

# FM

IN THIS ISSUE --

AMATEUR REPEATER  
REPORTS

50¢

JULY 69

The National FM Journal



Volume Three

Number Seven

JULY 1969

Cover Photo: W5UK Repeater Site, on the International Trade Mart in New Orleans, Louisiana

VOL. 3 # 7



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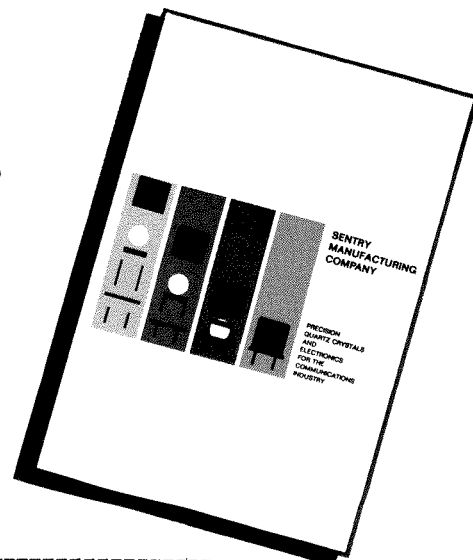
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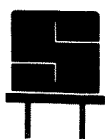
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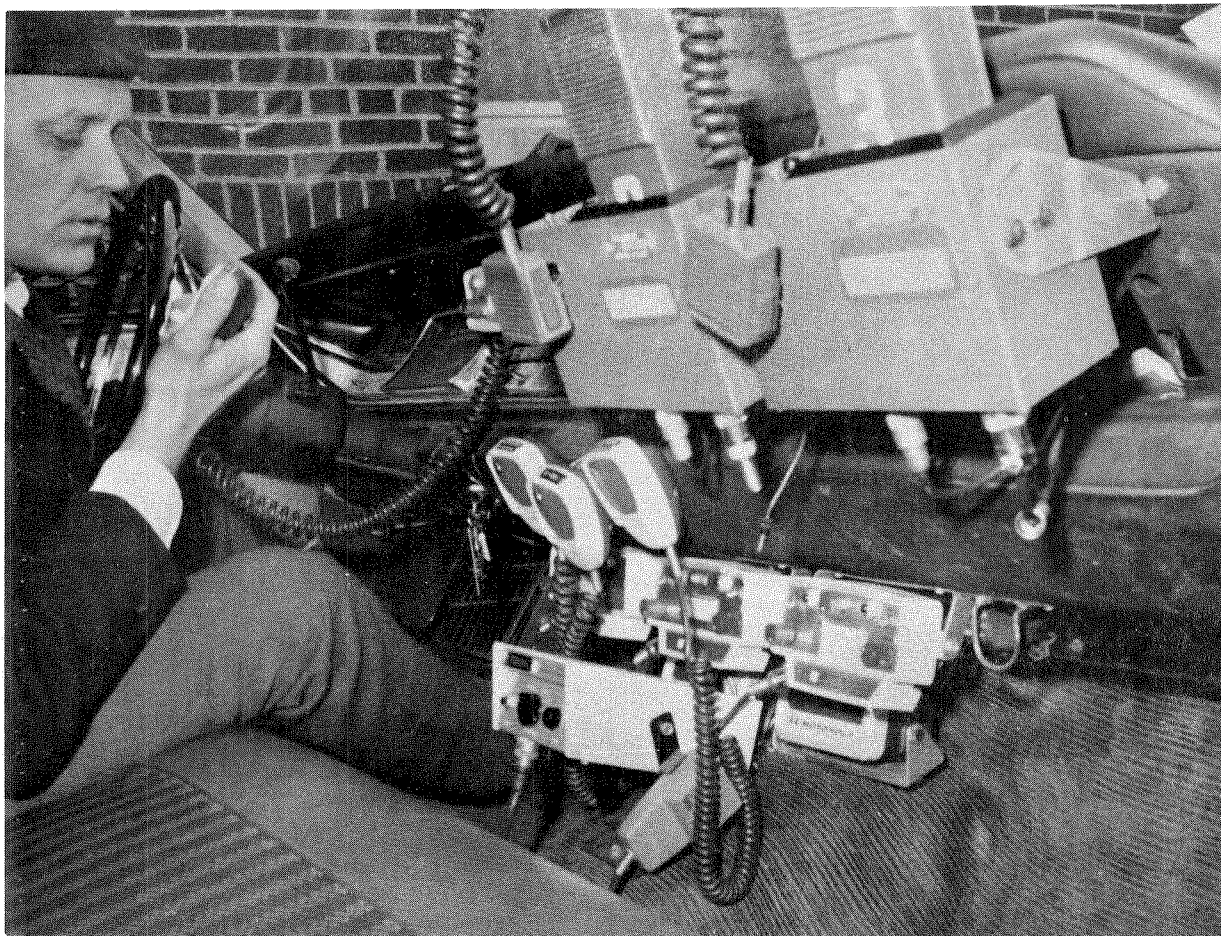
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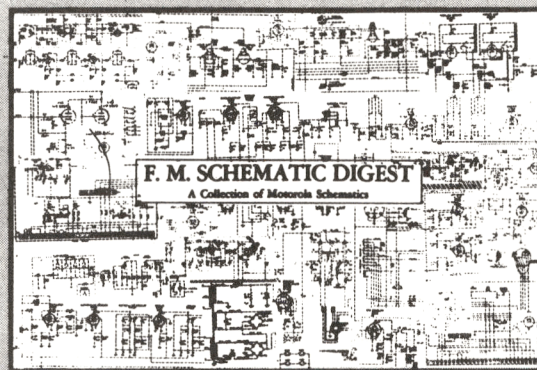
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## **editorial**

WA8UTB

Michael  
Van Den Branden

I have always tried to tell it like it is, and, at this time, there are a lot of things to be aired. Big and small changes have been made in the FM JOURNAL operation, all intended to help create a more ship-shape publication. The real observant reader might have already noticed, on the staff credits page, some of these big changes. I am sure that everybody has noticed another big change. That of the size of the publication.

The biggest jolt to a lot of the readers is that Ken Sessions, K6MVH, is no longer the Editor or even on the staff, as of this issue. I feel that you are entitled to an explanation for this, so I will try to make an account of the events which led to our separation. First let me say that Ken helped a lot to make FM what it is today! He volunteered his services to edit the material received for insertion

over a year and a half ago and since then had edited most of the copy. Not long thereafter, he wanted to be the advertising manager also. Eventually the problems began to get more difficult. What made these differences even worse was that they had to be settled on the telephone. Our individual phone bills were constantly over \$150 per month. Also, everything had to be mailed back and forth and usually by Air Mail/Special Delivery because of the time involved. The cost of this split operation in itself was not economical. Last month, Ken took a job in Chicago, Illinois leaving his family back in California until he was sure of the move. The straw, that broke the camel's back, was that I was almost the last person to know of this move. As a matter of fact, he called me from the Chicago area, collect, to tell me, almost a week after I had gotten the news through the grapevine. On Sunday, August 10th, I went to Chicago to attend the Annual Hamfester's Hamfest anticipating seeing Ken bright and early, since I had to drive five hours to get there and he lived a few miles away. I was surprised that he did not appear until afternoon. Then we discussed getting this issue printed and out. He remarked that he did not have anything ready yet. I said then, obviously the Journal would have to be published without him. After a few more exchanges Ken decided to take his leave of the Journal altogether.

The next thing I have done, is to move our mailing operation away from the Main Detroit Post Office. I am now mailing the Journals from the St. Clair Shores, Michigan Post Office which handles considerably less mail and should help to move the mail out faster.

Next we have taken out the Reader Service Cards, on which you circled the number that would correspond to the advertiser from whom you wanted



more information. It is replaced by a page with Information Request Blanks which we hope you will fill out and send them directly to the advertiser. This will save on time, so that you will get your information as soon as possible and also will relieve from us here a large burden of paper work. Please use these forms, so that the advertiser knows that you saw his product in the FM Journal.

The next change was forced on me by some of your fellow readers. Previously I have accepted new and renewal subscriptions on a Bill-me basis. We have found this impractical and expensive. Hereafter, payment will have to accompany the order. As usual, the Free \$7.00 crystal offer from Sentry which is offered with a three year subscription for \$14.00, will continue as long as Sentry feels that the offer is being met with good acceptance. Also, along this same line I have had to cut-out the nice free return post cards because they were costing me seven cents apiece which was okay for a new subscriber. However, to many guys have been using them to tell me of their new address or worse yet some just wanted to drop me a note.

You should also notice that the content of the Journal is changed a bit. Now that I will have control of the subject matter going into FM, I am sure that things will look a little different. I believe that everyone's view has a right to be heard, and I do not feel that, just because I do not agree with some one's ideas that their plans should miss being published so that the FM body themselves can make up their own minds. The FM Journal is your voice, so use it! Others want to know what you are doing and just what you think.

I guess that's about all under our new policy. Thank you for your Patience and understanding in this period. I hope to see you all at the up-coming conventions.

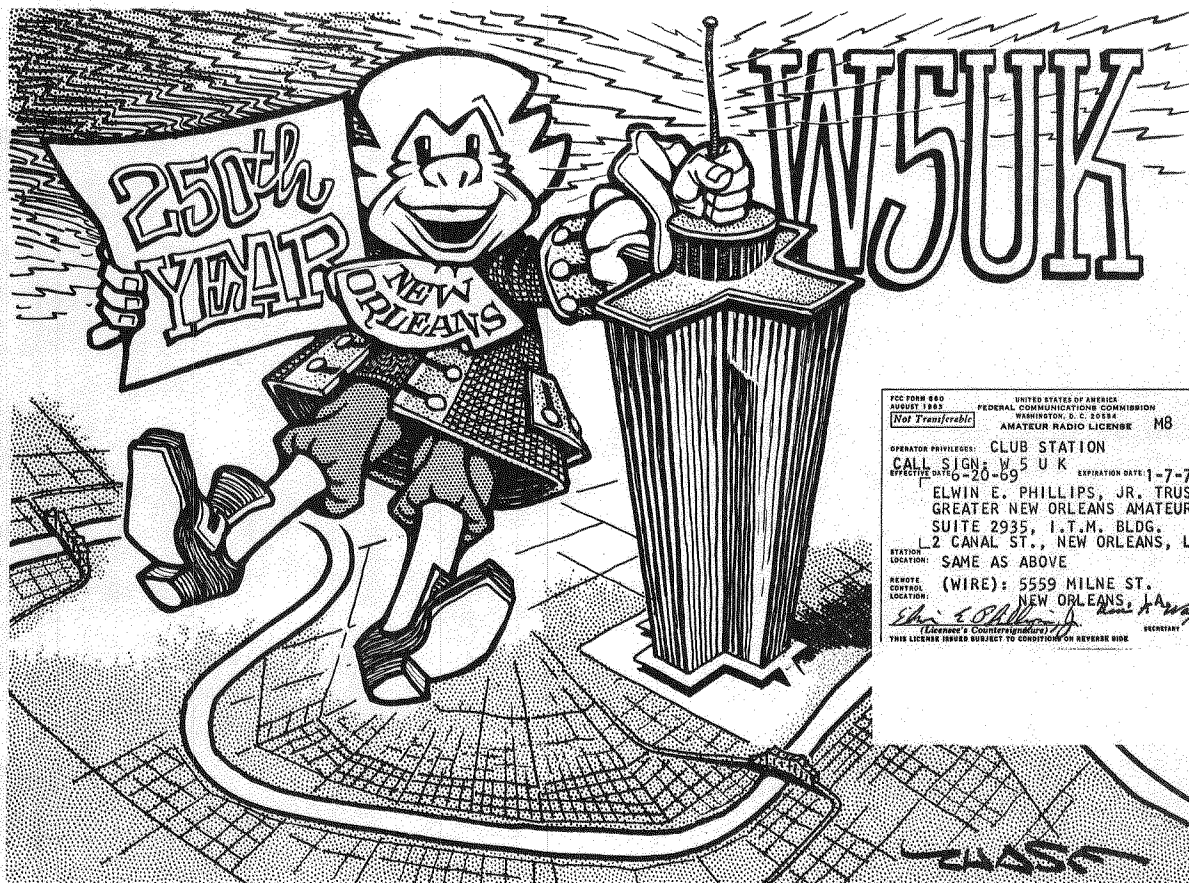
## 10 CODE

Many letters arrive daily from our readers making comments pro or con on The Amateur use of "10 Signals". Like them or not, they are present in certain small areas of the country. Your staff here at FM will not take a stand on this matter, other than to say "we don't use them ourselves".

For the many requests received we are printing the complete APCO (Associated Public Safety Communications Officers, Inc.) Official Ten Signal List. This list is for your information only, we are not recommending its use on Amateur Frequencies.

Associated Public Safety Communications Officers, Inc. OFFICIAL TEN SIGNAL LIST		
10-0	Caution	10-50 Accident (F, PI, PD)
10-1	Unable copy - change location	10-51 Wrecker needed
10-2	Signal good	10-52 Ambulance needed
10-3	Stop transmitting	10-53 Road blocked at . . . . .
10-4	Acknowledgement (OK)	10-54 Livestock on highway
10-5	Relay	10-55 Intoxicated driver
10-6	Busy - unless urgent	10-56 Intoxicated pedestrian
10-7	Out of service	10-57 Hit and Run (F, PI, PD)
10-8	In Service	10-58 Direct traffic
10-9	Repeat	10-59 Convoy or escort
10-10	Fight in progress	10-60 Squad in vicinity
10-11	Dog case	10-61 Personnel in area
10-12	Stand by (stop)	10-62 Reply to message
10-13	Weather - road report	10-63 Prepare make written copy
10-14	Prowler report	10-64 Message for local delivery
10-15	Civil disturbance	10-65 Net message assignment
10-16	Domestic problem	10-66 Message cancellation
10-17	Meet complainant	10-67 Clear for net message
10-18	Quickly	10-68 Dispatch information
10-19	Return to . . . . .	10-69 Message received
10-20	Location	10-70 Fire alarm
10-21	Call . . . . . by telephone	10-71 Advise nature of fire
10-22	Disregard	10-72 Report progress on fire
10-23	Arrived at scene	10-73 Smoke report
10-24	Assignment completed	10-74 Negative
10-25	Report in person	10-75 In contact with . . . .
10-26	Detaining subject, expedite	10-76 En route
10-27	(Drivers) license information	10-77 ETA (Estimated Time Arrival)
10-28	Vehicle registration information	10-78 Need assistance
10-29	Check for wanted	10-79 Notify coroner
10-30	Unnecessary use of radio	10-80 Chase in progress
10-31	Crime in progress	10-81 Breather/lizer report
10-32	Man with gun	10-82 Reserve lodging
10-33	EMERGENCY	10-83 Work school xing at
10-34	Riot	10-84 If meeting . . . . advise ETA
10-35	Major crime alert	10-85 Delayed due to . . . . .
10-36	Correct time	10-86 Officer/operator on duty
10-37	(Investigate) suspicious vehicle	10-87 Pickup/distribute checks
10-38	Stopping suspicious vehicle	10-88 Present telephone # of . . . . .
10-39	Urgent - use light, siren	10-89 Bomb threat
10-40	Silent run - no light, siren	10-90 Bank alarm at . . . . .
10-41	Beginning tour of duty	10-91 Pick up prisoner/subject
10-42	Ending tour of duty	10-92 Improperly parked vehicle
10-43	Information	10-93 Blockade
10-44	Permission to leave . . . . for . . . .	10-94 Drag racing
10-45	Animal carcass at . . . . .	10-95 Prisoner/subject in custody
10-46	Assist motorist	10-96 Mental subject
10-47	Emergency road repair at . . . . .	10-97 Check (test) signal
10-48	Traffic standard repair at . . . . .	10-98 Prison/jail break
10-49	Traffic light out at . . . . .	10-99 Wanted/stolen indicated





FCC FORM 605 AUGUST 1965	UNITED STATES OF AMERICA FEDERAL COMMUNICATIONS COMMISSION WASHINGTON, D. C. 20534	AMATEUR RADIO LICENSE	M8
Not Transferable			
OPERATOR PRIVILEGES: CLUB STATION			
CALL SIGN: W5UK		EXPIRATION DATE: 1-7-74	
EFFECTIVE DATE: 10-20-69			
ELWIN E. PHILLIPS, JR. TRUSTEE			
GREATER NEW ORLEANS AMATEUR RADIO CLUB			
SUITE 2935, I.T.M. BLDG. CLUB			
L2 CANAL ST., NEW ORLEANS, LA. 70130			
STATION LOCATION: SAME AS ABOVE			
REMOTE CONTROL: (WIRE): 5559 MILNE ST.			
NEW ORLEANS, LA.			
<i>Elwin E. Phillips, Jr.</i> (Licensee's CounterSignature)		<i>Elwin E. Phillips, Jr.</i> SECRETARY	
THIS LICENSE ISSUED SUBJECT TO CONDITIONS ON REVERSE SIDE			

## Amateur Radio vs. Camille STAFF REPORT by Bob Pederson, K2IEZ

CAMILLE- The most intense hurricane ever to hit the United States mainland, broke up Friday, August 22, 1969 in the far reaches of the North Atlantic, one week after she made her place at the top of the hurricane list. Savage "Hurricane Camille" will go down in U.S. Weather Bureau records as having slammed into the Mississippi and Louisiana coasts with record, incredible winds of up to 210 miles an hour and tides over 30 feet. She will also go down in the records of Amateur Emergency Communications as calling for our best and receiving same. The area of Southern Louisiana and the Mississippi Gulf Coast around Waveland, Bay St. Louis, Gulfport, Pass Christian and Biloxi, Mississippi, resembled a battlefield. One military commander in the area, which was under martial law, said "It looks like Hiroshima after the Atomic bomb was dropped in 1945". This writer agrees. Having been in the areas where severe hurricanes have hit before- such de-

vastation had never been seen. The search for victims still continues, the count today, one week later, is already over 200. The National Guard expects the death toll to go over 500, with many bodies never to be found.

Poles, power and telephone, broke under the savage winds and tidal waves leaving the entire Gulf Coast area without power or communications of any nature.

Sunday, August 17, when Camille was roaring up the Gulf towards New Orleans amateur radio public service nets were prepared and already operational. Fred Korson, W5HUT, the President of the 'Greater New Orleans Radio Club' put in unending hours preparing the W5UK network for "Camilles" appearance. Angelo Glorioso, W5KSI, was running around town obtaining generators and equipment. Elwin Phillips, WA5DXA, and Carl Kinell, WA5KND were making last minute changes and prevent-

ative maintenance to the repeater to insure lasting, dependable service during the emergency. The Greater New Orleans Radio Club, W5UK, whose facilities atop the International Trade Mart in downtown New Orleans became the main hub of a vast communications network. Operations on 75 meter SSB, 40 meter SSB, 6 meter SSB/AM and most important, the fine W5UK repeater, whose antenna is located at the 497 foot level on the pylon atop the International Trade Mart building. Emergency generators were ready as the water rose to a dangerous level downtown.

At this point no one knew that New Orleans would only receive winds of 125 mph. and the dangerous eye would slam the Gulf Coast 45 miles to the East.

The storm was nearing, all positions were operational, Camille's fury was being realized. Reports of all surrounding areas came pouring in via land line and radio. The public had to be informed. We were the only ones with information as to what was happening in the Gulf Coast towns. The radio and television networks were banging on our doors requesting information as most of their normal sources were not functioning. WWOM, whose studios are on the 29th floor along with W5UK, set up a camera at the club rooms and interrupted their programs at regular intervals with first hand coverage of the destruction taking place. Fred, W5HUT, and Elwin, WA5DXA, went on television and radio at WWOM requesting additional operators and equipment. From the information already received, all knew we would need them. Bob Pederson, K2IEZ, who was in New Orleans on business was sent by W5UK over to WDSU (N.B.C. affiliate) and made an on the air appeal over channel 6 TV for operators and equipment. Radio broadcasts over WDSU continued all night long, with reports received on a GE Porta-Mobil at WDSU and a Motorola HT200 down in their news center.

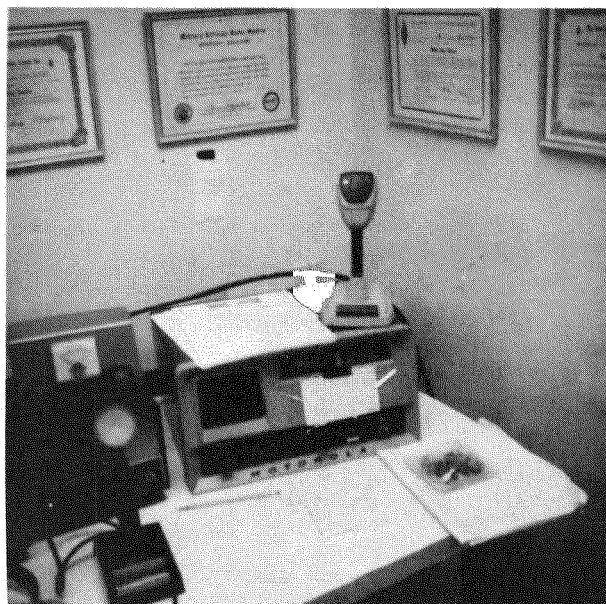


ABOVE-

Left to Right:  
Fred Korson, W5HUT  
Gil Boudreaux, W5CZJ  
Ray Boorstin, WA5FBQ

BELOW-

Repeater remote control at  
W5UK operating room.







ABOVE-  
Waveland, Miss., Aug. 18, 1969

About 2300 Local time, August 17th, the local winds were 100-125 Mph and we learned that the eye of Camille made a sudden shift to the North. The Buras area South of New Orleans was already destroyed and under 20 feet of water. Then one by one the Mississippi Gulf Coast stations began to disappear until communications ceased. Power failure was widespread and most of the Gulf area telephones were out. Nine days later, power and telephones are still out of service. Frantic calls on all bands produced no results. What had happened to the Gulf Coast? How bad were things over there? What can we do to help? We were apprehensive but optimistic in our ignorance of the obliteration and despair caused by "Camille".

Local Civil Defense, under the very capable direction of Larry Bright, K5GLA, Louisiana State Communications Officer at Jackson Barracks, was already operational since Sunday morning. One of his duties now became: Equipment/Operators; get them both into the disaster area and establish communications with the victims and rescue personnel. W5KSI and K2IEZ headed out Monday morning to Bay St. Louis. Roadblocks by State and local police proved no problem with proper identification, but, at the Mississippi State line we found total devastation. Utility poles, power lines, trees, signs, debris, buildings and bodies were all over the roads. This coupled with varying heights of water made the task of getting into the area impossible except by air. The outside world had heard nothing from the area since 2100 the preceding night.

Ben Hudson, W5MCC, himself nearly wiped out by Camille felt that he had the proper equipment but most important, he had the proper connection to get that equipment into the Gulfport/Bay St. Louis area. And, prove this he did. Monday afternoon Ben took off from New Orleans aboard a Coast Guard chopper and set up the first amateur communications link with the rest of the world. Amateur radio was

then and still is today the only communications in or out of this area. Ben took generators and equipment for 75 SSB, 40 SSB and NBFM-34/94 and 146.940 Mhz simplex. When Ben reported in to W5UK and the Red Cross and Civil Defence heard what he found, gears began to turn. The only way in or out being choppers the Coast Guard and Air Force had their hands full. The National Guard was activated and started the job of enforcing full Martial Law and their engineers, the job of clearing a road so that rescue vehicles could get in. The first road open was thru the N.A.S.A. Marshall Space Flight Test Center and authorized vehicles were permitted thru.

It was now Tuesday morning and still the only reports out of the area came from W5MCC and the Coast Guard... with one exception: Mighty little Bernie, WA5UEG, of Waveland, Miss. Waveland was one of the three towns to receive the brunt of "Camille's" fury. Bernie lives in a mobile home and got a generator on the line and set up on 75 SSB and 146.940 FM. He started sending reports that were hard to believe. No one had ever seen such utter destruction from a hurricane. Bernie operated day and night, without sleep, for days. Passing traffic, giving directions to all of us coming in, and supplying antennas, feed lines, etc. for whatever was forgotten or needed. Angelo, W5KSI, Bill, W5LHE and Bob, K2IEZ arrived in Waveland, Miss. early Tuesday morning, all having had no sleep since Saturday night. We were told by WA5UEG that there were no communications out of Clermont Harbor, Waveland and Pass Christian. We tried to get a chopper over to Pass Christian but they were all tied up bringing in doctors and medical supplies and carrying out bodies of the victims. We then were directed by the Mayor to go to Cleremont Harbor, as there were no reports from there. We went, but, Clermont Harbor was gone-Completely! There was nothing left of the town

standing over one foot high. We were shocked. We returned to Waveland and met Father Godsky of the Red Cross Disaster Center at the Waveland School- he needed communications fast. We set up a Swan on 3910 SSB with a dipole, and a 20 element two meter beam for 146.94 Mhz using a General Electric Porta-Mobil. The generator going- traffic, Emergency Only, started to pass-. Late Tuesday night we received a most welcome surprise. Ike, WA5VGB arrived at the school with a complete communications Van from the Navy Test Facility in New Orleans and 1 KW on all bands. We moved antennas into the van and Ike and his great crew took over and continued for the next six days. By now stations began getting generators going and antennas up. Operators were pouring in from New Orleans and other areas to help through out the crisis. To continue what happened along this line would be difficult. Credits to all of those who worked around the clock for days and days must be given, but how can you remember them all. I will attempt to list the unsung heroes of Amateur Radio who in the highest tradition of Public Service did their best.

President-

Alfred Korson, W5HUT

Vice President-

Angelo Glorioso, W5KSI

Secretary-

Clifton Arnold, W5EGH

Station Director-

Gilbert Boudreaux, W5CZJ

Emerg. Coordinator & Rpt. Trustee

Elwin Phillips, WA5DXA

Repair & Rpt. Maint. -

Carl Kinell, WA5KND

Delta Div. Director, ARRL-

Philip Spencer, W5LDH

Ex SCM-

Thomas Morgau, W5FMO

Aaron Cohen, WA5IRH

Pat Darby, WA5EIV

Glenn Mc Govern, WA5KID

Ray Boorstin, WA5FBQ

Dominick Nuccio, K5MPJ





ABOVE-

Main Street in Wave land, Miss.

Bernie Wilenzick, W5IVF  
 Robert Nunez, K5EJP  
 Ben Hudson, W5MCC  
 Thomas Morgavi, W5FMO  
 Harry Cellos, WA5QJT  
 Gregory Cellos, WA5SXZ  
 Elliot Blaize, W5TVW  
 Laurence Bright, K5GLA  
 Bill Chorin, K3RSE  
 Terry Lemon, K5OAZ  
 Nelson Biddle, W5JG  
 Andrew Gutterrez, WA4LYT  
 Bob Pederson, K2IEZ  
 K5TYP, WA5WPV, WA5HTM,  
 WA5YIZ and WA5VVB.

Citizens Band also had their place in helping on a local level, point to point SSB and their many hand held units. Someday these young lads may graduate and become first class Amateurs with their spirit.

We could go on all day, and not remember all who worked so hard, I saw many that traveled from Alabama, Northern Mississippi, Texas, Florida and Louisiana to help. For those we forgot to mention, many thanks also.

W5UK Repeater notes:

In operation- 1967  
 Control Points- 5  
 Frequency- 146.34 to 146.94 Mhz.  
 Coverage- Approx. 40 Miles  
 Club members- 100  
 Logging- Continous Tape  
 Access- Whistle on 1,000 cps.  
 Identification- Continous MCW  
 Transmitter- Motorola 30D- 30 watts  
 Rpt. Receiver- Sensicon A

W5UK pays \$1.00 per year to the International Trade Mart for all the facilites, including free parking in the I.T.M. garage.

Let us close this report with one last question: Are you ready with all of your area facilities to handle a local or National disaster? Think! The only justification that we as Amateurs have for our frequency allocations is PUBLIC SERVICE.

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**Mechanical Engineers** — Experienced in product design and product packaging or portable, vehicular base equipment.

**Systems Engineer** — Experienced in integration of equipment into systems. Special customer design, analysis of customer requirements, propagation analysis.

**Technicians** — Electronic Lab & Test Technicians. Assist engineers in the design, development, building and trouble-shooting of communications equipment. Amateur radio background helpful.

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# TONE BURST KEYING FOR REPEATERS

by: LES COBB, W6TEE



"--Never did find the hamfest. Six repeaters got into the act before I realized I was talking myself home."

Among the various techniques for selective control of remote devices, one of the simplest is tone burst keying. This method consists of a short burst of a specific audio frequency (typically 1/2 second long) automatically sent at the start of a transmission. In a repeater application, a burst detector is used in conjunction with the carrier-operated relay (COR) in the receiver to activate the repeater transmitter upon reception of the proper burst frequency, and to hold it on as long as the incoming carrier is present.

As a selective calling or control feature for amateur use, tone burst keying has taken a back seat to continuous sub-audible tone systems such as Motorola's Private Line (PL). Tone burst keying will keep the system on once it is keyed as long as a carrier, desired or undesired, is present. PL however, requires the tone to be present at all times, thus is immune to capture by unwanted signals. For this reason, PL is invariably chosen for high-reliability applications, such as UHF control of remote operated base stations in areas with high interference levels.

However, the simplicity and versatility of tone burst keying should not be overlooked where only a simple control or selection function, not related to primary control, is required. As an example, recently the number of open 34 to 94 repeaters on the air or being built in Northern California and Nevada was such that it became obvious that overlapping input coverage was going to cause unintentional keying and interference to adjacent machines. The solution selected was to assign a tone burst frequency allocation plan as shown in figure 1. This plan covers four repeaters and one remote base with a burst protected 94 receiver. Although the use of tone entry does not solve all of the possible interference problems for repeaters with overlapping coverage, it does minimize certain problems, and allows the using operators to bring up only the transmitter needed for the desired communications.

In certain of these systems, the burst protection applies only to the 94 transmitter. The operator at the UHF control point hears all 34 transmissions on the down channel, as well as 94



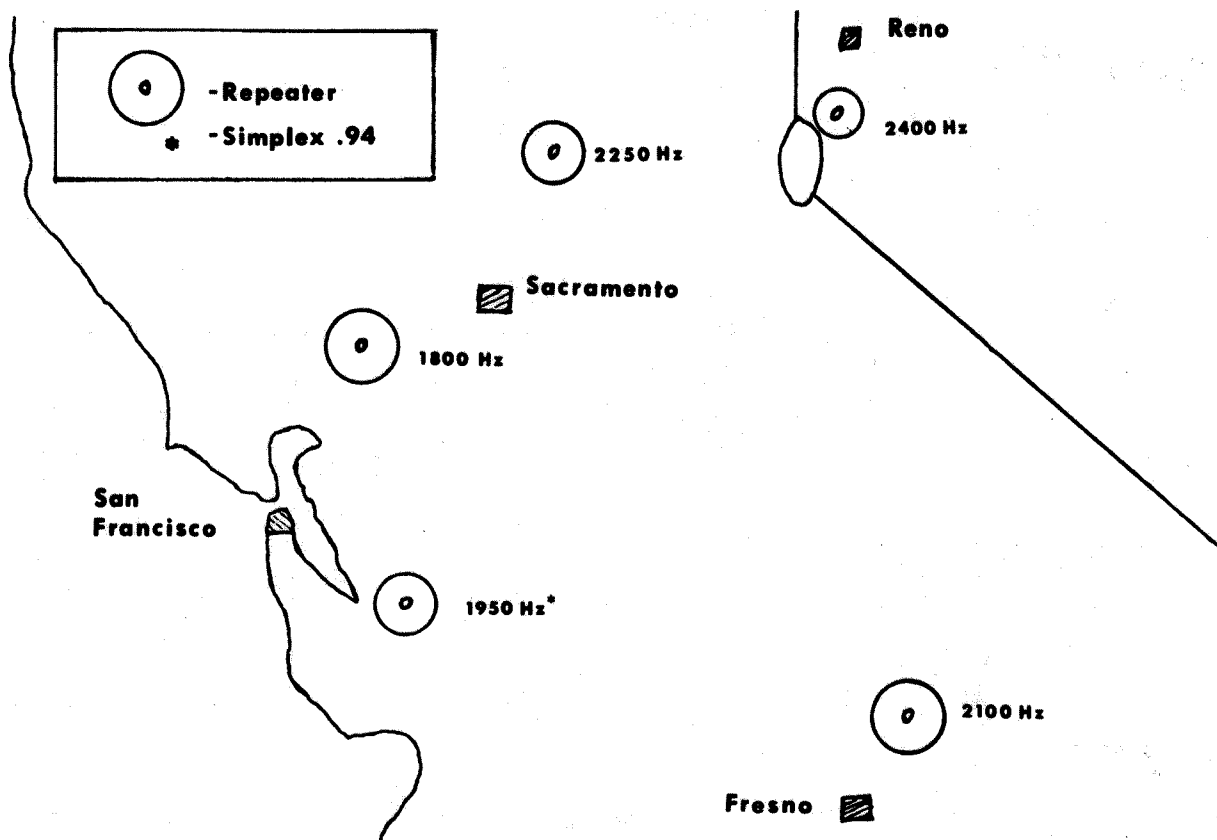


FIGURE 1 - TONE BURST ENTRY PLAN - 34/94 REPEATERS IN NORTHERN CALIFORNIA AND NEVADA.

(to prevent interference to other 94 activity). Therefore, a passing mobile, requiring assistance, may call on 34 or 94, without tone burst, and communicate with stations on the UHF control channel.

Another similar application is in use where, because of geography, a repeater requires satellite receivers. Typical are Chicago's CFMC (FM Journal Vol. 3 - No. 2) or California's NorCal Six meter system. By a simple tone selection, the operator controls which receiver he enters. NorCal not only has tone selected satellite receivers, it shares the frequency with another repeater with its own tone entry frequency.

If tone burst entry is used on open repeaters on the so-called "national" frequencies, some sort of standardization is necessary to allow the traveler some hope of universal access. Due

to the large quantity of Motorola tone equipment available, the Motorola frequencies are commonly used, even where the operators intend to construct their own tone oscillators or decoders. In Table 1 it shows the stock frequencies for the ubiquitous Motorola P-9301-A oscillator. The channel numbers are

Table 1 -

Channel	Frequency
1	1800 Hz.
2	1950
3	2100
4	2250
5	2400

Recommended tone burst frequencies.

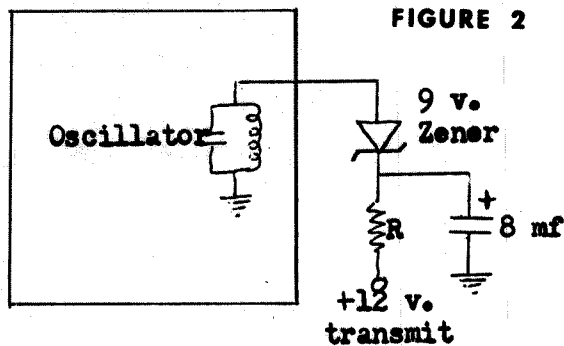


FIGURE 2

R - Selected for burst length

15k ..... 150 msec

25k ..... 0.5 sec

not Motorola's, but are suggested for identification and tabulation in repeater listings, etc,

It will be noted that these frequencies start at 1800 Hz. and increase in 150 Hz steps. There has been some confusion in the past between this and a 200 Hz spacing. Single frequency Motorola oscillators are supplied off-the-shelf in 150 Hz steps. Multi-frequency switchable oscillators normally are equipped in the same increments. However, when a Motorola three-frequency conversion kit is applied to an 1800 Hz oscillator, the resulting frequencies will be 1800, 2000, and 2200 Hz.

For those wishing to use commercial equipment, the Motorola P-9301-A oscillator and the P-9303 decoder are available on the used equipment market. More recently, the Motorola SP-1005-TAAE solid-state under the dash oscillator, with all frequencies shown in Table 1, switch selectable, has been available to hams.

The Motorola P-9301-A and P-9303 tube units are easily duplicated and their circuits may be found in the FM Schematic Digest published by Two Way Radio Engineers, Inc. (See Ad in this issue).

Solid state oscillators and decoders for other tone applications have been previously shown in many articles. The K6ASK circuits, most recently printed on page 43 of the February, '69 FM Journal, are quite suitable with minor modifications for burst operation. The timing circuit shown in figure 2 was developed by Reuben Meeks, K6GUC and can be applied to any oscillator. Note that the 12 volt supply must be keyed on and off with the transmitter. Figure 3 shows the connections between a transistor decoder and the COR to allow the carrier to hold the circuit up after detection of the tone burst.

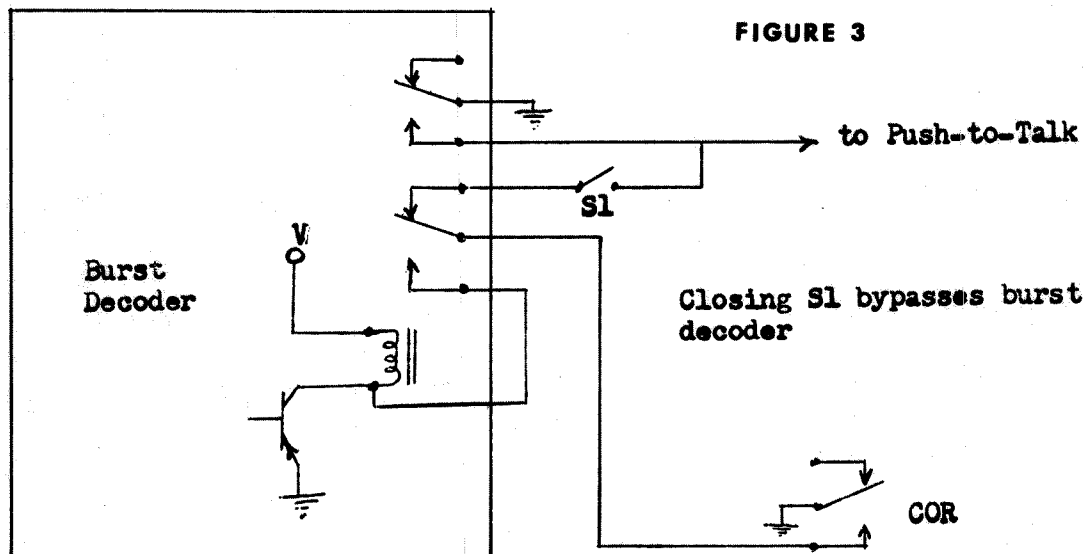


FIGURE 3





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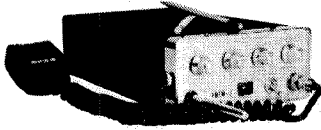
Complete specifications and prices can be obtained by sending a FM Information Request Card to:

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### FM-210 2 METER FM TRANSCEIVER GALAXY ELECTRONICS

Galaxy Electronics of Council Bluffs, Iowa, communications engineers and manufacturers of commercial, military and amateur radio equipment, has announced production of a new 2 Meter FM Transceiver.

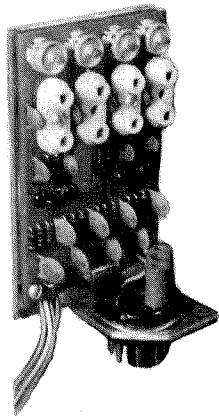
The FM-210 is an American-made, solid-state, FET front end transceiver offering top performance for either direct or repeater communications. Features include 3-channel independent transmit/receive selected by front panel controls, a highly effective squelch system for mobile operation and a speech compressor for optimum intelligibility under adverse conditions. The FM-210 operates on a power requirement of 12-14 VDC. The optional power booster, an ideal accessory, provides high power operation from either 12-14 VDC or 117 VAC.

The Galaxy FM-210 2 Meter FM Transceiver, available October 1, 1969, will be priced at just \$199.95 - the optional power booster at \$39.95.

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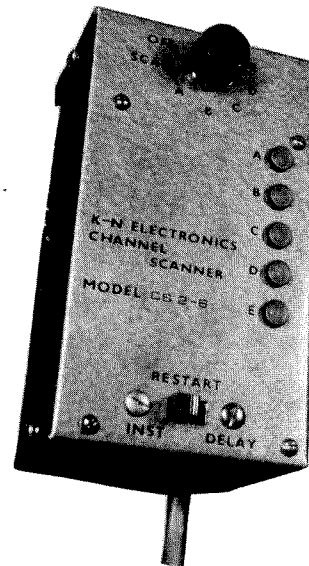
KN Electronics announced production of a new product for the GE Hi-band Progress Line equipment. The model 4HPR is an all Solid-State 4 frequency oscillator deck for the receiver and the model 4HPT is a four frequency deck for the transmitter. The decks are easily installed by simply plugging into the existing crystal sockets on your equipment and making a few minor wiring changes.

The decks require no additional space in your existing equipment enclosure since these decks are entirely contained within the area of the transmitter and receiver. They are only 4" x 2 1/8" in size and require 9 to 15 volts DC for operation.

Both models are \$22.95 each or if both are ordered together they are just \$19.95 each.

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#### CHANNEL SCANNER MODEL CS-2 KN ELECTRONICS, INCORPORATED

A new 5 channel, intergrated circuit version of the Model CS-1 Two Channel Scanner is now available to amateur and commercial users of multichannel FM equipment. This unit permits sequential monitoring of up to 5 frequencies with automatic lock-in on either occupied or idle channels. The rapid scanning rate, approximately 150 to 200 milliseconds per channel, insures that each channel is monitored at least once each second. A switch permits the selection of instant restart or a 12 second delayed restart.

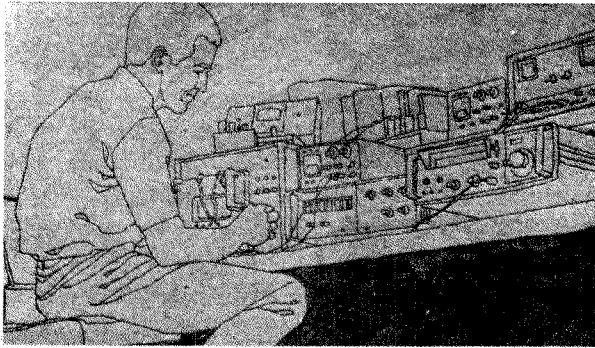
Five small panel lamps indicate the channel selected on the face of the 5 1/4 x 3 x 2 1/8" case.

The 6VAC Model CS-2-6 is \$29.95 and the 12 VDC Model CS-2-12 is \$27.95.

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## FM SERVICE CENTER

by Don Chase\*

I ask all regular readers of this column to remember that I service two-way radios for a living. Writing this column is a secondary consideration and although I try, it does take a while to answer all the letters and requests for information. I'm currently about 60 days behind in answering requests for help. A large amount of the information being requested is available through standard sources, many Motorola diagrams are in the Motorola Schematic Digest, which is available either from Two Way Radio Engineers, Inc. at 1100 Tremont St., Boston, Massachusetts 02120 or from Gregory Electronics at 249 Route 46, Saddle Brook, N.J. 07662. Gregory also has in stock the Pre-Progress Line General Electric Equipment, and that comes in two volumes: Vol. 1 covers 25 to 76 MHz equipment and Vol. 2 has from 150-174 & 405-470 MHz. A good source of information for the ham who does not know much theory or practice of FM equipment is the Communication Equipment Schematic Manual, which is available through FM Journal for \$3.95. This book has some information on recent model General Electric, Motorola, Bendix, and others and is intended as a simple, easy to understand introduction to servicing two-way radios.

### MOTOROLA "COFFIN BOXES" RECEIVERS

If one or more of the tuned lines tunes broadly or not at all, check continuity of the center conductor. The center conductor is strung with a number of ceramic "beads" and under vibration these units have been known to break the beads and center conductor. The original parts are difficult to obtain, but a useful substitute can be found in your local dime store-- at the jewelry counter.

\* \* \* \*

The squelch circuit in these units works beautifully, but when it goes bad, the trouble is hard to trace. First, suspect all capacitors in the noise rectifier-DC amplifier area. If the squelch will not close, check the second limiter grid current, as this is used as a reference in the squelch. If the squelch chops or will not open, suspect the possibility of a heater-cathode short (or leakage) in the noise rectifier.

\* \* \* \*

Keep in mind that the transmitter relays control the receiver B-plus and antenna, intermittent receiver trouble could very well be located in the transmitter.

\*Don Chase is regional editor of **FM**. He holds an amateur license (WØDKU) as well as a first-class commercial.

If you have service problems, send SASE directly to him at FM Service Center, 4543 South Elizabeth, Wichita, Kansas 67217.

## GENERAL ELECTRIC TPL

Many complaints of "pedal squelch" (change of the critical point with engine speed) are caused either by a leaky and/or temperature sensitive Q305, the noise amplifier transistor. Once in a while, the diode CR305 will be defective (in series with the squelch control) and once it turned out to be a defective squelch control.

\* \* \* \*

Early model TPL receiver units were temperature sensitive to an amazing degree (no pun intended). Most often the second oscillator transistor (2N1087) would quit oscillating. I've used silicon transistors for replacements, usually a 2N697 or 2N1711, but the frequency does shift with this substitution. Adjust the oscillator trimmers as needed and touch up the high IF tuning.

\* \* \* \*

Be careful in working on TPL transmitters, as the push-to-talk line returns to the positive twelve volt line, NOT chassis ground. Although it is not common, a short in the microphone circuit has been known to blow fuses and cause strong men to cry.

## GENERAL INFORMATION

Older model transmitters with dynamotors--try to keep the commutators clean, as a little dirt, dust or corrosion can cost you as much as 30% of your power output. One of the easiest ways to keep them clean is to use an ordinary pencil eraser to polish the commutators.

\* \* \* \*

A word of caution to people who wish to improve a receiver by adding a pre-amp. Gain is not what you are after. The object is to amplify the signal instead of the noise. If your pre-amp seems to oscillate, try a small resistance pad between the pre-amp and the set. Many front ends have a tendency to "take off" during no-signal conditions.

\* \* \* \*

If your high band Progress Line receiver has a weak intermodulation problem, loosen the three screws on the side of the antenna transformer and slide the upper assembly as far away from the chassis as you can. (about an eighth of an inch) When tuning the front end, use a A.C.V.M. on the voice coil leads, with a RF signal of 10 to 15 dB of quieting and adjust for maximum quieting. This point will be very close to, but not quite the same as the point of maximum limiter current.



Notice the sign in this photo! What is Wayne Green up to now? Send us the caption you would like to see on this photo and we will use a new one every issue.



# F. W. R. A.

or  
ANOTHER REPEATER STORY

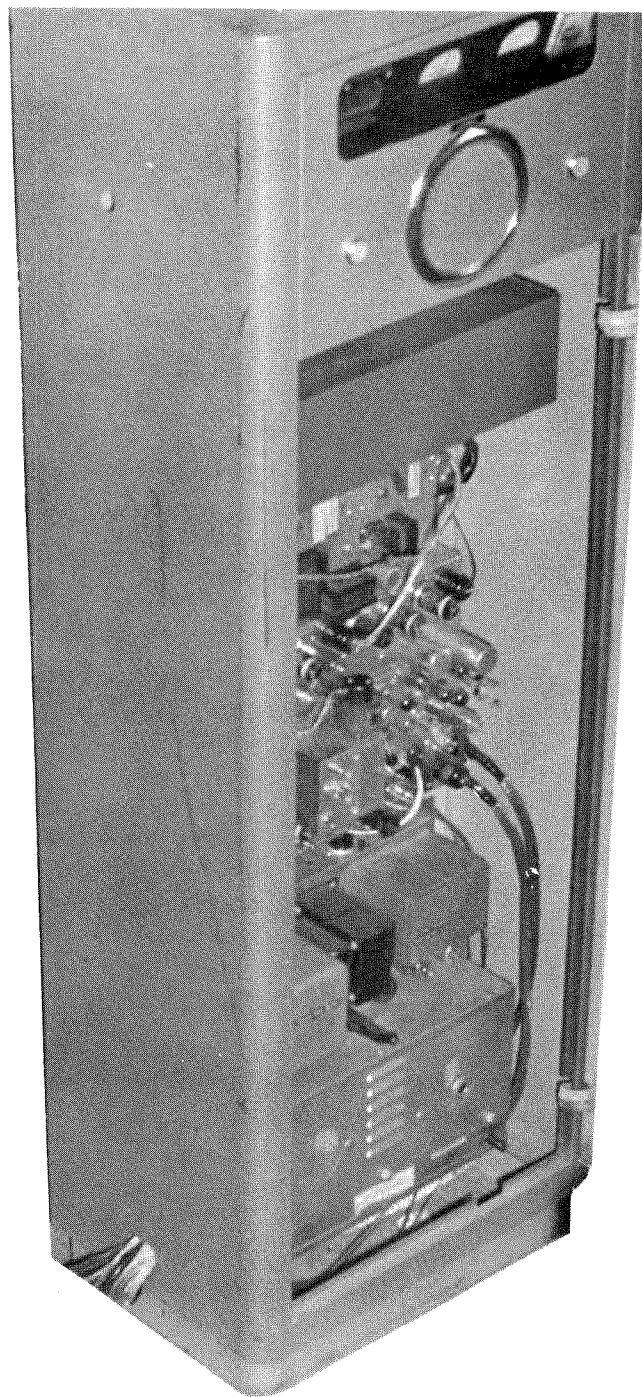
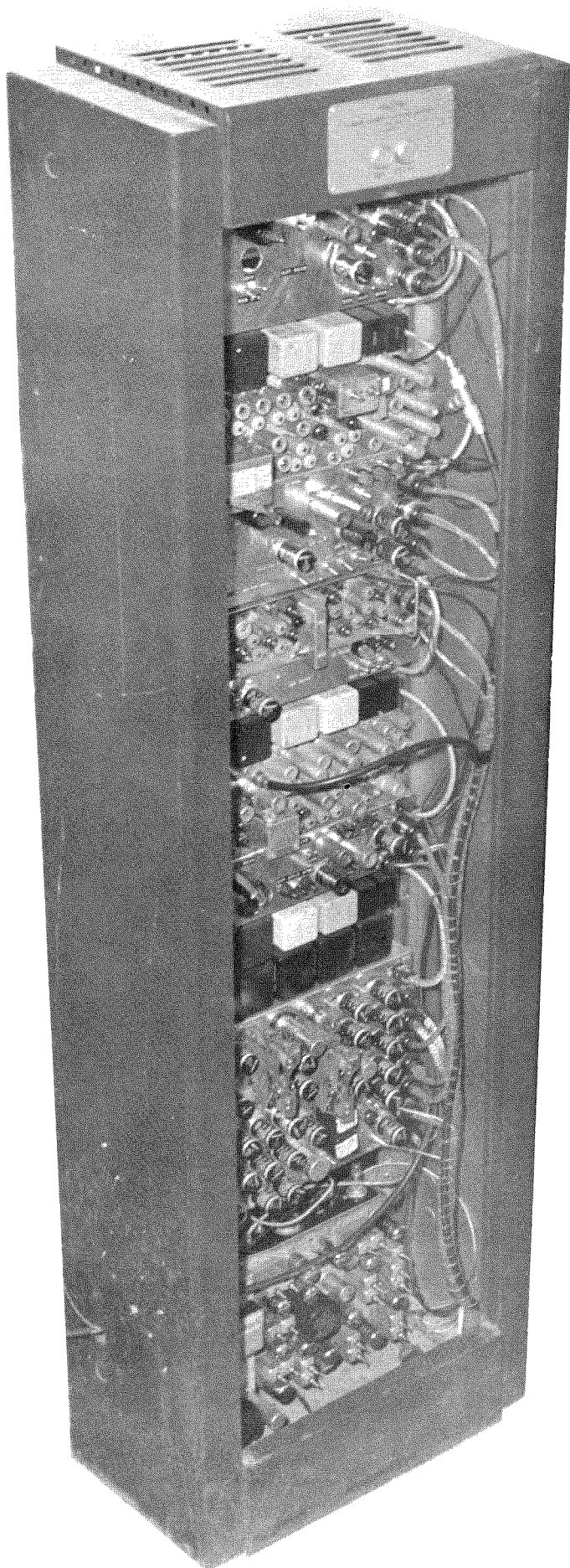
Roger Parkerson, K9OET

Perhaps this article should have used the title of the article which appeared in the March issue of **FM** about the Detroit repeater and said, "Indiana's First Repeater". Certainly, this is Indiana's first legal repeater and probably the original Ft. Wayne repeater, that was in operation nine years ago, was Indiana's first — legal or otherwise.

F.W.R.A. (Ft. Wayne Repeater Association) and the Ft. Wayne repeater got their legal start when the Articles of Incorporation were approved on August 23, 1968. But as I said, this whole thing really got started in 1960. It was at that time that three amateurs, besides myself, decided that FM was nice, but how much nicer it would be to extend our mobile range in some fashion. Unfortunately,

*View of the 300 ft. tower on the property of the Indiana & Michigan Electric Co. The ground plane on the top is their antenna. The three side mounted antennas are ours; Receiver on top, 450 MHz center and the bottom antenna is the transmit stick.*





*The Repeater Racks. Left houses the receivers: Auxiliary Stand by Receiver, 146.34 MHz receiver, 146.94 MHz monitor, 440 MHz control receiver, Master control chassis and A lo-band Receiver. Right houses the transmitters.*

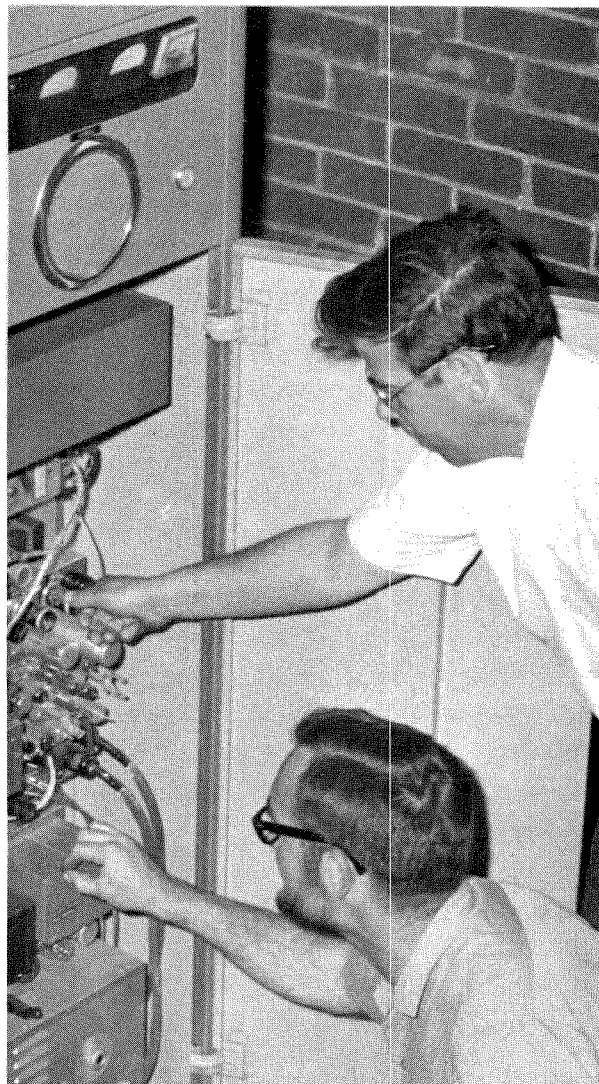


there were no nice "How - to" FM articles so, after much trial and error, we had a 2 to 6-meter cross band repeater in operation from my house on a "When I'm at home" basis. We were still in high school at the time so resources, rather than technical considerations, dictated our operation.

The repeater consisted of a 146.94 MHz receiver, COR and 3OD 6-meter transmitter. Also incorporated was an automatic dial phone patch, of which little was said. The system performed quite well, all factors considered. In fact, it performed so well that we drew the usual round of criticism from the "old timers" on the frequency. But being young, and not knowing any better, we just said that after 5 years or so on FM, they were just mad because we did something that they hadn't even thought of doing. This repeater stayed in operation about a year and a half until we all finished high school and went on our merry ways.

Five years later, having returned home after school, some of the old gang was back along with a few new faces. The "gang" consisted of Ken Banning, K9RSF; Bob Cobb, WA9LHP; Harold Johnson, WA9MEF; Bill Trulock, K9RKA, and myself, K9OET. I had not wasted those years at Purdue because I had a ream of schmatics on an "ultimate" repeater that I was just dying to see in operation. We formed into a loose group and equipment began to take shape. After much work, the second generation repeater was completed. This one, and in-band 146.34 to 146.76 system, was operated from another ham's house on a "When he was at home" basis.

By using .34 and .76, we relieved the .94 simplex congestion or at least we did not add to it. This repeater was in operation for about six months and served as a "test rig" for various ideas to be applied in our future system. It was at

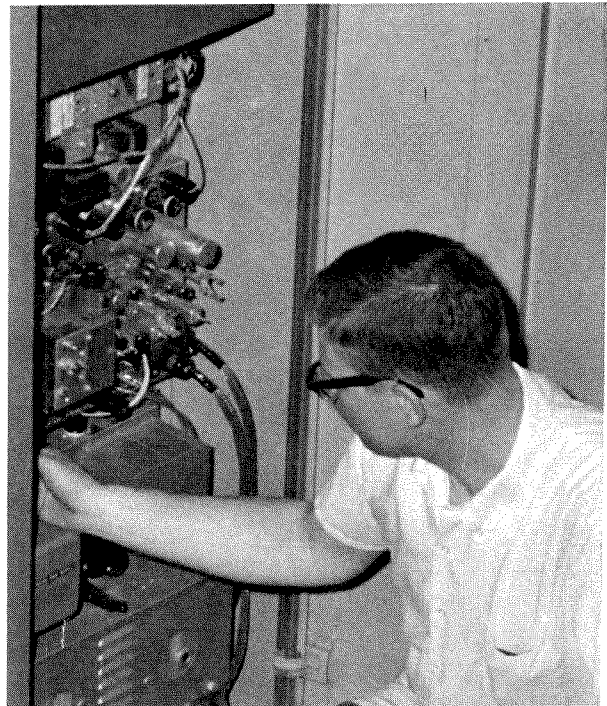
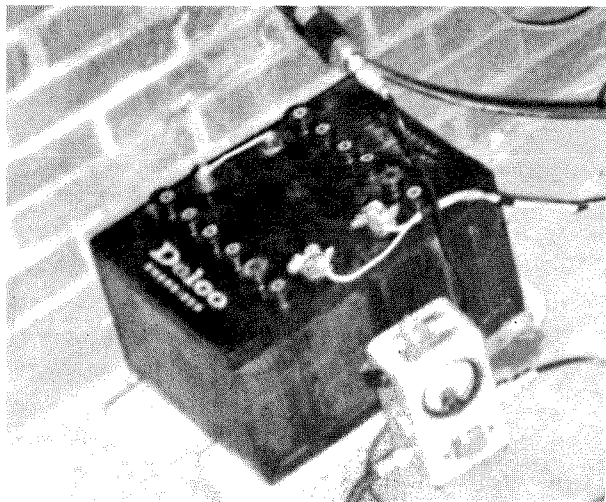


*Robert Cobb - WA9LHP, Standing and Harold Johnson - WA9MEF, beneath him, are making audio adjustments on the 450 MHz transmitter.*

this time that I was offered the job of C. D. Radio Officer; and we as a group decided Civil Defense and the repeater could mutually aid each other. This thing was now beginning to grow and it was decided to incorporate as a non-profit corporation to facilitate all aspects of the operation. With the aid of my cousin, who was an attorney, a corporate charter was issued.

With this in hand, we set about applying for a repeater license. We followed W3DTN's suggestions in the July issue of FM and the license application was submitted in September 1968. The location applied for was the tower of Indiana & Michigan Electric Co. They were very C.D. minded and permitted us to install our antennas on their 300 foot tower. Further, they supplied us with a room in the elevator penthouse and wired us into their emergency stand-by generator to insure continuous operation. Other local industries were contacted and certain items were obtained. Phelps-Dodge, who has a large copper wire plant here, also makes coax and after talking to several different persons, they gave us 1000 feet of 7/8 inch rubber jacketed Foamflex along with all the required connectors! To facilitate our logging requirements, Magnavox, another large local industry, gave us a 24 hour type logging recorder.

The Association supplied all of the equipment and Civil Defense bought and installed the antennas. At the top of the tower is our receiving antenna, a 6 db gain Phelps-Dodge station-master, 200-509. Twenty feet down is an 8 gain db Phelps-Dodge 450 MHz antenna. Seventy feet down from the top is another 6 db gain 2-meter antenna for the transmitter. All antennas are fed with the 7/8 inch coax. Our biggest fear, desensitization,



*Ken Branning - K9RSF, shown adjusting the hi-band exciter.*

proved to be groundless as we have none! With either our 30 watt exciter or 250 watt final in operation in the rack next to the receiver, absolutely no limiter deflection is noted, either up or down. Further when receiving a marginal signal, no difference is noted in quieting when the repeater transmitter is disabled. It is interesting to note that a cavity filter we had purchased for the anticipated problems was never even used.

On December 30, 1968, only 4 months later, our remote control license for the 5 control points arrived. WA9EAU repeater was put on the air January 1, 1969 — What a way to start the New Year!!! The actual system is contained in two racks, one Motorola six foot rack, and an old Link seven foot rack. In addition, there is the logging recorder and final amplifier power supply cabinets. A G.E. Progress

*The batteries supply the 24 volt relays.*





*The author, Roger Parkerson - K9OET, with Bill Trulock - K9RKA, looking on, dials up a control function.*

Line 30 Watt strip operates either directly into a Motorola  $\frac{1}{4}$  KW. The power level is tone switchable by any of the licensed control stations. UHF control equipment consists of a Motorola T44A6A system. The UHF system also functions as a repeater with 2-meters being repeated out on the 440 control channel for additional control purposes. The T44 drives a pair of 4CX250B's in another Motorola  $\frac{1}{4}$  KW. The transmitters have a two minute time-out timer to limit incoming transmissions and prevent receiver lock-up or, perish the thought, a malfunction! 450 uses a single antenna with a Phelps-Dodge duplexer which works quite well.

All control functions are by digital since touch-tone dials don't seem to be available in this area yet. In fact, General Telephone is just getting some of the local exchanges set up for it. The decoder circuit is a slightly modified version of a RTTY terminal unit published in '73'. The terminal unit is a solid state and aside from a few problems with the stepper relays, seems to work quite

well. The audio circuitry taps off from the receiver discriminator through a 12AU7 amplifier, cathode follower into the respective transmitters. Since the demise of our code wheel, we are now finishing and I.C. identifier as described in **FM**.

Well, that about sums up the Ft. Wayne Repeater Association, Inc., and the Ft. Wayne repeater. Right now we're talking about remoting some additional outlying receivers for better coverage for the low-power H. T. fellows. There is no problem hearing 250 watts but the incoming 1 or 2 watts becomes unreliable after 20 or 25 miles; additional receivers linked on 450 should take care of that. We would like to find some information on receiver voting selection. Also, we're talking about linking with some of the other repeaters. We've got a couple of ideas that we're persuing and hope to have more information later. Presently, however, we're satisfied with about 40 to 50 miles mobile coverage with base stations as far away as Indianapolis, (130 miles) working in with a good degree of consistency.



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**GONSET** 225 watt, hi-band amplifier, 3 watts up drives, compact, \$95; Hallicrafters S-37 receiver, AM/FM all hi-band channels, \$75; both 115 vac with manuals. Charles Spitz, Box 4095, Arlington, Virginia 22204

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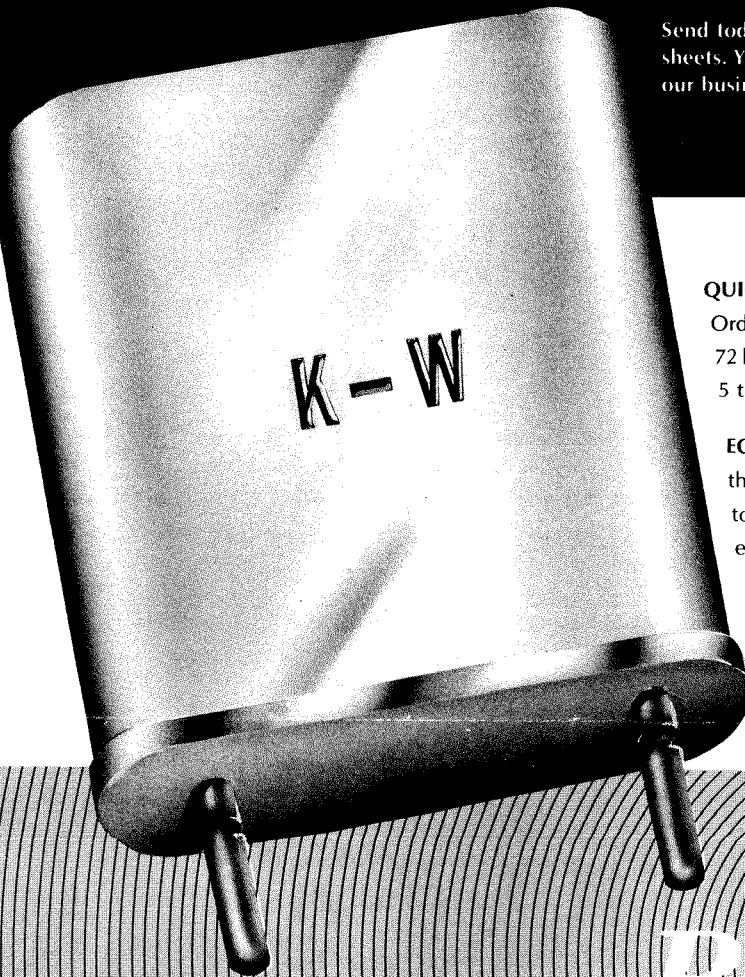
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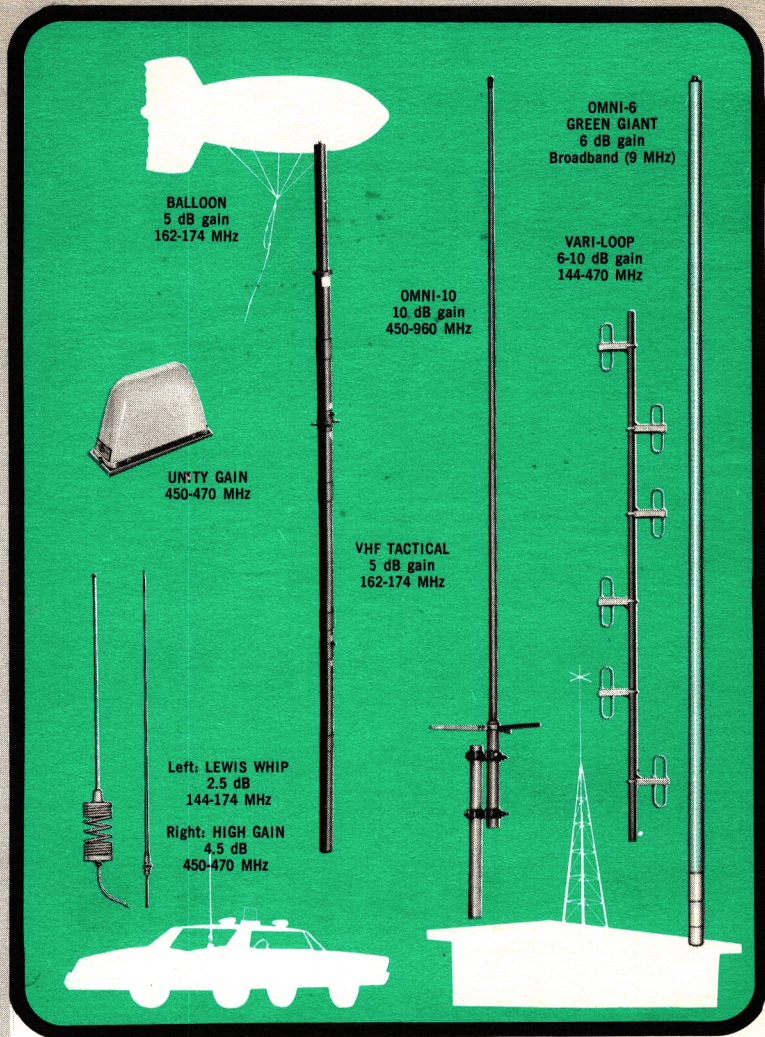
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