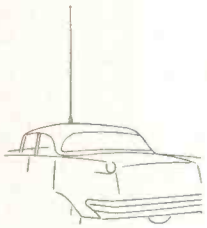
CONTINENTAL ELECTRONICS & SOUND CO.
6151 Dayton Liberty Road Dayton 18, Ohio

hy-gain "TOPPER"

Top-loaded Stainless Steel Whip

For Mobile Citizens Band Antennas





Exclusive top-loading design is an important advancement in automotive whips. Since 78% of radiation is from bottom half of whip and 22% from top half, the least compromise comes from loading at top, rather than at bottom. This outstanding feature in the Hy-Gain "Topper" raises radiating portion of whip to highest point and increases resistance to 52 ohms . . . no matching. Only 50 inches high, the Hy-Gain "Topper" can be mounted higher on vehicle, increasing superiority of performance. The "Topper" is ruggedly built. Top loading design utilizes a slim polyethylene enclosed coil capsule, permanently sealed to top portion of stainless steel whip. The "Topper" is completely impervious to any weather condition.

Four models are available for a variety of mounting arrangements:

- **TLW-M:** with chrome plated single hole, top mounting body mount..... **$14.90 LIST**
- **TLWT-M:** identical to TLW-M but in three sections for telescoping down to 28"..... **$14.90 LIST**
- **TLW:** with standard 3/8" x 24 threaded base stud for use with adaptive mounts.... **$11.60 LIST**
- **TLW-T:** identical to TLW but in three sections for telescoping down to 28"..... **$12.00 LIST**

ONLY THE HY-GAIN TOPPER CAN OFFER THIS OPTIMUM TRANSFER OF ENERGY

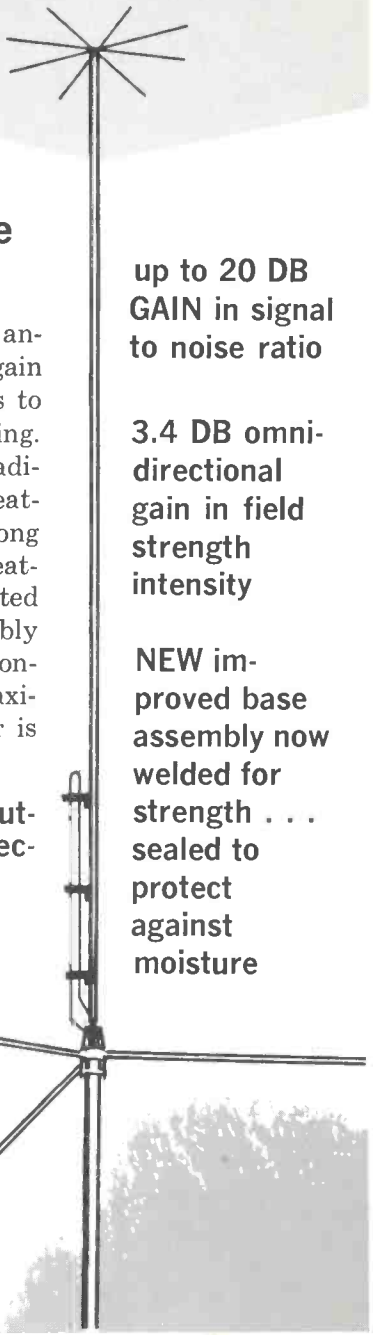
Hy-Gain offers a complete line of CB antennas and accessories

- **W-102:** 102" continuous taper stainless steel whip with 3/8" x 24 threaded stud.... **$7.25 LIST**
- **CMR:** base loaded rooftop whip with mount and solderless connector..... **$14.95 LIST**
- **BSW:** cadmium plated split ball, spring and 102" tapered stainless steel whip..... **$14.95 LIST**
- **CPR:** Original Hy-Gain design for coupling CB tranceiver and AM receiver for simultaneous use..... **$14.95 LIST**

See the complete line of mobile antennas, body mounts and accessories at your favorite CB supplier or write for full descriptive literature

hy-gain ANTENNA PRODUCTS
8400 NE Highway Six Lincoln, Nebraska

hy-gain COLINEAR
Base Station Antenna System



The Hy-Gain extended 5/8 wave ground plane DOUBLES effective radiated power in all directions

A revolutionary new concept in Citizens Band antenna design, the Hy-Gain Colinear achieves gain through concentration of power at lower angles to the horizon, both in receiving and transmitting. Built to heavy duty commercial specifications, radiator is 1¼" O.D. to ¾" O.D. heavy wall heat-treated aluminum tubing. Radials are 9 feet long and constructed of ⅝" O.D. heavy wall heat-treated aluminum tubing. Fiberglass impregnated base insulator and welded steel bracket assembly accepts all masts up to 1⅝" diameter. Rugged construction withstands winds up to 100 mph. Maximum SWR of 1.2:1 at resonance, the Colinear is designed for 52 ohm coaxial feed line.

The Hy-Gain Colinear is guaranteed to outperform any vertically polarized omnidirectional antenna on the market today!

up to 20 DB GAIN in signal to noise ratio

3.4 DB omnidirectional gain in field strength intensity

NEW improved base assembly now welded for strength . . . sealed to protect against moisture

Model CLR **$49.95** LIST

Write for complete technical bulletin

hy-gain ANTENNA PRODUCTS
8400 NE Highway Six Lincoln, Nebraska

FIRST in CB...Now FIRST Again...
with COMPLETE SELECTIVE CALLING!

TONE ALERT

Complete Selective Calling System!

The Viking "Tone Alert" is a complete selective calling system which may be easily attached to most two-way radio equipment. Completely mutes speakers on your units until one calls another—then automatically, your stations receive an audio note and an indicator light flashes "on", remaining lighted until call is answered. Now—your units can be operative 100% of the time regardless of volume and squelch control, but you eliminate the annoyance of hearing transmissions not meant for you, "skip", electrical noise and other distractions! Designed for "foolproof" operation—three-position lever switch has "stand-by", "operate" and "call" positions. Uses a very high "Q" frequency selective resonant reed relay—37 calling tones available. 1½" x 4" x 7¾".

6 VDC/115 VAC or
12 VDC/115VAC models.

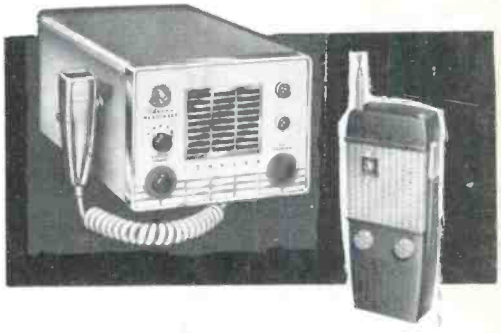
$59.95 NET

PRICED FROM $109.50 . . .

3 feature-packed "Messenger" Transceivers . . . Base Station, Mobile, or Hand-Held!

In the field or on the job . . . Viking "Personal Messengers" are delivering outstanding performance! Available in two compact hand-held units . . . 1 watt model with plenty of punch and excellent range for use on the Citizens Band . . . 100 milliwatt model for unlicensed use over shorter ranges. 11 transistors and 4 diodes. Superheterodyne receiver and exclusive tuned RF amplifier gives twice the sensitivity and 40% more range than similar units with conventional circuitry—more output than similar units with same rated inputs! Operates on pen-light or rechargeable nickel-cadmium batteries.

FROM **$109.50 NET**



Here's the performance proved Viking "Messenger"—5 channel, crystal-controlled Citizens Band transceiver. High efficiency design makes full use of maximum legal power—delivers a solid signal unmatched in fidelity and clarity! Excellent receiver sensitivity and selectivity—built-in "squelch"—AVC—and automatic noise limiter circuits. Only 5⅜" x 7" x 11⅜", easy to install anywhere. With tubes, push-to-talk microphone crystals for 1 channel.

FROM **$134.95 NET**

E. F. JOHNSON COMPANY
WASECA • MINNESOTA

WRITE TODAY
for information packed
4 Color Catalog

Application to mail at Controlled Circulation rates pending at New York, N. Y.

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