Radio-TV EXPERIMENTER

DECEMBER-JANUARY 75c

BUILD 1-TUBE HAM-BAND CONVERTOR

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UNIVERSAL REVERB FOR ELECTRIC GUITARS

YOWL & HOWL WITH OUR YULETIDE FUN LIST

www.americanradiohistory.com
The most exciting innovation in solid state stereo history.

Engineering excellence, 100% capability, striking esthetics — all at budget prices. We call it the industry's only TOTAL PERFORMANCE STEREO at lowest cost.

- A full capability 70-watt All Silicon Solid State Stereo Amplifier for $89.95 kit, $129.95 wired, including cabinet. Cortina 3070.
- An Automatic FM Stereo Tuner for $89.95 kit, $129.95 wired, including cabinet. Cortina 3200.
- A 70-Watt Solid State FM Stereo Receiver for $159.95 kit, $239.95 wired, including cabinet. Cortina 3570.

The most electronics value for your money has been the EICO design philosophy for 22 years. Its successful expression in stereo is the new Cortina Series. In performance, specifications, circuitry, controls, decor — in everything you expect of professional quality stereo, you'll see that nothing has been sacrificed — except high price. Let yourself in for one of the pleasantest surprises in stereo history: hear Cortina, see it, examine it at your local EICO dealer. Compare and judge critically for value. We believe you'll conclude with Popular Science "The EICO Cortina Series are low-cost audio components that look, and sound, like high-cost components."

SIMPLIFIED KIT ASSEMBLY — New EICO exclusive circuitry techniques make kit building easier, faster and more enjoyable. RF, IF and Multiplex circuitry of the Tuner and receiver are all supplied completely pre-assembled and pre-aligned. Each channel of the amplifier and receiver uses 3 etched printed-circuit module boards.

NEW ULTRA-COMPACT BOOKSHELF SIZE COMPONENTS
"The compact dimensions and attractive styling appealed to us. The Cortina 3070 represents a whole-some trend away from "overblown" amplifiers which are much larger than need be. In fact, it is one of the very few we have seen which are actually suitable for book-shelf mounting." Hirsch-Houch Labs.

CORTINA TECHNICAL HIGHLIGHTS:

AMPLIFIER — Total Power: 70W into 4 ohms; 50W into 8 ohms. Harmonic Distortion less than 0.8%. IM Distortion: less than 2% at full power. Hum & Noise: 72db below rated output. Frequency Response: ±1.5db 5Hz to 100kHz; ±0.5db 5kHz to 10kHz; ±0.25db 60kHz. Channel Separation: 40db. Size (HWD) 3½" x 12" x 7¾".

TUNER — Signal-to-Noise Ratio: 60 db. Capture Ratio: 4.5db. Image Rejection: 45db. Selectivity: 45 db. Audio Frequency Response: ±1db 20Hz to 15kHz. Size (HWD) 3½" x 12" x 7¾".

RECEIVER — Same as above Cortina Tuner and Amplifier. Size (HWD) 4¼" x 16" x 9½".

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- Radio-TV Servicing
- Electronics Technician
- Industrial Electronics Engineering
- Industrial Electronics
- FCC Radiotelephone Licenses
- Telephone
- Other (please specify)
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WHITE'S RADIO LOG, Vol. 48, Part 3—page 110
Cover photos by Leonard Heicklen
GET THE ONE ELECTRONICS CATALOG THAT ISN'T "ME TOO"

See the very latest in CB, audio, tape reels and cartridges and cassettes, communications, PA, radios, intercoms, antennas, electronic parts and kits, test equipment, transistors, Lifetime-Guaranteed tubes, mikes, speakers, walkie talkies. See what nobody but NOBODY but Radio Shack has. See why "The Shack" is the biggest chain of its kind in the country! See it in colorgravure — the kind of bargains shown on the next 15 pages. Exciting! New! Different! Get the book that isn't "me too" today!

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Unbreakable! Flexible! 1/32" Thick!

MAGNIFIER!

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EXTRA 4X FRESNEL MAGNIFIERS (Cat. No. 64-444) 50¢ EA.

Store Addresses, Order Form, See Page 20

Radio-TV Experimenter
RADIO SHACK SPECIAL PURCHASE!

4-TRACK AUTO STEREO TAPE CARTRIDGES

PLAYS IN ANY 4 OR 4-AND-8 TRACK TAPE PLAYER

HUGE ASSORTMENT!

PRERECORDED

ATTENTION MAIL BUYERS: Space prohibits listing separate titles. Please specify quantity—we will send an assortment of all different titles.

295

EACH

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Now you can buy full length prerecorded 4-track auto stereo tape cartridges for $2 to $3 less per reel than ever before! Radio Shack cleaned out a famous U.S. tape cartridge manufacturer of thousands of popular 4-track stereo cartridges, and we're passing the savings along to you! A vast assortment of over 50 titles: shows, jazz, country, folk, pop, western, classical. Buy now while our supply lasts!

(NOTE: See recent Radio Shack catalogues for 4 and 4-and-8-track tape players at our low, low prices!)

#15-1000

Store Addresses, Order Form, See Page 20

www.americanradiohistory.com
What's your project for our "Build In" radio?

Here's a wired transistor radio in 3 pieces. Dextrous do-it-yourselfers should have a field-day with this one.

You carpenters, metal-workers and gift designers will really appreciate Radio Shack's novel "Build In" — a 6-transistor superhet that's really a kit that isn't a kit. Confused? Part one is the radio, 100% wired, installed in a crystalline 2½ x 1 x 3½" case with the tuning knob sticking out of one end, and 8 wires out of the other. Part two is a separate volume control with built-in switch, knob, and soldered leads. Part three is a 2½" PM speaker installed in a plastic case, with soldered leads.

The three parts (plus a flat 9V battery, not included) can be installed in, on, or under anything, in just about any desired angle or position. And you don't have to be an engineer — Radio Shack's geniuses have provided a simple, idiot-proof lashup pictorial. Now all you need is the price (just $6.98, Cat No. 12-1150) and some Yankee ingenuity! Whether you hide "Build In" in a jug of corn likker, junior's wagon or Tillie's sewing box, the result is sure to please.

The basic radio itself looks like a little jewel, a real work of art — our photo doesn't do it justice. And the "kit that isn't a kit" is another of Radio Shack's exciting exclusive products that can't be bought elsewhere. Get a "Build In" at your nearest Radio Shack store ... and start your Christmas project early!

For Store Addresses, Order Form, See Page 20.

RADIO SHACK PROJECT BOOKS (4¢ a project)

"50 Easy to Build Solid State Projects"
Build your own transistor radios, electronic organs, amplifiers, code oscillators, megaphones, generators, etc. Ideal for hobbyists.
62-1050 ............... Net 2.00

"A Modern Transistor Workbook"
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Radio-TV Experimenter
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Build Yourself — or Win Cash by Sending Us Your Own Ideas!

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A Flashing Light that Can Be Used as a Warning Light, Clearance Lamp or Signaling Device. Great for Protection When Your Auto Breaks Down on the Turnpike!

This circuit is a real powerhouse—a relaxation oscillator capable of flashing a clearance lamp to full brilliance. The current drain is low since most of the current is drawn at the time of flash. Project takes no longer than one hour to wire.

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LIGHT OPERATED BUZZER

Excellent Burglar Alarm or Warning Buzzer! For an Interesting Experiment, Use Power Flasher Above to Work Buzzer.

Here’s an “electric eye” circuit that really works! By focusing a beam of light (flashlight or lens/bulb system) on the solar cell enough voltage is amplified to operate the buzzer. Adjust both the buzzer contacts and the sensitivity control (R1) for best sound.

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Turn Ingenuity and Hobby into Spare-Time Profits!

We are looking for experiments built around Radio Shack or other electronic parts. These will be published regularly in our catalogs. If published by us WE WILL PAY YOU AN AUTHOR’S FEE and reimburse you for parts bought from us — maximum $50 cost. By submitting it, you state it’s original with you. If we accept it, it is understood we can publish it for use by our catalog, flyer, book and magazine readers. Submissions cannot be returned. Send description, parts list, stock numbers, and schematic. DO NOT SEND ACTUAL SAMPLE as we will build it here to see if and how it works. Write today!

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FOR THE ELECTRONICS EXPERIMENTER

BUILD "EI'S" MIGHTY SUB-MINI SPEAKER

The fabulous Realistic FE-103, complete with cabinet construction details as published in Electronics Illustrated: 30-17,000 cps; 15 watts; 8 Ω.

40-1197, FE-103, Wt. 5 lbs. Net 7.95

CONTOUR NETWORK KIT.
With instructions.
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STEREO HEADSET
Separate Transducers!
Perfect for use with receivers, tuners, amplifiers, kits and recorders!
8 ohms.
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For Recorders, PA, Paging!
Sensitivity: 13-100, Wt. .8 oz. Net 1.89

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Precision made crystals!
Response up to 7000 cps.
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8 Ohm Impedance
Small in size but big in sound! Three sizes to choose from: 2 1/2", 2 1/4", or 2".
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60-Second Bonding Plus Instant-set Caulking!
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4 draws with adjustable compartments.
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Over 600 pieces! Something here for everyone. All brand new — no sweepings!
One full pound. Comparable value: $4.50!
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FOR THE STORE ADDRESSES, ORDER FORM, SEE PAGE 20

www.americanradiohistory.com
This unusual Radio Shack product, called the Realistic Microsonic 27MC Receiver, comes complete with a Ch. 11 CB crystal — and because it's a plug-in, it can be changed to any of the 23 channels. It's a teeny 3 1/2 x 2 1/2 x 1 3/8". It includes an earphone with clip, and the phone's lead acts as the antenna. So if you want to hide it away as a pager, there's nothing showing. For DX we've included a 16" telescopic whip to be used only if necessary. Let your imagination run wild with this novel device!

21-109 Microsonic 27MC Receiver

Only 7.95

NEW IDEA #2 — as a companion to the above, or a wireless CB microphone (!), there's also the Realistic Microsonic CB transmitter. Same size, color, everything. But transmit only, 100mw of course, with plug-in crystal for Ch. 11. Uses? For example: one of these plus x-number of receivers and you have a guided tour technique that'll never quit!

21-110 Microsonic CB Transmitter

Only 7.95

FREE ACCESSORIES:

- Receiver — earphone and whip antenna
- Transmitter — 35" telescopic antenna

Note: both units include crystals but require a 9V transistor battery to operate. 23-464, 29c each.
MICRONTA TEST EQUIPMENT
AVAILABLE ONLY AT RADIO SHACK

1000 OHMS/VOLT
POCKET AC/DC VOM

Regular: $5.95  SALE! 3.95

• Ultra Compact Size: Only 3½" x 2½" x 1"
• Convenient Thumb-Set Zero Adjustment

Pin jacks for 5 ranges. 2-color 1¾” meter scale. Reads AC or DC volts in 5 ranges: 0-5, 150, 1000V. DC Current: 0-150ma. Resistance: 0-100K ohms. Accuracy: ±3% DC, ±4% AC. Bakelite case with test leads, instructions, batteries.

22-027, Sh. wt. 1 lb. Net 3.95

HOME/AUTO TESTER

11.95 Factory Wired

• Checks Electrical Circuits in the Home or Garage!

Volt, ohm, ammeter, wattage and leakage checker; checks 6-12V batteries. 0-7.5/15/150/300V, 15 amps. Resistance 0-1000Ω. With leads, power cord. 6¼”x3¾”x2½”.

22-011, Wt. 3 lbs. 11.95

TRANSISTORIZED REGULATED VARIABLE DC POWER SUPPLY

Reg. $16.95  SALE! 13.44

• 25% Ripple, 0-20 Volts, Current 0-200 ma

Continuously variable output of 0-20 VDC. 2 operating ranges deliver 0-20ma to 0-200ma. Meter reads output voltage and milliamperes. 115 VAC @ 50/60 cy. Test leads. 4½”x2½”x2½”.

22-023, Sh. Wt. 4 lbs. Net 13.44

For Store Addresses, Order Form, See Page 20

DYNAMIC TRANSISTOR CHECKER

9.95

• Test Transistors "In" or "Out" of Circuit. Tests Low, Medium, High Power

Visual indication of electrode open & short circuits, current gain. GO/NO-GO test 5mA/50mA. clip leads for in circuit tests. 6¼”x3½”x2½”.

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EDGEWISE PANEL METERS

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• Moving Coil Type! 2% Accuracy!
• Compact! Easy-To-Read Scales!

Moving coil of 1 MA with zero adjust screw. 2% accuracy, soldier lug terminals. 1½” mounting hole centers. Size: 2½”Wx1-7/16”D x ¾”H.

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22-006, VU, -20 to +3 (0-100%) Net 2.50
22-003, Balance & Tuning Meter Net 2.50
**Running Time Meter**

Reg.  
Sale Price  

$6.95  
5.44  

- Records 0 to 9999.99 Hours!

Measures elapsed operating time of electronic equipment, transmitters, receivers, industrial machines, etc. Records running time in hours, tents and hundredths. Operates either from 40 or 110-125 VAC. 60 cy. with external resistor (supplied). Synchronous motor drive. Size: 2½x2¼x3½". 273-1628, Sh. wt. 3 lbs. Net 5.44

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- Bayonet type socket with 11 interchangeable lenses. For ½" hole. 272-343, Sh. wt. 4 oz. Net 1.44

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**24 Volt Power Transformer**

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**January, 1968**

Store Addresses, Order Form, See Page 20

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Semi Conductors for the Hobbyist

-- Archer --

Replacement Transistors

**PNP Types**
For high frequency, RF-IF, and converter circuits. Replaces: 2N247, 2N248, 2N252, 2N267, 2N274, 2N308, 2N309, 2N310, 2N317, etc.

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For universal IF circuits. Replaces: 2N110, 2N119, 2N135, 2N366, 2N406, etc.

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For 9 volt audio circuits. Replaces: 2N213, 2N214, 2N228, 2N306, 2N312, 2N313, etc.

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For 9 volt AF amplifier circuits. Replaces: 2N197, 2N198, 2N121, 2N229, 2N443, 2N444, 2N445, 2N446, etc.

For 9 volt AF amplifier circuits. Replaces: 2N197, 2N198, 2N121, 2N229, 2N443, 2N444, 2N445, 2N446, etc.

For 9 volt AF amplifier circuits. Replaces: 2N197, 2N198, 2N121, 2N229, 2N443, 2N444, 2N445, 2N446, etc.

**Twin PAK "POP" SERIES**

**Popular PNP Types**
- 5-2N107 Types
- 5-CN772 Types

Radio Shack Exclusive! Great for experimenters, hams, hobbyists for all audio applications. Complete with transistor base diagrams.

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- 5-2N35 Types
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**Silicon Field-Effect Transistors**

198

- High Impedance Input!
- Low Noise! High Gain!
- Characteristics Similar to Pentode Vacuum Tube!

1000's of applications where pentode tubes are used in low level circuits: field strength meters, "gate dippers", receivers, fcc power transmitters, etc. TO-5 case. Includes specifications.

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SAVE! 4 for 1.00

All quality American made parts; ideal for builder and hobbyist alike. Each board contains at least two transistors, plus loads of other components: resistors, capacitors, diodes, modules, coils, etc. Size: 2½" x 3½".

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198

Photo-sensitive cell, power transistor amplifier, electronic relay. Includes specs. and diagrams.

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PAK of 2

From 50-1000 PIV

276-1107, 50 PIV Pak of 2 0.25
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276-1109, 200 PIV Pak of 2 0.59
276-1110, 400 PIV Pak of 2 0.89
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Kit of 10

Takes PNP or NPN transistors with 3 contacts in line or triangle; complete with mounting plates. For every experimenter!

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**3 Amp Silicon-Controlled Rectifiers**

195

TO-66 Case! 200V

Designed to deliver loads up to 3 amps. Ideal for use in speed control operation, power converters.

276-1056, Net 1.95
276-1056, TO-66 mtg. hdwr. 30

**10 Germanium Diodes**

Similar to 1N34, 1N34A, 1N60

99c

Equivalent in use to silicon diodes with lower forward voltage drop.

276-821, Ship. wt. ½ lb. Net .99

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--- End ---
20 Power Resistors
Package consists of high-quality, wire-wound types. Includes: 5 to 25-watt power resistors; individual catalog net — $10.
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35 Precision 1% Resistors
Large assortment of popular 1/2, 1, and 2-watt values; includes encapsulated, bobbin, carbon film, etc. Made by Aerovox, Shellcross, IRC, and other famous names.
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50 Tubular Capacitors
An assortment of quality tubular capacitors, 100 mmf to .1 mmf to 600 WDC. Includes molded, paper and porcelain types. $10 if purchased individually from catalog: 272-1548, 1 lb. Net 1.00

4 Subminiature 455KC IF Transformers
Slug tuned, made for printed circuitry mfg., shielded. Size: 3/4 x 3/4 x 1/2". 273-515, 1/4 lb. Net 1.00

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Quality items, ideal for use in phonos amplifiers, tuners, recorders, etc. Take advantage of this Radio Shack Special low price!
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35 Miniature Resistors
World's smallest 1/4-watt carbon type resistors! All have axial leads; built for transistor and subminiature circuitry; Assorted values, with resistor color:
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40 Coils and Chokes
Shop assortment consisting of RF, OSC, IF, parasitic, peaking and many more types. If individually purchased, this would cost you $15!
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8 Volume Controls
Most Popular Values
Contains 8 assorted values including long and short shaft types. A tremendous bargain for service men!
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Here are resistors for hundreds of uses! Assortment has Allen Bradley and IRC carbons, with 5% values included. This pack is a regular $8.00 catalog net:
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January, 1968
## Celebrating Our 44th Anniversary

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<th>Product</th>
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<tr>
<td><strong>2N107 PNP Transistors</strong></td>
<td>One of the most widely used transistors today for general audio use. Complete with base wiring diagram. 276-501, $1.00</td>
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**100 Mc. NPN Planar Transistors**

- Similar to 2N1613, 2N-1893, and 2N2049.
- Made by Fairchild and Rheem.
- Rated at 700 MW. Vce 75; Hfe 40-120; 150 Ma; TO-8, TO-46 cases.

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**2N107 NPN Transistors**

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- Includes both NPN and PNP Silicon and Germanium types.
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<td>30 Ft. Telephone Extension Cord</td>
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1967 has been a year for disastrous earthquakes. Almost every newspaper headlined the disasters afflicting regions in Turkey and Venezuela. Many lives were lost and millions of dollars worth of damage sapped the economy of these countries. So great were the quakes that one which struck the western Pyrenees went practically unnoticed by the North American press despite the destruction of the French village of Arette and two hamlets, leaving over 1,000 people homeless.

These disasters raise again the question of how we can learn more about the mechanism causing these violent geological upheavals and so, perhaps, warn people of impending danger. It is a difficult task for a number of reasons. But over the past few years, the science of seismology has undergone something of a revolution following the development of extremely sensitive and powerful methods of monitoring the continuous major and minor rumblings of the earth's crust.

Already a great deal is known about earthquakes. For example, nearly all of them occur within two well-defined zones of the globe. These are the most recent belts of mountain-building activity which form irregular rings enclosing more stable regions of the earth's surface.

(turn page)
The Venezuelan tremors of July 29 and 31, which left behind a sad toll of more than 300 dead, 1,600 injured in Caracas and the port of La Guaira, happened somewhere near the midpoint of the Great Cordilleran Mountain Belt which itself forms part of the much larger circum-Pacific belt of mountains and earthquakes. Caracas lies at the point where part of the belt, the Caribbean Loop, curves back into the South American Continent.

Recent oceanographic research has now provided strong evidence that the floor of the Pacific—and those of other oceans—is slowly spreading (see "Continents on the Move," Radio-TV Experimenter, April/May 1967). This very stiff flow, continued beneath the edges of the bordering continents, sets up drag forces which crumple up mountains and produce intense stresses in the overlying crustal rocks. It is when these finally become too great for the rocks to sustain that breaks occur in the rock formations accompanied by the vibrations we recognize as earthquakes. Similar mechanisms are at work beneath the second of the world's great mountain belts, the Mediterranean-Trans-Asianic Zone, running from the Pyrenees through the Alps, Caucasus and Himalayas and down to the East Indies.

The tremor that destroyed Arette occurred within this zone. Turkey, too, is unfortunate to lie in this zone and the earthquakes of July 22, 23, and 30, centered on the city of Adapazari, 90 miles east of Istanbul, caused over 200 deaths.

Unfortunately these crustal catastrophes reveal very little of their intentions beforehand. Some, it is true, are preceded by so-called foreshocks, but not at any substantial interval of time before the main earthquake arrives. What does occur beforehand is a long and slow build-up of stress in the crustal rocks. But this state of tension is an exceedingly difficult thing to measure directly. Because most rocks are extremely rigid, the stress causes a minimal amount of deformation. Unlike a piece of wood which bends before it snaps, the strata give very little indication that they are about to rupture.

Any attempt to place measuring instruments within the rocks is thwarted because placing them there, by drilling for instance, relieves the tension at that point. Some attempts are being made—for example along the Great San Andreas Fault in California—to measure the minute surface distortion directly with sensitive optical techniques. But such methods can only work at sites where successive crustal movements are known to recur. Failing stress measurements as a means of predicting earthquakes, the only alternative left is to try to make some sense out of the overall patterns of crustal disturbance.

In fact the earth's crust is in a continuous state of grumbling activity, though most of the
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Not enough is known about these more feeble signals to tell whether such seismic signs even exist. But thanks to the need to develop instruments capable of distinguishing clandestine underground nuclear tests from natural earthquakes, we now have at least the tools that can enable us to study the microseismic world and gain new insight into it.

Since the Geneva committee of 1958 on the banning of nuclear tests, seismologists and instrument experts in southern England have been working to perfect equipment which will detect and identify the smallest underground nuclear explosions. The detection system chosen—one that had been used before only in a limited fashion by oil exploration companies—was that of the seismometer array. Instead of using single seismometers—instruments in which ground tremors transmitted to a sprung weight are measured electrically—arrays were built several tens of miles in extent in which 20 or 30 seismometers were spaced at equal intervals along two arms at right angles.

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ances. By taking all the records from all the instruments and adding them together with suitable time adjustments, the record of the distant event is enhanced at the expense of the local ones. Computers can do the job rapidly and accurately.

In other words, an array acts as a filter. Moreover, by using suitable electronics to alter the time lag of recordings between each instrument, the array can be “tuned” to respond to seismic waves of a given kind. Experimental arrays of this type now exist at Eskdalemuir, Scotland; at Yellowknife, Canada; at Tennant Creek, Australia; and at Jauribidaran, India. They are capable of detecting some of the smallest earthquakes occurring at any point on the globe. However, the total effort is only the first step in a soon-to-be worldwide research program. In a decade we will look upon this crude beginning and wonder why we desisted so long.

Who's for Dinner? All my readers should know Hal by now. He’s the joker that’ll twist any situation into a backdrop for one of his math teasers. For example, as the light comes up on our little drama, we see four happily married couples enjoying a delightful Chinese dinner. However, the table is a bit cramped because a single has joined the group. Yep, you’re right! The single is Hal, and the four couples include my wife and myself plus some friends. Hal met us in the movie theater and tagged along for what he hoped would be a free meal. No one complained about the free loader until he decided to entertain us with a small problem he conjured up while cleaning some egg foo yong off his lapels.

Hal began, “Nine men found themselves captives of Chinese pirates who had picked up some strange customs from East Indian natives. The captives were first seated in a straight line in front of the chief pirate. They were then asked to join a feast of feasts. A huge pirate who made Mr. Clean look like an infant with a full set of teeth stood behind the first diner on the extreme left and counted heads until he reached the seventh diner. This captive was invited to sample some exotic dish in the kitchen—not realizing the dish would be him, served in wine sauce to the boys in the back hut. The yellow giant would resume the head count with the next diner, again selecting the seventh head. He would return to the extreme left of the table when he came to the last diner at the table’s extreme right in order to continue the count.

“This every-seventh-head elimination procedure continued until there was only one person left. The last diner was offered to join the pineapple tidbits dessert being prepared in the kitchen or romance the night away with a beautiful Oriental wenches and gain his freedom.” (I was surprised with Hal’s vivid description of the girl until I realized he was actually giving a rundown on the pretty young thing tending the cash register.)

“Now,” Hal continued, “if you were one of the captives and knew the strange habits of these Chinese bandits, where would you sit? Would it be on seat 1 on the extreme left? Or would it be seat 2, or 3, or . . . up to seat 9 on the extreme right?”

Conceivably, it could be quite easy to determine the best seat at the table if pencil and paper were used. However, Hal would have none of that, nor would he tolerate any finer pointing or counting. The penalty for taking a short cut to the answer would certainly be a dash of soy sauce as Hal promised, and everyone knows Hal has no normal human restraints. So, dear reader, why should you be better off than me? See if you can do the problem in your head the first time—you get only one guess because Chinese pirates do not repeat.

I’ll let you know next issue which seat you should sit in and what seat I sat in. So set up your pup tent along side your favorite newsstand and start munching candy bars till the next issue comes your way.

Kick in the Head. From time to time, interesting letters cross the Editor’s desk, some praising our magazine and others—well, you might call them a kick in the head. Tommy Kneitel, a well-known author and a very good friend of this editor (and, I might point out, an Editor in his own right), took exception to an article by C. F. Stanbury II in our last issue. But, why should I explain; let Tommy’s letter do it!

Dear Mr. Sienkiewicz,

I seldom write letters to Editors; you people are a bad lot in general (what about you, T.K.?) and hardly worth venting any of my valuable anger on. As you can imagine, this time you must have really rung the gong, for a letter is most certainly in order. You recently ran a story about clandestine radio broadcasters (DX Crooks And Clandestines, Oct.-
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Positive Feedback

Nov. 67 Radio TV Experimenter) and your author (C. M. Stanbury II) went off into orbit about how, after their transmitter fire on April 9, 1967, WNYW, Radio New York Worldwide, broadcast temporarily from a "secret location." Much ado was made in your article about why the FCC could permit such a thing, how the station has possible CIA ties, and other such childish bilge. Unfortunately, Mr. Stanbury has a severe case of CIA Syndrome. I'm sure that he sees a sinister CIA plot on any given subject ranging from the American Revolution to aardvark breeding.

In actual fact, there was no "secret location" involved. The plain and simple story is that when WNYW burned down they were offered the loan of equipment from station KGEI. They decided against this and were even considering renting or buying outright the transmitter of shortwave station WINB in Red Lion, Pa. They finally decided to purchase time on commercial point-to-point transmitters for their programs. An arrangement was made with RCA for the use of 10-, 20-, and 50-kw transmitters in Riverhead, N. Y., and with IT&T for similar transmitters in Brentwood, N. Y. Special authorization was obtained from the FCC for these point-to-point transmitters to temporarily operate within SWBC bands.

Within two months, Radio New York Worldwide had obtained three Gates transmitters (10, 20, 50 kw) of their own and a 50-kw Continental transmitter. They use these while awaiting 100-kw transmitters; the plan is to return the 10-kw unit to Gates for credit, use the 20-kw transmitter to drive one of the 100-kw transmitters, and keep the two 50-kw units on the air. The station is considering the use of 250-kw transmitters from their new New Jersey site.

Most DXers feel that Stanbury holds the unchallenged Olympic record for jumping to conclusions, but this time he really flipped his gourd. Does he actually believe all of his speculations, does he do it because he feels that a bit of fiction peppers-up what might otherwise be a dull story, is he just putting us on, or is it that he doesn't know how to research an article?

Oh well, maybe CIA (Cunningly Imaginative Author) was involved after all.

Your for better facts.

Tom Kneitel, K2AES

Now, this editor does not want to take sides. Goofs and errors pop up in the best of magazines, and everyone knows the old saying, "Best intentions pave the road to QRM" or something like that. Kneitel and Stanbury (order does not indicate rank) are two of the finest shortwave authors in mag biz today. So, when one pops off at another, I just stand back and watch the fun.

Beer Can Report. In previous issues of Radio-TV Experimenter and Elementary Electronics I have asked readers to mail beer cans to the FCC in protest to a recent Part 15 action. Well, readers sent beer cans to me—indicating they agree with the FCC. Frankly, it has been an education. For example, did you know there are beers named Burgermeister, Colt 45, Coors, Hamm's, Lucky Lager, and Olympia? Oh well, more next issue.
Motorcycle Megacycles. Scooting down the highway on two wheels can be fine and dandy if that kind of goings on is your cup of tea—it isn't ours. And, you can add a spot of lemon to the tea by adding a CB rig to your bike. Sure, we've all seen CB rigs mounted on motorcycles, but this is the first time a rig has been specially designed for motorcycle installation.

The rig is the Poly Otter and it's from Polytronics Communications, Box 536, Baltimore, Md. 21203. This is a seven-channel CB unit with all crystals supplied, contained in a weatherproof black enamel aluminum case. Bottom mounting brackets let you bolt the set to your luggage rack (just like the fuzz radios) and a remote control head mounts on the handlebars.

Antenna for the Otter is where it otter be

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(sorry about that). right atop the transceiver; this makes for a more efficient transfer of signal from the rig to the antenna and also eliminates part of the installation chore since it's already in place. An inverter is available which will permit the Otter to utter on 6-volt cycles. The tab is only $199.50 for the Otter.

Gee, It's a G. E. Yes, General Electric, which may be a trifle unimaginative in the art of giving fancy model names to their CB gear, has come up with a unit known as the Model Y7050 transceiver. Actually, this is a "high powered" walkie-

European Electric Y7050 Walkie-Talkie

talkie which is credited with having a range of "up to 10 miles." G. E. doesn't say the actual RF wattage input or output other than to report that it is "greater than 1/10 watt" and requires a CB license.

Tipping the scales at about a pound and a half, the Y7050 can come alive with either pen-light batteries, or with accessories which permit operation with rechargeable batteries, a 12-volt storage battery, an auto cigarette lighter, or even house current. Operation is on Channels 11 and 16. Signals are flung into the great beyond by means of a 51-inch telescoping whip.

Price is $125 per pair, ask to see them at your nearest G. E. dealer.

First Base. The first base station CB rig with a built-in all-transistor speech preamplifier has been announced to the world of radio by Pearce-Simpson, Inc., P. O. Box 800, Biscayne Annex, Miami, Fla.

The rig carries the handle Guardian 23B and is designed to permit you to have both hands free while operating from your CB shack—in fact, remaining as far away from the rig as a foot and a half while still giving out with full

(Continued on page 136)
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Ground Floor Stuff. It is unfortunate that the average beginner or service technician considers the schematic diagram somewhat complicated. In truth, the schematic diagram is a short cut to learning the essential details about a circuit. The schematic diagram is, in fact, the easiest method of conveying information about the circuit. Thus, the understanding of the schematic diagram is an ideal beginning in the study of electronics.

And with this grand buildup, your ol' Bookworm takes pride in commenting on a new soft-cover text—Understanding Schematic Diagrams. Published by Allied Radio of Chicago, the text was edited by Julian M. Sienkiewicz, WA2CQL/KMD4313, the editor of this magazine. Julian fully understands the problems of neophytes, and used this knowledge to make Understanding Schematic Diagrams an excellent beginner's text.

Learning how to read a schematic is not too difficult, because the schematic can be broken down into easily understandable symbols. The schematic has aptly been described as "the road map of electronics," and just as a road map is easy to read, once the symbols are understood, so can the mysteries of the schematic be divulged.

This book approaches the subject from the beginning. You will learn about the various components—resistors, capacitors, coils, etc.—that make up the circuit, and the symbols for these components. Then you will learn how these components are joined together, just as towns and cities on a road map are linked by highways. Finally, with this background you are able to read a complete schematic. No
knowledge of electronics is required to understand this book. It includes the necessary elementary electronics for the beginner's benefit.

Want a copy? Then write to Allied Radio Corp., 100 N. Western Ave., Chicago, Ill. 60680. Tell them the ol' Bookworm sent you.

Start 'em Young. Here's a grabber for junior scientists: Arco's new Junior Science Projects by the editors of SCIENCE EXPERIMENTER, a Davis Publication. There are scores of fascinating step-by-step experiments and projects in electronics, physics, optics, chemistry, magnetism and astronomy packed into a hard cover book. Fully illustrated with hundreds of photographs, drawings and charts, the text not only shows how to construct the many projects but explains by means of experiments what scientific theory and principles apply. Included in its jammed-packed contents are details on building an infra-red detector, electronic stethoscope, electric slide rule, parabolic mike, ion-exchange fuel cell, projector scope, Tesla and many other marvelous and fascinating projects.

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(Continued on page 131)
"One of the luckiest days of my life was when I sent for DeVry Tech's informative booklets on Electronics. It was my start toward a wonderful future," says William L. Hudson, originally from Pennsylvania. "I attended DeVry's Resident School. Upon graduation, without added cost, their Employment Service helped me get a job. Like other graduates of their Resident School and Home Study programs, I am entitled to career-long placement service whenever I need it. That's a wonderful feeling!" concluded Hudson, who is shown above at his job as a laboratory electronics technician for a prominent manufacturer in the space program.

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---

Radio Heaven Maybe

I’m an SWL and tune in mostly on 25 meters. There, I occasionally hear a sound that might be produced by trumpets and a French horn. It is of about three bars duration and repeats itself indefinitely. What is it?

—M. G. Z., McKeesport, Pa.

We don’t know, but why don’t you write lyrics for it—it just might make the top-ten. Can our readers help us out?

**FM Is Not AM**

Please tell me how to modify my FM receiver front end to extend its range from 108 MHz to about 122 MHz.

—L. J. H., Chattanooga, Tenn.

While it could be done, you wouldn’t benefit since there are no FM stations up there, only AM aviation stations—which your set would not demodulate.

**Wasted Watts**

I have an old TV set that was given to me which I use only as a phono amplifier. I would like to make it more compact by eliminating the picture tube. However, I learned that it is in series with the rest of the set and the amplifier section won’t function without it. Can I replace the tube with something smaller and still use the set as a phono amplifier.

—R. T., Harrisburg, Pa.

You’re burning up a lot of kilowatt-hours of power running a whole TV set and making use of only two or three of its tubes as a phono amplifier. If the set draws 160 watts and you get one watt of audio out, you’ve got a mighty inefficient lash up. Since you can buy a comparable amplifier in kit form...
for as little as $10.95, why don’t you have the trashman take away that old TV set?

Shortwave Converter

_I have a Zenith AM radio. Can you give me a circuit for a shortwave converter to use with it?_ — R. A. R., Hayward, Calif.

You can use a separate pentode (V1) and a triode (V2) or a combination pentode-triode tube such as the 6GH8 connected as shown in the diagram. Coils L1 and L2 are wound on the same plug-in coil form. Coil L3 is also a plug-in coil. You’ll have to wind your own or select non-plug-in coils for the shortwave bands you want to cover from a J. W. Miller catalog. Radio parts stores in Oakland and San Francisco should have the catalog and many of the coils.

Coil L4 is a BCB loop antenna which should be placed close to your AM radio, assuming it too uses a loop. Set the radio to a clear spot on the dial around 1500 kHz. Tune in shortwave stations with C2 and adjust C1 for best reception.

CCTV with Sound

_Is it legal to have sound with my closed-circuit TV camera? If so, could my camera be converted? Or, could I use one of the new FM wireless microphones converted to operate on TV Channel 6?_ — M. F., Prescott, Ariz.

Write to the TV camera manufacturer and ask if they have a sound modulator for use with your camera. Sylvania and others make them. It is simply an FM transmitter which is fed directly to a TV set. The new FM wireless microphones operate in the 88-108 MHz FM broadcast band and may not be lawfully used if modified for one of the TV channels. You could use one if you use an FM receiver to...
pick up the sound at the required location.

Ballast Tube Needed
I recently acquired an old Hallicrafters AC-DC shortwave receiver. All the tubes and the BK-29D plug-in ballast tube were missing. The tubes can be replaced but I can’t find a ballast. It is connected into the circuit as shown in the diagram. Can I use resistors in place of the ballast and if so what watts?

—M. G., Chicago, Illinois

Have you tried Hallicrafters right there in Chicago? For R1 use a 200-ohm 20-watt resistor, the same for R2, and a 30-ohm 10-watt resistor for R3.

BCB Traps
On my shortwave receiver I pick up AM BCB stations between 1.7 and 2.2 MHz (mc). What causes this and is there any remedy?

—C. W., Albany, New York

Yours is a common trouble encountered with receivers with too much gain or inadequate front-end selectivity which causes intermodulation. Try a shorter antenna. If this doesn’t solve the problem, connect a wave trap across the antenna and ground terminals or add an RF gain control as shown in the diagram, or do both. Tune C1 to eliminate a specific BCB signal. Adjust R1 to provide just enough gain to receive the signal you want.

Q-Multiplier Coil
While building a Q multiplier I came across a part in the schematic, a variable coil labeled “tune to IF of radio.” My IF is 455 kHz but I have been unable to locate such a part. I have been advised to use half of an IF transformer. Is this right?


You can use an IF transformer by disconnecting the capacitor from across the coil you do not intend to use. You might be able to buy a ready-made coil from Hammarlund Manufacturing Company, Mars Hill, N. C. Ask for the price and availability of a quadrature coil for an FM-50A.

My, What Big Ears You Have
Where can I get a microphone that will pick up sounds at a long distance?

—J. B., Terre Haute, Indiana

Electro-Voice, Buchanan, Michigan, manufactures a microphone that is highly directional and extremely sensitive. Since your letterhead indicates you are a private detective, you should be aware that radio “snooping” devices can no longer be used except by authorized police agencies because of a recent FCC ruling. However, if you pick up conversations and transmit them on an audio basis within the same state, the FCC has no jurisdiction.

AC-Line Filtering
I need circuits for power line filters to cut out noise caused by neighbors’ vacuum cleaners, etc. I get the noise on AC radios but not on transistor portables at the same locations.

—C. L. D., Homestead, Florida

A noise filter circuit is shown in the diagram. The chokes can consist of bell wire wound for two or three inches on a half-inch diameter form. I have the same problem in my steel-framed New York City apartment where radio signal pickup is poor and noise level is high. My transistor radios don’t pick up the noise. You might try a Viking (830 Monroe Street, Hoboken, N. J.) Model 958 line filter ($12) designed for CATV system use, connected between a radio and an AC outlet. It is supposed to provide 60 dB of attenuation. Radio noise is best suppressed at the source.

Marines Have Landed
What kind of an antenna should I use to pick up long wave, CB and marine band stations?
can't pick up 2-3 MHz band marine signals with present antennas.
—A. A., Rochester, Minn.

You're about 150 miles from the Great Lakes but not too far from the Mississippi. You should be able to receive marine signals at night, but not necessarily in the daytime when range is limited to about 50 miles over water, and there is land to cross. For all but CB, use a long wire antenna and a ground. For CB, use a 9-foot vertical wire or regular CB antenna.

Not So Hot
My stereo receiver uses four EL95 tubes. After 15 minutes of operation the plate of one of the tubes glows orange and gets very hot. Any tube in the same socket does the same. The set sounds O.K. Is this normal?
—T. W., Calumet City, Illinois

There probably is distortion in one of the stereo channels and you're not noticing it if there is a defect in your receiver. It could be a leaky coupling transformer (see diagram), causing it to draw excessive plate current. It is possible that the screen of the affected tube is glowing instead of the plate. This would happen if one side of the output transformer is open, as shown in the diagram.

So You're the One!
I own a Sibley AF-950 receiver. It covers the AM, FM and SW (4-12 MHz) band. When I tune in the FM band on certain frequencies (104-105 MHz) my favorite television and the family's TV picture and sound just go off on Channel 9. Is there anything wrong with the radio receiver?
—A. S., Chicago, Ill.

Sounds like the trouble is caused by radiation from your receiver's local oscillator. Move it further away from the TV sets. Also, think of using a coax TV antenna lead-in. Frankly, there may be something wrong with your TV antenna and lead-in wire. Check it today!
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Your move!
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By Herb Freidman
W2ZLF/KBI9457

Hottest item going these days for the in-crowd guitar pickers is Olson Electronics' RA-844, a twenty buck add-on reverberation device that can make a twenty-dollar amplifier (or even your hi-fi amp) sound like a $200 guitar amplifier. You simply plug the electric guitar to the RA-844's input jack, connect the reverb amp to the guitar amp (or the hi-fi), and you can make the guitar sound like it's at the bottom of a five-story cavern.

Or, if you don't go for overpowering echo, you can add just a smidgen of reverb to make the overall sound very bright (like they do down at the local radio station.)

(Continued overleaf)
After the reverb unit has been disassembled, the keying jack hole is drilled and the jack installed. Note that the jack is insulated from chassis with fiber washers.

You can even use the RA-844 reverb amp with a dynamic mike to put a little pizzazz on a vocalist.

**Few Bucks, Big Buy.** Sound like a great buy for twenty bucks? You’re right, it is; that’s why it’s so big with the in-crowd. Only problem is that the reverb amp cannot be keyed in and out while playing. If you want to change back and forth from reverb to “dead strings,” you have to stop playing and shut down the depth (reverb) control. But if you’re willing to go for a few extra dollars and about an hour’s work, you can add a switch (keying) jack to the reverb amp so it can be keyed in and out with a foot switch as you play.

The foot switch modification for the reverb amp is shown in the schematic. The components to be added are shown in the dotted line. The reverb amp components show only the parts value. To understand what the modification does, let’s take a quick run through the circuit of the basic reverb amplifier itself.

The guitar pickup feeds into the input jack—its level controlled by the 10K volume control—and is amplified by transistor Q1. The unmodified (no reverb) signal is tapped off Q1’s collector through a capacitor and the 470K resistor, and is again amplified by Q4. (The loss through the 470K resistor compensates for Q4’s gain.) The guitar’s signal is then fed to the output jack—which is connected to the guitar amplifier’s input jack.

**Springy Sound.** Now go back to Q1’s collector. Note that the guitar’s signal is also fed through the transformer and is amplified by the push-pull amplifier (Q2 and Q3) and is then fed to the reverb unit. The heart of the reverb unit is a spring that literally bounces the signal back and forth, just like the echoes in a canyon (when you holler hello-o-o-o). The output from the reverb unit—which now consists of “echoes,” or reverberation—is fed through the Depth Control into Q4, where it mixes with the direct guitar signal.

When the Depth Control is closed, only the direct guitar signal passes through Q4 and there is no reverberation. As the depth control is advanced and more reverb signal is mixed with the direct sound, the total effect at the output jack varies from no reverb, to slight “liveness,” to cavernous reverberation.

**The Keying Circuit.** If one attempted to

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**Completed modification of the Olson reverberation amplifier. R1 is soldered directly to the keying control jack.**
key the reverberation in and out by disabling the power supply to the class B amplifier, the sudden change in load on Q1's collector transformer will cause a drastic change in level of almost 20 dB at the output jack, so this technique is out. If a foot switch was used to short-circuit the reverb signal across the Depth Control, not only would there be the possibility of severe hum and noise pickup in the control leads, but there would be severe clicks and pops as the effect was switched in and out.

To avoid clicks and pops, our modification uses delayed diode keying of the reverb signal that short (or restores) the reverb signal from the Depth Control's wiper contact to ground. With the delayed reverb signal taking approximately one second to key in and out, there is virtually no noise when keying the reverb effect—at most a slight sound well under the music level when the reverb is keyed out. We could entirely eliminate the slight thump but the circuit would get unnecessarily complex; when you're playing a gig no one will hear the thump anyway.

When jack J1 is open, the reverb amp functions normally, since diode D1 is non-conducting (D1 is very slightly back biased by the leakage through Q4's base-input capacitor). When J1 is closed, the battery voltage is applied to the C1-R1-C2-D1 circuit through R1. At the instant J1 is closed by a foot switch, C1, being uncharged, drops the voltage at the C1-R2 junction and lets it build up slowly, thereby forward biasing diode D1. D1 conducts, shorting the reverb signal to ground through C2.

When J1 is opened, interrupting the battery voltage, C2 discharges through D1 slowly (1 second) giving a slow fade-in of the reverb effect. Because of D1's natural "break-over" voltage, the echo effect is never 100-percent disabled. There is a slight residual effect that adds a smidgen of liveness; you won't know it's there unless you're a golden-eared pro. (Again, it would unnecessarily complicate the installation to get rid of the reverb effect entirely.)

**Installing The Keying Circuit.** Completely remove the guts of the reverb unit as a single assembly by unscrewing the input and output jack mounting nuts, the volume and Depth Control mounting nuts, and the reverb unit's two mounting screws. Scribe a pencil
REVERB

line along the edge of the input and output jack's trim plate and the edge of the battery holder. Drill a 9/16-in. hole exactly midway between the two lines (there is virtually no extra clearance so make certain the hole is centered before you drill). Install a single-mounting-nut type phono jack in the hole.

Rear view of completed modification showing keying control jack where foot switch is plugged in.

Be sure it is insulated from the chassis with shoulder washers.

Thoroughly clean the back of the depth control with some kind of contact cleaner, or radio-cement solvent, and solder a small terminal strip to the back of the depth control as shown in the photographs. The control cover will not take solder if it is not thoroughly clean. If possible, use a miniature terminal strip as supplied in the Allied Radio Terminal Strip Kit.

Install C1, C2, R2 and D1 on the strip as shown in the photographs. We used very small 300-uF capacitors to keep things neat; these capacitors as specified in the parts list are somewhat expensive. You can, if you want to cut costs, substitute any cheap capacitor as long as the voltage rating is three volts or more. In addition, C1 and C2 can be reduced to 100 uF, though the keying thump will be somewhat louder than with the bigger capacitors.

Finally, connect a 10-in. wire to the circuit-side power terminal on the volume control and re-assemble the reverb amp.

Cut the 10-in. lead just long enough to reach jack J1 and connect R1 between the jack (either terminal) and the lead; insulate the R1/wire joint with tape or spaghetti. Connect the remaining J1 terminal to the C1-R2 junction. Make certain the leads to J1 do not interfere with the reverb unit's spring.

Switching Feet. We suggest the foot switch listed as it's inexpensive, though just about any switch will work. Disassemble the foot switch and connect a length of ordinary lamp cord (or any two conductor cord) to the two switching terminals. The switch has s.p.d.t. terminals, so make certain you select the right two—check for the right ones by having a close look or with an ohmmeter.

Now, to finish up the job, connect a phono plug to the free end of the lamp cord being careful not to melt the cord insulation when soldering and causing a short circuit.

Connect the switch to J1, the guitar to the input jack, and the guitar amp to the output jack. Key the switch so the reverb effect is off and adjust the guitar, reverb volume, and amplifier volume controls for desired sound level; then key the echo effect in and adjust the depth control for the desired reverb effect. As you play, you can key the reverb effect in-and-out as desired. Try St. Louis Blues or Kansas City with reverb. Man, it's the greatest!

With the modification finished and the reverb amp plugged into guitar and amplifier, you're ready to make with the great wild sounds of the seventies.

Foot switch is disassembled so cable and plug can be attached. Be sure to connect cable to the right two contacts.
The variometer may be gone, but it's not forgotten; here's how to make your own version of this novel device.

By
Art
Trauffer

Variometer Radio

Meet the variometer, an efficient variable-inductance commonly used in crystal and tube radios in the early '20s. The variometer opens up a new field of experimentation for modern hobbyists, although it is no stranger to old-timers in radio.

The photo shows one of the many factory-made variometers which were popular in the early '20s. It is simply a movable coil which rotates inside a stationary coil—the rotary coil and stationary coil are both wound in the same direction and are connected in series.

Some of the original variometers were round and molded from hard rubber or bakelite, and others were square and made of wood. Some had the stationary coil cemented to the inside surface of the outer form, and some had the stationary coil wound on the outside of the outer form as is the case with the variometer described in this article.

**How It Does It.** When the rotor coil and the stator coil of the variometer both carry current in the same direction, the magnetic field will be greatest and the inductance will be maximum. When the rotor coil is rotated through a half revolution so that its magnetic field opposes that of the stator coil, the resulting field will be small and the inductance minimum. Thus the inductance is continuously variable over a considerable range.

The drawings show the constructional details for the author's experimental variometer. With a little patience, it is easy to build and performs as well as the factory-made variometer.

Be sure to wind the rotor and stator coils in the same direction, and connect them in series. (Continued overleaf)

Two radio circuits in which the experimenter can use the variometer as a tuning device.
The homemade variometer rotor is shown above. The cardboard used in the curved sections should be of the poster-board variety. The stator at right is almost identical in construction but is somewhat larger. The author's transistorized experimental variometer radio is at upper right.

**Rolling Your Own.** The stator form consist of two wooden end pieces of the dimensions given. Cardboard is used for the curved body sections and is fastened with glue and tacks. The holes in the end pieces are made big enough to freely pass a ¼-in. rod. The stator coil is wound on the form as shown and consists of two sections of 27 turns each of #24 wire. The windings are held in place by glue, applied sparingly.

The rotor is virtually identical to the stator but is slightly smaller so that it will fit inside the stator. Construct the form to the dimensions given. Then drill the holes in the end pieces so that the ¼-in. rod or tube makes a snug fit. Wind the two sections of the rotor coil also using #24 wire, 30 turns per section. Attach flexible leads to the coil ends to allow the rotor to rotate.

Assemble the variometer by placing the rotor inside the stator and pressing the tube rotor shaft (through which the rotor leads will pass) in the one end and the tube or rod in the other. Placing fiber washers between rotor and stator will prevent the rotor winding rubbing on the stator. Pass the rotor leads through the tube and connect one rotor wire to one stator wire so the windings are in series. *(Continued on page 136)*

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**PARTS LIST**

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>2 size-D flashlight cells</td>
</tr>
<tr>
<td>C1</td>
<td>0.02-µF capacitor</td>
</tr>
<tr>
<td>D1</td>
<td>1N34A germanium diode (or equiv.)</td>
</tr>
<tr>
<td>Q1</td>
<td>2N217 transistor</td>
</tr>
<tr>
<td>R1</td>
<td>220,000-ohm, ½-watt resistor</td>
</tr>
<tr>
<td>T1</td>
<td>3-lug terminal strip</td>
</tr>
<tr>
<td>4</td>
<td>Fahnestock clips</td>
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**BILL OF MATERIALS**

<table>
<thead>
<tr>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>¼-lb. spool #24 single-cotton-covered enameled magnet wire</td>
</tr>
<tr>
<td>1</td>
<td>20 x 3/8 x ¼-in. hardwood strip (for wood end pieces)</td>
</tr>
<tr>
<td>1</td>
<td>¼ dia. (O.D.) x 4-in. brass tube</td>
</tr>
<tr>
<td>1</td>
<td>¾-in. wide metal strip for mounting angle brackets</td>
</tr>
<tr>
<td>1</td>
<td>¾-in. wide metal strip for making battery holder</td>
</tr>
<tr>
<td>12</td>
<td>Short round-head wood screws</td>
</tr>
<tr>
<td>1</td>
<td>8 x 7 x ¾-in. wood baseboard</td>
</tr>
<tr>
<td>Misc</td>
<td>Tacks, thin cardboard, glue, hook-up wire, solder, etc.</td>
</tr>
</tbody>
</table>

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*Radio-TV Experimenter*
SALUTE TO HUGO GERNSBACK

Fifty years ago, if you were here, old enough to read, and interested in radio or electricity, you would probably have been an avid reader of Electrical Experimenter, then the most famous experimenter's magazine and one that is still talked about. That exciting pioneer magazine was edited and published by Hugo Gernsback. And it was only one of dozens he was to found. Radio-Electronics, for one, is still being published and is known throughout the world for its unique Gernsback flavor. Another, originally called Radio News, is known now as Electronics World.

The father of science fiction and one of our greatest prophets, Hugo Gernsback predicted there would one day be television, radar, fluorescent lighting, plastics, space travel, microfilm, synthetic fabrics, tape recorders.

Gernsback, in fact, outdid Jules Verne as a prophet. In 1911 he wrote about atomic energy as well as the problems of weightlessness and orbital rendezvous in space. Long before the word "television" was known to the public (1928) Hugo Gernsback opened up the first TV station, WRNY. Some of his predictions have not yet come true—"teleportation," dissolving here and reappearing there—is still in the future.

Hugo Gernsback was born in Luxembourg on August 16, 1884. From age nine, when his imagination was fired by Percival Lowell’s "Mars," he spent the rest of his fruitful life creating and publicizing technical changes. All of us will mourn the passing of this remarkable man.
BEAUTY

is only skin deep, fellahs!

No gang, it's not a cigar-smoking short-cropped dame, it's a young gent concerned with his manly loveliness getting a scalp treatment with hormones and high-voltage generated ozone steam that's supposed to prevent baldness.

This male is getting the lines at the corner of his mouth removed with a treatment consisting of an electrified needle inserted into the skin at the wrinkle. The current charges the coagulated albumins which causes the wrinkle, resulting in a degree of de-coagulation and lessening of the depth of the wrinkle.
Beautification of men came into vogue with the advent of men's cologne, face creams, hair dyes, sprays, and styling, but now . . . a bit of electronics gets into the act.

It was only a matter of time, and now it's here. The beauty salon for men. And we owe it all to one Christine Valmy, whose extensive background in both medicine, electronics and cosmetology allows her the title: aesthetician.

Miss Valmy practices her arcane art on hapless males at New York's Todaro Barber Shop. Her facial overhaul for men includes a variety of treatments such as "sandblasting" a client's skin with a powerful jet of water containing various cleaning agents. This opens the pores, cleans them and restores a measure of the bloom of youth.

Other treatments help restore a guy's loveliness by scraping off the dead cells of the face with a high-speed electric brush.

Chemical treatments of assorted types and hues are also employed in the re-making of a man. For instance, greasy goo for bedtime application (just like the little lady's) composed of vitamins, amino acids, enzymes, essential oils and phytostimulines.

Miss Valmy obviously feels that beauty treatments for men is the coming thing and to make sure you, I, and the guy down the

One scalp treatment consists of rubbing protein cream into the hair, then massaging with a special device that radiates ultraviolet and high-frequency RF.

Miss Valmy is treating this young man for unhealthy looking skin by using an ozone steam that opens pores, cleans them and removes dead outer cells.
BEAUTY—YUK!

street will be able to have our regular beauty appointments, she's set up a one-of-a-kind school to train aspiring aestheticians in the arts of skin anatomy, skin physiology, cosmetic chemistry, morpho-psychology and skin rejuvenation.

Claims for results of Miss Valmy's expertise are that treatments can completely remove or at least very much improve a man's skin problems depending on skin condition.

Not content that man should be beautiful of face only, Miss Valmy also has a range of hair and scalp treatments that'll help prevent baldness and falling hair. This deed is accomplished with the aid of chemicals ranging from vitamins to hormones accompanied by tender loving massage.

Where it'll all end this writer fears to say, but since the advent of cosmetics for men such as hair sprays and face creams, the care and feeding of manly loveliness has definitely been on the increase. Does it mean an end to the rugged, wrinkled all-American Western hero type? Meanwhile, fellahs, see you at Miss Valmy's salon. —Joe Craig

This fellah is admiring the space-age gadget responsible for making him a new man. It's the device used to generate ozone steam employed in many of the scalp and facial treatments.

The best way to get a new skin that glows with the vigor of youth is to take off the old one. That's just what this electrically powered brush is doing to the gentleman's face.

Flabby neck muscles are firmed up with these menatron pads; they exercise the muscles by zapping them with small jolts of electricity. Some 30 sessions are required to complete the job.

Deep neck creases are attacked with a kind of vacuum cleaner that massages, deep-cleans and disinfects the skin. This treatment combined with others can do much to make you lovelier.

www.americanradiohistory.com
Gadgets and Gizmos for Way-Out Sounds

There was a time when an electric (or amplified) guitar was just that—a guitar feeding an amplifier. Then someone added a tremolo to their amplifier. Someone else followed with reverb. And in no time flat the electric guitar became the number-one sound on the local radio station.

But as a famed performer of yesteryear was fond of saying: “You ain’t heard nothin’ yet.” As deluxe-featured as they were, guitar amplifiers of only a few months back don’t begin to approach what’s low available in pro amplifiers at the local music shops. Name any effect you can think of, and it’s likely yours for the buying, in a complete amplifier or as an add-on unit.

You think reverb is real gone? You literally ain’t heard nothing till you hear echo from drum-repeat— with the notes repeated over and over till they die away. Same thing goes for a fuzzbox that not only distorts the guitar’s sound but uses high-frequency feedback for an extra kick in the treble range. In fact, there are so many special guitar effects that we couldn’t uncover all of them in the 2 1/2 hours we spent at one of the largest guitar amplifier dealers in the East—Sam Goodys, located in Valley Stream, N. Y.

But before we go off on a tangent, let’s go back to the basic guitar amplifier and work our way up. This way, you’ll know what’s available and what you want to look for in a guitar amplifier.

First off, there’s the basic amplifier, which offers nothing in the way of features other than a tone control. Basic amplifiers start at about 1 1/2 watts output—just enough to entertain the family in the living room. The tone control will generally be a simple treble-cut affair, and the price of the entire unit will fall in the area of $20 or so.

As you move up the price ladder the power output similarly goes up, perhaps to 50 or 100 watts (though powers of this order are rarely found in a no-other-feature amplifier). Higher price also brings more flexible tone control—both bass and treble boost.
GADGETS AND GIZMOS

Electronic, or electronically processed, music all began with the electric guitar like the one above.

and cut. Also, a line-polarity reversing switch is ordinarily included to reduce hum and the possibility of shock stemming from simultaneous use of several AC-powered instruments or amplifiers.

Before we go any further, a note about a guitar amplifier's power-output rating. Unlike hi-fi amplifiers, which are rated in continuous sine-wave power output or music power output, a guitar amplifier is usually rated for peak power output. As you may know, peak power makes anything appear extra powerful, but what you may not be aware of is that peak power involves $4x$ factor. Therefore, to get continuous power output from peak power you divide by four: 100 watt peak power is 25 watts continuous (and vice versa).

Naturally, since a guitar's sound can predominate in volume peaks, a special speaker capable of handling high peak power output must be used. These special speakers are labelled and referred to as music speakers—or some similar term. The thing to remember is that the name music speaker doesn't necessarily infer hi-fi quality. Instead, it generally indicates high efficiency and high power-handling capacity needed in this kind of service.

Two Inputs Or Channels. Nearly all amplifiers are available with two inputs, but it is up to you to determine what inputs you're getting. Two inputs generally means two input jacks to a single amplifier channel with a single volume and tone controls affecting both inputs. On the other hand, two channels means two inputs each with its own independent volume and tone controls. In addition, one channel is generally a normal channel, equipped with standard tone and volume controls. The second channel, in contrast, might have identical tone and volume controls, plus user-selected tremolo, reverb, or other desired effects.

Tremolo. First effect generally added to a basic amplifier is tremolo, which slowly "pulses" the overall gain, usually at a rate of somewhere between 4 to 20 Hz. Two controls are provided. One, called a speed or rate control, determines the tremolo's frequency (a low rate gives a slow, sensuous pulsation while a high rate imparts a wobbling quality to the sound). A depth or intensity control determines the degree of tremolo effect (a little depth is just barely noticeable, while nearly full depth can almost move a water glass right off a table). As a rule of thumb, tremolo can be disabled by an on/off switch on the amplifier panel. However, more expensive amplifiers generally have a foot switch allowing the musician to key the tremolo in and out while playing.

Significantly, tremolo is nearly always provided as part of an amplifier. Rarely is it
One of the big names in electric guitar amps, this high-powered Fender has built-in reverb and tremolo.

an addition to an existing amplifier, though your local dealer just might be able to get you an add-on unit if you want one. However, you might have to wield the old soldering iron a bit to wire it in.

Reverberation. Reverberation (often erroneously called echo) is available either built-into an amplifier or as an add-on extra. Normally, it results from use of one or more springs. The signal, bouncing back and forth from one end of the spring to the other, generates an almost infinite number of rapidly decaying echoes that blend together so that no one particular echo stands out by itself.

Reverb effects generally have just one control, a reverb knob that sets the amount of reverb added to the primary guitar signal. Toss in just a touch of reverb and the sound gets bright, or live. Add a lot of reverb and the guitar sounds like it's being played in a deep cavern.

While the reverb effect can be disabled with the reverb control, most amplifiers have provisions for a foot switch that allows the effect to be keyed in and out without interrupting the jam session.

Echo. Echo is a most unusual effect, generated by a tape loop, or a magnetic drum or cylinder. One or more playback heads pick off the sound at some time interval—within a user-adjusted range—after it is recorded on the magnetic medium. The playback from the head or heads is then generally re-combined with the input signal so that the sound repeats and repeats itself, gradually or sharply decaying. In effect, you get at least one full repeat of a note or sound while you continue merrily playing other notes or sounds.

Echo units also provide for reverb, whereby the echoes are blended as in a straight reverb system. An echo add-on may also provide a vibrato effect which actually varies the frequency of the tone itself. Generally, when vibrato is provided in an echo add-on, it is very light and continuous, not controlled by the player as is vibrato generated at the guitar.

Bright And Super-Treble. Many amplifiers incorporate a brightness or super-treble switch. Basically, both circuits deliver extra treble boost, the exact frequencies being determined by the particular design. The bright or super-treble effect is generally in addi-
GADGETS AND GIZMOS

ition to the treble boost provided by the treble tone control.

**Super Bass.** No standard amplifier incorporates a super-bass circuit that gives more boost than can be obtained from the bass tone control. However, some custom-made super-bass add-on units are available if you have a secret hankering for thump with a vengeance.

**Fuzzbox.** A fuzzbox is an add-on device connected between the guitar pickup and the amplifier input that generates pure distortion —the solid rock sound. Essentially, a fuzzbox simply distorts the sound by sharply chopping the peaks of the waveform. The fuzzbox generally incorporates a control that determines the amount of distortion generated. Some fuzzboxes also have a feedback arrangement for the higher frequencies which cause the internal amplifier to break slightly into oscillation. The effect is to generate a hangover sound after the note or chord is struck.

A fuzzbox is supplied as a footswitch and contains an integral battery power source. The fuzz effect is keyed in and out by simply stepping down on the switch.

**The Bass Amplifier.** A bass guitar tuned one octave below a “standard” guitar naturally generates predominantly bass tones. Therefore, it requires an amplifier capable of exceptionally good response and power output at the lower frequencies. A bass amplifier is specifically designed for top performance at the way-down-low frequencies, usually providing an extra degree of bass boost. As a general rule, an oversize speaker(s) or specially designed low-frequency speakers are provided to handle the large amount of power needed.

A bass amplifier may be provided with an equalizer switch to allow its use with a “standard” guitar (high-frequency attenuation is removed). Or it may have a second or “normal” channel, so that the same amplifier can simultaneously handle a bass and “standard” guitar.

**Piggybacks.** When extreme high power is employed the possibility of microphonics is reduced by separating the amplifier from the speakers. Or you might have occasion to place the speaker at some distance from

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This Fender Band Master piggyback amplifier is used when extremely high output power is needed. It contains no speakers (they're separate) thereby reducing the possibility of speaker-to-amplifier microphonics.
Bass amplifiers, like this one by Gretsch, are designed to provide very-high low-frequency power for earth-shaking bass.

Solid-state amplifiers offer virtually nothing in the way of overall weight or size reduction. Suffice it to say that the tube and transistor realms both lay claim to some really great amplifiers and some extremely rotten ones. (You pay your money and take your choice.) On the other hand, if you need a really portable guitar amplifier, you'll find it only in solid state. But, be careful—some cheap units will come apart in the rain.

Portable amplifiers are generally of relatively low power, intended for beach parties, picnics, and the like. They operate off either 117 VAC or an internal power pack. Some models are basic amplifiers while others contain tremolo; and we may assume that reverb will soon be added to portable amplifiers.

**The Choice Is Yours.** Exactly what features you require is of course strictly up to you, and features (along with power output) usually determine price. The fuzzbox has proven so popular with rock-and-rollers as an add-on that it may soon be made an integral feature of most amps. (Check the Jan.-Feb., 1968 issue of ELEMENTARY ELECTRONICS.) We may also see a miniaturization of the echo add-on, allowing it to be offered as an integral feature as well.

As a general rule, of course, it's best to purchase an amplifier that meets your future needs the first time round. While there is a trade-in market for amplifiers, there is really no sense in trading one amplifier for a virtual duplicate just to secure built-in reverb or some other effect that can be had inexpensively with an outboard device.

If too many desired features will severely strain your budget, you might consider building your own amplifier. Several amplifier kits are available from the Heath Co., Benton Harbor, Mich. 49022. In fact, they have some good guitar kits, too! Kit assembly isn't difficult or troublesome for anyone with some electronic construction experience and a little spare time.

Having a good listen to a setup you're interested in buying is one way to decide, but don't forget to determine the features you want now and in the future. When making a listening check, pick a quiet corner and keep the volume down; a lot of volume can mask bad performance though make sure the unit's got the guts you need too.
The nation's most powerful electron microscope has recently been installed at U.S. Steel's Fundamental Research Laboratory in Monroeville, Pa. Resolving power of the unit is in the area of atomic dimensions. The million-volt, 17-foot high electron accelerator used to power the instrument is shown above. The microscope, below, is being used for a close look at the atomic structure of steels and other metals.

Sylvania's Electronic Tube Division has come out with a 10-inch, two-color, single gun cathode ray tube. The tube contains two layers of phosphor (red and green) alternately activated by a single electron beam. While not applicable to home color TV use, the tube has numerous other applications. Two suggested uses are in an air traffic control radar monitor showing high-flying aircraft in red and low-altitude traffic in green and "Identification, Friend or Foe" military radar.

The 3500 men aboard the aircraft carrier U.S.S. Oriskany don't suffer from lack of entertainment. They have their own closed circuit TV system (known as KRIS-TV) featuring news programs, films, and live interviews of ship-side notables. The system (by Sylvania) transmits to 65 television receivers located throughout the ship.
You'll get the most and the best CBing by talking the straight and narrow, here's how ...

There you sit with your CB license, equipment, and permission from wife and/or landlord to make the installation; all you've got to worry about now is the message and how to get it transmitted, legally, quickly, efficiently. Make no mistakes about this, it can't be done by intuition and luck has little to do with it either. It's a definite science, and we might as well set you straight right now.

Here's the idea in a nutshell, before we go into details:

1. The FCC has a set of operating rules which you must know and use. They enforce these rules.

2. CB operators (at least, most of them) are dedicated to trying to keep the CB channels as useful as possible. Towards this end they have set up several rules of the road for operators.

3. Efficient operating can frequently mean the difference between communications and confusion.

Those are the basics.

The FCC's Rules. The FCC (known to CBers as Uncle Charlie or Fox Charlie
SINLESS CBer

Charlie and sometimes the Friendly Candy Company) sort of cherishes the idea that you have in your possession a copy of Part 95 of their rules. This is a rather high-falootin' document which many CBers find with transmissions to stations of others limited only to those messages which are absolutely necessary.

A few examples of messages which cannot be legally transmitted are:

"I'm just calling to see who can hear me. How's my signal over there?"

"The rig here is a Frammis Mark Two, what's the set up on your end?"

"Calling the station in Venezuela, you're hard to decipher; it spells out the things which can and can't be done with a CB transceiver on 27 megas.

The main theme is that the transmissions from your station must contain substantive messages relating to your own personal or business affairs. In other words, hobby type (like ham radio) chit-chat is strictly verboten. The idea is for you to communicate mostly with units under your own license, coming in loud and clear here in Wisconsin."

"Name here is Billy, thought I'd give you a shout to get acquainted. What's the handle there?"

"Got a new mike on the rig, how's it sound?"

"Calling any station on the channel for a radio check."

"Can anybody out there tell me when the club meeting is?"
Get the idea? Substantive messages only.

Other Don'ts. Other things which cannot be transmitted are: transmissions for any purpose which is contrary to federal, state, or local laws; transmission of indecent, obscene, or profane words, language, or meaning; to communicate with unlicensed stations, or with stations licensed in other radio services or licensed by governments other than the U. S.; communications not addressed to a specific station (except in an emergency); to transmit music or entertainment; transmissions intended to cause interference to another station; false distress signals; for advertising services or products; coded messages (except when standard message codes are used and a copy of the full code is on hand at the station); communications covering more than 150 miles.

All transmissions should be as brief as possible and should not exceed 5 minutes.

After 5 minutes you must clear the channel and stand by (not transmitting on any other channel) for at least 5 minutes to let others use the channels.

Your callsign must be transmitted in full (letter for letter and number for number) at the beginning and end of each transmission or series of transmissions, in addition, you must also transmit the entire callsign of each station involved in the communication with you. If the callsign of the other station isn't immediately available, you can use a distinctive name ("React Control, Station in Hammondsville," etc.) until you ascertain the other station's call.

You may use any channel for your communications with your own units, however (except in emergencies), communications

Big brother is listening and the results of his sleuthing gets many a lawless CBer his very own FCC pink ticket.

After 5 minutes you must clear the channel and stand by (not transmitting on any other channel) for at least 5 minutes to let others use the channels.

Your callsign must be transmitted in full (letter for letter and number for number) at the beginning and end of each transmission or series of transmissions, in addition, you must also transmit the entire callsign of each station involved in the communication with you. If the callsign of the other station isn't immediately available, you can use a distinctive name ("React Control, Station in Hammondsville," etc.) until you ascertain the other station's call.

You may use any channel for your communications with your own units, however (except in emergencies), communications

**The CBers Creed**

As a Citizens Band Radio Operator, I recognize my obligations:
To the Federal Communications Commission and The United States of America, who believe that I am sufficiently mature to be entrusted with the ownership, control, and operation of a radio transmitter.
To my neighbors, who trust their lives and safety to my skill and judgment during times of emergency.
To my fellow Citizens Band operators, who depend upon me to follow established good practices, procedures and courtesies.

—and-

To discharge these responsibilities, I will at all times observe the highest standards as a Citizens Band operator.

—and-

I will never knowingly cause interruption to Citizens Band stations engaged in communications.
I will be careful to avoid generating interference to radio and TV receiving equipment, and will endeavor to locate and eliminate interference to any such equipment which may emanate from my station.
I will transmit only to pass necessary and substantive messages.
I will make all efforts to make full and proper use of Channel 9, the National Calling and Emergency Channel.
I will aggressively maintain my proficiency as a Citizens Band operator and keep abreast of electronics and communication developments so that my operation, which largely depends on such knowledge, may be of the highest order.
I will conduct myself on the air to reflect credit upon myself, the Citizens Radio Service and my country.
I will constantly strive to keep my standards high.
I pledge adherence to these principles so that I may contribute my part to more efficient radio communications, and advance the dignity of the Citizens Radio Service.

OPERATOR'S NAME

Our thanks to Cowan Publishing Co.

January, 1968

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www.americanradiohistory.com
SINLESS CBer

with stations not in your own network must be conducted on channels 9, 10, 11, 12, 13, 14, and 23.

On The Plus Side. You’re probably saying to yourself, “That makes it impossible to use the equipment.” Not true! You’d be surprised how little the foregoing taboos make a scratch in the communications you can transmit.

Here’s how to call your mobile unit from your base: Calling—“KXX1234 Base, calling Unit 2.”
Response—“KXX1234 Unit 2, to base, over.”
Clearing—“KXX1234 base, clear with unit 2,” and “KXX1234 Unit 2, clear with base.”

Between mobile units of the same licensee:
Calling—“KXX1234 Unit 1 calling Unit 3.”
Response—“KXX1234 Unit 3 to Unit 1, over.”
Clearing—“KXX1234 Unit 1 clear with Unit 3,” and “KXX1234 Unit 3 clear with Unit 1.”

Between units of different licensees:
Calling: “KXX1234 to KXX6789,” or “KXX1234 to KXX6789 Unit 3.”
Response: “KXX6789 to KXX1234, over.”
Clearing: “KXX1234 clear with KXX6789,” and “KXX6789 clear with KXX1234.”

Rules of the road. Backing up the FCC’s rules and regulations, most CB operators try to exercise as much courtesy as possible with others of their brotherhood. For instance, they will seldom hog a channel when they know that others wish to use it; they get their message sent and done with as quickly as possible.

CBers have unofficially established Channel 9 as their Calling and Emergency Channel. The idea is to keep the receiver going on Channel 9 when not otherwise engaged in communications; in this manner, stations can always find each other on this one particular channel. When the initial contact is made, stations can then switch over to another channel so as to keep 9 clear. Emergency communications with REACT and other emergency monitoring stations are also conducted initially on Channel 9. The message here is Keep 9 Clear!

CBers have also established their own specialized version of the popular 10 Code. While, at one time, there were a number of different versions of 10-Codes (a different one in each locality), a standardized one was introduced several years ago and has now won universal acceptance.

FCC Enforcement. There has to be a traffic cop on duty to protect the pedestrians from those who might violate the traffic laws. So it is with CB, and the cop on the corner is the FCC’s extensive monitoring network. Elaborate and highly sophisticated monitoring stations are located across the nation from Puerto Rico to Alaska and Hawaii. These stations listen to CB channels (and everything else too) and make tape recordings of those transmissions which are in violation of Part 95.

FCC monitors then transcribe these tapes.

CHANGE OF ADDRESS NOTICE

A licensee of a Citizens Class B, C, or D radio station may advise the Commission of a change of mailing address by letter. No application or fee is required. Supply the following information:

Station Call Sign

Licensee’s name as shown on license

Licensee’s address as shown on license

Licensee’s new mailing address Zip

Licensee’s signature

You may use this notice to furnish the information if you desire. Mail it to: Federal Communications Commission, 334 York St., Gettysburg, Pa. 17325.
into written documents which are then incorporated into official FCC "Violation Notices." CBers who receive such a notice are required to immediately respond to the notice in writing, explaining the reason for the rule infraction.

Appropriate action is taken after the FCC has considered the CBer's explanation—the FCC may then decide to forget the incident, to give the operator another chance, to impose a fine (possibly as much as $200), or to revoke the CBer's license.

Failure to answer the FCC's notice will almost surely mean license revocation.

In addition to the FCC's regular monitoring stations, the FCC's 24 District Offices frequently are pressed into monitoring services. These offices are especially effective when it comes to sending out mobile units to clean up a particularly nasty area of irresponsible CB activity. Last year a fleet of FCC mobile monitors descended on a town near Washington, D. C., and the end result was 8 sadder but wiser former CBers. The job was accomplished in only a few trips.

You will never know when an FCC monitor is listening in on your conversation; the FCC people don't cut in and make their presence known. Our advice is to talk the straight and narrow.

**Emergencies.** Emergencies are a special case since the FCC recognizes that by their very nature they must take precedence over all other communications.

When a station sends out an emergency call you should get the channel cleared of all other users as soon as possible. Make every effort to assist the other station.

Stations involved in emergency communications are given a pretty free hand at temporarily violating the FCC's rules—any channel may be used, time limitations are thrown to the wind, getting the message through is the most important consideration.

The FCC requires, however, that if you are forced to violate any of the normally imposed CB operating restrictions while involved in emergency communications, you must notify the FCC's Washington, D. C. office and also your local (or nearest) FCC office of the incident as soon as possible. Tell them the nature of the emergency and the use to which your station was put during that time.

(Continued on page 130)

---

### NATIONAL CB 10-CODE

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-1</td>
<td>Receiving poorly.</td>
</tr>
<tr>
<td>10-2</td>
<td>Receiving well.</td>
</tr>
<tr>
<td>10-3</td>
<td>Stop transmitting.</td>
</tr>
<tr>
<td>10-4</td>
<td>OK, message received.</td>
</tr>
<tr>
<td>10-5</td>
<td>Relay message.</td>
</tr>
<tr>
<td>10-6</td>
<td>Busy, stand by.</td>
</tr>
<tr>
<td>10-7</td>
<td>Out of service, leaving air.</td>
</tr>
<tr>
<td>10-8</td>
<td>In service, subject to call.</td>
</tr>
<tr>
<td>10-9</td>
<td>Repeat message.</td>
</tr>
<tr>
<td>10-10</td>
<td>Transmission completed, standing by.</td>
</tr>
<tr>
<td>10-11</td>
<td>Talking too rapidly.</td>
</tr>
<tr>
<td>10-12</td>
<td>Visitors present.</td>
</tr>
<tr>
<td>10-13</td>
<td>Advise weather/road conditions.</td>
</tr>
<tr>
<td>10-14</td>
<td>Make pickup at.</td>
</tr>
<tr>
<td>10-15</td>
<td>Urgent business.</td>
</tr>
<tr>
<td>10-16</td>
<td>Anything for us?</td>
</tr>
<tr>
<td>10-17</td>
<td>Nothing for you, return to base.</td>
</tr>
<tr>
<td>10-18</td>
<td>My location is.</td>
</tr>
<tr>
<td>10-19</td>
<td>Call by telephone.</td>
</tr>
<tr>
<td>10-20</td>
<td>Report in person to.</td>
</tr>
<tr>
<td>10-21</td>
<td>Stand by.</td>
</tr>
<tr>
<td>10-22</td>
<td>Completed last assignment.</td>
</tr>
<tr>
<td>10-23</td>
<td>Can you contact?</td>
</tr>
<tr>
<td>10-24</td>
<td>Disregard last information.</td>
</tr>
<tr>
<td>10-25</td>
<td>I am moving to Channel.</td>
</tr>
<tr>
<td>10-26</td>
<td>Identify your station.</td>
</tr>
<tr>
<td>10-27</td>
<td>Time is up for contact.</td>
</tr>
<tr>
<td>10-28</td>
<td>Does not conform to FCC Rules.</td>
</tr>
<tr>
<td>10-29</td>
<td>I will give you a radio check.</td>
</tr>
<tr>
<td>10-30</td>
<td>Emergency traffic at this station.</td>
</tr>
<tr>
<td>10-31</td>
<td>Trouble at this station, help needed.</td>
</tr>
<tr>
<td>10-32</td>
<td>Confidential information.</td>
</tr>
<tr>
<td>10-33</td>
<td>Correct time is.</td>
</tr>
</tbody>
</table>

**Note:** Any 10-code signal may be reversed by stating it as a question. For example, 10-20? would mean "What is your location?" or 10-36? "What is the correct time?"
By Jorma Hyypia

Star performers on this quiz program are likely to win only a free trip to the pen.

**The Big PAYOFF**

Ampex video tape system is used in experimental setup by Miami Police Department. Detective here is watching prerecorded interview.

Want to get on TV? Perhaps the easiest way is to heave a brick through a store window in Miami, Fla. In no time at all you will be a star performer in a new TV spectacular recently set up by the Miami Police Department.

You are low in a quiet recording studio. The lights go on. As you answer question after question, every twitch, lip-wetting and shoulder-jerking movement you have will be recorded for posterity on videotape. And you can be assured of having an interested audience.

Several times a day, all the precinct officers will line up at attention in the roll call room and give your taped performance undivided attention. They couldn't be more interested. They want to be sure to ask for your autograph the next time they spot you wandering through downtown Miami with a brick in your hand.

Admittedly, the Miami quiz show is still small-time TV. But the day may come when your performance will be shown on a nationwide police TV network—provided that you rate VIP treatment. This is pretty much assured in light of the big-time sponsor giving financial backing to the Miami experiment. The sponsor: The Office of Law Enforcement Assistance of the U.S. Department of Justice.

**Tools Of The Trade.** Using Federal funds, the Miami police acquired an Ampex VTR-7000 series video tape system including six monitors (two for the squad room, two for the detective bureau, and two for use as portable equipment). Two tape units are used for recording and playback—a console for regular station-house work, and a portable unit for field work.

The Miami video equipment uses 300-line resolution. Cost of the tape is about $60 per
Suspect being interviewed is video-taped, sight and sound. Mannerisms and speech recorded this way makes far better identification possible than old system of mug shots. With an average of 75 interviews per spool, relatively little tape is required.

3,000-ft. reel; which is substantially cheaper than the cost of commercial video tape. A 3,000-ft. reel provides an hour of recording time. In theory, this is equivalent to about 120 separate "interviews" averaging about a half-minute each. However, in practice each tape holds about 75 interviews; even so, the tape cost is well under a dollar per interview— an obvious bargain considering the wealth of information recorded as compared with ordinary still photo mug shots.

The tape provides a permanent record not only of the appearance of the suspect, but also of his personal mannerisms and voice characteristics.

So far the equipment has checked out A-OK except that the operators would like to replace the 3-lens camera turret with a more flexible zoom lens.

The day may come when police videotaping will be done in color as well as in black and white. Color would offer obvious advantages. Skin colorings, identifying blemishes, scars and the like would be recorded much more naturally. The cost of color equipment, says Ampex, would not be prohibitive: a color video system would cost only about $500 more than the presently used VTR-7000 black and white system.

**Other Applications.** Primary emphasis now is on video-mugging of suspects. But there are many other ways in which video tape systems could be used in police work.

For example, various police training programs would be far more effective if supplemented with video tapes that demonstrate such techniques as first aid, self defense, surveillance, and suspect questioning.

Portable equipment taken to the scene of a crime could provide far more revealing photographic records than is possible (Continued on page 134)
Remember the year you wanted a 20-amp-200-BV,, silicon transistor and got a barbecue apron and a chef’s cap? Or the Christmas you asked for a 4-band communications receiver and got bedroom slippers?

Don’t blame the little woman: she operates on another wavelength. Seldom are her audio receptors tuned to your sound waves. The mismatch turns out neckties.

To discourage such distortion, why not give up attempts at audio communication and try this simple visual layout?

Print this year’s Wish List in large red letters on poster board. Next, tape the communication to the top of her dressing table mirror so that it intercepts her line of vision every time she tries to see her face. This will guarantee that a full-color image will be imprinted on her visual receptors with a high repetition rate.

To assure yourself of high volume and quality reception at Christmas, always jot down gift wishes as they occur to you. This will prevent that awkward failure of recall just when the missus pops the question, “And what would you like for Christmas, dear?”

In case your memory now refuses a playback of the many little wishes you have had during the year, following is a list of small items which almost any electronics enthusiast would be happy to find in his Christmas sock.

1. A burp gun for troubleshooting
2. A little red wagon for pulling a chassis
3. Toggle switches for chastening recalcitrant toggles
4. A purity ring to wear around your tongue when the children are within earshot
5. A sack of horse manure to keep your tuner stable
6. Pink plastic curlers to ensure correct waveform
7. A wideband detector to sort the single girls from the married ones
8. A woofer to offer friendly welcomes to lonely burglars
9. A bottle of Scotch for maintaining loading characteristics
10. Jack—any kind—telephone, telegraph, check, or money order

With these items, and others that may occur to you, you should be well on your way to the merriest of Christmases.
As far as modern music is concerned, nothing equals the big, pulsating sound of an amplified guitar. But as far as your neighbor is concerned, nothing is more annoying—particularly at midnight.

To answer the need of musicians who like to practice at unusual hours, and to provide an easily portable "practice amplifier," Telex has introduced the Amplitone I headset.

The Amplitone I is a standard mono hi-fi headset with one important difference. Built into the right earphone is a complete six-stage amplifier, and a battery compartment for a 9-volt battery. When the power switch, which is also built into the earphone, is in the Off position, the amplifier is disabled and disconnected, and the Amplitone I functions as a 22-ohm hi-fi headset. When the power switch is turned On, the amplifier is connected between the attached phone plug (with cord) and the earphones.

Speaker Earphone. Each earphone consists, as shown, of a specially fabricated wide-range miniature 44-ohm speaker—the two speakers are connected in parallel for 22 ohms total impedance. The right hand speaker is backed up by the printed circuit amplifier.

The power switch mounts on the earpiece housing, which is moulded so that space is available for the battery. The left earpiece does not contain an amplifier, but is used to house a spare battery.

We tested overall operation of the Amplitone I just as it would be used by an amateur or professional guitarist; and we also checked it for usable frequency response with an AF signal generator.

Usable Frequency Response. The frequency response of the system—amplifier and speaker—appeared to a panel of users to be essentially flat, as far as the ear was concerned, from 80 to 15,000 Hz. The low end response, that is, the minimum frequency producing a discernible and usable sound level was 50 Hz.

We checked the Amplitone I with a moderately priced three-pickup solid-body guitar. The headset provided more than adequate amplification with the guitar's level controls well below maximum.

Sound level in the headset approached the threshold of pain without undue distortion. In fact, at very loud listening levels the distortion was very low, equivalent to a good hi-fi amplifier.

Soundwise, the only negative aspect was an annoying "hiss" at very low sound levels; the amount of hiss being to some degree determined by the setting of the guitar's volume control (the Amplitone I does not have a volume control). As with the distortion, the hiss was discernible only at an extremely low sound levels. Within a normal to very loud sound level, neither hiss nor distortion is evident.

Each headphone contains a miniature wide-range speaker of 44-ohms impedance, the two hooked in parallel for 22 ohms.
**LAB CHECK**

**Comfort.** The *Amplitone I* appears massive and has a good solid heft, but surprisingly, it is one of the most comfortable headsets we've used. The band, being large, sets across the entire top of the head with no tendency to fall off—even if the user bobs, rocks, jumps, or rolls in time to the music.

The earphone pads are relatively narrow and very soft with little noticeable pressure against the head, yet they effectively insulate the wearer from outside noise. Soft slider springs allow the headset to adjust to the size of the user's head, and provides an inch or so of up-and-down adjustment.

**Other Uses.** If your guitar amplifier is equipped with a headphone or external speaker jack, the *Amplitone I* can be used as ordinary hi-fi phones by simply setting the power switch to **Off**.

Another model, the *Amplitone II*, has an amplifier built into each earphone providing a stereo headset. While we can't see any value in stereo for guitars, the stereo connection would allow two instruments to be monitored by one player—say two guitars, or one guitar and an electronic sideman. Actually, the Amplitone II is designed for hi-fi use. It can be connected directly to a record player, tape deck, or tuner, and produce full stereo sound for enjoyable and private listening.

**Summing Up.** When used within normal and natural sound levels limits, the *Amplitone I* does exactly what it's supposed to do and does it well. It most certainly provides a means of individual enjoyment of an electric guitar not hitherto available—such as at the beach or in a moving vehicle.

The Amplitone I is priced at $79.95. The Amplitone II sells for $99.95. Additional information is available from Telex, Dept. S, 3054 Excelsior Blvd., Minneapolis, Minn. 55416.
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Jan. 1968

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Propagation Forecast

As noted several times in the past, these forecasts are not based entirely on propagation conditions, but upon the best shortwave broadcast DX available during any given period. A striking example of the differences produced by this method is our listing for Africa (south of the Sahara) at 1800-2100 listener’s time. Here, we are forecasting poor reception. It’s not that the propagation conditions themselves are so bad at these hours—in fact, they’ll be comparatively good. It’s that most African stations, especially the DX variety, are off the air during most of this period.

Except for stations somewhat below the equator (where it is summer), reception conditions will generally be at their annual peak. At night, static on the lower bands will be virtually nil, while during daylight hours the upper bands (including 11 meters) will be open for lengthy periods. Of course, at this relatively high point in the sunspot cycle we can definitely expect some severe ionospheric disturbances during which only nighttime reception of tropic stations will be anywhere near par. Speaking of tropical stations, a reminder! On Christmas and New Year eves most Latin American stations remain on the air past normal sign-off. Hard working DXers should bag some interesting catches on 60 and 90 meters, and if you listen late enough, the medium wave broadcast band.

<table>
<thead>
<tr>
<th>Dec./Jan. 1967</th>
<th>ASIA (except Near East)</th>
<th>EUROPE, NEAR EAST &amp; AFRICA (N. of the Sahara)</th>
<th>AFRICA (S. of the Sahara)</th>
<th>SOUTH PACIFIC</th>
<th>LATIN AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000-0300</td>
<td>25</td>
<td>31, (41), 49</td>
<td>41, 60</td>
<td>25, 31</td>
<td>49, 60, 90</td>
</tr>
<tr>
<td>0300-0600</td>
<td>25, (41), (60)</td>
<td>31</td>
<td>(31) poor</td>
<td>41</td>
<td>49, 60, 90</td>
</tr>
<tr>
<td>0600-0900</td>
<td>19</td>
<td>(16), 19, (25)</td>
<td>19</td>
<td>25</td>
<td>49</td>
</tr>
<tr>
<td>0900-1200</td>
<td>19</td>
<td>(13), 16, 19</td>
<td>19</td>
<td>(25) poor</td>
<td>31</td>
</tr>
<tr>
<td>1200-1500</td>
<td>19 (poor)</td>
<td>(13), 16, 19</td>
<td>19, 25</td>
<td>(25) poor</td>
<td>(19), 25</td>
</tr>
<tr>
<td>1500-1800</td>
<td>16, 19</td>
<td>25, 31, (49)</td>
<td>31, (49), 60</td>
<td>(16), 19</td>
<td>31</td>
</tr>
<tr>
<td>1800-2100</td>
<td>25</td>
<td>25, 31</td>
<td>31 (poor)</td>
<td>(16), 19, (25)</td>
<td>49, 60, 90</td>
</tr>
<tr>
<td>2100-2400</td>
<td>25</td>
<td>31, 41</td>
<td>41, 60</td>
<td>(16), 19, (25)</td>
<td>49, 60, 90</td>
</tr>
</tbody>
</table>

To use the table put your finger on the region you want to hear and log, move your finger down until it is alongside the local standard time at which you will be listening and lift your finger. Underneath your pointing digit will be the shortwave band or bands that will give the best DX results. The time in the above propagation prediction table is given in standard time at the listener's location which effectively compensates for differences in propagation characteristics between the East and West coasts of North America. However, Asia and the South Pacific stations will generally be received stronger in the West while Europe and Africa will be easier to tune on the East coast. The shortwave bands in brackets are given as second choices. Refer to White's Radio Log for World-Wide Shortwave Broadcast Stations List.
Amazing new battery promises to revolutionize portable power sources

Air, water and salt. That's all you need to make this revolutionary portable battery operative. To recharge, just slip in some fresh electrodes! Too good to be true? Read on. You'll flip when you get all the dope on this battery's performance!

But first, who will use the so-called Magair battery? The U.S. Marine Corps for one, inasmuch as USMC gave General Electric Company researchers a $167,000 contract to develop a new power source. Non-military users will probably include just about anyone who operates mobile communications equipment, tape recorders or other electronic devices in the field. Campers, hunters and fishermen will find the Magair a convenient source of power around camp. And it's a natural for boat enthusiasts who can juice it up as easily with salt water as with fresh.

Exit Lead-Acid? The Magair battery promises a number of important advantages over conventional dry cells and lead-acid storage batteries. Unlike dry cells, the Magair can be reactivated repeatedly. Simply pour out the water and magnesium hydroxide sludge that forms during use, insert new magnesium anodes, add salt and water. That's all! There's no need for external power sources or orthodox recharging equipment. The entire reactivation can be accomplished in minutes, anywhere, far out in the wilderness or aboard a boat.

Handling safety is an important plus. A lead-acid storage battery must be protected carefully from physical damage because of the highly corrosive and toxic acid it contains. Not so the Magair. The only thing you can slop out is salt water.

In light of all these advantages, you might expect at least some sacrifice of performance. Here's the big surprise. The Magair actually packs five times more energy than a typical lead-acid storage battery! The Magair provides an energy density of about 50 watt-hours per pound of battery weight; the average lead-acid battery provides only about 10 watt-hours per pound of weight.

Too Good To Be True. Still looking for a catch? You probably won't find it in the price, although GE hasn't yet said what the Magair will cost. However, manufacturing costs are substantially lower than in the case of conventional batteries. The obvious conclusion: highly competitive pricing is in the offing.

The cost of electricity obtained from the magnesium-air cell is composed of the replenishment cost plus the amortized cost of the air electrode and cell structure. The replenishment cost is conservatively estimated at $0.003 per watt-hour. At moderate rates of production, the cost of magnesium-air cells using a high-performance platinum-catalyzed electrode is estimated to be less than $10 per watt. At this cost, and with 1000 hour service life, the cost of electricity would be 1.3 cents per watt-hour. This is well below the cost of electric power from inexpensive dry cells. Used at room temperature, the expected cell life is over 2000 hours, hence the cost may
E aplenty

actually be substantially lower than this.

**Buck Per Watt.** Magnesium-air cells using cheaper air electrodes with no platinum catalyst would have an estimated cost of less than $4 per watt, and might be as low as $1 per watt.

The Magair battery currently being developed under the Marine Corps contract consists of 23 cells, each with a magnesium anode and a porous air cathode. This battery measures 4 x 8 x 12 inches in size. One set of magnesium anodes in this unit will supply 24 volts for a field radio for up to 12 hours before anode replacement is necessary.

The fact that almost any available water can be added to the battery means that use in remote areas is easier than in the case of other types of batteries. For example, the carry-in weight of a 5-cell battery is 11.9 pounds—10.8 pounds for magnesium anodes and salt and 1.1 pound dry battery weight. This battery will supply 500 watt-hours or more if the cell is refilled 60 times using locally available water.

**How It Works.** Like a conventional battery, the Magair system’s anode undergoes a chemical change and is consumed in the reaction. Unlike a conventional battery, however, the Magair system combines fuel with oxygen drawn from the air through a porous cathode. The porous cathode promotes the reaction of oxygen in the air with water in the electrode and the magnesium electrode to produce an electric current.

Magnesium hydroxide (milk of magnesia) is formed as a by-product. By chance, the magnesium hydroxide sludge acts to purify water of contaminants that might otherwise be deleterious to cell action.

**Mystery Cathode.** The porous air cathodes are not consumed in the chemical reaction, but do eventually deteriorate for other reasons. These may be replaced one-at-a-time, as necessary. Design of the cathode is still considered proprietary by GE, and details concerning its construction or composition are not yet revealed. However, it is known that the design includes a porous polymer material and a metal current collector. Platinum is the most effective catalyst although other metals such as palladium, silver and mixed oxides can also be used.

To most of us, these design secrets are of marginal interest. What we would really like to know right now is just when—and at what price—GE will put the revolutionary Magair on dealer shelves.

One thing is certain. If GE’s advance claims for the battery are proved out in consumer practice, the company’s battery sales should zoom higher than Ben Franklin’s kite in a Kansas windstorm.
The 6-meter Ham band is one of the busy portions of the VHF spectrum. Local ragchews, traffic nets and experimental transmissions fill the band. At times the band opens up, and over the horizon transmissions from several hundred to thousands of miles become possible. At these times, the 6-meter band sounds like a swarm of bees, with stations trying to complete QSO’s before the band becomes normal again. Sound like these 6-meter happenings are for you?

If so, you can listen in on 6-meter goings-on with our one-tube compactron converter. The converter tunes the most active portion of 6 meters, being bandspread over 50 to 51.5 MHz, and uses the triple-triode compactron as grounded-grid RF amplifier, mixer and tunable oscillator stages.

The converter is built into a compact aluminum cabinet with a built-in AC power supply, and it converts 6-meter signals to the upper end of the broadcast band (1500 to 1600 kHz) so you can receive them with a standard BCB receiver.

Here’s How. 6-meter signals are coupled from the antenna, via J1, to the broadly tuned antenna coil L1. The signals are amplified by the grounded grid amplifier V1A, and coupled by L2 and C3 to the mixer V1B. The oscillator V1C is tuned by L3 and C6 above the frequency of the 6-meter signals. C7 and C8 bandspread the oscillator to cover the most active portion of the 6-meter band. L5 and the interelectrode capacities of V1C provide the RF feedback path for the oscillator.

The oscillator output is coupled to the mixer grid by internal capacity of the compactron, and the frequency difference between the oscillator and the 6-meter signals is converted to an output IF frequency of 1600 kHz. This output frequency is coupled to the BCB receiver via L4 and J2.

The DC power for the convertor circuits is supplied by T1—D1, and filtered by C11—R8. The compactron heater power is also supplied by T1.

Construction. Our convertor is built in a 7½ x 4½ x 5-in. aluminum cabinet with a built-in chassis (LMB W-2F). This cabinet has removable front, rear, and bottom panels, as well as a removable top panel. Best way to start construction is to remove all of the panels and lay out the positions of the components on top of the chassis as shown in the photos. Place the parts as close as possible to the positions shown as placement is critical.

Install the tuning capacitor C6 on the front panel approximately ⅛-in. above the chassis, and cut a feed-through hole ⅛-in. dia. just below the terminal nearest V1. Mount the remaining parts as shown in the photos, using serrated washers to prevent movement.

Coil Winding. Wind 13 turns of #28 enameled wire on a J. W. Miller adjustable coil form 20A000-4 for L1 and L2 coils. Space the coil terminals approximately ⅛-in.
apart and the top terminal should be about 1/16-in. from the top of the coil form.

After L1 is installed, wind two turns of #22 hookup wire around its center and connect the ends to the ground lug installed with the coil, and a length of coax. Connect the other end of the coax to J1. Then wire the remainder of the converter chassis. Wind 10 turns of #22 hookup wire around L4, twist the wire ends together and connect them to J2. Remove 1 rotor blade from C6.

Remove unused terminals on the terminal board holding the power supply components R8, C12, D1, C14 and C15. Use insulated sleeving on the pigtail fuse F1 to prevent shorts. Keep the AC line cord and power supply wiring away from other wiring and components around the V1 socket. Cement a 2 1/4 x 4-in. cardboard section on the panel for a dial and cement a length of bus wire to the knob for a dial pointer.

**Alignment And Operation.** Install V1 in its socket and connect the converter to the AC line. Set the power switch S1 to on and allow the converter to warm up for approximately 10 minutes. While the converter is warming up, check for any signs of trouble, such as overheating components.

Connect the converter to a BCB receiver with coax from J2. If the receiver does not have terminals for an external antenna and ground, wind four turns of wire around the receiver loop antenna and connect them to J2. If the receiver is of the transformerless variety, take care to prevent direct connection between the receiver chassis and the converter.

**Using A Generator.** Set the receiver to a clear spot between 1500 and 1600 kHz. Connect a signal generator to J1 and set the generator for a modulated 50-MHz output. Set the tuning capacitor to a point slightly less than full capacity (the rotor blades not quite fully meshed with the stator).

Set the adjustment screw of L3 all the way out from the chassis and adjust it towards the chassis until you hear the signal. Note; the signal can be heard at two positions of the tuning screw. Set the screw at the position highest from the chassis (higher frequency). This enables the oscillator to operate at a higher frequency than the signal.

Set the signal generator frequency to 50.5 MHz and tune C6 until you hear the signal. Adjust L1, L2 and L4 for maximum output signal, reducing the signal generator output as necessary to prevent overloading. Now calibrate the dial with the signal generator.

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**PARTS LIST**

| C1, C2, C5, C10, C13—001-uf disc capacitor |
| C3, C9—47-pF disc capacitor |
| C4—100-pF disc capacitor |
| C6—Variable capacitor, modified (Hammarlund HFA-15B), one rotor blade removed (original capacity is 2.8 to 16 pF) |
| C7—4.7-pF, disc capacitor |
| C8—10-pF, disc capacitor |
| C12, C14, C15—005-uf disc capacitor |
| C11A, B—Dual 50-uf, 150-VDC electrolytic capacitor |
| D1—1N2071 silicon diode, 400-PIV, 500-mA |
| F1—1/2-A fuse, pigtail type |
| J1, J2—Phono jacks, single-hole mounting |
| L1, L2—13 turns #28 enameled wire on J. W. Miller coil form 20A000-4 or equiv. (see text) |
| L3—Adjustable RF coil, 0.68-uH J. W. Miller 20A687R81 or equiv.) |
| L4—Antenna coil, loopstick J. W. Miller RFC-50 or equiv.) |
| L5—8.2-uH RF choke (J. W. Miller RFD-50 or equiv.) |
| R1, R3—6800-ohm, 1/2-watt resistor |
| R2—220-ohm, 1/2-watt resistor |
| R4—1600-ohm, 1/2-watt resistor |
| R5—1-megohm, 1/2-watt resistor |
| R6—33,000-ohm, 1/2-watt resistor |
| R7—4700-ohm, 1/2-watt resistor |
| R8—3300-ohm, 2-watt resistor |
| S1—5-p.s.f. slide switch |
| T1—Power transformer, 125-VAC 15-mA, 6.3-VAC 0.6-A secondary (Allied 54A1410 or equiv.) |
| V1—6D10 compactron tube |
| V2—Compactron tube socket |
| V3—Terminal board, 8-lug (Erie 3976-205-2 or equiv.) |
| V4—Cabinet with built-in chassis 7 1/2 x 4 1/2 x 5 in. (Newark 91F1096 or equiv.) |
| Misc.—AC line cord, RG-58 coax cable, solder lugs, wire, solder, etc. |
Without A Generator. If you don't have a signal generator, set the coil tuning screws out from the chassis as follows: L1—7/16-inch, L2—9/16-inch, L3—9/16-inch. Connect the unit to an antenna and try to peak up the coils on received signals.

Before using the convertor, allow a 10-minute warmup to stabilize the oscillator section and minimize signal drift. For strong signals, a whip antenna will be fine; for weaker signals, use a beam antenna.

If you live in an area with FM broadcast stations, you may receive them on the higher end of the convertor tuning range. This is caused by the second harmonic of the convertor oscillator heterodyning with the FM signals. This is most noticeable when the 6-meter band is quiet, and is minimized when the band is active.

The convertor tuning range is bandspread from 50 to 51.5 MHz. This is the most active part of the band as most hams stay near the band bottom to avoid TVI in channel 2 areas. If desired, the tuning range of the convertor can be expanded by increasing the value of C8.

Schematic of Tricky Trio shows well engineered design resulting in fine performance.
All electronic gear requires some level of voltage and current to function properly. The power supply presented here will meet most of the power requirements for projects described in this publication and elsewhere. Authors of electronic projects for the hobbyist generally keep in mind the economic aspects of building the project and therefore design circuits around an economic power source.

In many cases, where a one or two tube gadget is described, the B+ voltage requirements range between 125 and 175 VDC at up to about 40 mA, and the filament supply is usually 6.3 VAC at approximately 1 A. For transistor projects, the voltage range is usually from 3 to 9 VDC at up to a maximum of about 30 mA. This compact unit will supply the B+ and filament voltages and currents, and provide a regulated 6 VDC at up to 40 mA.

**Circuit Description.** The high voltage supply features a full-wave bridge-rectifier module selected to give minimum ripple using reasonable size filter capacitors. A bridge may be made up using four standard silicon diodes, but you can’t beat the module for small size and easy hookup.

Under-chassis layout is roomy with lots of working space. J2 is common ground point.

Component location isn’t critical but following layout shown insures good results.
Resistor R2 acts as a bleeder to drain the charged capacitors after the power supply is shut down. Many electronic projects that have three or more stages require two separate power supply taps to minimize interstage coupling.

If you plan on building such circuits, we recommend you install an additional B-plus output jack as indicated on the schematic. In use, the optional output should be connected to the plates of the output tubes where hum level is not overly critical. The regular B-plus output (J1) connects to the low level or input stage.

**Low Voltage DC.** The s.p.s.t. slide switch S2 selects either a 6.3 VAC output (J3 and GND) or 6.2 VDC (J4 and GND). The DC circuit utilizes a conventional half wave rectifier with a single capacitor providing the necessary filtering.

The 1-ohm resistor R3 prevents damage to silicon diode D2 when the initial surge of current flows to charge the large filter capacitor C2. Zener diode ZD1 is a 6.2-volt 1-watt unit and does an excellent job of regulating the output voltage under varying loads.

Up to 40 mA of current can be drawn from this supply with only a .03 volt change in output voltage from no load level.

**Construction.** The chassis is formed from 18 gauge aluminum to measure 1 x 3 x 5 in. The nearest size chassis commercially available measures 1¼ x 3 x 6¼ in. and may be substituted for a home-made job. The front panel is cut from a piece of aluminum and measures 3 in. high by 5 in. wide. However, the panel must be made to match the chassis you use.

Five-way binding posts were chosen for all jacks because of their versatility in accepting connecting leads. The
QV POWER SUPPLY

Jacks are equally spaced along the lower front panel and serve to secure the panel to the chassis.

The low voltage filter capacitor C2 is available in a smaller package than the one used by the author. The capacitance may range from 800 μF to 1500 μF at no less than 10 VDC. If you use a "can" type capacitor, a 1-in. mounting hole is needed.

**Terminal Strip Wiring.** The mounting and wiring of the small components is centered around two terminal strips; one for the low voltage DC and the other for the high voltage DC. Don't forget to use a heat sink when soldering D1, D2 and ZD1 and make sure the polarities are correct. Proper polarity is, of course, to be observed for both of the filter capacitors as well.

**Putting It To Work.** Before connecting the power supply to a project, be certain to check the circuits' voltage and current requirements. If it is your own experimental circuit, use a tube manual to ascertain the approximate plate currents and filament currents required. Remember that some of the popular 12 volt filament tubes may be operated with a 6-volt supply by connecting the two halves of the filament in parallel across the 6 volts. Under no circumstances should the 6-VDC supply be used for the filament supply.

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Nifty little package ready to fire-up just about any project that's in the works.

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**Yipes! Stripes!**

Here's one for the curious who wonder where tigers and zebras get their stripes. At General Electric's Communication Products Department, Lynchburg, Va., they're painting multi-colored stripes on miles of circuit wire used in two-way mobile radios.

Though wire painting is not new, it is unusual activity for an electronics plant. Three different colors are applied simultaneously while the wire travels 150 feet per minute. The wire is thus color coded to help get it wired to the right terminal.

The wire machine's carousel-shaped dauber has three paint pots and striping wheels. The colorful merry-go-round whirls 1,800 times per minute while applying three different paints at the same time. Although 40 color combinations are used by GE, the machine can paint 729 combinations of stripes with nine colors—black, brown, red, green, orange, yellow, blue, violet and gray.

Now one more for the curious. What about stripes on peppermint sticks? Candy-makers say they're not painted. Just two strips of different colored candy are wound together.

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**PARTS LIST**

C1A, C1B—20-20-μF, 150-VDC, dual-section electrolytic capacitor (Radio Shack 71-2-49 or equiv.)

C2—1000-μF, 10-VDC electrolytic capacitor (see text)

D1—Full-wave bridge rectifier module (Erie FWB 3004A or equiv.)

D2—Silicon rectifier diode, min. 50-PIV, 750-mA (Radio Shack 276-1107 or equiv.)

J1—J4—5-way binding posts, insulated, red (Radio Shack 274-333 or equiv.)

J2—J3—5-way binding posts, insulated, black (Radio Shack 274-333 or equiv.)

R1—560-ohm, 1-watt resistor

R2—150,000-ohm, 1/2-watt resistor

R3—1-ohm, 1/2-watt resistor

R4—33-ohm, 1-watt resistor

S1—5-p.s.t. slide switch (Radio Shack 275-315 or equiv.)

S2—5-p.d.t. slide switch (Radio Shack 275-125 or equiv.)

T1—Power transformer, 117-VAC pri.; 125-VAC, 50-mA and 6.3-VAC, 1.5-A sec. (see text)

ZD1—Zener diode, 6.2-V, 1-watt (General Electric V-24X16.2 or equiv.)

1—Chassis, aluminum, 1x3x5 in.

1—Panel, aluminum, 3x5 in.

2—Terminal strips, 6 lug

Misc.—Screws, nuts, decals, wire, solder, etc.
There's lots more to needle, cartridge and record care than meets the eye and these are the items subjected to the most abuse of all the components in a phonograph. The basics of servicing and maintenance of "what's up front" in a phonograph are simple — once you know them. So come with us as we present the hows and whys essential to keeping your disc show on the road. And if you're an old timer that knows all about it, this may be just the refresher needed to keep you heading right.

First Of All. How do you know that your phono needle (stylus) is defective? To find out, there are several simple tests you can make. If the tone arm of the phonograph slides across the record after setting down, change the stylus. This check should be made on a new (unwanted or unloved) record.

Now take a look at the stylus to see if dirt or dust is lodged between it and cartridge. If there is, brush it out, using a small camel's hair brush.

Play the record once again. Often, dust or dirt will cause mushy music. If there is still no improvement, let's try another check.

Take a new record or one that is clean. Set the changer to manual position, and play about one inch of the record. See Fig. 1 on the next page. Is the one inch played-space duller looking? If so, replace the stylus.

Other Ways. Another method is to take a clean white cloth and wipe the record after it has been played. If the stylus is defective and cutting the groove, you'll pick up small black record chips (black or dark dust) on the cloth. Replace the defective stylus.

Another way is to take a magnifying glass, like Grandpa used to read with, or a low-power microscope, and take a good look at the tip of the stylus. A sharply-pointed one will chisel out the groove of the record. Maybe there is a flat spot on the point. Replace the stylus in the above cases.

A good stylus will go towards a sharp point, but will be rounded off at the pointed end as shown in Fig. 2.

Check to see if you have excessive noise or scratchy needle-talk. This test should also be made on a fairly new record. (Be sure the volume is down when making this check.) Bend down close to the record and you should hear a little needle-talk even under good conditions. With a very bad needle or defective record, you can hear the noise from quite a distance.

(Continued overleaf)
Fig. 1. A chipped or worn stylus will cut the grooves of a record making them dull-looking; if so, better get a new stylus.

Fig. 2. The tip of a good stylus is actually a rounded "ball" that won't chisel into the soft vinyl record groove.

Fig. 6. On this popular cartridge, the stylus shank simply snaps into the plastic cartridge body.

Fig. 7. To remove the stylus assembly from this type cartridge, position the turnover lever as shown.

**PHONO FRONT END**

**Record Wear.** Most phonograph records will last for years if proper care is used. Before any record is played, wipe it off with a record cloth. Handle all records by the edge. Don't grasp them in the middle or with one hand. Little hands should not handle expensive records. Sticky fingers will smear the record with grease which will lodge dust and dirt into the record groove.

Don't leave a stack of records on the spindle center post or turntable after shutting off the record player. They will start to warp and on a very warm day may begin to droop. Phonograph records left on the turntable will also collect dust. Return all records to their jackets or record cabinet.

**Watch Your Speed.** Watch for correct speed settings and correct stylus position for the record being played. For instance, if a 78 stylus is played on a 45 or 33 1/3 record, damage can be done. Also the pickup arm will tend to skate on the record.

Can a new record be defective? It certainly can be. Check for a poor cut in the record grooves. Also, if the starting cut is too shallow or narrow, the pickup arm may drop off the record or start ahead of the music (Fig. 3). Check to see if the finish
Fig. 3. Poor sound can also be the fault of the record even if it's a new one. Compare sound against other records.

Fig. 4. Dozens of different types of styli can make for confusion in your part. Four typical styli are shown here.

Fig. 5. When removing the stylus for replacement, first check to see how it is attached to the cartridge.

Fig. 8. Gently pull up and away on the stylus assembly; the metal clip gives way with very little pressure.

Fig. 9. Pull the stylus assembly clear being very careful not to put strain on the stylus shank or "saddle."

track of the record is triggering the changer. If other records play at these settings, you have purchased a defective record.

In case a new record doesn't drop down from the center post, it's possible the center hole is not perfectly round. Generally a defective record will stand alone while all other records play perfectly.

To avoid getting a defective one, select a new record in its original sealed jacket. One that has been opened may have been played several times before. Also, buy only good known brand records to make sure you don't get stung.

**Diamond Or Sapphire.** What type of replacement stylus should you buy? There are pros and cons on whether to buy a dia-
Fig. 10. Replacement of this type of stylus is exactly the reverse process of the removal procedure.

Fig. 11. To remove the stylus assembly in this type of phono cartridge, first turn the stylus-flip lever straight out.

**PHONO FRONT END**

Phonograph front-end tips or sapphire stylus. Don't replace the "small fry" phono stylus with a diamond. You're throwing good money away.

A new diamond stylus will give a great many more plays than the sapphire. But then diamond, as every girl knows, is more costly than sapphire. The sapphire stylus will cost from $1.50 to $4.50, while the diamond will vary from $4.95 on upwards. However, on an hours-of-play-per-dollar basis, the diamond stylus outshines them all. A handful of typical and vastly different replacement styli are shown in Fig. 4.

Some people get more hours per stylus than others. But this is the choice of the operator. One person may hear a worn stylus before another.

Some hi-fi bugs will replace the stylus when it has less than 500 plays. Other music enthusiasts replace the stylus four or five times a year—with the seasons.

On really good records, a diamond stylus should be used. Extra record care can save you money.

**Stylus Replacement.** Can you replace your own stylus? Certainly, by knowing how and using a little care. Pull the arm up and take a glance at the stylus and cartridge.

**Fig. 15.** Stylus shank rides in saddle which is connected to the cartridge element that turns groove wiggle into sound.

**Fig. 16.** The pencil points to the U-shaped saddle in a typical cartridge. Be sure stylus shank is properly seated in saddle.

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Then pull it straight away from the cartridge body. To replace the stylus, use the reverse procedure.

Some styli are held down with a metal clip as in Fig. 5; some snap into position as in Fig. 6. Others plug into a slot or are bolted in place with a small nut. With a steady hand, anyone can replace a stylus. If nervous, let someone else do it.

Figs. 7-10 show you how to change a stylus in a clip type of cartridge. There are many types of styli on the market but they all replace fairly easily. Figs. 11-13 shows another typical stylus replacement procedure. In some cases it may be necessary to drop the cartridge out of the holder before the stylus can be replaced, as seen in Fig. 14.

Instruction booklets that come with the phonograph will illustrate how to replace the stylus. Look at the instructions on the cartridge.

Fig. 14. If the tone-arm has limited vertical movement, cartridge can be removed for easier stylus replacement.

Fig. 17. Typical stereo cartridge has four terminals but only three connecting wires since ground connection is shared.

Fig. 18. Mono cartridge is usually hooked up with a shielded cable though in cheapies, it may just be a twisted pair.
Fig. 19. Using a changer in "manual," be careful not to drop arm as record, stylus, and cartridge may be damaged.

Fig. 20. Old turnover type crystal cartridge mounts and pivots on front shaft; it’s removed by taking turnover knob off.

Fig. 21. Some stereo cartridges have only three terminals with center one being common ground for both sides of cartridge.

Fig. 22. On this type cartridge, the connecting wires are soldered to a small adapter which then plugs on to the cartridge.

Fig. 23. Replacement cartridges often come with a choice of different mounting brackets to suit different tone-arms.

PHONO FRONT END

replacement stylus carton for further directions.

Fragile-Don’t Drop. One thing to be careful of—don’t damage the cartridge. If you do, you may end up spending a few unnecessary dollars.

Take a close look at the front end of the cartridge for a “U” shaped saddle (shown in Fig. 15). This saddle, or plastic piece, goes down into the cartridge and fastens to

(Continued on page 132)
Like much of Southeast Asia, Indonesia boasts an intriguing political past and offers equally intriguing DX prospects. Made up entirely of islands, it counts DX-wise as anywhere from one to six countries, primarily because those islands are farther apart than a good many countries we can think of. Its varied collection of neighbors—Malaysia, the city-state of Singapore, the sultanate of Brunei, and Timor, a Portuguese colony—promise equally fascinating shortwave hunts.

The islands of Indonesia were originally administered as separate colonies under the Dutch. Later, dictator Sukarno, now deposed, welded the islands together politically as one nation. Its capitol is at Djakarta on the south-central island of Java, which, along with Sumatra and Bali, makes up the heart of this politically stormy nation.

Radio Republik Indonesia's (RRI) key station at Djakarta is readily heard throughout North America. Best bet is its international service, "The Voice of Indonesia," which has English beamed to our West Coast at 0930-1030 EST (0630-0730 PST) on 9865 kHz.

Though this is the only transmission aimed at us from Indonesia, the English transmission at 0600-0700 EST on the same frequency is, strange as it seems, even more widely heard in North America. And for those who want to make logging the main part of Indonesia more of a DX challenge, RRI's regional transmitter at Jogjakarta (YDJ on 5047 kHz) is a natural. Its frequency falls in 60-meter territory, which means that reception will usually peak around sunrise, listener's time.

On The Outside. One outlying Indonesian state which nearly always counts as a separate DX country is West Irian, the former Dutch New Guinea. Explanation is that this is technically a trust territory (though in fact, it is administered as permanent part of the Republic). RRI has transmitters at Sorong on 7290 kHz (best time is again around 0600 EST) and 4872 kHz. For the record, reports for RRI regional stations should go to the appropriate local office. But be sure to make reports "interesting," since all Indonesian stations seem to be erratic verifiers.

Two more outlying Indonesian states sometimes also considered separate DX countries are Maluku (which is the Molucca Islands with capitol at Ambon) and Sulawesi (which is the Celebes Islands with administrative center at Menado). RRI at Ambon

INDONESIA AND ITS NEIGHBORS

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INDONESIA AND ITS NEIGHBORS

Like much of Southeast Asia, Indonesia boasts an intriguing political past and offers equally intriguing DX prospects. Made up entirely of islands, it counts DX-wise as anywhere from one to six countries, primarily because those islands are farther apart than a good many countries we can think of. Its varied collection of neighbors—Malaysia, the city-state of Singapore, the sultanate of Brunei, and Timor, a Portuguese colony—promise equally fascinating shortwave hunts.

The islands of Indonesia were originally administered as separate colonies under the Dutch. Later, dictator Sukarno, now deposed, welded the islands together politically as one nation. Its capitol is at Djakarta on the south-central island of Java, which, along with Sumatra and Bali, makes up the heart of this politically stormy nation.

Radio Republik Indonesia's (RRI) key station at Djakarta is readily heard throughout North America. Best bet is its international service, "The Voice of Indonesia," which has English beamed to our West Coast at 0930-1030 EST (0630-0730 PST) on 9865 kHz.

Though this is the only transmission aimed at us from Indonesia, the English transmission at 0600-0700 EST on the same frequency is, strange as it seems, even more widely heard in North America. And for those who want to make logging the main part of Indonesia more of a DX challenge, RRI's regional transmitter at Jogjakarta (YDJ on 5047 kHz) is a natural. Its frequency falls in 60-meter territory, which means that reception will usually peak around sunrise, listener's time.

On The Outside. One outlying Indonesian state which nearly always counts as a separate DX country is West Irian, the former Dutch New Guinea. Explanation is that this is technically a trust territory (though in fact, it is administered as permanent part of the Republic). RRI has transmitters at Sorong on 7290 kHz (best time is again around 0600 EST) and 4872 kHz. For the record, reports for RRI regional stations should go to the appropriate local office. But be sure to make reports "interesting," since all Indonesian stations seem to be erratic verifiers.

Two more outlying Indonesian states sometimes also considered separate DX countries are Maluku (which is the Molucca Islands with capitol at Ambon) and Sulawesi (which is the Celebes Islands with administrative center at Menado). RRI at Ambon
DXing Indonesia

is heard from time to time on 7140; RRI Menado, also operating in 40-meter Ham territory, is on 7295 kHz (be careful not to mistake the latter for West Irian on 7290). Both Ambon and Menado will probably get through the Ham QRM best shortly after sunrise, but you might start looking a little earlier in the day if you live east of the Mississippi.

With the island of Timor, we come to one of the toughest places in the world for North American listeners to bag. Portuguese Timor, of course, always counts as a separate country and, in some DX circles, so does the Indonesian portion of this island. RRI (with an ID that can be readily spotted by almost any SWL) operates here from Kupang (YDV) on 3259 kHz—down in 90-meter land. The Portuguese, meanwhile, operate their station at Dili on 3268 kHz, just 9 kHz up from Kupang’s frequency. Reception patterns on 90M are similar to those on 60M but stations are somewhat tougher to bag.

One For Three. The final RRI target also operates on 90M. This is YDW2 at Pontianak, Kalimantan on 3340 kHz (frequency may vary slightly). RRI Kalimantan is heard more often than either Kupang or Dili. Therefore, it’s best to look for YDW2 first, then, if you hear it, shoot for the other two. For the record, Kalimantan is Indonesia’s portion of the island of Borneo. Also, located on the island of Borneo is the Eastern part of Malaysia (the former British colonies of Sabah and Sarawak) as well as the sultanate of Brunei.

Significantly, the inclusion of Sabah and Sarawak into Malaysia led to conflict with Indonesia, which claims the territory for itself. While Sukarno was in power, this dispute had reached the guerilla warfare stage, but tensions have eased considerably since his overthrow. However, for DX purposes, East Malaysia always counts as a separate country. The R. Malaysia regional station at Kuching (Sarawak) transmits on 4895 and 4950 kHz, while 7160 is also used around 0430 EST; the station at Jesselton (Sabah) operates on 4970 kHz. Both of these stations are often heard in North America, as is R. Brunei on 4865.

Mainland Malaysia. Fortunately, stations on the mainland are even more easily received. R. Malaysia’s international service, “The Voice of Malaysia,” operating from transmitters at Kuala Lumpur, has English language broadcasts for Australia and New Zealand at 0615 EST on 11900 and 6175 kHz. It can also be logged on 9710 kHz with various oriental languages after the 0800 S/On. Meanwhile, the BBC operates a Far East Relay at Tebrau (for some reason many SW clubs erroneously list this one as Singapore). The BBC Far East Station uses a number of different frequencies, including 11750 kHz around 0700, 9580 kHz around 0800, and 11725 kHz—sometimes heard around 1900 EST.

The city-state of Singapore (actually an island off the tip of the Malay Peninsula) originally did join Malaysia but withdrew shortly, more or less by mutual consent of all parties concerned. R. Singapore transmits extensively on 11940 kHz during the a.m. hours, with English aired at 0430 EST (0130 PST). Another channel used, starting at 0400, is 7250.

Finally, for those SWLers who would rather do things the hard way, the British Forces Broadcasting Station can sometimes be heard on or about 5010 kHz with a little luck and a lot of patience.

Incidentally, all non-Indonesian stations listed in this article are good verifiers.
Integrated circuits, or IC's as they are now called, are the epitome of electronic technology today. A typical integrated circuit consists of a 25-mil square of semiconductor material with a number of transistors, diodes, resistors, and, in some cases, capacitors deposited thereon. These components are interconnected and packaged in a small transistor can or other container with external leads for circuit connection.

One of the first integrated circuits available to the experimenter was the Westinghouse WC183. It's available as the WC183G in a ten lead plastic package or as the WC183T in a TO5-style transistor can.

The WC183 is a general-purpose low-level audio amplifier consisting of an 8 transistor balanced circuit with internal DC feedback. It is fabricated on a silicon chip about 20 mils square.

The photograph shows the silicon chip and interconnections to the hermetic glass sealed leads. (The photograph is highly magnified to show it more clearly.) The circuit is shown in the diagram and consists of a 3-stage class "A" amplifier followed by a class "B" output stage. Note that the amplifier must be used in a push-pull output arrangement and not as two separate amplifiers.

Gobs Of Gain. Under ideal laboratory conditions, the overall circuit gain of the IC is given as 90 dB with a 4.5 volt power source. (90 dB represents a voltage gain of...
In the circuit shown, with 50,000 ohms input impedance, undistorted voltage gain of 20 times (26 dB) was obtained. This is adequate gain for most applications.

Mini-Mix has an output transformer that will provide a 75- or 150-ohm output impedance. This will enable you to use microphone cables up to 100 ft. long between the mixer and the power amplifier. Of course, the power amplifier must have a low impedance input.

Mini-Mix has two inputs with individual gain controls. Two microphones can be connected, their gains controlled individually and their outputs mixed in the output stage of the IC amplifier. The 50,000-ohm impedance of most crystal microphones is a good match to the 40,000-ohm input impedance of the IC amplifier. The gain controls are also 50,000 ohms and won't degrade the input impedance.

Making Mini-Mix. The entire mixer is self-contained in an aluminum box 3\(\frac{3}{4}\) x 4 x 1 in. It can easily be held in one hand or slipped into a jacket pocket. The box is made from a miniature aluminum chassis with a homemade aluminum cover. The input and output connectors, gain controls, and amplifier assembly are mounted on the chassis.

The cover has four rubber feet attached and is actually the bottom of the box. The two box halves are carefully cleaned with steel wool and sprayed with two coats of zinc chromate. They are then wet sanded and spray-painted with flat black lacquer. The decals are applied and a clear flat spray is given it to protect the lettering.

Sans Socket. The IC has 12 leads on .200-in. diameter centers. IC sockets are difficult to find and expensive to buy so the alternate method of mounting shown in the photo was used. A center clearance hole 11/32 in. in diameter is made in a phenolic board and a circle of twelve holes .093-in. diameter is drilled around it. The phenolic board is laid out and drilled approximately as shown and the turret terminals and two short stand-offs are staked into place. The TO5 IC can is inserted in the hole upside down and the leads are attached to turret terminals staked into the .093 holes.

The standoffs on the bottom of the board are for mounting board to chassis. The battery holder is riveted in place and the output transformer is held in place by two 2-56 screws and nuts. Two 2-56 screws hold the box halves together. The two additional turret terminals near the transformer are for the secondary leads that provide the two different output impedances.

The connectors and the IC board assembly are mounted into the box half and then the wiring is installed. It is not necessary to use shielded wire since all the leads are short and the unit is completely shielded.

Buss wire, number 22, was used with plastic insulating sleeving where necessary.
Top of Mini Mix is miniature aluminum chassis and bottom is made from sheet aluminum to fit.

for circuit wiring. The IC can be pushed into the mounting hole in the phenolic board and the leads crimped to the terminals as shown.

The locating tab on the IC can should be positioned as shown. Additional leads are fastened to the terminals before being soldered. Use extreme care when soldering so as not to overheat the IC junctions.

Sink The Heat. Each turret terminal should be held with needle nose pliers to draw off the excess heat from soldering. The output transformer has a tapped secondary. One wire is connected to ground and the other two to turret terminals. A wire from the output connector can then be soldered to either terminal to get either 75 or 150 ohms output impedance.

The miniature trimmer resistor is used to control the gain of the circuit. It can be set to its maximum value unless distortion occurs. The battery should be installed after all the wiring is completed and checked for errors.

Try-Outs. After the unit is completed, it can be tested by connecting one or two crystal microphones to Mini-Mix and connecting its output to the low impedance input of an audio amplifier. If an audio signal generator and oscilloscope is available, a check can be made for distortion. Our unit was free of distortion at normal input levels. Mini Mix will work nicely when connected to just about any public address amplifier.

PARTS LIST FOR MINI MIX

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
<th>Vendor</th>
<th>Code</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Mercury battery, 4.2 volts (Mallory TR153, Allied Radio 1885938, or equiv.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1, C2</td>
<td>100-uf, 15-VDC electrolytic capacitor (Mallory MTA110E15 or equiv.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J1, J2</td>
<td>Phono jacks (Radio Shack 274-346 or equiv.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J3</td>
<td>Microphone connector (Keystone 505 or equiv.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>Integrated circuit (Westinghouse WC-1831, available from Tridac Electronics Corp., Box 313, Alden Manor Br., Elmont, N.Y. 11003 for $8.95 postpaid, N.Y. State residents add appropriate tax.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1</td>
<td>50,000-ohm variable resistor with switch (Lafayette 32C7367 or equiv.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>50,000-ohm variable resistor (Lafayette 32C7359 or equiv.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R3</td>
<td>5000-ohm miniature trimmer resistor (Mallory MTC-503L or equiv.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>Switch on R1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>Transistor output transformer (Argonne AR163, Lafayette 33C8554 or equiv.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Knobs (Mallory 1910K or equiv.)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Most components in Mini Mix are contained in IC, remaining parts are wired as shown in schematic.

January, 1968
PLUG CONNECTIONS THAT WON'T QUIT

- A great new goody to fix up those cable plugs so they just won’t quit is this thermogrip glue-gun that uses a hot-melt polyethylene-based adhesive. Operation of the gun is simplicity itself, just plug it in, let it warm up, then apply the nozzle to the area to be sealed or the wires to be immobilized. Then, press down on the solid-stick sealant and it’ll flow out the nozzle. In only sixty seconds, the glue has set to about 90 percent full strength. When set, it’s non-flammable, has good insulating properties, and is resilient so it won’t break.

—Judith Rubin

START YOUR CAR WITH ONE JUMPER CABLE

- There may come a time when you’re stuck with a car with a dead battery and only one jumper cable. As shown in the photo, all is not lost, just drive an A-OK auto up nose-to-nose so the bumpers touch. That gives you a current path through the chassis. Then take the jumper cable and hook it to the hot side of the battery; that’s the side that’s not grounded. The other end of the cable goes to the ungrounded side of the other vehicle. Start up as you would normally and you’re all set to go. Bet you never thought of that.

—John L. Russel

NEAT TRICK AVOIDS BURIED CONDUCTORS

- When drilling holes in floors or walls, you may accidentally slice through a buried cable conduit or water pipe. This simple setup lets you drill to your heart’s content without danger of a nasty shock, blown fuse, or a face full of water. The hookup consists of a battery and doorbell hooked in series. The other side of the battery goes to the metal case of the drill, and the remaining connection of the doorbell is hooked to any cold water pipe. Then if the drill bit hits conduit or a pipe, the circuit is completed, and the bell rings.

—John L. Russel

- Send your Imagineering tips with full details and a photo or drawing to Radio-TV Experimenter, 505 Park Ave., New York, N. Y. 10022. The top three ideas selected by the editors will win $10.00 each. Entries become the property of Radio-TV Experimenter and can’t be returned.
Be Your Own NEWS CENTRAL

By C. M. Stanbury II

Separating fact from slick fiction is easy when you know how to hear between the lines

The shortwave broadcast bands literally crawl with news programs of all shapes, sizes and political hues. SW news coverage far exceeds that of AM (BCB), FM or television. But the trick is to know the sources that are "good" and, even trickier, how to use the bad ones. In the next few pages, we'll show you how to start your own personal news service and then how to systematically improve it.

An example of a good news source is the British Broadcasting Corporation (BBC). Of any single broadcasting organization anywhere in the world, it offers the broadest and most reliable coverage. A close second to the BBC is our own Voice of America (VOA).

These two operate on so many different frequencies there is no point in listing specific channels. You will be able to find their English language broadcasts at almost any hour on whichever bands are active. And you should monitor at least one newscast from each of them every day. They will provide you with needed background information to cope with the many "points of view" presented by less reliable sources.

Inside Info. For added regional (continental) coverage, there are other more or less accurate stations which at times can prove helpful. For additional African news, the best source is probably R. Ghana's transmission to the Caribbean at 1500 EST on 11850 and 9760 kHz; for Asia, have a listen to R. Japan at 1845 EST on 15135 and 17825 kHz, then again at 2100 on 15135, 15235, 17825 and (beamed to Hawaii) 17720 kHz.

Finally, for additional European info, the Swiss Broadcasting Corp. is a pretty fair prospect. It beams English our way at 2030 EST on 9535 and 11715 kHz. This is repeated at 0015 EST (2115 PST) on 9695 and 11715 kHz. About the only trouble with these stations' newscasts, especially the latter pair, is that they are so neutral that sometimes the heart of the news comes out pretty sugar-coated.

Between The Lines. Now, armed with these reliable sources, you're ready to make sense out of the wild propaganda which other SWBC voices habitually spew forth. For example, if on June 8, 1967 you had listened to the BBC recount Israeli victories throughout the day, and then tuned in to R. Cairo's North American broadcast (at 2030 EST on 9475 kHz) and heard them use the Israeli attack on an American ship (the U.S.S. Liberty, which turned out to be spying on both sides) as proof that we were helping Israel, you would have known just how desperate the Arab world really was.
Then, had you tuned in to Cairo's home service June 9 on 15475, you could have heard, following Nasser's "resignation" speech, some of the best-staged "live" walls in the history of broadcasting.

So there, illustrated by the above examples, you have it. From unreliable news stations (those engaging in pure propaganda) a shortwave listener can discover for himself that government's official line and, particularly in time of crisis, how weak or how strong their position is.

While English language broadcasts will, needless to say, be the most useful and informative, foreign language home services can also provide interesting clues. With the latter, you should watch for long periods of martial or nationalistic (national anthems, etc.) music (which indicates fighting is either taking place or imminent), short excited speeches or official proclamations (the long winded variety don't mean much and are usually just the standard barrage of propaganda).

Tuning A Clue. A good list of home service transmitters can be found in WHITE'S RADIO LOG in this issue. Most of those listed below 8MHz fall into that category. During emergency periods, they will operate continuously (unless damaged or destroyed) and you can tune for them at any appropriate time of night (check Propagation Forecast in this issue for exact hours).

Tuning for international broadcasts in the English language is more complicated. Both times and frequencies are constantly subject to change and in order to truly make SW "your own news central," you should have the very latest schedule data.

The best solution to the problem of what's happening where is to join a good radio club specializing in shortwave broadcast information. By a "good club," we mean one that gets the latest frequency and time changes to its members within 30 days. At present, the two top SWBC oriented clubs are the American SWL Club, 16182 Ballad Lane, Huntington Beach, Calif. 92647 (annual dues $4.00) and the North American Shortwave association, P. O. Box 989, Altoona, Pa. 16603 (annual dues $5.00). A sample copy of their monthly bulletins can be had for 25¢ each.

Spotting Trends. Now, once you have your news service set up, you will want to keep complete records to refer back to. Even if you already maintain a DX log, it's best to keep a separate news record. As this volume grows, the SWL will find that it has traced his own "ear witness" record of our fast changing world.

For example, if you had started a few years back, your news log would record the decline of O.R.T.F. Brazzaville (the French government's international relay in the Congo Republic) from Africa's top news source to the out-an-out propaganda mouthpiece of Charles DeGaulle that it has become today.

Your SW news log can best be arranged by date though you may want to cross index by country. Each item recorded should include station name, transmitter location (when known), country, time, frequency, and all pertinent transmission content. Nothing should be put in the log unless you're sure of the identification and that you have correctly heard what the station was broadcasting.

You should also have some general reference sources at your fingertips. A world almanac (such as "Information Please"), an up-to-date atlas, one or two large scale wall maps, and a reliable daily newspaper are all important. From the paper you can clip significant items and staple them to the appropriate page of your log book.

(Continued on page 136)
The newcomer to ham radio, about a year from now, will be one of the most confused fellows there ever was. He will feel like the guy who walks into a movie theater showing a complicated mystery film and discovers the projectionist has the reels mixed up.

This befuddled newcomer will be faced with a new set of Federal regulations, the first major revision of ham rules in 15 years.

After sitting on a series of proposals for nearly four years, while frequently promising final action "soon," the Federal Communications Commission finally hatched its overdue egg recently.

The new rules are intended to benefit ham radio, and they probably will do just that, although maybe not as much as some experienced hams had hoped. Because of their unnecessary complexity, though, there may be some bad effects, too.

Here's the Scoop. Basically, the new regs, some of which go into effect in November, 1968, and the rest in November, 1969, create a new class of ham license and slice up the 80, 40, 20, 15 and 6 meter bands among this class and the other two principal license classes already existing.

The new class will be called "Advanced Class," and the written exam for it will be somewhere between the present General and Extra Class exams in difficulty. The new Advanced Class code test will be 13 words a minute—same as for the General—and hams with a General Class license will not be required to take the code test when they apply for an Advanced Class license. The Extra Class written exam will remain the most difficult of all and the code test with it will remain at 20 words a minute.

Hams having the old Advanced Class ticket, issued years ago under an earlier and more sensible licensing plan, will retain this designation and will be allowed all operating privileges of the new Advanced Class license.

Under the new plan, holders of the Extra Class license will be allowed to work all ham frequencies, just as they may now. General Class license holders will be allowed to work only certain frequencies roughly half of the 80 through 15 meter bands, while Advanced Class license holders will fit in between—allowed on some frequencies where Generals are forbidden, but restricted from some frequencies which are open to Extras. The details are shown in a table on page 108.

Why? Objective of all this business is to give hams the incentive to improve their ability by studying for a higher class license. The carrot held out to encourage us is the privilege of using frequencies that we will be restricted from otherwise.

Since General, Conditional and Extra Class license holders may use all frequencies under the present rules, the only way to set up an incentive plan was to take away some frequencies from General and Conditional Class license holders. This unfortunate situation, which was impossible to avoid, was what kicked up all the fuss when this plan was originally proposed. Most of the guys kicking up the fuss didn't trouble themselves to find out what they were talking about.

The reason for having an incentive licensing set-up at all is simply this: it seems many of us have been criticized in recent years for growing into a bunch of ignorant slob who spend a lot of time on the air running off at the mouth, but do very little to really learn what radio is all about. Sadly, much of this criticism is justified.

By giving us the incentive to crack open a few text books and peek behind the front panel of our chrome-plated rigs to see what goes on back there, it is hoped that we become smarter about electronics.

(Continued on page 108)
Below are some of the controls that activate Susie's monitoring functions which include blood pressure, pulse and respiration rate, temperature, fluid loss, blood loss and replacement rate; all of which are recorded on graph at right.

Sexy Susie

Sweet little lady that she is, her only curves are sinusoidal

By Bob Williams

Sexy Susie, the nurse's aide, is a recent development in the vital area of keeping tabs on the critically ill. Originally, her electronic brain was designed only to keep vigilant watch on open-heart surgery patients during the post-operative period. But now she's plugged in to any hospital patient needing continuous observation.

One of Susie's big assets is the freeing of scarce nurses and interns for other duties. And as skilled hospital labor becomes even shorter in supply, we're likely to see a lot more of Susie and her planned-for improved sisters.

Susie's talents allow every important physical parameter of the patient to be monitored, including pulse rate, respiration rate, temperature, fluid loss, blood loss, blood replacement rate, and blood pressure, both diastolic and systolic. This host of readings is processed in Susie's circuits and the results are recorded on a moving graph.

The graph allows a physician to tell at a glance just what's happening to his patient and whether the condition is improving or
Total cost of Susie is estimated at over $10,000 and she took some five months to design and build.

Above, technician attaches various sensing devices to patient so that Susie can do her job with minimal outside help.

getting worse. Also, the continuous record can provide important clues as to the nature of the illness that periodic checks can’t.

Susie is the brainchild of Dr. Adrian Kantrowitz who, working with technician Phillip Herschberg, designed and built her over a five month period at the Maimonides Hospital in Brooklyn, New York. A grant from the National Institute of Health paid the bill.

Susie is being evaluated, improved and the overall results of her talents are being studied to see if on a large scale basis this type of system is feasible in hospitals.

In the planning stages are a setup whereby a number of monitoring devices could be operated and controlled through a centrally located console. Each device would be programmed to keep watch on one or more specific conditions depending on the nature of the patient’s illness.

Meanwhile, Susie is working with her special patients day and night and while she’s not much to look at, she certainly rates an A for effort.

Susie goes through a routine physical to insure that her inhuman vigilance never wavers in time of need.

Susie, though she’s got a heart of gold, isn’t perfect, so advanced models are in the works and she may soon have a sister or two.
When the winds of winter are putting the dampers on outdoor activities, one very popular indoor sport sees a seasonal revival. That is the pastime of slot-car racing.

This sometime king of indoor sports is further enhanced by the endless experimentation and modification possible. And, too, by the accessory gadgetry that makes for added tinkering joy.

And for the dedicated racer, we have just the thing to put the final professional touches on any race. The little goody presented here will give you a green light to start the race, then the green turns red for whichever car finishes first, after a preset (from 1 to 10) number of laps. This unique lap counter is designed to be used with either 1/24 or 1/32nd scale cars.

The circuit is simple, using small inexpensive stepping relays to count the laps. There are actually two identical counting circuits. The schematic is kept simple by showing only one circuit. A 12-VDC stepping relay (K1) is tripped each time a model car passes a track mounted microswitch (S4).

A two-deck, 11-position rotary switch (S6) selects the desired number of laps and connects a red winning light (I1) to the proper relay contact. A reset pushbutton (S2) lets you conveniently set the relay to its zero or starting position for proper sequencing, as indicated by a green light (I2). Note that the relays operate from a half-wave DC power supply while the pilot lights use 12.6 VAC.

Construction. All parts fit easily into a 6 x 4 in. sloping panel cabinet. Be sure you mount the relays and switches so that all terminals are readily exposed for easy soldering. The two white translucent lens caps are press fitted/screwed into slightly larger than 1/2-in. holes. Tape (by their leads) a red and a green 16-volt grain-of-wheat bulb into each lens cap. Effectively, you will have two white indicators, each of which can be made to light either red or green.

The track-mounted microswitches (S4 and S5) are fastened to the track on 4-40 x 1 1/2-in. screws inserted through 7/64-in. holes drilled in 1/4-in. from the edges of the track.
If you use the recommended Olson SW-338 switches, remove the metal mounting plate that comes on them and run a 7/64-in. drill through the mounting hole nearest the actuating arm. Using this drilled out hole, mount the switch on the 4-40 screw sticking up from the track. Be sure the switch arm action is in the direction the cars will travel.

Three nuts and two lockwashers are used on each 4-40 screw. One nut tightens the screw to the track. One nut and lockwasher on top and one nut and lockwasher on the bottom of the switch holds it firmly in place. By loosening the nuts, the switch can be moved up and down or rotated in or out for proper car contact.

**Wiring.** The wiring is straightforward and can be readily done from the schematic. Connections for the relay coil are soldered directly on the two male prongs; a connector isn't necessary. The use of a terminal strip or two mounted under the transformer screws will be helpful. Notice that one of the 11 lugs on S6 is not used. This is the zero or off position of the switch. Notice also that one of the 12 contacts on the relay is not used.

(Continued overleaf)
Looking at the terminal side of the relay, the stepping action is counter-clockwise. Be sure you remember this as you wire the switches to the relays so the number indicated by the switch will correspond to the number of steps needed to get the relay to that point. The zero or starting position on each relay is the terminal to which one lead of the green bulbs (PL2 and PL4) is connected. One deck of S6 is wired to K1 and the other deck to K2. Screw terminals provide connections for the remote switches.

**Operation.** Switch S1 on. Rotate S6 to the desired number of laps (from 1 to 10). Push both reset buttons until both indicators light green. This indicates that both relays are in the same starting position for proper sequencing. Start the model cars ahead of the track mounted switches so that one lap must be made before the green lights go off. The green lights stay off for the remainder of the race. The first car completing the selected number of laps will cause its indicator to light red, thus winning the race. If you want the winner to be indicated audibly, a buzzer can be connected into the circuit.

You may find that adjustment of the track switches is required at this point. The easiest way is to place the car in the position it would be when passing the switch. Raise or lower the switch on the screw until its height is such that the contact arm hits the car mid-body. Then rotate the switch on the screw so as the car passes, the lap counter registers a click. Tighten the nuts securely and you’re ready for the Grand Prix.

An electric counter of this type is much more reliable and accurate than the mechanical variety used with most sets. It will add more excitement and professionalism to your model car racing.
Now There Are 3 Heathkit Color TV’s To Choose From

Introducing The NEW Deluxe Heathkit “227” Color TV

Exclusive Heathkit Self-Servicing Features. Like the famous Heathkit “295” and “180” color TV’s, the new Heathkit “227” features a built-in dot generator plus full color photos and simple instructions so you can set-up, converge and maintain the best color pictures at all times. Add to this the detailed trouble-shooting charts in the manual, and you put an end to costly TV service calls for periodic picture convergence and minor repairs. No other brand of color TV has this money-saving self-servicing feature.

Advanced Performance Features. Boasts new RCA Perma-Chrome picture tube with 227 sq. in. rectangular viewing area for 40% brighter pictures ... 24,000 v. regulated picture power and improved “rare earth” phosphors for more brilliant, livelier colors ... new improved low voltage power supply with boosted B+ for best operation ... automatic degaussing combined with exclusive Heath Magna-Shield that “cleans” the picture every-time you turn the set on from a “cold” start, and keeps colors pure and clean regardless of set movement or placement ... automatic color control and gated automatic gain control to reduce color fade and insure steady, flutter-free pictures even under adverse conditions ... preassembled & aligned 3-stage IF ... preassembled & aligned 2-speed transistor VHF tuner and deluxe VHF turret tuner with “memory” fine tuning ... 300 & 75 ohm VHF antenna inputs ... two hi-fi sound outputs ... 4” x 6” 8 ohm speaker ... one-piece mask & control panel for simple installation in a wall, your custom cabinet or even optional Heath factory-assembled cabinets. Build in 25 hours.

Deluxe Heathkit “295” Color TV

NEW

FREE 1968 CATALOG!

Has same high performance features and built-in servicing facilities as new GR-227, except for 295 sq. in. viewing area (industry’s largest picture)... 25,000 volt picture power ... universal main control panel versatile in-wall installation ... 6” x 9” speaker.

GRA-295-1, Walnut cabinet .................. $62.95
GRA-295-3, Early American cabinet .......... $98.95
GRA-295-2, Deluxe walnut cabinet ........... $94.50

Kit GR-295
$479.95
(less cabinet)

Kit GR-227
$399.95
(less cabinet)

Kit GRA-27
$19.95

New Remote Control For Heathkit Color TV

Now change channels and turn your Heathkit color TV off and on from the comfort of your armchair with this new remote control kit. Use with Heathkit GR-227, GR-295 and GR-180 color TV’s. Includes 20’ cable.

Deluxe Heathkit “180” Color TV

Same high performance features and exclusive self-servicing facilities as new GR-227 (above) except for 180 sq. in. viewing area.

GRA-180-1, Contemporary walnut cabinet .... $49.95
GRA-180-2, Early American cabinet ........... $75.00
GRA-180-3, Table model cabinet ............ $24.95
GRA-180-5, Table model cabinet & mobile cart (illus. above) .................. $39.95

NEW

HEATHKIT COMPANY, Dept. 19-12, Benton Harbor, Michigan 49022
In Canada, Daysstrom Ltd.

Please send model (s) .......

Include FREE Heathkit Catalog.

Name

Address

City

State

Zip

Prices & specifications subject to change without notice.

January, 1968

101
Look What’s NEW In The

NEW! Deluxe Solid-State Combo
Amplifier & Speaker System!

All the “big sound” features every combo wants... tremolo, built-in “fuzz”, brightness, reverb, plus a shattering 120 watts of EIA music power. Has 3 independent input channels each with 2 input jacks. Handles lead or bass guitars, combo organ, singer’s mike, even a record changer. Speaker system features two special 12” woofers, special horndriver and matching black vinyl-covered wood cabinet.

NEW! Low Cost Single-Channel Solid-State Guitar Amplifier

Boasts 20 watts EIA music power, 40 watts peak power; variable tremolo & reverb; two inputs that handle lead guitars, singer’s mike; special heavy-duty 12” speaker; line bypass reversing switch that reduces hum; transformer-operated power supply; and handsome leather-textured, black vinyl covered wood cabinet with extruded aluminum front panel and chrome knobs. 35 lbs.

NEW! Low Cost Solid-State FM Mono Receiver

Features all-transistor circuit for cool, instant operation; FM mono listening; 7 watts music power; 5 watts RMS; response 18 to 60,000 Hz ±1 db; inputs for phono and auxiliary; outputs for 4 thru 16 ohm speaker; flywheel tuning; all front panel controls for easy operation. 9 lbs. Optional walnut ($9.95) or beige metal ($3.95) cabinets.

NOW Available Fully Assembled ...
Heathkit “Starmaker” Dual-Channel Guitar Amplifier

Features all solid-state circuit; 25 watts EIA, 60 watts peak power; two channels, one for accompaniment, accordion or mike, the other for variable tremolo & reverb; two inputs each channel; two 12” heavy-duty speakers; line bypass reversing switch for hum reduction; leather-textured black vinyl covered wood cabinet with extruded aluminum front panel & chrome knobs. For extra savings, build the kit version in just 15 hours. 52 lbs.

NEW! Low Cost Solid-State FM Stereo Receiver

Features complete FM, FM stereo listening; wide 18-60,000 Hz ±1 db at full 5 watt continuous power per channel; 14 watts music power; inputs for phono & auxiliary; outputs for 4 thru 16 ohm speakers; stereo indicator; adjustable phase for best stereo; and flywheel tuning. 12 lbs. Optional walnut ($9.95) or beige metal ($3.95) cabinets.
'68 HEATHKIT® Catalog!

NEW! Professional 10-Band Shortwave Listener's Receiver

Kit SB-310

$249.00

(SB-600 8 ohm 6" x 9" speaker $18.95)

Covers 6 shortwave bands (49, 41, 31, 25, 19, & 16 meters) ... 80, 40 & 20 meter ham bands ... 11 meter CB. Has 5 kHz crystal filter for AM, SSB and CW; Selectivity that slices stations down to last kHz ... no more guessing station identities; 11-tube circuit; crystal-controlled front-end; prebuilt & aligned linear oscillator; metal cabinet. Other crystal filters available. 20 lbs.

NEW! Amateur Novice CW Transceiver

Kit HW-16

$99.50


NEW! Heathkit Jr.® Solid-State Portable Phonograph

Kit JK-17

$19.95

Perfect for the youngster in your family. Plays all 4 speeds, all record sizes. Crystal cartridge with sapphire stylus for all types of records; 4" speaker; built-in 45 rpm adaptor; preassembled turntable and hardboard cabinet. Build in 1 to 2 hours. 117 VAC, 60 Hz operation. 11 lbs.

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Kit GH-17

$14.95

Ideal for kit-building or other electronic soldering jobs. Safe 6 volt, 25 watt GE midget iron with non-corroding tip. 3 heat ranges. Excellent heat recovery time. Quick warm-up ... iron ready in 2 minutes. Protective metal case. Build in an hour. 5 lbs.

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LITERATURE
* Starred items indicate advertisers in this issue. Consult their ads for additional information and specifications.

LIBRARY

CB—AMATEUR RADIO—SHORTWAVE RADIO

**93.** Heath Co. has a new 23-channel, all-transistor, 5-watt CB rig at the lowest cost on the market, plus a full line of CB gear. See their new 10-band AM/FM/Shortwave portable and line of shortwave radios.

101. If it's a CB product, chances are International Crystal Radio has it listed in their colorful catalog. Whether kit or wired, accessory or test gear, this CB-oriented company can be relied on to fill the bill.

122. Discover the most inexpensive CB mobile, Citi-Fone II by Multi-Elmac Company. Get the facts plus other CB product data before you buy.

127. Carry-Comm Laboratories' latest ironies Laboratories' latest "User's Catalog"—16 pages packed with information about a CBS, mobile, base station, another CBS, mobile, base station, another. Also, discover Conar's colorful catalog. You'll find something for any interest and budget. And Heath Co. will happily send you a copy.

128. Delta Products new capacitive discharge ignition system in kit form will pep up your car. Designed to cut gas costs and reduce point and plug wear. Get Delta's details in full-color literature.

42. Here's a colorful 104-page catalog containing a wide assortment of electronic kits. You'll find something for any interest and budget. And Heath Co. will happily send you a copy.

44. EICO's new 48-page 2-color pocket-size short form catalog is just off the press. Over 250 products: Ham radio, CB, hi-fi in kit and wired form are illustrated. Also, discover EICO's new experimenter kit line.

125. Need TV camera kit, touch control lamp, hi-fi component, test units or shop wiring? Then you need Conar's latest catalog. Born from NRI, Conar has become a major supplier of electronics hobbyist parts.

64. Try instant lettering to mark control panels and component parts. Delta's booklets and sample component parts, let you embrace many interests and desires! Get a copy of Delta's catalog now.

108. The facts on Mercury's line of test equipment kits—designed to make troubleshooting easier, faster and more profitable.

109. Seco offers a line of specialized and standard test equipment that's ideal for the home experimenter and pro. Get specs and prices today.

ELECTRONIC PARTS

**1.** Allied's catalog is so widely used as a reference book, that it's regarded as a standard by people in the electronics industry. Don't you have the latest Allied Radio catalog? The surprising thing is that it's free!


**3.** Bargains galore! Parts, tools, test equipment, radios and many more bargains are available to ultra-low prices. Progressive Free Edu-Kits will send latest catalog.

102. Sentry Mfg. Co. has some interesting poop sheets on speech clip- pers, converters, talk power kits and the like for interested CB'ers, hams and SWL'ers, too.

**8.** Get it now! John Meshna, Jr.'s new 46-page catalog is jam packed with surplus buys—surplus radios, new parts, computer parts, etc.

**23.** No electronic bargain hunter should be caught without the 1967 Copy of Radio Shack's catalog. Some equipment and kit offers are so low, they look like misprints. Buying is believing.

**5.** Edmund Scientific's new catalog contains over 4000 products that embrace many interests and fields. It's a 148-page buyer's guide for Science Fair fans.

106. With 70 million TV and 240 million radios somebody somewhere will need a vacuum tube replacement at the rate of one a second! Universal Tube Co.'s Troubleshooting Chart and facts on their $1 flat rate per tube.

**4.** Olson's catalog is a multi-colored newspaper that's packed with more bargains than a phone book has names. Don't believe us? Get a copy.

**7.** Before you build from scratch check the Fair Radio Center's latest catalog for electronic gear that can be modified to your needs. Fair way to save cash.

6. Bargains galore, that's what's in store! Poly-Fake Co. will send you their latest eight-page flyer listing the latest in available merchandise, including a giant $1 special sale.

**10.** Burstein-Applebee offers a new giant catalog containing 100s of big pages crammed with savings including hundreds of bargains on hi-fi kits, power tools, tubes, and parts.

**11.** Now available from EDI (Electronic Distributors, Inc.): a catalog containing hundreds of electronic items. EDI will be happy to place you on their mailing list.

120. Tab's new electronics parts catalog is now off the press and you're welcome to have a copy. Some of Tab's bargains and odd-ball items are unbelievable offers.

117. Harried by the high cost of parts for projects? Examine Bigelow's 13th Anniversary catalog packed with "Lucky 13" specials.

SCHOOLS AND EDUCATIONAL

**61.** ICS (International Correspondence Schools) offers 236 courses including many in the fields of radio, TV and electronics at ultra-low prices. Progressive Free Edu-Kits will send free booklet "It's Your Future."

www.americanradiohistory.com
★74. Want to whiz through circuit problems in seconds without pencil and paper? Then get the facts on an amazing electronics slide rule and course from Cleveland Institute of Electronics.

114. Prepare for tomorrow by studying at home with Technical Training International. Get the facts today on how you can step up in your present job.

59. For a complete rundown on curriculum, lesson outlines, and full details from a leading electronic school, ask for this brochure from the Indiana Home Study Institute.

105. Get the low-down on the latest in educational electronic kits from Trans-Tek. Build light dimmers, amplifiers, microphones, and many more. Trans-Tek helps you to learn while building.

HI-FI/AUDIO

124. Now, Sonotone offers you young ideas in microphone use in their new catalog. Mikes for talk sessions, swinging combos, home recording, PA systems and many more uses.


85. Need a tuner? Preamp? Amp? Tape deck? Then inspect Dynaco for kits or wired units. It's worthwhile looking at test reports Dynaco sends your way.

119. Kenwood puts it right on the line. The all-new Kenwood stereo-FM receivers are described in a colorful 16-page booklet complete with easy-to-read-and-compare spec data. Get your copy today!

15. Acoustic Research would like to send you a copy of their fact-packed "Stylus Force" booklet—must reading for hi-fi bugs.

16. Discover why Lab 80 by Gar-rard offers top dollar value. 32-page Garrard Comparator Guide will make you a wiser buyer.

17. Electro-Voice has two new, pocket-size, four-color product guides for you. One covers speakers and components; the other, microphones and accessories.

19. Empire has made exceptional advances in speaker cabinet design you should read about. Also, Em-pire's successes in the turntable and cartridge fields are worth discovering.

24. Need a hi-fi or PA mike? University Sound has an interesting microphone booklet audio fans should read before making a purchase.

27. 12 pages of Sherwood receivers, tuners, amplifiers, speaker systems, and cabinetry make up a colorful booklet every hi-fi bug should see.

95. Confused about stereo? Want to beat the high cost of hi-fi without compromising on the results? Then you need the new 24-page catalog by Jensen Manufacturing.

99. Get the inside info on why Acoustech's solid-state amplifiers are the rage of the experts. Colorful brochure answers all your questions.

TAPE RECORDERS AND TAPE

123. Yours for the asking—Elpo's new "The Tape Recording Omnibook," 16 jam-packed pages on facts and tips you should know about before you buy a tape recorder.

31. All the facts about Concord ElectronicsCorp. tape recorders are yours for the asking in a free book-let. Portable, battery operated to four-track, fully transistorized stereos cover every recording need.

32. "Everybody's Tape Recording Handbook" is the title of a booklet that Sarkes-Tarzian will send you. It's 24-pages jam-packed with info for the home recording enthusiast. Includes a valuable table of recording times for various tapes.

33. Become the first to learn about Norco's complete Carriage-Corder 150 portable tape recorder outfit. Four-color booklet describes this new cartridge-tape unit.

34. "All the Best from Sony" is an 8-page booklet describing Sony-Superscope products—tape recorders, microphones, tape and accessories. Get a copy before you buy!

35. If you are a serious tape audiophile, you will be interested in the new Viking of Minneapolis line—they carry both stereo recorders you should know about.

HI-FI ACCESSORIES

112. Telex would like you to know about their improved Serenata Headset—and their entire line of quality stereo headphones.

98. Swinging to hi-fi stereo headsets? Then get your copy of Superx Electronics 16-page catalog featuring a large selection of quality headsets.

104. You can't hear FM stereo unless your FM antenna can pull 'em in. Learn more and discover what's available from Fincos's 6-page "Third Dimen-sional Sound."

TOOLS

★78. Need pliers to hold, bend or cut fine wires? Check Xcelite's new line of miniature pliers shown in Catalog 166 along with a complete selection of regular pliers and snips.

118. Secure coax cables, speaker wires, phone wires, etc., with Arrow staple gun tackers. 3 models for wires and cables from 3/16" to 9/16" dia. Get fact-full Arrow literature.

TELEVISION

★70. Need a new TV set? Then assemble a Heath TV kit. Heath has all sizes, B&W and color, portable and fixed. Why not build the next TV you watch?

97. Interesting, helpful brochures describing the TV antenna discovery of the decade—the log periodic an-tenna for UHF and UHF-TV, and FM-stereo. Get it from JFD Electronics Corporation.

RADIO-TV EXPERIMENTER

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New York, N. Y. 10022

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ADDRESS

CITY

STATE

ZIP

January, 1968

107
Ham Traffic
Continued from page 95

Hopefully, this new plan will get at least some of us headed in that direction. It doesn't take much listening on the bands today to learn that most guys haven't the foggiest notion how their rigs work, and what's more, they don't care.

This is pretty bad, because ham radio isn't supposed to be a playtime hobby, it's supposed to be a serious training ground. Having fun along with it should be like having a piece of dessert, but not the main course of the meal.

The new FCC plan should wipe out some of the complacency most of us feel at one time or another, and show us we are expected to be accomplishing something.

However, it seems to me the plan is needlessly complicated and contains some dangers that were not present before.

Why Not the One-Horse Buggy? For one thing, why not basically follow the original proposal, made nearly four years ago by the American Radio Relay League, and restrict certain entire phone bands to the higher class license holders? It used to be that way, many years ago, before the General Class license was invented, and the old timers tell me it worked out pretty well. A guy who wanted to work phone had to show he was worthy of the privilege. Much of the nonsense we hear today on phone was unheard of under the pre-General Class rules.

But, by chopping up each phone band and each CW band into slivers for each license class and giving each a slice of the pie, the FCC is effectively drawing up the battle lines for war. There're already hard feelings between classes up in the VHF region—now these bitter feelings are bound to spread down to the HF bands.

You won't have to wait long before you will hear a General Class operator say "That blankety-blank Advanced Class clod is slopping over into MY part of the band."

And, a little farther along the band, an Advanced Class operator will be saying "That no good Extra Class operator is splattering over into MY part of the band."

Several times in past years, the FCC has been asked to divide the phone bands into sections, with one for AM operation and another for SSB. They also have been asked to set aside certain frequencies for CW only, and others for RTTY only. The Feds always refused to divide the subbands into separate modes—they said the sidewinders and the ancient modulators would just have to learn to live with each other, just as the brass pouchers and the Teletypers would have to do likewise.

But now, Uncle Whiskers divides the bands into smaller slices than was ever asked, and does it in such a way that it is bound to cause unnecessary strife when we can little afford it.

Let's Get Technical. What really is needed, now more than ever before, are some new FCC definitions of technical standards for hams to meet. The present rules on this subject are so vague that the technically-

NEW FCC AMATEUR FREQUENCY ASSIGNMENTS

<table>
<thead>
<tr>
<th>CLASS</th>
<th>Effective (kHz)</th>
<th>Frequencies (kHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>November 22, 1968</td>
<td>November 22, 1969</td>
</tr>
<tr>
<td>General</td>
<td>3525-3800 (CW)*</td>
<td>3550-3800 (CW)</td>
</tr>
<tr>
<td></td>
<td>3850-4000 (phone)</td>
<td>3900-4000 (phone)</td>
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<td></td>
<td>7025-7200 (CW)</td>
<td>7050-7200 (CW)</td>
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<td>7225-7300 (phone)</td>
<td>7250-7300 (phone)</td>
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<td>14025-14200 (CW)</td>
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<td>21300-21450 (phone)</td>
<td>21350-21450 (phone)</td>
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<tr>
<td></td>
<td>50.1-54 mHz (phone, CW)</td>
<td>50.25-54 mHz (phone, CW)</td>
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<td>Advanced</td>
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<td></td>
<td>cies as for General Class</td>
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<tr>
<td></td>
<td>Phone frequencies:</td>
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</tr>
<tr>
<td></td>
<td>3825-4000</td>
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<td></td>
<td>7200-7300 (entire phone band)</td>
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<td>14200-14350 (entire phone band)</td>
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<td></td>
<td>21275-21450</td>
<td>No Change</td>
</tr>
<tr>
<td></td>
<td>Entire 6-Meter Band</td>
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</tr>
<tr>
<td>Extra</td>
<td>All U.S. Amateur Frequencies</td>
<td>No Change</td>
</tr>
</tbody>
</table>

Notes: *CW may be operated also on phone frequencies, just as now, if desired.

- Ten-meter band is not involved in new frequency plan. Only change on two-meter band is elimination of Novice operation after November 22, 1968. Novice license term will be extended to two years. Only change affecting Technician Class license holders is that after November 22, 1968, Extra and Advanced Class only will be allowed on 50.0-50.1 MHz. On November 22, 1969, this restriction will be extended to 50.0-50.25 MHz. There will be no change in the present system of call sign prefixes.

- After November 22, 1968, applicants for Extra Class, unless they already hold an Advanced Class license, must first take the exam for Advanced Class.

- FCC says the schedule for use of frequencies which are to be restricted to Advanced and Extra Class operators may be delayed if insufficient occupancy of these frequencies is found.
oriented ham has a very difficult time learning what technical standards he is expected to meet.

For example, arguments have raged among hams for years over broad signals that caused interference to operators on adjacent frequencies, yet there are no hard and fast rules on how broad a signal may be. Nor are there any rules defining frequency tolerance or frequency drift standards. This is bound to become a sore point with the new rules that chop up the bands like mincemeat.

It seems pretty ridiculous when you consider that some hams are far enough advanced to build satellite relay stations and to bounce signals off the moon, yet the FCC rules governing hams barely recognize the existence of SSB, which hams pioneered more than 20 years ago!

Another question—how well will the complicated new rules be enforced? Already understaffed, Frank Charlie Charlie has demonstrated and admitted he can enforce the present rules only in a very spotty manner. How in the world can the new jig-saw puzzle be adequately enforced?

Not long before announcing its decision on the incentive plan, which tightens up requirements, the FCC proposed another rule change which would relax requirements for amateur station identification.

Essentially, this new proposal, if adopted, will give official approval to a whole group of sloppy operating practices now engaged in by a large number of hams.

Basically, this proposed change would require that instead of identifying his own station and the station or stations to which he is talking every 10 minutes, an operator need give only his own call. Only at the end of his communications would he have to say to whom he was talking, and even then he would need to give only the call of one station in case he was working several fellows at the same time.

Also, when working portable or mobile, he would not be required to give his location, as he is supposed to do now, but instead he would give the call sign area in which he is operating.

So, the hackneyed “W9XYZ portable five,” and “WØXXX mobile seven” and “W1XAM and the group” would become the approved procedure.

The FCC says the present rules on station identification are “excessive to normal monitoring and investigative needs.”

Fine for them, maybe, but how about us?

That is, how about those of us who try to operate our stations and conduct our communications with some sort of businesslike order? It’s hard enough now to keep track of who’s talking to whom, with so many operators not following the ID rules. If these same guys take the same light-hearted attitude toward the proposed new system, if it is adopted, just think of the unidentified babble we’ll hear on the bands!

One of the purposes of the Amateur Radio Service is to serve as a training ground in radio communications. If the Feds really want to encourage us to become better qualified radio operators, which is the whole idea of the incentive rules, then their new proposal for fantastically loose identification procedures is a giant step in the reverse direction.

Maybe the FCC doesn’t really take us very seriously any more. I’m sure a lot of folks in the technical industries don’t take us seriously. We’re to blame, though, because too many of us don’t take ham radio very seriously ourselves.

So, I believe it’s up to us, every one of us, to show the FCC and everyone else in the field of electronics that we are worthy of more respect.

Although the new FCC rules are needlessly complicated, they do lead the way to improvement of our “hobby,” and they can be made to work if we want them to work.

So, what’s say, gang—let’s cut out the nonsense and get down to serious business. Let’s become competent operators and practical technicians. Let’s pick up ham radio and put it back up on the pedestal where it used to be—and then let’s keep it up there! Ready? Let’s go!
This is the third and last part of White's Radio Log, published in three parts twice each year. This format presentation enables the Editors of Radio-TV Experimenter to offer its readers two complete volumes of White's Radio Log each year, while increasing the scope of the Log and its accuracy.

In this issue of White's Radio Log we have included the following listings: U. S. AM Stations by Call Letters, U. S. FM Stations by Call Letters, Canadian AM Stations by Call Letters, Canadian FM Stations by Call Letters, Major Broadcast Stations in Mexico and the Caribbean and the World-Wide Shortwave stations section.

In the February-March, 1968 issue of Radio-TV Experimenter the Log will contain the following listings: U. S. AM Stations by Frequency, Canadian AM Stations by Frequency, U. S. Television Stations by States, Canadian Television Stations by Cities and the World-Wide Shortwave Stations section. In the event you missed a part of the Log published during 1967, you will have a complete volume of White's Radio Log by collecting any three consecutive issues of Radio-TV Experimenter published during the year. The three consecutive issues are an entire volume of White's Radio Log that offers complete listings with up-to-the minute station change data that are not offered in any other magazine or book.

If you are a broadcast band DX'er, FM station logger, like to photograph distant TV test patterns, or tune the shortwave bands, you will find the new White's format an unbeatable and up-to-date handy reference.

QUICK REFERENCE INDEX TO WHITE'S RADIO LOG

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<th>Location</th>
<th>KHz</th>
<th>Call</th>
<th>Location</th>
<th>KHz</th>
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<th>Location</th>
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<td>Kingman, Ariz.</td>
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<td>KATB</td>
<td>Little Rock, Ark.</td>
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<td>KBAC</td>
<td>Kansas City, Mo.</td>
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<td>KABN</td>
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<td>1240</td>
<td>KABC</td>
<td>Long Beach, Calif.</td>
<td>1480</td>
<td>KABF</td>
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<td>KBHD</td>
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<td>1510</td>
<td>KABC</td>
<td>Santa Ana, Calif.</td>
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<td>KABF</td>
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<td>KABN</td>
<td>Seattle, Wash.</td>
<td>1450</td>
<td>KABL</td>
<td>Longview, Wash.</td>
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<td>Anchorage, Alaska</td>
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Every effort has been made to ensure accuracy of the information listed in this issue of White's Radio Log, but absolute accuracy is not guaranteed and of course, only information available up to press-time could be included. Copyright 1963 by Science & Mechanics Publishing Co., a subsidiary of Dow Publications, Inc., 505 Park Avenue, New York, New York 10022.
KEXO Seattle, 1260 kHz
KEUN Bakersfield, Calif., 1260 kHz
KERC Eastland, 1260 kHz
KEPS 1260 kHz
KENO 1260 kHz
KENM 1360 kHz
KENI 1410 kHz
KENE 1490 kHz
KELK 1340 kHz
KELI 1440 kHz
KEHG 1410 kHz
KEEP Twin Falls, 1260 kHz
KEEN 1260 kHz
Call Ave., New brief), 1260 kHz
KELS 1260 kHz
KEX Portland, 1260 kHz
KEZY Anaheim, 1260 kHz
KEYE San Antonio, 1260 kHz
KFI San Francisco, Calif., 1260 kHz
KFIL 1260 kHz
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KFYV 1260 kHz
KFWB 1260 kHz
KFYM 1260 kHz
KFYMJ 1260 kHz
KFKX 1260 kHz
KFKM 1260 kHz
KFJZ 1260 kHz
The list of stations continues to provide frequency, location, and other technical details about each radio station.

Are your home-town AM stations listed correctly in White's Radio Log? If you believe there is a correction White's listings, please check first with your local station. For each callsign obtain the correct city location, frequency, and power. (Remember, even though your local paper may list a station as a "home-town" station, it may be officially licensed by the FCC for operation in the next city.) Get all the facts on a piece of paper (the very brief), include your name and address, and mail to White's Radio Log, RADIO-TV EXPERIMENTER, 505 Vick Ave., New York, N. Y. 10022. Your help in contributing to the accuracy and completeness of White's Radio Log will be sincerely appreciated.

—Editor
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**January, 1968**

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125
Canadian FM Stations by Call Letters

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</tr>
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<td>Saskatoon, Sask.</td>
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</tr>
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<td>Yellowknife, N.W.T.</td>
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<tr>
<td>CMB-FM</td>
<td>Ottawa, Ont.</td>
<td>94.5</td>
</tr>
</tbody>
</table>

**Major Broadcast Stations in Mexico and the Caribbean**

**BAHAMS**

1540 ZNSI Nassau

570 CMHJ Santa Clara
590 CHWJ Havana
630 CMAQ Santa Clara
630 CMAQ Havana
690 CBMC Havana
720 — Calo
760 CMCQ Havana
790 CMCM Havana
890 CMCJ Havana
930 CMDN Guanatamo
910 CMGX Mantanzas
930 CBVF Islas Pinos

**CUBA**

855 PJC2 Willemstad (Curaçao)

570 CMHJ Santa Clara
590 CHWJ Havana
630 CMAQ Santa Clara
630 CMAQ Havana
690 CBMC Havana
720 — Calo
760 CMCQ Havana
790 CMCM Havana
890 CMCJ Havana
930 CMDN Guanatamo
910 CMGX Mantanzas
930 CBVF Islas Pinos

**CURACAO (Netherlands, W. I.)**

**HAITI**

1035 VEVG Cap Haïtien

**JAMAICA**

550 — Montego Bay
560 — Kingston
580 — Mandeville

**DOMINICAN REPUBLIC**

520 HSID Santo Domingo
520 HIAW Santo Domingo
790 HLS Santo Domingo
955 HFJ Puerto Plata
1020 HJP Santo Domingo
1330 HIBB Santiago de los Caballeros
1460 HAN Hato Mayor del Rey

**MEXICO**

620 XENK Mexico City
630 XERF Monterrey
680 XELG Leon
680 XEN Mexico City
690 XETRA Tijuana
730 XEMX Mexico City
730 XERX Leon (relay)
800 XEDF Ciudad Juarez
850 XETQ Orizaba
900 XEMX Mexico City
940 XEQX Puerto Vallarta
750 XEFJ Ciudad Juarez
750 XEFY Morelia
800 XETU Tampico

**SWAN ISLAND (United States)**

1160 — Radio America (7)

**World-Wide Short Wave Stations**

1. Here we go again with another round of our real, official DX contest; the one with no prizes. Test your skill and equipment with the following:

   a. Want to dig a not-too-often reported country? What about looking for Radio Afghanistan on 21585 kHz at 1100 to 1200 GMT.

   b. How many U. S. Navy stations can you monitor on 2716 kHz in a 15 minute period? Here’s a tip—listen after dark for best results.

   c. How about trying your tuning ability on the rarest of the rare; Antarctica? There are no broadcast stations there but you might hear communications station VLV at Australia’s Mawson Base. Look for VLV contacting McQuarie Island on 15845 (or sometimes 12255) kHz at 0900 GMT.

   d. While we’re looking for Antarctica, let’s not forget that it gets pretty cold up north. Take a look at 8939 kHz and listen for an aeronautical communications net in Alaska, Canada, and on south to sunny California. How many different stations can you copy in a half hour?

   e. Here’s a new station—Radio Equis, in Managua, Nicaragua. Try for this one on 6025 kHz after 0100 GMT.

   f. From the mysterious Himalaya Mountains we offer you the chance to log the tiny kingdom of Nepal. They have a new 100
kilowatt transmitter going on 4600 kHz at 1515.

7. Zambia, last nation on the country list since Zanzibar went out of business in 1964, is not too often reported. You can listen for the General Service of Radio Zambia on 7235 kHz around 0345 GMT. At around 0845 GMT they are also heard on either 7250 or 7260 kHz.

8. Hey, before you go feeling sorry for poor old out-of-business Zanzibar, they have opened up shop under the new name of Tanzania (after joining forces with Tanganyka). Their broadcasting station at Dar-es-Salaam is being reported on 4785 kHz at 1600 GMT. Also try for this station on 5985 kHz at 0300 GMT, and on 9550 kHz at 0900 GMT.

9. We wonder if any of you have ever logged the Faroe Islands; they are indeed rare on the airwaves. You might flip the receiver over to 9880 kHz around 0750 GMT to see if you can hear telephone station OKY39 which has been heard testing from Thorshavn in the Faroes.

10. Did you know that there were a number of CW (code) aeronautical beacons operating just above and below the standard broadcasting band? Some are in South America and Canada and are easily copied. Listen some night and see how many you can hear in a half hour (15 minutes above the broadcast band and 15 minutes below).

**Scoring.** 10 points for numbers 1, 3, 5, 6, 7, 8, 9. You get 2 points for each of the stations in numbers 2, 4, 10. From 80 to 100 you're a champ; 50 to 79 you show promise; 30 to 49 you aren't trying hard enough; below 30 you need a better receiver and probably more patience!

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Craig Cook, Milwaukee, Wisc.
Scott Kanoff, Yeadan, Pa.
Ken Stevens, Denver, Colo.

---

**kHz** | **Call** | **Name** | **Location** | **GMT**
---|---|---|---|
2420 | R. Soo Carlos | Sao Carlos, Brazil | 0200

**90-Meter Band—3200-3400 kHz**

<table>
<thead>
<tr>
<th>kHz</th>
<th>Call</th>
<th>Name</th>
<th>Location</th>
<th><strong>GMT</strong></th>
</tr>
</thead>
</table>
3204 | Nigerian BC | Ibadan, Nigeria | 0530 |
3222 | Ici Home | Lome, Togo | 0530 |
3378 | R. Bolde | Belize, Brit. Honduras | 0315 |
3379 | Nigerian BC | Kaduna, Nigeria | 0501 |
3390 | Malawi BC | Blantyre, Malawi | 0500 |
3395 | VLFBR | Rabaul, New Guinea | 0900 |
3910 | CR4AC | R. Barlavento | Cape Verde Is. | 2300 |

**60-Meter Band—4750-5060 kHz**

<table>
<thead>
<tr>
<th>kHz</th>
<th>Call</th>
<th>Name</th>
<th>Location</th>
<th><strong>GMT</strong></th>
</tr>
</thead>
</table>
4775 | ELWA | R. Village | Monrovia, Liberia | 0630 |
4830 | HRVC | R. Evangelista | Tequiquilpa, Peru | 0310 |
4840 | OAA24G | R. La Oroya | La Oroya, Peru | 0400 |
4845 | YVPA | R. San Felipe | San Felipe Venezuela | 0610 |
4865 | HJST | R. Neiva | Neiva Colombia | 0400 |
4970 | YVKB | R. Venezuela | Caracas Venezuela | 0210 |
4990 | V. de la Revolucion | Conakry, Guinea | 0600 |
5100 | HCMJI | E. Gran Colombia | Quito, Ecuador | 0500 |
5110 | R. Zambia | Lusaka, Zambia | 0245 |
5190 | YVKB | R. Venezuela | Caracas Venezuela | 0230 |
5198 | R. Kuwait | Kuwait | 0500 |

**49-Meter Band—5950-6200 kHz**

<table>
<thead>
<tr>
<th>kHz</th>
<th>Call</th>
<th>Name</th>
<th>Location</th>
<th><strong>GMT</strong></th>
</tr>
</thead>
</table>
5970 | H3VY | R. Hitzoto | Bogota Colombia | 2210 |
5980 | R. Demetra | Georgetown, Guyana | 0100 |
5990 | HJGR | V. del Pueblo | Poreira, Colombia | 0140 |
6005 | CFCH | Jovan Marcon | Montreal Quebec | 1300 |
6015 | R. Abidjan | Abidjan, Ivory Coast | 2230 |
6070 | CFRX | CFRX | Toronto Ont. | 1610 |
6075 | H31HT | J. Santbrana | Bogota Colombia | 0010 |
6075 | HJHV | J. Accion Cultural | Bogota Colombia | 0010 |
6080 | OAXZ | R. Nac. de Peru | Lima Peru | 0100 |
6090 | R. Praga | Prague Czech. | 0500 |
### 41-Meter Band — 7100-7300 kHz

<table>
<thead>
<tr>
<th>kHz</th>
<th>Call</th>
<th>Name</th>
<th>Location</th>
<th>GMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>610</td>
<td>TGOA</td>
<td>V. de las Americas</td>
<td>Guat. City, Guat.</td>
<td>2330</td>
</tr>
<tr>
<td>610</td>
<td>XEGM</td>
<td>R. Moncloa</td>
<td>Madrid, Mex.</td>
<td>2030</td>
</tr>
<tr>
<td>610</td>
<td>RALF</td>
<td>R. Alber</td>
<td>Algiers, Algeria</td>
<td>0600</td>
</tr>
<tr>
<td>6120</td>
<td>Swiss</td>
<td>BC</td>
<td>Berne, Switz.</td>
<td>2200</td>
</tr>
<tr>
<td>6156</td>
<td>4VE</td>
<td>V. de la Habana</td>
<td>Havana, Cuba</td>
<td>0940</td>
</tr>
<tr>
<td>6136</td>
<td>CHUX</td>
<td>CHNX</td>
<td>Holliax, N.S.</td>
<td>0345</td>
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<tr>
<td>6135</td>
<td>PKZ1</td>
<td>R.TV Gaucha</td>
<td>Porto Alegre, Brazil</td>
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<tr>
<td>6150</td>
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<td></td>
<td>London, England</td>
<td>0000</td>
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<tr>
<td>6170</td>
<td>R.</td>
<td>H. Habana</td>
<td>Havana, Cuba</td>
<td>0100</td>
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<tr>
<td>6175</td>
<td>ZYVU</td>
<td>R. Guaraní</td>
<td>Bol. Horizonte, Brazil</td>
<td>0700</td>
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<tr>
<td>6185</td>
<td>ZYR7</td>
<td>R. Bandeirantes</td>
<td>Sao Paulo, Brazil</td>
<td>0900</td>
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<tr>
<td>6190</td>
<td>HIEU</td>
<td>V. de la Libertad</td>
<td>St. Domingo, Granada, Dom, Rep.</td>
<td>2130</td>
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<tr>
<td>6195</td>
<td>4VHW</td>
<td>R. Haiti</td>
<td>Port au Prince, Haiti</td>
<td>2120</td>
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<tr>
<td>6207</td>
<td>TIIHG</td>
<td>R. Reloj</td>
<td>San Jose, C.R.</td>
<td>0430</td>
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### 31-Meter Band — 9500-9775 kHz

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<tbody>
<tr>
<td>9515</td>
<td>XEYW</td>
<td>V. de Amer. Latina</td>
<td>Mexico City, Mex.</td>
<td>0200</td>
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<tr>
<td>9520</td>
<td>OZFS</td>
<td>R. Denmark</td>
<td>Copenhagen, Denmark</td>
<td>0200</td>
</tr>
<tr>
<td>9645</td>
<td>R.</td>
<td>G. Ghano</td>
<td>Accra, Ghana</td>
<td>2045</td>
</tr>
<tr>
<td>9670</td>
<td>R.</td>
<td>R. Bucharest</td>
<td>Bucharest, Rumania</td>
<td>2330</td>
</tr>
<tr>
<td>9630</td>
<td>ZYRR</td>
<td>R. Aparecida</td>
<td>Aparecida, Brazil</td>
<td>0935</td>
</tr>
<tr>
<td>9640</td>
<td>DMCW</td>
<td>Deutsche Welle</td>
<td>Cologne, W. Germany</td>
<td>0415</td>
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<tr>
<td>9665</td>
<td>HEU3</td>
<td>R. Swin</td>
<td>Berne, Switz.</td>
<td>2010</td>
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<tr>
<td>9670</td>
<td>R.</td>
<td>R. Cayo</td>
<td>Colombo, Ceylon</td>
<td>1230</td>
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<td>9675</td>
<td>R.</td>
<td>R. Warsaw</td>
<td>Warsaw, Poland</td>
<td>0730</td>
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<td>9675</td>
<td>R.</td>
<td>R. Berlin Int.</td>
<td>Berlin, East Germany</td>
<td>0115</td>
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<tr>
<td>9695</td>
<td>R.</td>
<td>R. Vatican.</td>
<td>Vatican City</td>
<td>0025</td>
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<td>9690</td>
<td>TWR</td>
<td>R. Bonaire, Neth.</td>
<td>Antilles</td>
<td>0255</td>
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<td>9700</td>
<td>R.</td>
<td>R. Sofia</td>
<td>Sofia, Bulgaria</td>
<td>0000</td>
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<td>TWR</td>
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<td>Antilles</td>
<td>1045</td>
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<td>9730</td>
<td>R.</td>
<td>R. Berlin Int.</td>
<td>Berlin, East Germany</td>
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<tr>
<td>9770</td>
<td>VEN</td>
<td>R. Viennese</td>
<td>Vienna, Austria</td>
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<tr>
<td>9833</td>
<td>R.</td>
<td>R. Budapest</td>
<td>Budapest, Hungary</td>
<td>0045</td>
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<td>1070</td>
<td>R.</td>
<td>R. Peking</td>
<td>Peking, China</td>
<td>1310</td>
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<tr>
<td>1145</td>
<td>R.</td>
<td>R. United Arab BC</td>
<td>Cairo, Egypt</td>
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<td>R.</td>
<td>R. Moscow</td>
<td>Moscow, USSR</td>
<td>1900</td>
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<tr>
<td>1175</td>
<td>NHC</td>
<td></td>
<td>Tokyo, Japan</td>
<td>1630</td>
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<tr>
<td>1175</td>
<td>SW</td>
<td>R. Swiss</td>
<td>Berne, Switzerland</td>
<td>2130</td>
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<tr>
<td>1175</td>
<td>R.</td>
<td>R. Nederland</td>
<td>Hilversum, Neth.</td>
<td>1955</td>
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<tr>
<td>1175</td>
<td>SRAH</td>
<td>R. Habano</td>
<td>Havana, Cuba</td>
<td>2030</td>
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### 25-Meter Band — 11750-11975 kHz

<table>
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<th>Call</th>
<th>Name</th>
<th>Location</th>
<th>GMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>11750</td>
<td>BBC</td>
<td></td>
<td>Tabras, Malaysia</td>
<td>1600</td>
</tr>
<tr>
<td>11770</td>
<td>R.</td>
<td>R. Kabul</td>
<td>Kabul, Afghanistan</td>
<td>1800</td>
</tr>
<tr>
<td>11785</td>
<td>R.</td>
<td>R. Sweden</td>
<td>Stockholm, Sweden</td>
<td>0045</td>
</tr>
<tr>
<td>11800</td>
<td>R.</td>
<td>R. Sofia</td>
<td>Sofia, Bulgaria</td>
<td>1930</td>
</tr>
<tr>
<td>11805</td>
<td>R.</td>
<td>R. Nacional</td>
<td>Canary Is.</td>
<td>0130</td>
</tr>
<tr>
<td>11805</td>
<td>ZYJ3</td>
<td>R. Globo</td>
<td>Rio de Janeiro, Brazil</td>
<td>0000</td>
</tr>
<tr>
<td>11810</td>
<td>R.</td>
<td>R. Sweden</td>
<td>Stockholm, Sweden</td>
<td>2050</td>
</tr>
<tr>
<td>11815</td>
<td>R.</td>
<td>R. Neyk</td>
<td>Tokyo, Japan</td>
<td>2100</td>
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<tr>
<td>11815</td>
<td>TWR</td>
<td>R. Trans World R.</td>
<td>Bonaire, Neth. Antilles</td>
<td>0030</td>
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<tr>
<td>11820</td>
<td>XE8R</td>
<td>R. Heraldo de Sonora</td>
<td>Mexico City, Mex.</td>
<td>0130</td>
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<tr>
<td>11825</td>
<td>BBC</td>
<td></td>
<td>London, England</td>
<td>0540</td>
</tr>
<tr>
<td>11830</td>
<td>V.</td>
<td>A. America</td>
<td>Greenville, N.C.</td>
<td>0200</td>
</tr>
<tr>
<td>11835</td>
<td>4VE</td>
<td>VDE</td>
<td>Cape Haitien, Haiti</td>
<td>0300</td>
</tr>
<tr>
<td>11840</td>
<td>R.</td>
<td>R. Warsaw</td>
<td>Warsaw, Poland</td>
<td>2210</td>
</tr>
<tr>
<td>11850</td>
<td>R.</td>
<td>R. Ghano</td>
<td>Accra, Ghana</td>
<td>2030</td>
</tr>
<tr>
<td>11850</td>
<td>R.</td>
<td>R. Moscow</td>
<td>Moscow, USSR</td>
<td>0645</td>
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<tr>
<td>11865</td>
<td>R.</td>
<td>R. RCC</td>
<td>Ascension Is.</td>
<td>2300</td>
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<tr>
<td>11866</td>
<td>R.</td>
<td>R. Nac. Congolaise</td>
<td>Lubumbashi, Congo</td>
<td>2300</td>
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<tr>
<td>11875</td>
<td>R.</td>
<td>R. RSA</td>
<td>Johannesburg, S. Afr.</td>
<td>2345</td>
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<tr>
<td>11890</td>
<td>R.</td>
<td>R. East BC</td>
<td>Manila, Philippines</td>
<td>1630</td>
</tr>
</tbody>
</table>

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**January, 1968**

www.americanradiohistory.com
One thing to remember, the transmission of a false distress or emergency call is a very serious offense and anyone caught playing this game is usually put into orbit by the FCC. The word MAYDAY is the international radio-telephone distress signal—never use it except when the safety of life is directly involved.

A flat tire on a lonely road may be a rotten break for you, but it does not call for a MAYDAY. If your car is involved in an accident where an ambulance or other medical aid is immediately required (or even if you come upon someone else’s serious accident) you can clear the channel with a MAYDAY, then proceed with the message of who, where and when.

When you’ve got a priority emergency or distress message, we suggest that you first fire up the CB rig on Channel 9. Call for any REACT station within range. That failing (and it seldom will fail), try to raise any station. Any CBer hearing the call will be only too anxious to offer you every possible cooperation and aid. Be brief and to the point, but give all pertinent details.

Operating Technique. No need to shout into your microphone when transmitting, all you’ll accomplish is the distortion of your voice to the point where you can’t be understood.

If you can’t get through by talking in a normal tone of voice with the mike about 3 or 4 inches in front of your mouth, then there is probably something wrong with your CB rig, or with the receiver at the other end of the contact.

Speak slowly and distinctly, and avoid long transmissions. The old maxim is, “Good grief, be brief!”

Summary. Keep these things in mind before you pick up your mike and press to talk:

1. Know the FCC’s CB rules, and live by them.
2. Use Channel 9 only for making the initial contact, then switch to another channel.
3. Monitor Channel 9 while you are not in communications.
4. Answer any call for aid.
5. Be courteous to all other stations; remember that no station has priority use of a channel (except in an emergency) and all must share and share alike.
6. Don’t transmit without first listening long enough to be certain that the channel is not in use.
7. Don’t use CB when a telephone is available.
8. Immediately reply to any FCC correspondence.
9. Be brief, but speak slowly and distinctly. Don’t shout.
10. If you suspect that your equipment isn’t functioning properly, don’t use it until it has been checked (and repaired if necessary) by a licensed and qualified service technician.

Those are CB’s 10 Commandments. Don’t be a CB sinner.
New Products
Continued from page 34

istance ranges for general, low and high resistance applications. Other ranges on special order. For more info write for Bulletin 501.1, Vytell Corp., Box 92, Arlington Heights, Ill. Price of Pack is $3.49.

Kits for Experimenter Kats

So you’re tired of electronic kits that lay out every move leaving nothing for the experimenter to fool with? Then you’d better investigate the new Radio Shack kit line that packs perf-board electronic projects which you bread-board. Flea clips packed with the kits let you solder or just connect—you change parts, redesign layout, or save parts easily. Six kits are currently available. They are: AC/DC power supply (No. 28-104, $6.95); “OTL” audio amplifier (No. 28-106, $4.95); transistor radio kit (No. 28-102, $3.95); transistor organ (No. 28-101, $5.95); wireless AM mike (No. 28-103, $3.95); 1-tube DC radio (No. 28-100, $3.95). At all Radio Shack stores; or write to Radio Shack Corp., 730 Commonwealth Ave., Boston, Mass. 02217, or 2727 W. 7th St., Fort Worth, Texas 76107, whichever is closer to you.

SWL’ing De Luxe!

The brand-new Heathkit SB-310 receiver will delight the finicky shortwave listener with selectivity that does away with guessing station identities—you return to the exact frequency every time. With its non-backlash vernier dial you get 10 switch-selected bands; 49, 41, 31, 25, 19 and 16-meter shortwave; 11-meter CB; and 80, 40 and 20-meter amateur bands. A 5-kHz crystal filter is included for AM, CW and SSB (there are optional narrower bandwidth filters for optimum CW and switch-selected upper and lower sideband coverage). The SB-310 also boasts a crystal-controlled front-end for same tuning rate on all bands, built-in switch-selected automatic noise limiter, prebuilt and aligned Linear Master Oscillator, separate RF and AF gain controls, calibrated S meter, headphone jack for DXing. “Subpack” packaging makes 20-hr. assembly possible, requiring only a VTVM for final alignment. The SB-310 kit is $249.00 (less speaker), and the Heath Co., Benton Harbor. Mich. 49022, will be happy to supply you with further information.

Adds Multi-Miking to PA or Recorder

The Bogen MX6A-T mixer-preamplifier is an AC-powered, all-silicon, solid-state unit which can be used singly to add 4 more microphones or other signals to an existing system. The 4 inputs can handle either high- or low-impedance microphones or electric guitars, each under continuous control through individual volume controls. Also, two of the 4 channels will accept tuner or crystal cartridge signals. The output of the MX6A-T is capable of driving any packaged amplifier through its auxiliary input, and it will also drive power amplifiers with 5-volt or better sensitivity. The unit uses standard phone jacks for high-impedance microphones and guitars; screw terminals for low-impedance microphones; RCA-type phone jacks for output to auxiliary input of public address amplifier or tape recorder. Size: 9 ½ x 6 x 2 ½-in.; weight, less than 5 lb.; price, $74.85. Ask for further specs from Bogen Communications Div., Box 500, Paramus, N. J. 07652.

Tool Kit Par Excellence

There’s everything in the JTK-5 tool kit by Jensen Tools that an electronics technician or experimenter could want for breadboarding. Listen: 2 needle files, 2 regular files, scribe, precision knife, 12-piece nut-driver, 2 wire-bending pliers, 2 diagonal cutters, slip-joint pliers, scissors, 7 screwdrivers, scale, slide caliper, soldering iron and solder, soldering aid set, tweezers, wire stripper, adjustable wrench, hex and spline-key wrench sets, 3/8-in. electric drill, drill case and set of 14 high-speed drills, socket hole punches (set of 4), ball peen hammer, center punch, hacksaw, taps, reamer, and 2 electronic alignment tools. All this in a 6 x 6 x 19-in. steel toolbox with tray. Price is $99.50. For a catalog describing the JTK-5 and other tool kits write to Jensen Tools, 3630 E. Indian School Rd., Phoenix, Ariz. 85018.
the crystal element. Do not put any pressure on or disturb the saddle: accidentally dropping the pickup arm may also destroy or crack the cartridge.

The defective stylus should be removed and taken to a record shop or TV dealer for replacement. If it has broken into several pieces, take all of them with you to help identify the part.

You can also locate the stylus replacement part number by referring to the manufacturer's operation booklet. If the booklet is lost, look at the back of the console or underneath the back cover for a model number. If possible, the original stylus should be replaced with one carrying the same part number. But in case the brochure has been thrown away and the model number of the phonograph torn off, take the old stylus with you.

In A Haystack. Perhaps the stylus has dropped out and can't be found; draw the outline of it as you remember it. Since there are dozens of different styli types, you're not likely to describe it properly and hope to return with the right one.

It is wise to scotch- or mask-tape the old stylus carton number to the back of the record compartment. The next time you need a new one, the information is close at hand. Don't leave the whole carton in the record compartment; during cleaning it can easily be thrown away.

After the stylus has been replaced, be sure its shank is lying in the “U” shaped saddle shown in Fig. 16. The stylus might be bent out of place, not touching the saddle—the result will be no music. A lot of styli are destroyed or lost when the cleaning cloth snags it during routine dusting.

It may be rather difficult to replace the stylus if the pickup arm will only pull up a few inches. In this case, drop the phonograph down by loosening the two side mounting screws and then replace the stylus.

Cartridge Check. Before removing the stylus, always check to see if the cartridge is functioning. Take your thumb or finger and lightly draw across the stylus. You should hear a thumping or rumbling noise. If so, the cartridge and amplifier are working.

In case there is no noise at all, the cartridge, amplifier or speaker is dead. Turn the volume on the amplifier wide open. If a hum is heard, suspect a defective cartridge.

Remove the cartridge hook-up wires and place a finger or the blade of a small screwdriver against one of the unshielded wires. You should hear a loud hum. If so, the cartridge is defective. If not, the amplifier or speaker is dead.

There may be two, three or four wires leading to the phono cartridge. The monaural cartridge has only two wires connected to it, as shown in Fig. 17. It may consist of a small shielded cable. Some low-priced phonographs have two separate, unshielded wires.

A phono cartridge with three or four wires indicates a stereo unit. Generally, the ground or shielded wire goes to each side of the cartridge with the “hot” or grid wires being inside of the braided shield, as indicated in Fig. 18.

Defective Cartridge. A defective phono cartridge may be cracked, become weak, and produce distorted, intermittent or mushy sound. The weak or dead cartridge will produce mushy or no sound in the speaker. A cracked cartridge will work intermittently. A cracked cartridge may result from dropping the pickup arm. See Fig. 19.

It is possible to have distortion or intermittent pickup in only one stereo channel. You can isolate the cartridge by switching the two channel hook-up cables. Either switch the cable at the amplifier or the cartridge hook-up wires.

For instance, if the left channel is good and the right channel is mushy, distorted, or intermittent, switch the outside cartridge hook-up wires. If the right channel is still inoperative, you know the cartridge must be replaced.

Intermittent. Now check for intermittent conditions while the switched wires are in this position. Simply place a new record on the turntable and apply a little pressure on the pickup arm. Be careful and use one finger to push up and down on the pickup arm. The intermittent cartridge will snap off and on with intermittent music. In case the amplifier is defective, a good place to start is to check all tubes.

Replacing The Cartridge. Some phone cartridges are bolted to the pickup arm while others snap into position. Hold the pickup arm up where you can see the cartridge. Usually, mounting screws will be located on each side of the cartridge assembly. A short Phillips screwdriver may be needed to get to
the screws. Snap-in type cartridges will pull down from the front end of the unit.

Other turn-over cartridges may be removed by first removing the small set-screw in the turn-over knob. A typical turn-over cartridge appears in Fig. 20. A thin screwdriver blade is needed to remove the small recessed screw. Be careful not to lose the small screw or tension spring on removing the cartridge.

After the phono cartridge has been dismounted, unhook the small connecting wires. Write the color code of each wire on a piece of scrap paper. Look for a ground wire under the cartridge mounting screws. See Fig. 21. Most connecting wires just plug into the cartridge. Others solder to a plug-on adapter as in Fig. 22.

**Clip Care.** Be careful when replacing or removing small wire clips. In case the wires are frayed at this point, resolder the clip connection; be sure it is removed from the cartridge when soldering, as excessive heat can destroy the cartridge.

Use rosin-core solder sparingly, as excessive solder can run into the clip and plug up the connection hole. It is best to grasp the clip with a pair of long-nose pliers close to the area to be soldered so solder can't run into the plug or connection.

Connecting wires on a turn-over cartridge can break off or become frayed and short against one another. Poor or no sound can result from this condition. Check the wire connection on all replaced cartridges for possible trouble.

Excessive hum from the phonograph may be caused by an open ground or connecting wire. Turn the volume down to see if hum originates in the amplifier or tone arm. If the hum is still present, check for a dried-out electrolytic filter capacitor in the amplifier and replace it.

In case the hum disappears when the volume is down, look for a broken wire or shielded cable. A defective cartridge can induce hum when the amplifier volume is wide open. This is the result of the cartridge output voltage failing to override the open ground or grid line. Try reversing the two cartridge wires in a monaural phonograph. Check the common center ground wire in a stereo pickup arm for an open circuit.

**Genuine Parts Only.** A cartridge should be replaced with the original part if possible. If not, there are many replacement cartridges on the market. See Fig. 23. Be sure the new cartridge has approximately the same output voltages and weight as the original. Correct weight may be checked if a stylus pressure gauge is handy.

Check the cartridge for correct wiring connections after installing the new cartridge. See that the stylus is riding in the "U" shaped saddle. If the cartridge is the turn-over type, rotate the turn-over knob to see that the small wires and clips do not touch. Now turn the volume up and thumb the needle of the new cartridge. A rough sound should be heard.

**Check The Changer.** While replacing the stylus or cartridge, a few, quick checks should be made on the record changer.

See if the pickup arm sets down at the starting point of the record. If not, look for adjustment screw on back or underneath the arm. Adjust until satisfied that the landing point on two or three different records is correct.

Now check the inside reject point. This adjustment is under chassis and it is wise to let a known Radio-TV repair shop make this and other critical adjustments. If 45 RPM records don't change as they should, use talcum powder on the large spindle.

You may even want to pull the record changer or record board from the cabinet to clean up properly. See Fig. 24. Generally, several Phillips head screws hold the turntable to the cabinet. To check adjustments on the record changer, you can prop it up on two quart paint cans.

Armed with the straight dope, the future care and feeding of your record player shouldn't be a problem, and can even be downright fun. Happy playing.

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Fig. 24. Most changers can be removed for servicing by unscrewing the two bolts on each side of the base plate.
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It's the brand new High Standard Model 10 Police Shotgun, the mean- est, deadliest close-range weapon in the arsenal of law-and-order! Small enough to be carried in a holster, it can spit out 60 .32-caliber pellets in less than 5 seconds. Read about it in the December S&M!

Don’t miss the December S&M, on your newsstand October 24th!

The Big Payoff
Continued from page 65

through the written word and still photos. A video camera can pan across a broad scene to show the relationship of objects one to another; an observer can simultaneously add voice descriptions to the sound track. Also, the re-enactment of crimes would be more vivid and informative if put on video tape than if described only in written reports.

Roving Record. Mobile equipment could be used by police for surveillance work in areas where trouble can be anticipated. A police officer in a patrol car (or in a van or truck not identifiable as a police vehicle) could tape a street scene, then retape it during later trips through the area. Simultaneous comparison playbacks of the tapes would instantly reveal any changes that had taken place in the period between tapings; the tapes would eliminate normal human errors deriving from limited observation or recall. This surveillance technique would be akin to aerial reconnaissance methods used in warfare.

Making a dishonest living is getting tougher all the time, and video tape is apparently going to make it even tougher. When someone taps lightfingered Louie on the shoulder and says "Smile, Crookster, you are on candid camera," it isn't likely to be the amiable and talented Allen Funt of TV fame. It will be a camera-toting police officer talking. But a sense of humor won't help the law-breaker very much. We suspect that the real laughing will be done in the police squad room when Louie's TV performance hits the monitor screen.

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January, 1968

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Variometer Radio. One diagram shows the variometer used in a crystal radio. This hook-up is beautiful in its simplicity and performs well when used with a good water pipe ground, and an outdoor antenna at least 50 feet long. A variometer is not very selective when used alone in a tuned circuit, but it is fine for the many localities where there are only a few local broadcast stations.

The other diagram shows the variometer used in a diode-transistor radio, the transistor providing one stage of audio amplification. No battery switch is used—you cut the current by pulling out one of the earphone cord tips.

You might want to try other experiments, such as connecting a 365-pF variable capacitor across the variometer, or in series with the antenna lead to increase selectivity and tuning range.

In any case, resurrection of this quaint variable inductor can be both an interesting and informative way to spend a few hours. And the use of a little imagination can undoubtedly find a variety of other uses for this oldie, but goody.

Utility Happenings. While we have dealt mostly with SWBC transmissions, utility and distant BCB stations can play a part in the SWLs search for news. Of particular importance in the utility field are 2182 kHz, the international (marine) distress and calling frequency; and 2670 kHz, the U. S. Coast Guard calling and distress channel. Whenever there is an emergency at sea, these are definitely the stops to tune the rig to. Of course, DX reception is possible only at night.

Meanwhile, during local emergencies such as flood, riot, or hurricane, AM broadcast band stations in the affected area will often remain on the air all night. Sometimes even stations with daytime-only licenses will be permitted by the FCC to remain on during the hours of darkness. And when such troubles do occur, you will be able to quickly determine frequencies from WHITE'S RADIO LOG and virtually be where the action is.

Pearce-Simpson Guardian 23B Transceiver

100% modulation.

The 23B comes equipped for transmitting and receiving on all 23 CB channels. All you need buy is a microphone (base station type) on a stand and you're in business. Price of the 23B is $269.90. This unit was tested and reported on in the CB BUYER'S GUIDE, 1967 Edition by the Editors of this magazine. Some of the hot specs are: input sensitivity, 0.4 µv; adjacent channel rejection, 65 dB; image rejection, 90 dB. Check the GUIDE for the complete report.

Stop Citizens Bandits. Here's a little item which should be popular; it's a clever way to scare off would-be robbers of your mobile and base station CB gear.

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in bright yellow letters on a green background "Warning, Protected By LECTRONIC Automatic Alarm System." Peel off the protective covering and slap this on your car or home window and you can be assured that nobody is going to touch anything that isn't supposed to be touched.

These stickers are the same ones used by folks who really have alarm systems so professional thieves know them "from way back" and give them a wide berth.

Order yours from C.E.S.R., 4 Parish Court, Stony Brook, N. Y. They're 25¢ each or 3 for 50¢. Money back guarantee!

What's Your Poison? Okay, this is your CB column. Why not tell us what you like or dislike about it? The editor would like to know. Just send a post card in care of the magazine and help him to help you.
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