K9YA Telegraph

Robert F. Heytow Memorial Radio Club

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CONELRAD for Hams

Control of Electromagnetic Radiation

Philip Cala-Lazar, K9PL

Early in the Cold War, before intercontinental ballistic missiles became a reality, it was long-range heavy bombers carrying nuclear payloads that posed a major threat to the American homeland. It was thought these enemy aircraft would home in on radio signals emanating from the United States.

To deny that navigational resource to the enemy, President Harry S. Truman, in December 1951, signed into law a means for the *control of electromagnetic radiation*, forever more known by its acronym, CONELRAD.

Chicago Daily Tribune
December 11, 1951: Truman Edict Sets Up Radio, TV Blackouts

President Truman signed an executive order that would blackout electromagnetic devices in the event of "…hostile action endangering the nation."

The devices covered by this decree was encompassing and included: *All radio stations, including police and fire alarm systems; all television stations; neon signs; electric lights* [?]*; electric razors; elevator motors; spectroscopes; therapeutic devices and medical equipment, including X-ray equipment; automobile ignition systems; industrial heaters; diathermy equipment; mercury vapor lamps; and radar food cookers.*

Looking over that rather draconian list it is apparent the country would come to an absolute standstill if and when the decree was enforced.

The President had also asked for the government's power to "confiscate all radio and television stations and other devices which send out radiation." The scope of that empowerment is mind-boggling and Congress refused to grant it.

Stating it was "theoretically possible for air raiders to locate New York City by its electrical noise level," Major General Francis L. Ankenbrandt, Air Force director of communications, said the bill was necessary to "…counteract activities of saboteurs, spies, and fifth columnists who would guide an approaching enemy air force."

> *"…saboteurs, spies and fifth columnists."*

The National Association of Broadcasters opposed the decree. NAB president, Justin Miller, said such an authorization "…to close down a broadcasting station, under the guise of an emergency, meant control of a great media of news and information."

This was countered by Presidential Secretary Joseph Short who averred, "…procedures authorized under the executive order had been worked out in conference with radio and television broadcasters and the FCC." He added, "…this system of controls will be triggered by an air attack or threat of an air attack," and cautioned against a "'misunderstanding' of the decree."

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Inside This Issue...

A Blast From the Past

A Modern Crystal Radio

Paul W. Ross, W3FIS

Exterior View of Finished Receiver

It has been many long years since I started to fool around with radios. I remember building a crystal set as an early project, using an actual galena crystal for the detector. Well, technology has changed, and I decided to see what I could do some 60 years later.

After doing the obligatory research on the topic on Google, I decided on the following design objectives:

1. Try to use generally readily available parts - Radio Shack, the local hardware store, and on-line suppliers for anything unusual.
2. Be able to use a variety of output devices – a crystal headphone, "Walkman" style phones, or an external amplifier. A matching transformer will be necessary.
3. Something that would be fairly compact and nice appearing. I also wanted one that could be taken on trips or in the field, if desired.
4. Be able to be connected to long-wire antenna, or external antenna tuner and the other antennas in the ham shack.

"…technology has changed…"

Now to the Specifics

For a coil form, I picked up a 1 1/2" PVC pipe union from the local hardware store. It actually measures 2" in diameter, and is 2 1/2" long. It is mounted with a pair of 1/4" nylon bushings and #4-40 machine screws tapped into the ends. If you don't have a 4-40 tap, use nuts and lock washers, or long enough self-tapping screws. Small blocks of wood or sections of hardwood dowels would work for standoffs.

Some calculations showed that the coil should be wound with about 80 turns of #26 wire (I just happened to have a spool of that size on hand). I would need taps for input and output matching, so I divided the windings into eight sections of 10 turns each. Taps were created by drilling 1/16" hole pairs and threading the wires through the hole pairs to anchor the ends of each section. When wound, the coil was given two coats of clear urethane varnish to secure the wire.

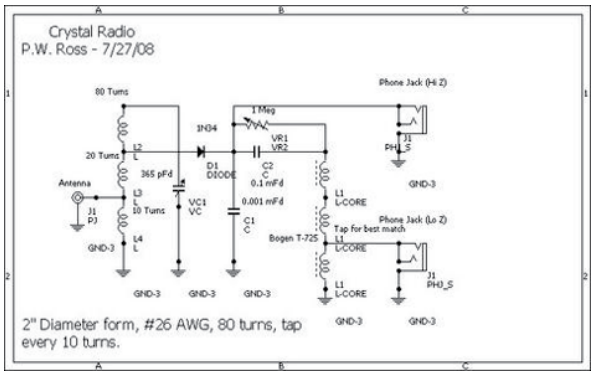
In retrospect a "twisted" tap design might have been more convenient to make, but with the holes you don't need four hands to hold the coil and make the taps.

Make sure to clean the insulation from the wires and check for electrical continuity with an ohmmeter when soldering the junctions between coil segments. A piece of shrink tubing or vinyl spaghetti was used to insulate the taps.

For a case, I made a trip to Michael's, a local crafts and art supply store. They had some nice, inexpensive, and unfinished wooden boxes. For a front panel, I used a piece of 1/8" plywood from the same place. Everything was either painted or stained.

The general layout is not critical. The major issue was to get everything on the panel. The panel is retained in the box with four small wood screws screwed into 1/2" square basswood cleats (from Michael's, as well). I found the wood back in the crafts section, or could have gotten it from any good hobby store.

Don't glue these cleats in place until you find out how deep the assembly is going to be. You need to clear the coil on the bottom, and the antenna posts on the top so that the case will close. The Bogen



Simple Crystal Detector

Robert F. Heytow
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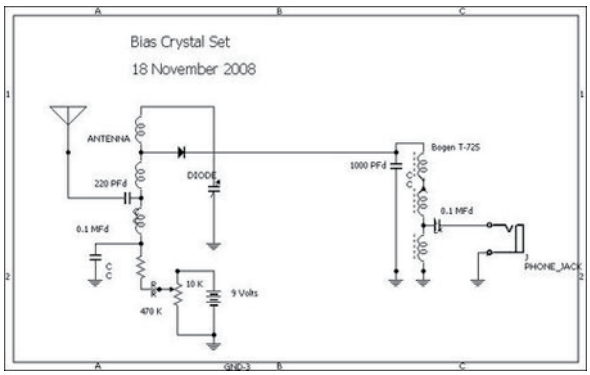
T-725 transformer used for matching was mounted to the back of the panel with #8-32 machine screws and nuts.

I had the coil and transformer in hand before I went to find a box that would fit my needs. If you have access to good shop facilities, you can, of course, make your own box.

The antenna connections are made with either a pair of binding posts, or a UHF coaxial jack. The coaxial jack was used so that connections could be made to my MFJ-16010 antenna tuner, and the random wire antenna in my ham shack, if desired.

The variable capacitor came with only one mounting hole tapped. Two additional mounting holes for the variable capacitor were carefully tapped with a #6-32 tap. The 365 mfd variable capacitor was then mounted to the front panel with three short #6-32 pan head screws. Make sure that the screws do not interfere with the rotation of the variable capacitor plates. Any good size knob will do to tune the set. Bigger is better here, unless you have a capacitor with a vernier drive.

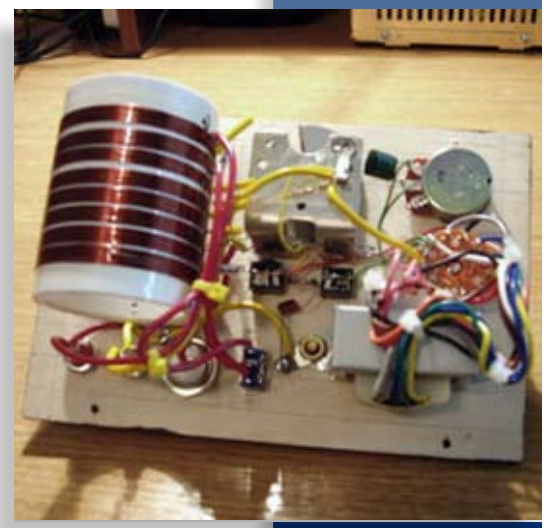
The output is through a Bogen T-725 matching transformer and a 12-position switch. Each possible tap on the transformer was used. This gives me a range of 8 ohms through 40k ohms output. The bottom position on the tap switch was "ground" to short the output, if desired. The next to top position on the switch is the 40k ohm tap on the transformer, and the top position is to the junction between the diode and "Benny" circuit. The 1 megohm pot is wired so maximum resistance is at the clockwise position. For low-level signals, the setting doesn't seem to be critical. A jack is also provided for a crystal headphone. This is a mono jack. The regular output jack is a stereo jack (tip and ring) to the wiper on the tap switch. The frame of the transformer is connected to the circuit ground with a solder tag under one of the mounting bolts.



Schottky Crystal Circuit with Bias Adjustment

There is space with the lid closed to hold the crystal headphone, and a coil of magnet wire for an antenna.

The antenna tap is to the first tap from the bottom of the coil (10 turns). The crystal goes to the second tap (20 turns). The variable capacitor is connected to the top of the coil. However, to get full broadcast band range, I used a small SPST toggle switch to select either the top of the coil, or two taps down.



Interior View of the Finished Receiver

After using the usual germanium diode as a detector, I decided to explore Schottky diodes, which have better rectification characteristic. Unfortunately, these diodes require a slight forward bias for optimum performance. To this end, I removed the "Benny" circuit and substituted a 10K audio taper potentiometer with a 9-volt battery. The switch on the 10K pot was used to switch off and on the battery. I am prone to forget to turn things off, so I wired a small red LED as a pilot light.

> *"After dark, things get more interesting."*

It is very interesting using the Schottky diodes. Adjustment of the bias control actually "tunes" the detector for maximum effectiveness. The strategy is the same as used in early Carborundum® and other mineral detectors.

To further enhance things, I put in a SPDT switch to select between the Schottky diode and the original germanium diode. In germanium diode mode, I simply do not turn on the bias circuit.

I found the best performance to be with a good ground, a 40' long wire antenna, and one of the Radio Shack "mini" amplifiers. A longer antenna is better. I finally ended up with a "stealth" antenna out the window about 50' long of some of the #26 wire. If you get more than five feet away from it, it is essentially impossible to see.

During the day, as might be expected; you can only pull in local stations. After dark, things get more interesting. ■

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My Most Interesting QSO

Len Kinaitis, KD8FKD

Len, KD8FKD

My most interesting *and* memorable QSO was my first CW contact, which occurred on August 16, 2008. Let me just digress a bit here to put this in perspective.

I've been interested in ham radio since my early boyhood days. Ah, but life got in the way and it was many, many years before I finally took the Technician test. That was on Saturday, February 24, 2007. Those astute readers out there may recognize this date as the very next day after the abolishment of the Morse code test requirement for any ham license. Anyway, I passed and went on, got the General class a month later and then, finally, the Extra about nine months later. I spent the first year or so of my ham career on 2-meter repeaters in my area, then got a HF rig and "worked" the microphone on SSB. But my real desire was Morse code. I've had a fascination for code since my boyhood days. I can't really explain it, but I wanted to do code more than anything else in ham radio.

Now I have to say that code did not come easy for me. It was quite a challenge for me (and still is). I don't have one of those "musical" brains that could pick it up easily. I practiced and practiced until one day I felt I was ready to try an on the air QSO. It's now or never!

Little did I know that my first CW QSO was with a ham radio celebrity and legend. It was none other than *K9YA Telegraph's* own staff cartoonist, W9CBT, Dick Sylvan! I didn't know that at the time, but was thrilled when I found out later.

Since then, I've had many CW QSOs and it has become my favorite operating mode. In fact, I do CW just about 100% of the time now.

Thanks Dick! That was one interesting and memorable QSO! ■

Dieter Klaschka, DL2BQD

I really don't remember my very first QSO. Perhaps it was on SSB in the early 80s with a Teltow 215, 100-watt, club station transceiver in the GDR.

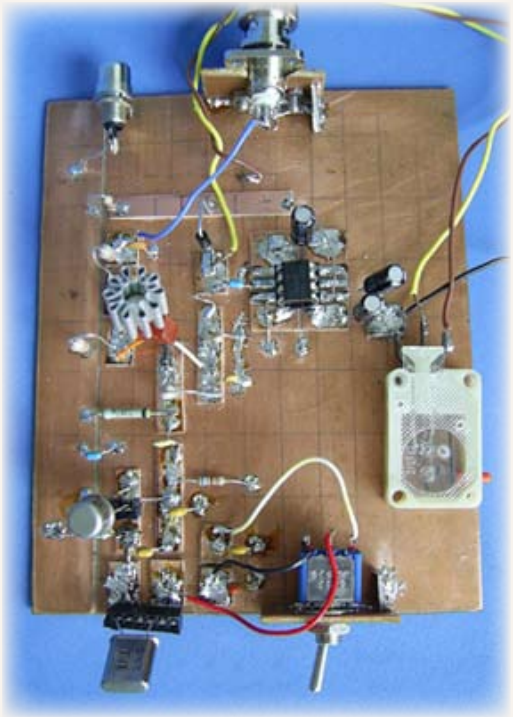
It's the QSOs from 21 May I remember well. 500mW into a ZM and a 40-meter dipole, 16 metres up. You can see the very miraculous riglet in the photo.

PIXIE 2, Manhattan style without sidetone.

I put two stations from the very north and mid-Germany into the log during the annual Minimal Art Session activity. There were heavy thunderstorms in the northwest—I used a micro-switch as a key—it worked!

I have the DXCCqrp and built some popular kits, but I have never had so much joy with a rig.

The PIXIE has a very long history and there are thousands of stories about it. When you have reached all your goals, why not come back to the roots?



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K9YA Field Day - 2009

Mike Dinelli, N9BOR

Field Day is a lot of work. It's not so much the 24 hours of the event, but the preparation leading up to it. If you've ever done any painting, you know what I mean. The painting is the fun part, but the necessary prep work is the work part.

We had four participants on the day of the event: John, AAØBP; Steve, N9WAT; Art, WB9JKZ; and myself. We operated class 1A (one transmitter/club station) off the grid. Team K9YA, likes it simple and efficient, so we equipped ourselves with proven legacy gear. Our station consisted of a Kenwood TS-850SAT with cascaded mechanical filters and three inverted vees on a single feedline. We used a 24-foot aluminum tower with a 15-foot mast as center support. Logging was performed with a boatanchor laptop computer and TR software running DOS. We brought backup equipment for every part of our station—just in case.

Location, Location, Location

Our idyllic Field Day site is located in northern Illinois at Camp Lakota—a Boy Scout owned facility. It's 90-minutes northwest of downtown Chicago. There is plenty of room for our operation and it becomes a wonderful stage for curious Scouts. It's fun fielding their questions and watching them listen to on-air Morse code through a spare set of headphones. "Is the computer decoding the signals?" asked one Scout. "No, we only use the computer to log the information; the code is copied by the operator." "That is so cool!" he said. We think so too.

> *"That is so cool!"*

Art, WB9JKZ

It wouldn't be Field Day without rain and lightning. Our tower was located on high ground in the middle of an open field. At the first sign of lightning, we throw our coax back towards the tower and take shelter. We haven't lost a team member yet and don't want to take any unnecessary risks with Mother Nature.

Steve, N9WAT, (L) and John, AAØBP, (R)

Eclectic Technologies

As we waited for the storm to pass, Steve is watching weather radar on his Blackberry. Over our two-hour break, we followed the storm heading east. Most of the storm was south of us moving very slowly. At some point it hits me that we are using technologies spanning well over 100 years. From Morse code to live weather radar on a handheld cellular computer. We mused that if we were hit with a tornado, our modern cellular technology would probably be useless. Our off the grid, legacy CW station would still be working though.

Even though we are somewhere around the bottom of the solar cycle, we're working station after station on 15-, 20-, 40- and 80-meters. You get a feel for the operator on the other end by the way they're sending. Sometimes it's fast with perfect timing and sometimes it's slow and shaky. Still, we have a meeting of the minds as we convey information to each other. Occasionally we run into someone we know and send a quick "HI" or "dit dit." It feels good.

Dawn Breaks

A string of Christmas lights adds ambiance to our portable station. Otherwise, it's pitch black overnight and you can't see five feet in front of you. We know our tower is straight ahead, but it's completely lost in the night. Around 4:00 a.m. outlines form as the sun begins to rise at the distant horizon. The last time I enjoyed a sunrise like this was last year's Field Day.

At the end of the day, we're 1,162 QSOs richer. Time well spent. I can't wait until next year. ■

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An Oddball Vertical

Bargain Parts and Lots of Fun

Rod Newkirk, VA3ZBB/W9BRD

The onset of TV after WW2 brought with it 300-ohm twinlead. Hams grabbed bargain rolls of it to try folded dipoles, one-band antennas (we had no 15-meters) that became quite a fad. The single-band FD faded away as quickly as it had appeared. Some OM down south, probably doodling with his Smith Chart, found that an 88-foot wire, center fed, gave him an acceptable 300-ohm match on 40- meters. The extra length could be dangled. Not only that, the match held for 20- and 10-meters, providing a neat multiband antenna that needed no tuning.

A 44-foot version interested me. I had been toying with the idea of trying a vertical atop my uncle's three-story building on Chicago's north side. HF verticals were frowned upon generally at the time. As one western DX man put it, verticals were non-directional, equally weak in all directions. But I knew a few hams who were getting decent results with vertical radiators. Twenty and 10-meters were jumping with DX. Feeding a two-band vertical with one flat feedline seemed feasible.

I mounted a 22-foot war-surplus whip on a 16-foot wooden 2" x 2" and ran some No. 12 wire down to a bend at the bottom, giving me my 44 feet. Standoff insulators at the top of the pole were the guy points and feed connection for the 300-ohm line. The connection angle was fairly obtuse. Twisting the feed line on its 150-foot run down to my cellar ham shack should minimize any interaction with the radiator. No tuning was required for 20- and 10-meters, coupling to the rig being a few turns on a swinging link near the cold end of the final coil.

Verticals in city locations attract all sorts of manmade QRN, especially auto ignition noise. I was armed with a brute-force noise blanker that produced clean holes for CW work. There was a busy street intersection half a block away that could have put me out of business. The tip of the antenna, about 80 feet high and in the clear, was vulnerable to static discharge from any gray cloud passing by. An RF choke to ground eliminated the tick-tick-tick. I was all set to give it a go.

Every ham had TVI to some extent at the time. TV transmitting stations had moderate power and there were always people who insisted on using rabbit-ears in their basements. I stayed off the air on prime time, anyway. My high-visibility antenna drew many a telephone call when I was nowhere near my shack. Good thing my uncle was a patient sort.

Running no more than 40 or 50 watts I got impressive results. I couldn't compete with good Yagis on towers, but my DX total was climbing. DXing was a different sport in those days. Hams didn't help each other to higher countries totals. It was every ham for himself. No clusters and no DXpeditions. You kept your own secret stalk list. Soon you became aware that the guy on Easter Island had his coffee at 5:30 a.m. just before he CQ'd on his favorite portion of 20-meters. I caught a few rare ones before they had a chance to transmit.

Homebrew Class C finals made 10-meters so rife with harmonics that you called CQ TEN CQ TEN to let folks know you were really on the band. Conditions were superb, the peak of a solar cycle. Next month I intend to tell you how that simple vertical turned into the best DX antenna I've ever had. I wish I had it now. ■

Ham Quips

DICK SYLVAN, W9CBT

WHO SAID YOU CAN'T TAKE IT WITH YOU!

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K9YA Telegraph

CONELRAD: Warning Yellow

When an air attack appeared "probable" the U.S. would be placed under a "Warning Yellow."

CONELRAD: Warning Red

When an air attack appeared "imminent" the U.S. would be placed under a "Warning Red." In the period between Warning Yellow and Warning Red radio stations would be notified, via landline, of a "radio alert." During a radio alert radio broadcasting stations would interrupt their carriers for five seconds, return to the air for five seconds with an unmodulated carrier, again interrupt carriers for five seconds, and return to the air with a 15-second, 1,000 cycle tone followed by the announcement they were leaving the air and for listeners to tune to 640 kc or 1240 kc. These frequencies would be utilized by a group of specially designated stations that would transmit for a time, on one of the emergency frequencies, leave the air, and be replaced with another specially designated station. In this manner approaching aircraft would be denied a fix on a specific station and location.

Therefore, hams of a certain age and some younger folk smile knowingly at mid-century broadcast receivers bearing little triangles, circles or the letters CD (Civil Defense) at 640 kc and 1240 kc on the dial scale. Of course, this control of electromagnetic radiation included amateur radio stations.

For the general listening public it was a mostly passive exercise; in case of a national emergency they'd be directed to tune to those little triangles for news bulletins and information. For hams, beginning on January 2, 1957, when FCC Part 97, §12.190 through §12.196 became effective, much more responsibility and vigilance was demanded. Amateur radio operators were directed to monitor a broadcast radio or television station before operating and every ten minutes while operating to hear if a CONELRAD radio alert was in effect.

Here is the FCC's decree to U.S. amateur radio operators.

§12.192 Reception of RADIO ALERT. (a) The licensee of a station in the Amateur Radio Service is required to provide a means for reception of the CONELRAD RADIO ALERT or a means for the determination that such ALERT is in force.

(b) All operators of stations in the Amateur Radio Service will be responsible for the reception of the CONELRAD RADIO ALERT or indication that such ALERT is in force by:

(1) Reception of a CONELRAD RADIO ALERT MESSAGE which will be broadcast by each standard, FM and TV broadcast station on its regular assigned frequency before they leave the air; or

(2) reception of standard broadcast stations operating under CONELRAD requirements during the period of the ALERT on 640 or 1240 kc.; or

(3) determining that an ALERT is in force by lack of normal broadcast station operation (observations made before every amateur station operation is begun and at least once every ten minutes during operation thereafter will be considered as sufficient for compliance with this section); or

(4) other means if so authorized by the Federal Communications Commission.

Even before this decree hams and others had been designing and using CONELRAD monitors. The August 1954 issue of *Popular Mechanics* offered the four-page article "HOW TO BUILD A LOW-COST CONELRAD MONITOR," by Athan Cosmas, W2PKD.

To help hams meet the compliance deadline in elegant fashion, the June 1956 issue of *QST* presented "Conelrad Alarm Circuits: *A Symposium of Radio-Alert Ideas*."

Now that the time had arrived, George Grammer, W1DF, offered practical advice and some monitor circuit designs in his article, "Conelrad Compliance: *Suggestions for Observance of Rules on Radio Alerts*," in the January 1957 issue of *QST*.

From contemporary sources it appears most hams complied using an inexpensive AC/DC All-American 5-tuber, turned on at the beginning of an operating session, volume set at minimum and turned up at 10-minute intervals to intercept a CONELRAD alert. Other operators purchased ready-built CONELRAD monitors, built one of several available kits or home-brewed a monitor from their own or published plans. These designs provided visual and/or audio confirmation that all was well, or not. Often, it was a flickering incandescent bulb or neon lamp that provided evidence a voice or musical program was in progress

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and all was well. If the visual signal extinguished (five-second carrier off) or went to steady output (15-second tone) it indicated a CONELRAD alert and time to switch off the transmitter. Some monitors had an audible signal to accompany the visual warning while others could automate transmitter switch off via a built-in relay or provided terminals for a user-supplied relay.

August 5, 1963 marked CONELRAD's demise. The arrival of ICBMs and their sophisticated inertial guidance systems impelled the end of a program whose operational life spanned the close of one military era and the coming of age of another.

August 5, 1963 was also the date that saw the Emergency Broadcast System arise from CONELRAD's ashes. ■

References Consulted

Chicago Daily Tribune, December 11, 1951

Popular Mechanics, August 1954

QST, January 1956, June 1956, January 1957, April 1957

The radio amateur's handbook, American Radio Relay League, West Hartford, Conn., 1961

Time, July 12, 1963

CONELRAD Equipment

Amateur radio equipment manufacturers promptly responded to the CONELRAD edict by offering hams a range of monitors as kits and pre-wired units.

Conalert, Kaar Engineering Corp., Palo Alto, Calif., no price listed.

Morrow CM-1 Conelrad Monitor, $39.50.

Regdon's QRT Conelrad System Kit, $16.50 (including tubes).

Walter Ashe Radio Co., Conelarm, Model CA, $16.50, "Not a Kit" and "Ready To Use." This monitor featured a very nifty Civil Defense triangle logo on its front panel.

Wiens Conelrad Alarm, $39.50, completely wired and tested.

World Radio Laboratories WRL Conelrad Kit with printed circuit, $22.50. Completely wired, $29.50.

Beginning March 1958, **Heathkit** offered its **CA-1** monitor kit priced at $13.95.

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