

- Some Questions and Answers About CB Radio
- John F. Thompson Elected NHSC President
- More Adventures in TV Servicing



**journal**  
*July/August 1976*

From **LEADER**

# FIVE-INCH SOLID-STATE TRIGGERED OSCILLOSCOPE/VECTORSCOPE



Only **\$339.50**

Stock No.501WT  
Shipped UPS

**Quantities  
Limited!**

The triggered scope is an improved type of cathode-ray oscilloscope with a one-shot sweep circuit. The electron beam remains in a stationary position and does not deflect until "triggered on" by an input waveform or transient. When turned on, the beam sweeps across the CRT, displaying the incoming waveshape, and then returns to rest. Each succeeding pulse will cause the beam to deflect again, giving the effect of a repetitive waveform. The triggered sweep feature makes it possible to observe non-recurring transients and to synchronize on either the high-frequency or low-frequency components of complex waveforms. The horizontal deflection is calibrated in time, making it possible to measure the frequency or duration of waveforms and pulses. The vertical is calibrated in volts per centimeter, making precise amplitude measurements possible. It is also possible to operate the sweep in an automatic or conventional free-running state.

## SPECIFICATIONS

**VERTICAL AMPLIFIER:** Sensitivity: 20 mv p-p/cm to 10 v p-p/cm, 9 steps in 2-5-10 sequence and uncalibrated continuous adjuster. **Bandwidth:** DC or 2 Hz to 10 MHz. **Rise time:** 35 nsec. **Input impedance:** 1 megohm, shunted by 33 pf. **CALIBRATION:** Square-wave voltage: 0.05, 0.5, and 5 v p-p; 1 kHz approx. **HORIZONTAL AMPLIFIER:** Sensitivity: 200 mv p-p/cm or better. **Bandwidth:** 2 Hz to 200 kHz. **Input impedance:** 1 megohm shunted by 40 pf. **TIME BASE:** Sweep speeds: 1 usec/cm to 0.2 sec/cm, 17 steps in 1-2-5 sequence and uncalibrated continuous adjuster. **TV:** V (for 30 Hz) and H (for 15.75 kHz/2). **Magnification:** x5 (maximum speed 0.2 usec/cm). **Sweep mode:** triggered and automatic (slope + and -). **Synchronization:** internal and external: + and -. **POWER SUPPLY:** 115/230 v; 50/60 Hz; 50 va approx. **SIZE:** 10½" high by 8" wide by 16½" deep. **WEIGHT:** 30 pounds.



# journal

July/August 1976  
Volume 34, No.4



<i>James Crudup</i>	2	SOME QUESTIONS AND ANSWERS ABOUT CB RADIO
<i>Harry Bennett</i>	13	JOHN F. THOMPSON ELECTED NHSC PRESIDENT
<i>J. B. Straughn</i>	16	MORE ADVENTURES IN TV SERVICING
<i>Ted Beach</i>	21	HAM NEWS
	25	NRI HONORS PROGRAM AWARDS
<i>Tom Nolan</i>	26	ALUMNI NEWS

EDITOR AND PUBLISHER  
*William F. Dunn*

TECHNICAL EDITOR  
*Ted Beach*

MANAGING EDITOR  
*Tom Beadling*

EDITORIAL ASSISTANT  
*Mildred Duncan*

STAFF ARTISTS  
*Bill Massey*  
*Arthur Susser*  
*Ernie Blaine*

In this issue, ubiquitous Journal author James Crudup answers twelve most-asked questions about CB radio, NRI Prexy John F. Thompson is elected President of the NHSC, and the ever-popular J. B. Straughn adds yet another to his series of practical TV servicing case histories.

The NRI Journal is published bimonthly by the National Radio Institute, a division of the McGraw-Hill Continuing Education Center, 3939 Wisconsin Avenue, Washington, D.C. 20016. The subscription price is two dollars yearly or 35 cents per single copy. Second-class postage is paid at Washington, D.C.

# Some QUESTIONS & ANSWERS about CB RADIO

by James Crudup KFU3927

Today, next to the telephone, CB (Citizens Band) radio is far and away the most popular means of electronic two-way communications in the United States. The current popularity of CB radio probably results from the recent reduction of the FCC licensing fee from \$20 to \$4 and from the nationwide publicity received during the onset of the fuel crisis and trucking strikes.

Currently, more than six million CB radio licenses have been issued in the United States, as more and more people discover the utility and convenience of CB radio. Too, CB radio is rapidly achieving the status of a cult, with its own specific language and behavior modes. In this article, we have tried to provide answers to some of the more frequently asked questions about this modern phenomenon of CB radio.

## WHAT IS CB RADIO USED FOR?

The main use of CB radio has been as a communications link between motorists on the nation's highways. Many CBers like to think of the CB radio as a "telephone in the car," and use them to converse with other motorists who have CB radios, either for legitimate reasons of personal information or—all too often—frivolously. Many CBers have two CB units, one in the car and one at home, enabling them to communicate with their families.

CB radio has often proved invaluable in cases of emergency. For example, calls have been made directly to or relayed to hospitals, police stations, and gas stations for assistance.

CB radios can be used for personal or for business communications. They are used in boats, trucks, airplanes, and even on tractors. Service businesses, salespeople, and professionals such as doctors and lawyers also use CB radios to fill the communications gap while performing their jobs. In many cases the use of CB radio has greatly reduced inefficiency resulting from lack of communications during the work day in some organizations.

## HOW CAN I OBTAIN A CB LICENSE?

It is relatively easy to obtain a CB license. If you are eligible, there are only two things that you must do: obtain a copy of Part 95 of the FCC rules and regulations from the Government Printing Office (GPO Cat. 004-000-00324-1, \$1.50, Washington, D.C. 20402), and fill out a copy of FCC Form 505.

To be eligible, you must be at least 18 years old and a citizen of the United States. Noncitizens can apply for licenses if they have a U.S. residence and are acting as private citizens and not for a foreign government. Neither foreign governments nor their representatives are eligible for CB licenses.

No technical knowledge is required and there is no examination to pass. All you have to do is fill out FCC Form 505 (which is packed with all new CB radios) and send it together with a check or money order for \$4 to the Federal Communications Commission, Gettysburg PA 17325. Unfortunately, due to the recent deluge of applications, there is a six-week backlog for regular licenses. CB licenses are good for five years, after which time they may be renewed.

CB license applications can also be obtained at any of the FCC Field Engineering Offices (listed at the end of this article), the FCC building in Washington, D.C., or from dealers who sell CB radios. Most dealers have spare applications on hand. Remember to request FCC Form 505.

On the application you must certify that you have in your possession or have ordered a copy of Volume VI, Part 95 of the FCC rules covering Citizens Band radios. An order form is conveniently attached to the CB license application. The cost of this document is \$5.35. Mail the completed form together with a check or money order to Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

## IS THERE A TEMPORARY LICENSE?

Yes, there is, but you still must complete FCC Form 505. Public complaints about the FCC's leisurely processing of CB licenses have resulted in the establishment of a 60-day license. This license, FCC Form 555-B, is reproduced overleaf in case your CB dealer has none available.

You simply complete the form with your name and address and indicate when you mailed the regular CB license Form 505 to the FCC. This temporary form is good for 60 days. Hopefully, you will have your regular license before its expiration. The temporary license is not mailed to the FCC. You keep it.

You assign yourself a call sign. The first letter of the call sign is always K. Then, use the first letter of your first name, the first letter of your last name, and your Zip Code. For example, my temporary call sign would be KJC20903.

Regular CB licenses are good for five years, after which time they may be renewed.

## WHAT TYPE OF CB RADIO SHOULD I BUY?

There are three types of CB radios: mobile radios, base station radios, and portable radios. Each type has its purpose.

Mobile radios are designed to be used in cars, trucks, boats, motorcycles, and other vehicles. They are rugged and most of them are completely solid-state. They are the choice of 70 percent of CB buyers. Mobile radios cost between \$60 and \$400. Most popular CB radios sell for between \$125 and \$175. Of course, the quality improves as the price increases.

Citizens Band radio is officially classified as "Class-D Citizens Radio Service" by the FCC. At the present time there are 23 channels in the Class-D band. Most mobile CB radios in the \$120 to \$180 price range are designed to operate on all 23 channels. Some of the cheaper mobile CB radios do not have full 23-channel capability.

Mobile radios are designed to operate from a 12-volt direct-current power supply such as the battery in your automobile. They cannot be operated directly from a 120-volt wall outlet. Therefore, if you want to use them in your home or office, you will need a 120-volt ac to 12-volt dc converter.

Base station CB radios are designed for and generally used at one permanent location. They are not designed to be moved about like mobile radios. Base station radios are generally larger and cost more than mobile radios. Unlike mobile radios that are designed to be operated from a 12-volt dc power supply, base station radios are operated from the power line. However, some base station radios can be used with a 12-volt dc supply.

Portable CB radios are small hand-held radios that use internal batteries and are commonly referred to as "walkie-talkies." Most portable CB radios do not have the full 23-channel capability that most mobile and base radios have. It is more common to see portables with between one- and six-channel capability. However, there are a few portables with 23-channel capability. Most portables generally have less output power than mobile and base station radios.

Because of their low output, portable radios with less than 100 milliwatts (one-tenth of a watt) of output power do not have to be licensed. The maximum output power of licensed AM mobile and base station radios is 4 watts. It is against the FCC rules for a licensed CB operator to talk to an unlicensed operator of a portable radio. Walkie-talkies with outputs of less than 100 milliwatts are covered under Part 15 of the FCC rules and regulations. For more information, obtain a copy from the FCC.

# Temporary Permit

## Class D Citizens Radio Station

# 1

## Instructions

- Use this form only if you want a temporary permit while your regular application, FCC Form 505, is being processed by the FCC.
- Do not use this form if you already have a Class D license.
- Do not use this form when renewing your Class D license.

# 2

## Certification

Read, Fill In  
Blanks, and Sign

### I Hereby Certify:

- I am at least 18 years of age.
- I am not a representative of a foreign government.
- I have applied for a Class D Citizens Radio Station License by mailing a completed Form 505 and \$4.00 filing fee to the Federal Communications Commission, Box 1010, Gettysburg, PA. 17325.
- I have not been denied a license or had my license revoked by the FCC.
- I am not the subject of any other legal action concerning the operation of a radio station.

Name \_\_\_\_\_

Signature \_\_\_\_\_

Address \_\_\_\_\_

If you cannot certify to the above, you are not eligible for a temporary permit.  
Willful false statements void this permit and are punishable by fine and/or imprisonment.

Date Form 505 mailed to FCC \_\_\_\_\_

# 3

## Temporary Call Sign

- Complete the blocks as indicated.  
Use this temporary call sign until given a call sign by the Federal Communications Commission.

<b>K</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	↑	↑	↑						
	Initial of Applicant's First Name	Initial of Applicant's Last Name	Applicant's Zip Code						

# 4

## Limitations

Your authority under this permit is subject to all applicable laws, treaties and regulations and is subject to the right of use or control by the Government of the United States.  
This permit is valid for 60 days from the date the Form 505 is mailed to the FCC.

You must have a temporary permit or a license from the FCC to operate your Citizens Band radio transmitter.

**Do Not Mail** this form, it is your Temporary Permit.

See the reverse side of this form for a summary of operating instructions.

You may remove this form from the Journal and use it for your temporary license.



# Using Your Citizens Radio Station

(See Part 95 of FCC Rules & Regulations for complete instructions on authorized station use.)

## Welcome to the Citizens Radio Service

Citizens Band Radio is a shared communications service with many people using the same frequencies and channels.

The guidelines provided in this form are not intended as a substitute for FCC Rules, but as a general reference to those operating practices and procedures which will benefit you and other users of Citizens Radio.

Your compliance with these guidelines and your consideration for the rights of others in your radio service is necessary if the full potential and enjoyment of Citizens Radio is to be realized.

**1**

## Who May Operate Your Citizens Radio Station?

You, members of your immediate family living with you, and your employees, while on the job.

**2**

## How Many Transmitters Does this Permit Authorize?

A maximum of five (5).

**3**

## Can the FCC Inspect My Station?

Your station and station records must be available for inspection by an authorized agent of the FCC.

**4**

## Where Should I Keep This Permit?

Keep it in a safe place. Post photocopies at all fixed station locations. Indicate on photocopies the location of this permit. Attach a card with your name, address and temporary call sign to each transmitter.

**5**

## How Shall I Identify My Station?

Identify transmissions in English with your temporary call sign.

**6**

## How Can I Use My Station?

Use it for private short-distance radio-communications for your personal or business activities. Channel 9 is reserved solely for emergency communications and to assist motorists.

### Prohibited Communications Include:

- Activities contrary to law
- Transmitting obscene, indecent or profane messages
- Communicating with non-Class D stations
- Intentional interference to other radio stations
- Transmitting for amusement, entertainment, or over a public address system
- Transmitting false distress messages
- Advertising, selling, or for hire

**7**

## How High Can My Fixed Station Antenna Be?

See Section 95.37 if your antenna will be over 20 feet above ground. Additional information is available in SS Bulletin 1001h.

**8**

## May Amplifiers Be Used With My Transmitter?

'Linear' amplifiers are absolutely prohibited. 'Power' microphones may require adjustments to your transmitter.

**9**

## Who Can Make Adjustments to My Transmitters?

Adjustments affecting proper operation may be made only by, or under the supervision of a licensed first or second-class radio operator.

There are several high-quality portable CB radios available that are excellent for wireless communications when weight and other limitations exist. They have been used very effectively for security patrols, hiking and camping expeditions, and other such applications.

## DO I NEED A SPECIAL ANTENNA?

All CB radios require an antenna. Most portable radios are equipped with antennas. However, mobile and base station radios are not. Antennas must be purchased separately. Antennas are designed to transmit and radiate radio signals efficiently, and the shape and size of an antenna determines its efficiency.

There are several types of CB antennas, the two most popular being the vertical whip and the ground plane antennas. The vertical whip is very popular for mobile use and the ground plane is favored for base station use. Figure 1 shows the vertical whip and the ground plane antennas.

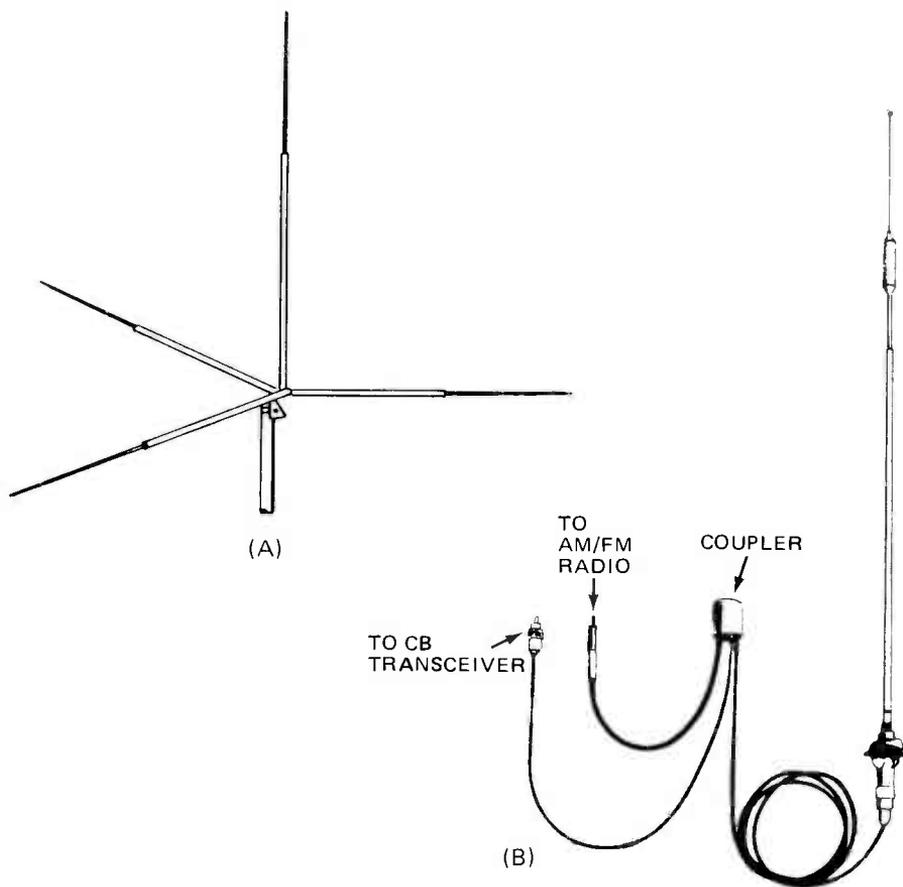


FIGURE 1. (A) GROUND-PLANE ANTENNA. (B) VERTICAL WHIP ANTENNA.

The length of an antenna is directly related to the frequency it is supposed to transmit or receive. For CB-band frequencies, the ideal antenna would be 36 feet. Such an antenna would, of course, be very awkward to use. Fortunately, fractions of this 36-foot length work efficiently. Antennas that are half-length, quarter-length, and eighth-length are being used to transmit and receive CB signals.

Even a quarter-wave antenna would be nine feet long. This is still rather long to install on an automobile. Because of its characteristics, a device called a loading coil can be connected to an antenna to electrically lengthen it while allowing the antenna to be made physically shorter. They can be connected to the base, center, or top of an antenna. The whip antenna illustrated in Figure 1 uses a loading coil.

Generally, the higher an antenna is installed, the better it performs. Antenna height is limited for both mobile and base station installation by the FCC.

The maximum height of a base station antenna is outlined in Section 95.37 of the FCC rules and regulations. Basically, the antenna of a base station radio cannot be mounted higher than 20 feet above the man-made structure to which it is attached.

Ideally, the best place to mount a mobile antenna on an automobile is in the center of the roof. However, this type of installation is not always practical. Mobile antennas are made with a variety of mounts so they can be mounted almost anywhere on a car. At the present time it appears that the trunk is the most popular spot. Mobile antennas can also be mounted on the bumper, the drain gutter, or the cowl. Most mounts are designed to be clamped on, a few have magnetic clamps, and some require holes to be drilled for installation. Be just as careful about selecting an antenna as you are about selecting a radio.

## SHOULD I INSTALL MY OWN CB RADIO?

A lot of nonprofessionals have successfully installed CB radios. On the other hand, quite a few people who are capable of installing a CB radio have gladly paid a professional to do the job. Although installing a CB radio is not unduly complicated, it does require some electronics skill and in some cases a certain degree of mechanical skill. This, of course, depends on the car and how neat you want the installation to be.

The April 1976 edition of *Popular Electronics* magazine contains an excellent and comprehensive article explaining how to install a CB radio. It is quite likely that a copy of this magazine can be obtained from your local library.

The most popular type of mobile installation is under the dashboard of the automobile, although mounting radios on brackets attached to the floor of the car just under the dashboard is becoming more common. Slide-mount brackets of this type are excellent deterrents to thieves because the owner can remove the radio from the car quickly and easily.

Once the radio has been mounted, the antenna must be attached to some part of

the car and connected to the radio by “coaxial cable.” This cable is commonly referred to as “antenna cable,” but the technical description is “RG58.” It has special characteristics which match the CB radio for maximum efficiency. The shorter the cable run from the antenna to the radio, the stronger the signal. For neat installations the antenna cable is concealed behind the molding inside the car. Removing and reinstalling the molding can be tricky.

Once your radio is installed and connected to the antenna, the system should be checked before you turn it on. Two common mistakes that inexperienced CBers tend to make are poor antenna connections and reversing the power leads.

The manufacturer’s information almost always clearly identifies the positive and negative power leads, and in most cases the positive lead is red and the negative lead is black. Whether you connect them properly or not could mean the difference between ruining your radio and having it work the first time it is turned on.

The most common problem with antenna cable is faulty attachment to the antenna or to the connector at the radio. After you have made your connections, pull lightly on them to make sure they are secure. By no means should you crush, staple, or pass screws through the antenna cable.

There is more to installing a CB radio than just putting it in the automobile. After it is installed and mechanical checks are made, it should be checked with the proper test equipment.

The average charge for installing a CB radio is between \$25 and \$45, depending upon the area in which you live. Most professionals can install a radio and check it properly in about 45 minutes. It takes the average nonprofessional about two or three hours, even if the right tools are available.

## WHAT IS AN SWR CHECK?

A standing-wave ratio (SWR) check is a test with an SWR meter to determine if your CB radio, cable, and antenna are operating efficiently. A high SWR reading generally means your antenna needs a slight amount of adjusting. This is usually done by loosening a set screw on the antenna and changing its height. A high SWR reading can also mean that you have problems with the antenna cable or one of your connectors.

SWR meters are not complicated to use. They vary in cost from \$10 to \$100, the average meter retailing for about \$20. They can be purchased at most stores that sell CB radios. Many places that sell CB radios will check the SWR of a CB system for a small fee.

## WHAT ARE THE CB CHANNEL FREQUENCIES?

Actually, this is not particularly important because most radios simply list the channels as 1-23 and not by frequency. The CB channel frequencies are shown in Figure 2 in case you do need them.

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	26.965	9*	27.065	17	27.165
2	26.975	10	27.075	18	27.175
3	26.985	11	27.085	19	27.185
4	27.005	12	27.105	20	27.205
5	27.015	13	27.115	21	27.215
6	27.025	14	27.125	22	27.225
7	27.035	15	27.135	23†	27.255
8	27.055	16	27.155		

\*Emergency channel (use for emergency only)

†Calling channel (used to make contact only)

FIGURE 2. CB CHANNEL FREQUENCIES.

## WILL THE NUMBER OF EXISTING CHANNELS BE INCREASED?

The FCC is presently considering Docket 20120, a proposed channel expansion for Class-D citizens radio. It is probably just a matter of time for the ruling to be made, most likely by June of next year.

When the expansion does take place, it is unlikely that there will be a precipitant rush to buy the new rigs by present CB owners. There will probably be a slow upgrading of rigs with most activity remaining on the original 23 channels for some time. After all, the new expanded channel rigs will probably cost more, and the old ones will be harder to sell once the new expanded rigs are available.

## HOW DO I LEARN THE CB LANGUAGE?

When it comes to transmitting on CB radio, plain old English is out. On the air, everybody is “good buddy” and there is a 10-something for just about everything. Picking up the CB jargon takes a little time. The easiest way to learn the language is to simply listen to the radio for a few days before you go on the air. Regardless of how long you wait and listen, the first time you key the mike you are going to be nervous—that’s nothing unusual.

A “handle” is a nickname a person uses on CB radio. Generally, a person’s handle is connotative. For example, the President’s wife, Betty Ford, has selected “First Mama” as her handle. Other examples of handles are “Twiggy” for a petite female and “Jolly Green Giant” for a large male. CBers select their own handles—they are not issued by the FCC, nor can they be used in place of your FCC authorized call sign.

There is a list of CB terms generally referred to as “10-codes.” Ten-codes were originally developed as a sort of verbal shorthand to conserve air time on crowded channels. I have included a list of the most widely used 10-codes in Figure 3. This information should get you off to a good start. Glossaries of CB jargon have been widely published recently in many magazines.

Code No.	Meaning	Code No.	Meaning
10-1	Receiving poorly	10-37	Wrecker needed at .....
10-2	Receiving well	10-38	Ambulance needed at .....
10-3	Stop transmitting	10-39	Your message delivered
10-4	Okay, message received	10-41	Please tune to Channel .....
10-5	Relay message	10-42	Traffic accident at .....
10-6	Busy, stand by	10-43	Traffic tieup at .....
10-7	Out of service, leaving air	10-44	I have a message for you (or ....)
10-8	In service, subject to call	10-45	All units within range report
10-9	Repeat message	10-50	Break Channel .....
10-10	Transmission completed, standing by	10-60	What is next message number?
10-11	Talking too rapidly	10-62	Unable to copy, use phone
10-12	Visitors present	10-63	Net directed to .....
10-13	Advise weather/road conditions	10-64	Net clear
10-16	Make pickup at .....	10-65	Awaiting your next message
10-17	Urgent business	10-67	All Units comply
10-18	Anything for us?	10-70	Fire at .....
10-19	Nothing for you, return to base	10-71	Proceed with Tx in sequence
10-20	My location is .....	10-73	Speed trap at .....
10-21	Call by telephone	10-75	You are causing interference
10-22	Report in person to .....	10-77	Negative contact
10-23	Stand by	10-81	Reserve hotel room for .....
10-24	Completed last assignment	10-82	Reserve room for .....
10-25	Can you contact .....	10-84	My telephone number is .....
10-26	Disregard last information	10-85	My address is .....
10-27	I am moving to Channel .....	10-89	Radio repairman needed at .....
10-28	Identify your station	10-90	I have TVI
10-29	Time is up for contact	10-91	Talk closer to mike
10-30	Does not conform to FCC rules	10-92	Your Tx is out of adjustment
10-32	I will give you a radio check	10-93	Check my frequency this channel
10-33	Emergency traffic at this station	10-94	Please give me a long count
10-34	Trouble at this station, help needed	10-95	Transmit dead carrier 5 seconds
10-35	Confidential information	10-99	Mission completed, all secure
10-36	Correct time is .....	10-200	Police needed at .....

FIGURE 3. THE 10-CODES.

## HOW CAN I JOIN A CB CLUB?

Recently, CB clubs have been springing up all across the nation, and their numbers continue to increase almost daily. Such clubs are organized to provide their members with technical assistance, a forum for the discussion of mutual interests, social events, and the opportunity to participate in organized community services. For more information at the local level, you might check with other CBers in your area. You might also check with the local electronics supply store which sells CB radios in your area. Often ads will be placed on their bulletin boards inviting new members for CB clubs.

On a nationwide basis, there are two large CB organizations: REACT and ALERT. Both organizations are concerned with assisting motorists on the highways. These organizations are well-trained and organized, and have often rendered first aid during emergencies. Over 200,000 volunteers make up the REACT organization.

The ALERT organization is represented in all 50 states and their headquarters is in Washington, D.C. ALERT helps coordinate the efforts of local clubs, produces bulletins and newsletters, and has represented CBers before government bodies. For more information on both organizations I suggest you contact them directly. The addresses are: REACT, 111 East Wacker Drive, Chicago IL 60601. ALERT National Headquarters, Suite 818A, National Press Building, Washington, D.C. 20004.

## HOW DO I GET INTO CB SERVICING?

With the anticipation of CB sales increasing by more than tenfold by 1980, CB servicing appears to be a very profitable business opportunity. A well-known manufacturer of test equipment has estimated that more than 1.5 million CB radios will require servicing during 1976 alone. With an average service charge in the neighborhood of \$22, it would seem that a well-trained technician could earn a substantial income.

In order to service Citizens Band radios you need at least a Second-Class commercial FCC radiotelephone license, and in many cases shops prefer technicians with First-Class licenses. To prepare for such a license you may want to take the NRI Communications Course or the NRI FCC License Preparation Course.

Experience is also important. To gain experience, you might consider working in a shop that repairs radios before you obtain your license. Any competent technician can work on CB radios. However, the FCC regulations clearly state that the unit must be checked by a holder of a Second-Class or higher commercial license to ensure that it meets the technical requirements before it is placed in service. This would be an excellent way of learning the ins and outs of CB repair. Once you have been exposed to servicing CB radios and understand how the business is set up and operated, you may consider venturing into the business on your own.

### FIELD ENGINEERING OFFICES

Address all communications to Engineer in Charge, FCC

Mobile, Alabama 36602	Baltimore, Maryland 21202
Anchorage, Alaska (Box 644) 99501	Boston, Massachusetts 02109
Los Angeles, California 90012	Detroit, Michigan 48226
San Diego, California 92101	St. Paul, Minnesota 55101
San Francisco, California 94111	Kansas City, Missouri 64106
San Pedro, California 90731	Buffalo, New York 14203
Denver, Colorado 80202	New York, New York 10014
Washington, D.C. 20554	Portland, Oregon 97204
Miami, Florida 33130	Philadelphia, Pennsylvania 19106
Tampa, Florida 33602	San Juan, P.R. (Box 2987) 00903
Atlanta, Georgia 30303	Beaumont, Texas 77701
Savannah, Georgia (Box 8004) 31402	Dallas, Texas 75202
Honolulu, Hawaii 96808	Houston, Texas 77002
Chicago, Illinois 60604	Norfolk, Virginia 23510
New Orleans, Louisiana 70130	Seattle, Washington 98104



## John F. Thompson Elected NHSC President

John F. Thompson, President of NRI, was unanimously elected President of the National Home Study Council by its Board of Trustees at the annual NHSC conference in San Diego.

The Council, a voluntary association of accredited private home study schools, was founded in 1926 to promote sound educational standards and ethical business practices within the home study field. The independent NHSC Accrediting Commission is listed by the U.S. Office of Education as a nationally recognized accrediting agency. There are currently over 100 schools accredited by the Council, representing a student body of 1,200,000.

Mr. Thompson has been active in NHSC affairs for many years and has served as chairman of various committees continuously since 1965. He has also served on numerous accreditation visits to other schools as an examiner.

In 1974 he became a member of the NHSC Board of Trustees and has served as Treasurer and Chairman of the Finance, Budget and Audit Committee.

It is particularly appropriate in 1976 when NHSC celebrates its fiftieth anniversary that Mr. Thompson now assumes the presidency of the National Home Study Council. For on October 29, 1926, fifty years ago, NRI's founder, James E. Smith, was one of thirteen individuals who met in Washington, D.C. for the first official meeting of the National Home



**John F. Thompson**  
President, National Radio Institute

Study Council. Mr. Smith had previously been active in bringing these individuals together, believing as he did in a need for an organization of schools which would assist home study in assuming a position comparable with its real importance. During all of NHSC's fifty years, NRI has been an accredited member, with many of NRI's executives over the years active in supporting the Council. James E. Smith is included in the NHSC Home Study Hall of Fame. Two of Mr. Smith's

NRI associates were recipients of NHSC Distinguished Service Awards.

Mr. Thompson's association with James E. Smith began in 1956 when "Jack" joined NRI as a Student Service consultant. After serving in a number of responsible positions at NRI, Mr. Thompson's concern for the traditions of NRI in serving students well, and in particular his enthusiastic support of NRI leadership in innovative technical training, led to his appointment in 1966 to Vice President and Member of the NRI Board of Directors. His membership on the board with its more immediate exposure to James E. Smith, Chairman of the Board at the time, made Jack even more determined to continue the NRI leadership in technical training as well as NRI's traditional active support of the National Home Study Council.

Named President of NRI in 1973, Mr. Thompson is now in a position to exert

his full influence in support of the NRI concept of innovation in technical training. With the recent introduction of a remarkable new series of NRI "firsts" in home study training, it's evident that NRI is in good hands under his presidency. The National Home Study Council will also be in good hands. But no matter how extensive are Mr. Thompson's NHSC responsibilities, he will always be probing for better ways NRI can serve students well.

John F. Thompson will never be far from his concluding paragraph in his letter to new NRI students:

"You are a Very Important Person to us! You are the reason this school exists. Today, we know you as a new student. In the weeks and months ahead, we hope to earn the right to call you our friend." And, of course, you are also the reason the National Home Study Council exists.

# Can anyone do what you do any better?

You're pretty darn good at your job.  
But today, we all have to consider how we can do  
our work a little better. That's how  
each of us can help keep our jobs here in America.  
For now and for the future.

## America. It only works as well as we do.



A Public Service of This Magazine & The Advertising Council

## SPECIAL NOTICE FOR COMMUNICATIONS COURSE STUDENTS

Several students enrolled in the new NRI Communications Course have inquired about the transceiver that they will build as part of their course. A number of ads erroneously referred to the transceiver as a 220-MHz CB transceiver. The transceiver is not and never was intended to be a CB transceiver.

In the beginning, when the transceiver was first planned, we felt that the activity in the 220-MHz Amateur band would increase, and as a result, we planned the transceiver for operation in this band. However, activity has not increased. In large parts of the country there is no 220-MHz activity at all.

Activity in the 2-meter Amateur band, however, has continued to increase. There are hundreds of 2-meter repeaters on the air which make it possible to extend the normal operating range of a 2-meter mobile transceiver. Therefore, we have changed the transceiver to be supplied in the Communications Course from a 220-MHz transceiver to a 2-meter transceiver which will operate in the range 144-148 MHz. The 2-meter transceiver will have a full 400 synthesized channels.

In addition to changing the band in which the transceiver will operate, we have also been able to increase the power output of the transceiver. The original design called for a power output of 10 watts. The new design calls for a minimum power output of 20 watts. We have been able to do this because a new solid-state module has been made available for 2-meter operation. This module will greatly simplify the building of the 2-meter transceiver and at the same time will more than double the available power output. This should greatly increase the usefulness of the equipment, particularly under adverse conditions.

In the original design, the control head and speaker could be separated from the main unit and mounted in the car near the driver while the main unit could be mounted in the trunk. We found that instead of this being a convenience, it greatly complicated the construction of the unit. In the past, the tube-type transceivers were so large that this was a good idea. However, the solid-state transceiver is so small that the entire unit can be mounted near the driver. Therefore, to simplify the construction and improve the operation of the transceiver, we have eliminated this unnecessary complication. This will also make it much simpler to change the transceiver back and forth between mobile and base station operation.

We also wish to make it clear that the experiments performed as part of your training will be performed using a dummy antenna. An Amateur License is required before you can operate the transceiver on the air in the 2-meter Amateur Band. NRI will help students who have completed their transceiver and wish to go on the air to get the required Amateur license.

# *more* **ADVENTURES** *in* **tv** *servicing*

by J.B. Straughn

## SEARS MODEL 564.41230100

This color set came to me several months ago with a request that I install a new power transformer. The customer had the new transformer, stating that the serviceman who started the job had become ill and could not finish the work.

The circuit shown in Figure 1 is a little out of the ordinary, which is par for many sets made overseas. The thing which is unique is the tap on the power transformer used to supply voltage to the color portion of the set, which is transistorized. The primary of the old transformer was open. There did not seem to be any shorts, so I went ahead and installed the new transformer, for a labor charge of \$15. This fixed the trouble and the set played with good color.

About two weeks ago the set came back and—you guessed it—the transformer primary was open again. This was a horse of a different color as I was now the prime repairer, so to speak.

I checked everything that could cause the transformer to be overloaded, such as leakage from the cathodes of the picture tube to its heaters, the low-voltage rectifier for the 29-volt transistor supply and, as a matter of course, the two 100-ohm 20-watt resistors in series with the primary. While these resistors could not become defective in any way that would overload the primary, they did show a large change in value so I decided to replace them while working on the power supply. I got replacements from a local parts supply house in Montgomery but no



one had a replacement power transformer so I had to order one from Sears. If there had been room, I would have gotten a standard transformer with a 6.3-volt secondary and a separate transformer with a 20-volt secondary.

I was quite concerned because this would be the third transformer in the set, counting the original. The trouble was obviously intermittent in nature because the set would work for some time after the replacement was installed without signs of overloading. When I went to order the new transformer from the local Sears warehouse, I asked one of their servicemen if there had been a rash of trouble in this model. He reported no particular trouble of the kind in question.

What to do? I remembered the case of another foreign-made set in which the diodes intermittently broke down. If the rectifier were to short, there could be enough current through the 220- $\mu$ f input filter capacitor to cause enough primary current to open the primary.

I installed a regular low-voltage diode, the two resistors in the primary circuit, and the new transformer. The old diode was about the same physical size as the usual signal diode used as a video detector!

This does not mean that a small physical size won't work. Just last week I bought a card of International Rectifier diodes of the same small size that are rated at 2.5 amperes. In any event, I installed a new rectifier and then found that the positioning of the button of the circuit breaker was touchy. The circuit breaker would close but if disturbed would open. I meant to install another but the guy showed up and wanted the set "right now." I told him about the circuit breaker but he took it anyway. The set worked okay and I felt sure the transformer would not burn out again.

The transformer cost me \$7.80, the resistors \$1.85, and the diode 50 cents, totaling \$10.15. The labor amounted to about one and a half hours not including my 85-mile round trip to order the power transformer. I made out a bill for \$38.50, not a bad price considering I would be in the soup if the new transformer gave up the ghost again.

About a week later I got another call. The circuit breaker would not stay closed. The customer said he used tape to hold the red button in and wanted to know if this was okay. I told him to bring it back and I would put in a new circuit breaker, but he didn't want to do this. The truth finally came out—this guy did not own the set but was having it fixed for a "lady love" and the affair was about over and he didn't want to get in deeper. I looked over the schematic and saw that there was a protective resistor of 1 ohm, 7 watts in series with the circuit breaker. I told him his solution to the problem would probably be okay and that the resistor would burn out if there were a big overload—say around 8 amps or more! That was the last I heard about the set.

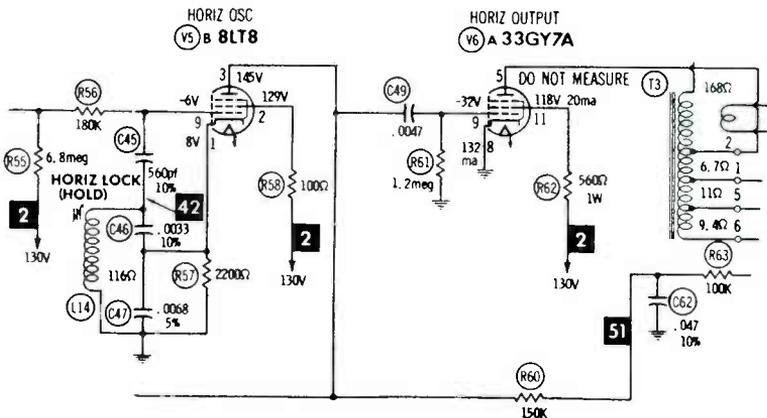
## ADMIRAL CHASSIS H3-1A

I had repaired this set many moons ago but couldn't recall the details. The customer said it had only played three weeks and had then stopped. When I asked him why he hadn't brought it right back, he said he had gone to Georgia. I suspect he had been in the cooler all this time, which is really neither here nor there.

The set was dead and no tubes lit up. I pulled the entire chassis except the picture tube and loudspeaker. This let me get at the bottom of the circuit board. I rang out the circuit with my ohmmeter and located an open in a poorly soldered connection on pin 12 of the 33GY7 tube. I resoldered the connection and when the picture tube heater was reinserted in the circuit by putting its socket back on the tube base, filament continuity was reestablished in the set.

I also noticed that the locating lug on the crt base was broken off. This meant you had to know how to put the socket back on so the heater would light. To do this I located the two pins of the tube base which showed continuity. These had to be the heater pins, since they did not show zero resistance, but about what you would expect for a heater. In some sets there are two leads for grid 1, but they would show zero resistance. In any event, once the heater pins were identified it was only necessary to rotate the socket so the holes on either side of the locating lug of the socket (heater leads) were joined with the heater pins. (It takes longer to tell about than to do.)

With the set back together and turned on, the tube filaments lit but the set was still dead—no sound or raster. This meant no high voltage, and no boost, for without boost voltage the audio detector will not perform. My neon bulb (on the end of a fiber insulating rod) did not glow when brought near the plate lead of the 1BC2 high-voltage rectifier (see Figure 2), showing that there was no horizontal energy flowing in the flyback transformer (horizontal output transformer). I found



*Courtesy Howard W. Sams*

FIGURE 2. HORIZONTAL CIRCUIT OF H3-1A.

there was voltage on pin 2 of the 33GY7 (B+ voltage available) and that there was no negative voltage on pin 9 of this tube. Lack of negative voltage showed there was no horizontal drive to the 33GY7.

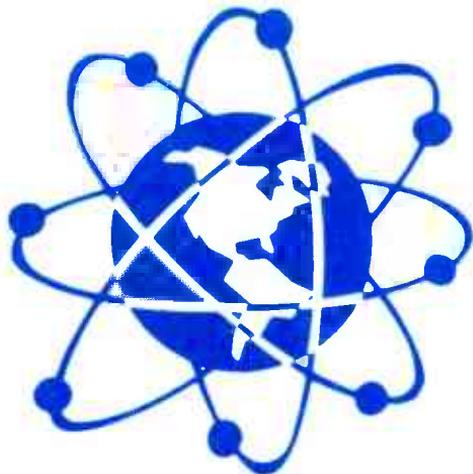
I started to pull the 8LT8 to check it and burned my fingers because the tube was too hot to touch. This amount of heat is not normal because the plate current is limited by the minus 6 volts on pin 9 of the 8LT8. If this oscillator is not working the tube will get hot as there will be no negative voltage on pin 9. The plate voltage (pin 3) measured about 5 volts instead of 145 volts. This showed the tube was drawing far too much plate current as would be the case when the oscillator did not work.

Next I checked the horizontal hold coil as I have had a lot of trouble with them. The coil was open and although I found the break, I did not repair it, as the adjusting rod was also missing. The only place you can get a replacement rod, to adjust the coil core, is an Admiral distributor, so I called the local distributor in Atlanta and ordered a new coil and rod (I got two of each for future work). When I got the old coil out I decided to check the 0.0033- $\mu\text{f}$  and 0.0068- $\mu\text{f}$  capacitors in the circuit. One lead of the 0.0068- $\mu\text{f}$  capacitor proceeded to break off at the body. Drat it (not exactly what I said, but you get the idea)! This was a 10% capacitor and all I had was a 20% unit, so I put it in.

I tried the set out and found that while I had a healthy minus -35-volt drive on pin 9 of the 33GY7, there was no high voltage and my neon lamp would not light. I did some more poking around and found no screen voltage on pin 11 of the 33GY7. The 560-ohm one-watt screen resistor was open. This, of course, was caused by lack of grid drive when the local oscillator was dead, which resulted in excess screen current in the 33GY7. I replaced the resistor and now had raster, picture, and sound.

Very shortly thereafter the set seemed to go into oscillation as the raster was covered with all kinds of lines. At long last I found that if I wiggled the video i-f tube in its socket I could make the "oscillation" come and go at will. I took everything apart again so I could get at the bottom of the circuit board and found a poor connection on the tube base. (This showed up on the ohmmeter when the tube was moved around.) I resoldered the connection and this cleared up the oscillating condition. However, after the set had been operating a short time I had to adjust the slug in the horizontal hold coil. I figured the 0.0068- $\mu\text{f}$  capacitor I had installed was drifting and changing in value. The next time I went to town I got a 5% replacement and with it installed the horizontal frequency stayed put.

In view of the fact the set "had only worked three weeks" after the last time I fixed it, I charged \$23. This wasn't much for what I had done but I did better than break even and could see from what had been done before I must have charged a pretty sum the first time I fixed it. I was pretty sure someone had been into it to open the horizontal coil, etc., but why argue? I decided I wouldn't work on this set again because the circuit board had about had it and was opening up in too many places to suit me. I hope I remember my decision on this set!



## HAM NEWS



*By Ted Beach* **K4MKX**

Things have been rather hectic in this neck of the woods for the last two months. Seems like everything needed doing at the same time, and as a result, some of the various projects slipped by without getting done. One of the things that is going to have to be postponed is the discussion on simple antenna systems promised in the last issue of the Journal. I have just not had the time to do my homework properly.

I always like to be sure that what I pass along to you is going to do the job as represented, and that means trying out the various projects before writing them up. I have everything on paper, and now all I need is the time to convert the paper antenna systems to wire and give them the old smoke test. That will have to be next time, however.

As this is being written (in May), our local radio club in Arlington is making plans for Field Day, and I hope to take this opportunity to try out a couple of the antennas I will describe next time. One of the members of the radio club

is an electrical contractor who has access to PVC covered house wire at cost, and I have bought 500 feet of this for my experiments.

I fully intend to try some balanced feed systems, using the wire for the feed line as well as the antenna. Shades of the old days! You thought everyone uses coax these days, eh? The beauty of such a system is that with a good tuning unit, you can load up on almost any band and be assured of getting power to the antenna. Even if the feed line has a high SWR, the loss incurred is usually a radiation loss rather than an  $I^2R$  loss since the feed line is quite loss-free. More about this later.

Now let's see who we've heard from since last time. Quite a few long letters were in the mail with much about student and graduate activity. As usual, those listed first in the list are students and graduates of the NRI amateur courses, while those listed last are other students and graduates.

It certainly is nice to see those Extras in the list. It almost makes me want to

R.J.	WN3AAC	N	Pittsburgh PA
Ted	WN3BNI	N	Erie PA
Ed	WN4COG	N	Alcoa TN
Ronnie	WN5PIW	N	Tyler TX
Harold	WN5RJP	N	Dallas TX
Goldie	W6BRM*	E	San Diego CA
Carl	WN7DJR	N	Lynnwood WA
John	WN9RPY	N	Des Plaines IL
Al	WN9UBE	N	Rockford IL
Charlie	W4DEQ	G	Jamestown NC
Hank	WA4MSY*	G	Seminole FL
Jim	WN7DTO	N	Richland WA
Ron	W8OQW	A	Saginaw MI
Don	WB8STQ*	A	Trotwood OH
Gordon	WA0GLI*	E	Duluth MI
Lynn	WB0LVD	—	Wray CO

\* Just upgraded — congratulations!

go out and get mine, as I have been threatening to do now for some time. However, I think I'll wait a bit longer, as I do not have enough time "in harness" to qualify for a two-letter call and, besides, there are so many things going on in the FCC that if I wait they will probably change the rules in my favor. In addition, I still can't copy 20 words per minute! Oh, well.

WN4COG got his license back in October of last year, but didn't get on the air until February of this year. It took Ed that long to get going because he was in the midst of putting together the Heath SB303/SB401 station. His first contact was on 15 meters with a WB5/TI2 in San Jose, Costa Rica. Ed said he was really surprised when the station came back to his very nervous and shaky call. The antenna at WN4COG is a four-band parallel dipole made from TV rotor cable fed with coax to a balun. The four bands Ed cut the antenna for are 40, 20, 15 and 10, and the orientation is such that it works best to the west coast and Central America.

WN5RJP certainly has a busy schedule. Harold says that between working as a field recruiter for the Army, going to college two nights a week, studying his NRI course and building various kits, he just does not have the time that he needs to study code and operate. He passed his test back in December but didn't get his ticket until late in February; just about par for the FCC, Harold. Anyway, all that waiting allowed him to put together a very fine business station, consisting of a Heath HW101 along with an SB650 and SB614.

Harold asked a question that many of you have asked, and that is why don't we try to get an NRI net of some type going to meet on the air and lend mutual help in getting code speed up. I guess the answer is that it is a good idea, but having tried it once before, it just doesn't work in practice. I think it was about four or five years ago that we tried this, but because of the varied geographic locations of the participants, only two or three contacts were made over a period of several months.

This was during a time that I did not have a rig on the air, and all I could do was listen. For a Novice Net, 40 meters would probably be the best bet, even with all the QRM and relatively limited range. Having never been involved in net operations myself, I'll leave it up to you out there to see whether or not you would like to try this out. I will act as moderator or coordinator, but you all will have to do the planning and organizing by letting me hear from you.

As mentioned earlier, it certainly is good to see those Extra calls listed. Goldie, W6BRM wrote: "A lot of credit for this accomplishment is due to my taking the NRI Advanced Amateur Radio Course." Many thanks, Goldie.

WN9RPY writes that he is getting a lot of help from his course also and hopes to take the General test very soon. Then he will be able to use his FT101EE to the fullest. Fine business, John, and we'll be rooting for you.

Early in May, we had the distinct pleasure of chatting briefly with Charlie, W4DEQ, when he stopped by NRI. He is a graduate of the old Radio TV servicing course and is presently taking the Color TV course and enjoying it very much. Charlie got his General ticket back in 1946 when he was discharged from his job as a radio operator in the Navy, and has held the present call since that time.

WA4MSY just recently got his General Ticket, and operates from his Florida QTH using a Hallicrafters HT40 transmitter and a Hammarlund HQ129X receiver. Hank likes to work 80 meters, but says he will have to wait until he can get up a better antenna before he can work any real DX.

WN7DTO writes that at the present time four of the six members of his family have Novice licenses: James, WN7DTO; Stephen, WN7DTK; Joseph, WN7DTL; and David, WN7DTM. I wonder who got WN7DTN? Very nice, James, and now if you can only talk the other two into taking the plunge you will be an all-Ham family!

W8OQW started out back in 1954 with all home-brew gear, and today still has a good bit of the home brew still working. At present, Ron uses an SB101 with an 811 linear amplifier on 80 and 75, and an HW18 on 160 meters. These rigs feed an inverted vee matched with a Johnson Matchbox.

WB8STQ writes that he has notified us several times of his call, but somehow or other the notes did not reach this desk. Sorry about that, Don. Anyway, it is very good to be able to report your new Advanced ticket, especially after all of your tries (I believe you said eight, at nine dollars each!). Don has an HW101, a Wilson 1402 and a Heath HW202, for which he is going to build a synthesizer in the near future. He seems to like VHF a lot, as he is also active on 220 and 450, although he did not indicate what gear he was using.

Gordon, WA0GLI, made the long trip from Duluth to St. Paul on March 26 to take a few amateur exams. At the time, he held a Conditional license, and successfully passed General, Advanced and Extra. Very fine, Gordon. He still remains active on VHF, but also finds time to manage two CW nets in Minnesota, and so far has 49 states worked in 1976 toward a Bicentennial WAS. While he is resting, Gordon works on keyers, preamplifiers for Oscar, and other such projects.

Where do you find the time?

WBØLVD writes that he would have had a lot less trouble with the FCC exams if he had taken our Communications course just a little earlier. I know what you mean, Lynn. At present, he is working on an 80-foot free-standing tower to which he will attach 20- and 40-meter beams to replace the presently used 18-AVT vertical. I would imagine an 80-foot tower would be a real monster without guys. Good luck!

Finally, we had a note from Don Upp saying that he had at last passed the 13 wpm code test, so we presume that he must have gotten some sort of license. Unfortunately Don did not tell us which one.

See you next time, with the before-promised information on simple antenna systems. Until then, have a happy Bicentennial Fourth of July. Very 73,

Ted - K4MKX

AMATEUR RADIO STATION  
**WB3AXR**  
J. M. LYTLE - CONTROL OPERATOR

ATTRACTIVE LAMINATED SIGN engraved as shown with your name and call. Overall size 3½" by 9". White lettering on your choice of black, blue, or red. Mount on the wall or at your station console. Only \$6 postpaid. Type or print clearly your name and the call to be engraved, and send together with your name and address to AJAX, 1016 Crawford Drive, Rockville, Maryland 20851.

PUT YOUR  
BEST FOOT  
FORWARD  
in the March of Dimes



THIS SPACE CONTRIBUTED AS A PUBLIC SERVICE BY THE PUBLISHER

## Job Ops

**HELP WANTED:** Newly established TV station in upstate New York is seeking new employees. Applicants must have a First-Class FCC license and must be able to exhibit technical abilities by resume and interview. Those hired will be operating a master control switcher, film island, VTRs, ICL, etc. They will be expected to develop into maintenance engineers capable of troubleshooting and preventive maintenance of studio and transmitter equipment. Send resume to Newton Dunn, Chief Engineer, WCFE-TV, State University College, Plattsburgh, New York 12901.

# NRI HONORS PROGRAM AWARDS

For outstanding grades throughout their NRI courses of study, the following March and April graduates were given Certificates of Distinction with their NRI Electronics Diplomas.

## WITH HIGHEST HONORS

Walter R. Babcock, Houston TX  
R. H. Garcia, Virginia Beach VA  
George E. Imhoff, Ferdinand ID  
Edward McMillan, Brooklyn NY  
Robert C. Orner, Mt. Holly Springs PA  
Reed Ellis Phillips, Oceanside NY  
Frederick J. Shaffer, Brooklyn MI  
Pepe Siv, Dearborn Heights MI  
Charles B. Younginger, Conneaut Lake PA

## WITH HIGH HONORS

Russell D. Bateman, Laurel MD  
Richard J. Evans, Patrick AFB FL  
Alexander Ferragamo, Revere MA  
John E. Haldenwang, Seal Beach CA  
Leon B. Hinkle, Ridgeley WV  
John L. Johnson, Grand Forks AFB ND  
Orville W. Jones, Jeffersontown, KY  
Francis E. Kaczinski, Avenel NJ  
Daniel S. Kiddon, Little Rock AFB AR  
Harold Kinley, Kingstree SC  
Raymond LaBonte, Rochester NY  
Donald D. LaNeve, New Cumberland WV  
Harry Lee, Flushing NY  
Joseph Lefevre, King City ON, Canada  
Peter Long, Lanham MD  
Danny M. Meyer, Glendale Heights IL  
Susan Dian Miller, Evansville IN  
Lazar Moscovici, Brooklyn NY  
James E. Norine, Sebastopol CA  
Jerome Papes, Ludington MI  
Edward J. Pleva, Jr., Berwyn IL  
Henry E. Poland, Wooler ON, Canada  
Leslie L. Roblin, APC New York  
Paul R. Roshon, West Newton PA  
Robert G. Sanford, Clarksville MD  
Fred J. Schultz, Brooklyn NY  
David G. R. Short, Corpus Christi TX  
John A. Stiassney, Saratoga Springs NY  
James L. Stimson, Poughkeepsie NY  
\*Donald H. Tuttle, Norway ME  
Edward J. Wells, Portland OR

## WITH HONORS

Mahmoud A. Abulkheir, Jamaica NY  
Daniel H. Adams, Dutch John UT  
Kenneth Wayne Bahr, Huntsville AL  
Kenneth A. Blacklock, Santa Rosa CA  
Frank R. Bondi, Jr., Boston PA

\*Name omitted from previous list.

Ellis A. Bush, Milton FL  
William D. Callaghan, Base Borden ON  
James L. Callaway, Eaton OH  
Anthony J. Carroll, Lakewood CO  
Vidal John Chavannes, Don Mills ON  
Tracy M. Clark, Elkhart IN  
Larry H. Collins, Anderson SC  
Jerry D. Cook, Loring AFB ME  
Earl C. Combs, Jr., Rangeley ME  
Steven V. Couch, Ottawa KS  
John C. Craig, Greeley CO  
Rick A. Crist, Nellis AFB NV  
John A. Darroch, Parlin NJ  
Joseph A. DiCaprio, Utica NY  
Lawrence H. Drayton, Bethesda MD  
Jerry Emrich, Columbus OH  
Gary Forrester, York PA  
Wayne Fortlage, Brooklyn OH  
Calvin Freeman, Cleveland OH  
Donald R. Gebhardt, Weston MO  
David Gomes, Fairfield CA  
Russell A. Graham, Sun City AZ  
Richard A. Gridley, Ravenna OH  
James E. Haygood, Redwood City CA  
James W. Henson, Jr., Jackson WV  
Kevin K. Holsinger, Burley ID  
Carl D. Howie, Jr., Shreveport LA  
Christopher Jeans, Bishop's Falls NF  
Robert J. Johansen, Staten Island NY  
Richard D. Jugel, Bristol CT  
Bennie L. Kenney, Rainelle WV  
Everett L. Kimsey, Norfolk VA  
Alan Larkin, Portage MI  
C. M. Lawrence, Tulsa OK  
John Levi McMaster, Hanover PA  
Richard G. Miller, APO New York  
David L. Motycka, Glastonbury CT  
Daniel L. Passer, Brown Deer WI  
David W. Peterson, Bisbee AZ  
Frank J. Rauch, Pompton Plains NJ  
James A. Rich, Aurora IL  
Philip E. Richardson, Martinez CA  
Richard E. Samuelson, Flint MI  
Earl D. Shaw, Oakland CA  
Gary Raymond Shepard, Burlington VT  
George H. Smith, Columbus OH  
Marlin B. Smith, Pittsfield ME  
Wolfgang Takatsch, Roseville MI  
Thomas A. Tully, Lindenhurst NY  
Ronald D. Upchurch, New Castle IN  
Curtis R. Vess, Leighton AL  
David W. Vincent, San Antonio TX  
Dennis Y. Yamamoto, Honolulu HI  
Bruce R. Young, Jr., Olanta PA

## DIRECTORY OF ALUMNI CHAPTERS

**DETROIT CHAPTER** meets at 8 p.m. on the second Friday of each month at St. Andrews Hall, 431 E. Congress St., Detroit. Chairman: James Kelley, 1140 Livernois, Detroit, Michigan. 841-4972.

**FLINT (SAGINAW VALLEY) CHAPTER** meets 7:30 p.m. the second Wednesday of each month at Andy's Radio and TV Shop, G-5507 S.Saginaw Rd., Flint, Michigan. Chairman: Roger D. Donaven.

**NEW YORK CITY CHAPTER** meets at 8:30 p.m., first Thursday of each month, at 1669 45th Street, Brooklyn, New York. Chairman: Sam Antman, 1669 45th Street, Brooklyn, New York.

**NORTH JERSEY CHAPTER** meets at 8 p.m. on the second Friday of each month at the Players Club, located on Washington Square in Kearny, New Jersey. Chairman: Al Mould. Telephone 991-9299 or 384-8112.

**PHILADELPHIA-CAMDEN CHAPTER** meets on the fourth Monday of each month at 8 p.m. at the home of Chairman Boyd A. Bingaman, 426 Crozter Avenue, Folcroft, Penna. Telephone LU 3-7165.

**PITTSBURGH CHAPTER** meets at 8 p.m. on the first Thursday of each month in the basement of the U.P. Church of Verona, Pa., corner of South Ave. and Second Street. Chairman: James Wheeler.

**SAN ANTONIO (ALAMO) CHAPTER** meets at 7 p.m., fourth Thursday of each month, at the Alamo Heights Christian Church Scout House, 350 Primrose St., 6500 block of N. New Braunfels St. (three blocks north of Austin Hwy.), San Antonio. Chairman: Robert Bonge, 222 Amador Lane, San Antonio. All San Antonio area NRI students are always welcome. A free annual chapter membership will be given to all NRI graduates attending within three months of their graduation.

**SOUTHEASTERN MASSACHUSETTS CHAPTER** meets at 8 p.m. on the last Wednesday of each month at the home of Chairman Daniel DeJesus, 12 Brookview St., Fairhaven, Mass. 02719.

**SPRINGFIELD (MASS.) CHAPTER** meets at 7:30 p.m. on the second Saturday of each month at the shop of Norman Charest, 74 Redfern Drive, Springfield, Mass. 01109. Telephone (413) 734-2609. Chairman: Preston Atwood.

**TORONTO CHAPTER** meets at McGraw-Hill CEC, 330 Progress Avenue, Scarborough, Ontario, Canada. Chairman: Branko Lebar. For information contact Stewart J. Kenmuir, (416) 293-1911.



### FLINT/SAGINAW VALLEY MEMBER HAS FABULOUS VACATION

Andy Jobbagy of the Flint-Saginaw Valley Chapter took a wonderful vacation trip to California and Nevada. He visited Lake Tahoe, Reno, Virginia City, and San Jose, and then on to Chinatown in San Francisco. From there he went to the California Redwood Forest and last to the famous Paul Masson champagne wine cellars where good old Hungarian wine was being aged in 50,000-gallon barrels. Of course, a sample was in order.

At the April 7 meeting, Mr. Douglas Gram presented a talk on how to use the scope for troubleshooting. He used the scope to trace a Zenith color TV high-voltage problem and it turned out to be a feed-through capacitor with a poor solder joint.

Fred Malik brought in a black-and-white TV set to work on and the problem turned out to be a yoke with a shorted turn.

At our April 20 meeting the Chapter received an invitation to the Sencore Instrument Company seminar

#### NRI AA OFFICERS

Ray Berus .....	President
Earle B. Allen, Jr. ....	Vice President
J. S. Bartlett .....	Vice President
Homer Chaney .....	Vice President
Branko Lebar .....	Vice President
Tom Nolan .....	Executive Secretary

## Alumni News

held at the Holiday Inn in Flint, Michigan. This seminar was sponsored by an Owosso Parts dealer. Owosso is 25 miles from Flint.

Steve Avetta, Cash Laferty, and Frederick Malik all came home with an instrument from the seminar. The dealer promised to put on a lecture concerning oscilloscopes for the Flint Chapter in the very near future.

The April 28 meeting found Chapter member Dale Keys had purchased a B&K 415 sweep marker generator so the members could use it at any time and it will be available at Andrew Jobbagy's shop where we hold our regular meetings. Also at this meeting the chapter hired Douglas Gram to teach us how to use the sweep marker generator and at the next meeting he will instruct us on alignment procedures.

We now have two great instruments, a B&K sweep marker generator and a B&K television analyst. The latter was courtesy of Dennis Besser.

The Chapter also has a new member. He is Hal Buehler from Lansing, which is 65 miles from Flint. Welcome to the Chapter, Hal.

### DETROIT CHAPTER BRAVES ICY CONDITIONS TO HOLD MEETING

At the March 12th meeting, an ice storm in Detroit made transportation very difficult. However, 12 members still showed up at the meeting and a transistor radio was brought in by Mr. Gill Sager which was the project for the evening.

The radio had little volume but due to the lack of heat and the poor lighting conditions in the building because of the weather, the members were unable to do any troubleshooting on the unit.

At the April 9 meeting 14 members and one visitor attended and the project for that meeting was a GE clock radio. Using signal tracing, Mr. Oliver and Mr. Nagy found defective audio transistors.

Mr. Kelly read a letter he received from Mr. John Hayden of Danville, Virginia. The letter concerned some problems Mr. Hayden had encountered with his color television. Mr. Hayden informed the chapter that Mr. Nolan, Executive Secretary, had sent him a new flyback transformer for the TV

which corrected all his problems, and the TV has been operating fine ever since.

### **SAN ANTONIO CHAPTER HOSTS EXECUTIVE SECRETARY**

Tom Nolan, NRIAA Executive Secretary, made his annual visit to the Chapter on April 21.

Tom gave a talk on servicing solid-state television receivers. He also brought with him a small NRI frequency counter and an NRI Discovery Lab which will be incorporated in NRI courses from now on as a teaching aid.

The following evening the Fiesta was in progress, so the Chapter entertained Janet and Tom at Beethoven's Hall (a real German evening) which included German food and dancing to a real German band.

### **ZENITH SERVICE SUPERVISOR GIVES TALK FOR PITTSBURGH CHAPTER**

At the March 4 regular meeting, Mr. Thomas P. Brutscher, field service supervisor for Zenith Television Corporation, gave a fine talk on the new Zenith 13 inch color TV receiver.

He had planned to have one of these new 13 inch color TV receivers with him to demonstrate, but because of a robbery at the warehouse, the police were keeping it for evidence.

At the April 1 meeting Mr. James L. Wheeler, retired TV repairman, gave a fine talk on using an oscilloscope to repair color TV receivers. He also gave a demonstration on its use by using his own oscilloscope and a color TV receiver which he brought with him.

Mr. Wheeler does not sound like he is really retired as his interest is still right there in the business.

### **SPRINGFIELD CHAPTER LEARNS ABOUT AUTOMATIC GAIN CONTROL**

At the April 12 meeting Mr. John Parks gave a talk on automatic gain control circuits and showed slides that the Chapter had obtained from the RCA Corporation.

The members voted to have their annual picnic this year and it will be held on June 26, rain or shine. All paid-up members and their wives are eligible to attend at no additional cost for their wives.



## **Thanks to you, I still have a home.**

For over 30 years, Smokey has been asking you to be careful with fire.

During that time, you've helped cut the number of careless fires in half.

So from Smokey Bear and all of us who live in the forest, thanks for listening. And keep up the good work.



A Public Service of This Magazine  
& The Advertising Council



This solid-state 23-channel transceiver comes complete with telescoping trunk-mount antenna!

# SOLID-STATE 23-CHANNEL TRANSCEIVER



- Signal/RF Power Meter
- ANL (Automatic Noise Limiter) Switch
- Delta Tuning Switch
- Off/Volume Control
- Squelch Control
- Illuminated Channel Indicator
- Channel Selector
- PA (Public Address)

Only  
**\$159.95**

Stock No. RT500  
Shipping weight  
7 pounds

## RECEIVER

**Circuit type:** Dual conversion superheterodyne. Crystal frequency synthesizer provides 23 crystal-controlled transmit and receive channels. Delta tuning of  $\pm 1.5$  kHz on each channel plus mechanical filter. **Sensitivity:** 0.7 microvolt for 10 db S + N to N ratio at 30 percent at 1000 Hz modulation. **Selectivity:** 6 db down at  $\pm 3$  kHz. 50 db down at  $\pm 10$  kHz. **Intermediate frequency:** First i-f: 11.275 MHz. Second i-f: 455 kHz. **Audio output:** 3 watts with 3-1/8" P.D.S. **Auxiliary circuit:** Series gate noise limiter, variable squelch, PA, Delta tuning.

## TRANSMITTER

**Collector power input:** 5 watts maximum. **Range boost:** Yields high average modulation at average voice levels. **Carrier deviation:** Not greater than  $\pm 800$  Hz nominal on (exceeds FCC and other requirements). **Harmonic suppression:** Exceeds 50 db. **Antenna matching:** Nominal 50 ohm.

## GENERAL

**Power supply:** 12 volts dc negative ground. **Accessories included:** Press-talk dynamic microphone, dc power cable (2.3 ampere fused), mobile mounting bracket, and mounting screws. **Dimensions:** 5-3/4 inches wide by 2 inches high by 7-3/4 inches deep. **Weight:** 4 pounds.

Specifications subject to change without notice.

Every Sharp transceiver is individually performance-tested before shipment. From the date of purchase, this warranty covers both parts and labor for a period of one year. Authorized Sharp Service Stations are located throughout the United States.

ORDER NOW . . . FROM CONAR

## CITIZEN-BAND CONVERTER

Hear traffic and emergency vehicle information on road conditions, accidents, jams, weather, etc., without buying an expensive CB radio.



Your regular car radio can now become a CB radio receiver . . . without disturbing the normal operation of your AM or FM bands.

- No license required.
- Monitor all 23 CB channels.
- No antenna to buy.\*
- Simple two-wire installation at dash.
- Operates on any 12-volt negative-ground vehicle.
- Excellent sound and quiet operation.
- Sensitivity control.
- LED pilot light.
- All-metal construction.
- Black and chrome decor.
- Compact size: 1½ inches high by 4 inches wide by 5½ inches deep.
- No battery to buy.
- Monitor the national emergency frequency (Channel 9).

\*While not necessary, a CB antenna will provide performance rivaling that of a CB transceiver.

CB owners: Use the Ultralec Converter to monitor your regular call channel while using your CB transceiver to talk on another channel.

Stock No. CB023 **Only \$34.95**

## POWER, SWR, AND FIELD-STRENGTH METER

- 10-watt and 100-watt scale
- Direct reading for checking antenna installation
- Field strength reading for checking antenna performance
- Important modulation reading



**Only \$34.95** Stock No. AC003

## SWR and Field-Strength Meter

- 100-microampere movement
- Coaxial fittings
- Relative field strength readings. Forward and reflective power.



Stock No. AC001

**Only \$18.95**

# CONAR

A Division of the National Radio Institute  
3939 Wisconsin Avenue  
Washington, D.C. 20016

**CHECK ONE:**

- Cash order
- COD (20% deposit required)
- Select-A-Plan order

**CHECK ONE:**

- New Conar account
- Add-on Conar account
- Reopen Conar account

**PLEASE PRINT**

**Ship to another address? Give directions here:**

\_\_\_\_\_ NRI Student or Graduate No. \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip code \_\_\_\_\_

Social Security No. \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

c/o \_\_\_\_\_

Moved since last order?

Previous address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip code \_\_\_\_\_

1. Name of Item	2. Stock No.	3. How Many?	4. Price Each	5. Total	Wt.

**IMPORTANT:**

To speed handling, any correspondence should be on separate paper.  
All prices are net FOB, Washington, D.C. Please include postage for weight shown and insurance on Parcel Post orders.  
A 20% deposit is required on COD orders. Select-A-Plan orders: Please complete reverse side and sign payment agreement below. Thank you for your order.

6. Total cash price for merchandise	
7. Parcel Post and insurance (Do not remit for items shipped Express Collect)	
8. 10% cash down payment and Parcel Post costs required on new Conar accounts.	
9. Unpaid balance of cash price (Items 6 and 7 less item 8)	
10. Sales tax (Washington, D.C. residents only)	
11. Unpaid balance (Amount to be financed) (Item 9 plus item 10)	

Prices in the Conar catalog and Select-A-Plan time payment privileges apply only to residents of the United States and Canada. Residents of Canada and foreign countries are responsible for customs charges.

**PAYMENT AGREEMENT**

Enclosed is a down payment of \$ \_\_\_\_\_ on the merchandise I have listed on the Conar Order Form. I will pay Conar a minimum payment of 7% of the beginning unpaid balance or \$5 per month, whichever is greater, until the full balance plus applicable interest is paid. Title to and right of possession of the merchandise shall remain in Conar Instruments until all payments have been made. If I do not make the payments as agreed, Conar may declare the entire balance immediately due and payable. In satisfaction of the balance, Conar may, at its option, take back the merchandise, which I agree to return upon request. I agree that the above conditions shall apply to any add-on purchases to my account. The statements on my credit application are true and are made for the purpose of receiving credit.

Date \_\_\_\_\_ Buyer sign here \_\_\_\_\_

Please do not write in this space.



A CONAR CLOSEOUT SALE . . . ON THE MOST ADVANCED  
DIGITAL CLOCK AVAILABLE ANYWHERE!



 *digital concepts*

## ELECTRONIC CLOCK KIT

Previously offered at \$89.50

**Closeout Price**  
**\$39.95**

Includes shipping charges

**The new electronic clock that gives readout of hour, minute, and second . . . plus the month and the day!**

The Digital Concepts electronic digital clock and calendar can indicate the hours, minutes, and seconds . . . or the month and the day . . . or alternate between time and date . . . on an electronic readout . . . in numerals .55" high . . . that is visible from almost any viewing angle, no matter how light or dark the room. There are no moving parts whatever. So the operation is totally silent, the accuracy is superb (to within seconds a month), and life expectancy is an incredible 100,000 hours!

### Wide choice of display modes

With the Digital Concepts unit you decide if you want to display the time only, or a continuous 10-second cycle in which time alternates with date. You can also decide if you want to operate on a 12-hour or 24-hour international time sequence. You can change the display modes and time sequences with particular ease. And a power failure indication on the clock/calendar prevents false readings.

### As beautiful as it is accurate

There is no more contemporary feeling in a timepiece than the "digital look," the perfect decorative accessory for your home, office, or place of business. And the perfect gift for that special someone. The hand-rubbed oiled walnut is simple elegance itself. Order today!



OUR LOSS IS YOUR GAIN! ANOTHER MONEY-SAVING CLEARANCE  
SALE BY CONAR INSTRUMENTS!

## Discontinued Camera Lenses at BARGAIN PRICES!



### STANDARD LENS

25 mm, f1.9 focusing from 2 feet to infinity. Click-stop iris to f22. Standard "C" mount.

Stock No. LE1  
Parcel Post Insured

**Only \$7.50**

Was \$30!



### TELEPHOTO LENS

50 mm, f1.9 telephoto focusing from 2 feet to infinity. Click-stop iris to f22. Standard "C" mount.

Stock No. LE2  
Parcel Post Insured

**Only \$7.50**

Was \$28!

NRI Journal  
3939 Wisconsin Avenue  
Washington, D.C. 20016

Second-Class  
Postage Paid  
at Washington, D.C.  
and Additional Entry

MR LAWRENCE T ANDERSON B198-F424  
3453 BALSAM NE  
GRAND RAPIDS MI 49505