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NO. 10

VOL. 1



Paul Signorelli K6CHR 9/68
Box 9535
North Hollywood, Calif. 91609



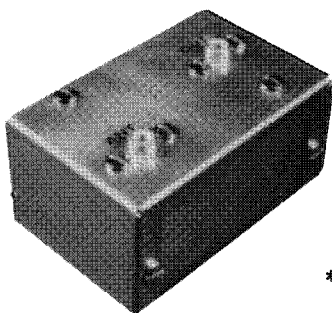
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FM BULLETIN

Vol. 1 No. 10

2005 HOLLYWOOD - GROSSE PTE., MI.

The FM BULLETIN is published monthly for the sake of promoting and informing on FM activity on VHF and UHF Channels. This publication does not assume responsibility of statements made by our advertisers in business competition. All signed articles published here-in, represent solely the individual opinions of the writer and not those of the FM BULLETIN. Deadline for copy must be the 15th of the month for the following month. The sooner the better! Copy preferably should be typewritten, double spaced on one side of the paper with generous margins. Submit all diagrams in black ink; they will not be returned unless requested. Photographs and pictures must be black and white. Subscription is two dollars per year or three years for five dollars. Air Mail, add 75¢.

EDITOR & PUBLISHER

Michael J. Van Den Branden - W8UTB

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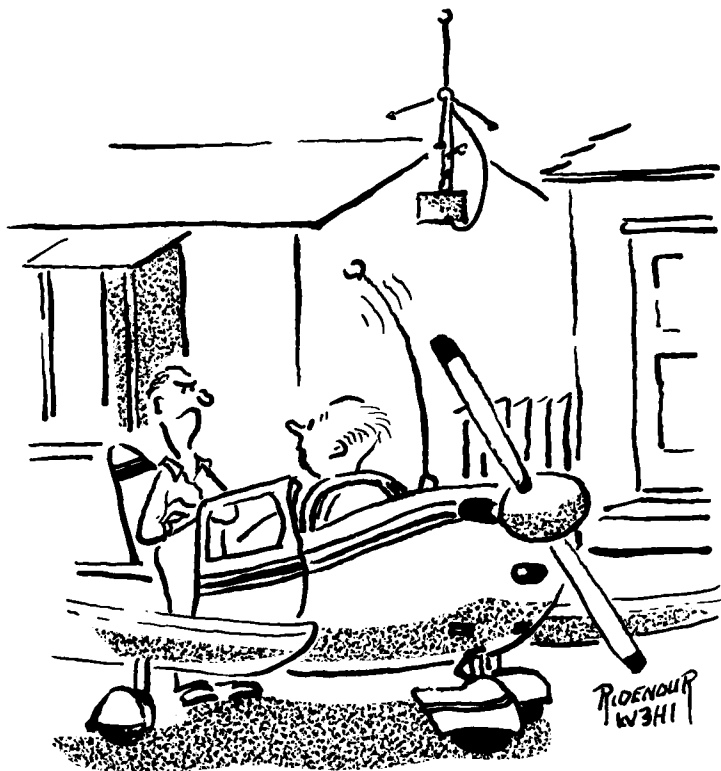
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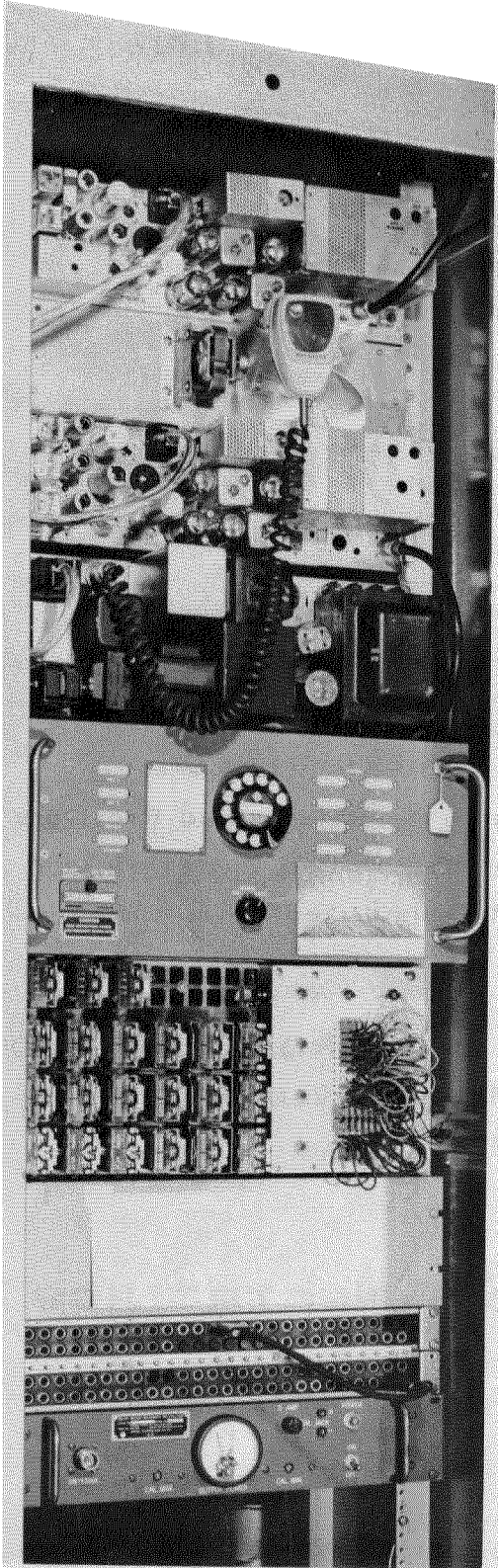
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W1JTB/W2GHR

KILLINGTON, VERMONT / MANHASSET, NEW YORK



FEDERAL COMMUNICATIONS COMMISSION

WASHINGTON, D.C. 20554

October 30, 1967

Mr. Gordon M. Pugh
89 Trumbull Road
Manhasset, New York 11030

COPY

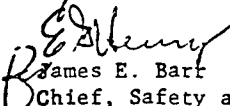
Dear Mr. Pugh:

Enclosed herewith are your renewed and modified licenses for amateur stations W1JTB and W2GHR. Radio remote control of each station is authorized at the following locations and subject to the following conditions:

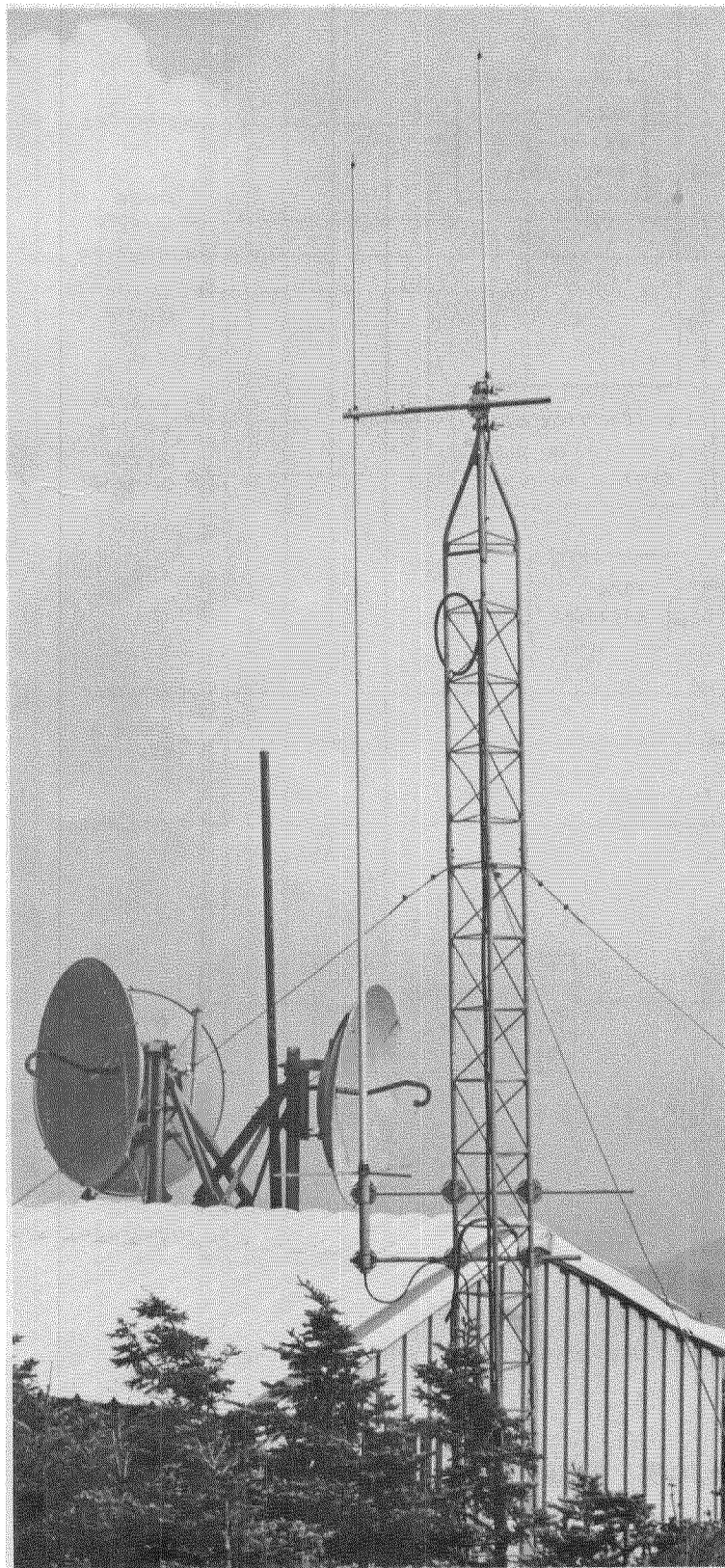
- A. W1JTB, Killington Mountain, Sherburne, Vermont. Control points:
- (1) 89 Trumbull Road, Manhasset, New York.
 - (2) North Beacon Mountain, Fishkill Township, New York (WKIP).
 - (3) Bald Mountain, near Troy, New York (WAST-TV).
 - (4) Highland Park Road, 1.8 miles East of Duanesburg Churches Road, Duanesburg Township, New York.
 - (5) Athens Township, Vermont, 3 miles South of Cambridgeport on Cemetary Road, 1/2 mile from intersection with Brookline Road.
 - (6) Barre, Vermont, Sunset Drive, 500 ft. East of Windy Wood Road.
- B. W2GHR, North Beacon Mountain, Fishkill Township, New York (WKIP-FM transmitter site). Control points:
- (1) Same as A(1)
 - (2) Same as A(3)
 - (3) Same as A(4)

This letter is an attachment to your station licenses and copies should be posted or readily available at each location authorized. It is requested that you maintain a block/flow diagram description of your stations and control points for inspection purposes when needed.

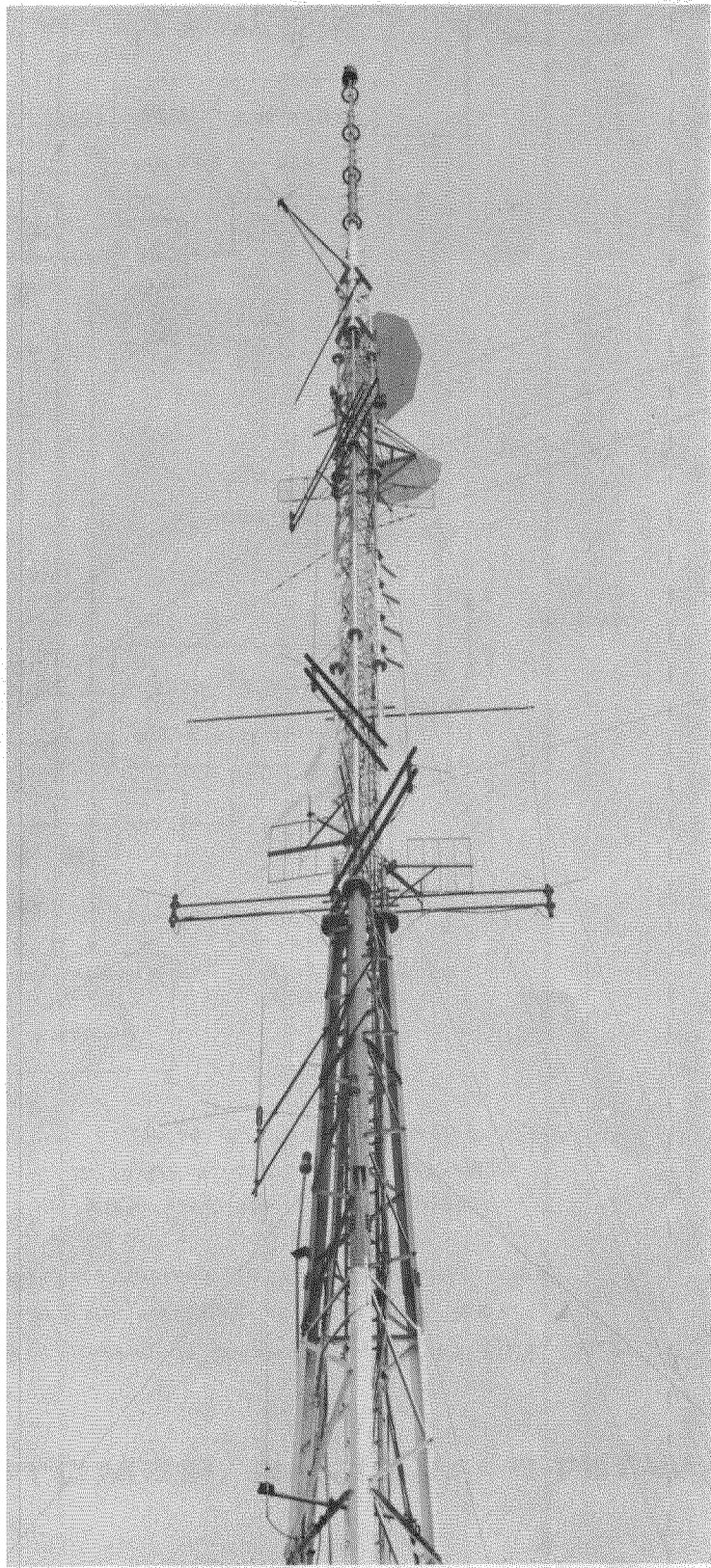
Very truly yours,

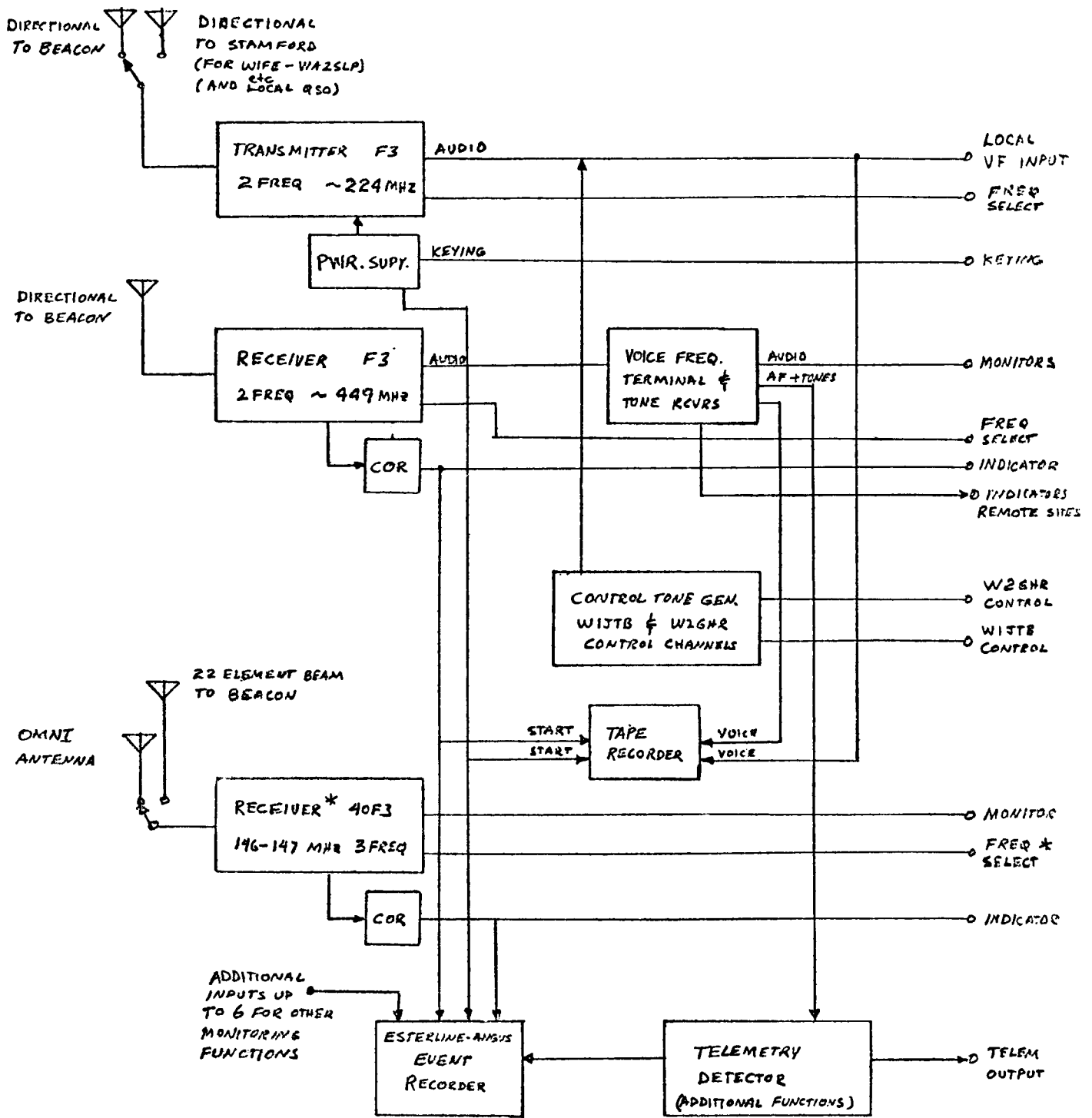

James E. Bart
Chief, Safety and Special
Radio Services Bureau

W1JTB- 2 Meter and 450 MHz. antennas at the summit of Killington Mountain, Vermont. Equipment is located in this building. The dishes are part of the M/W network for the Vt. State Police.



W2GHR- Relay point and Base station antennas at Mt. Beacon, New York. Half of the antennas shown are part of the Amateur installation.





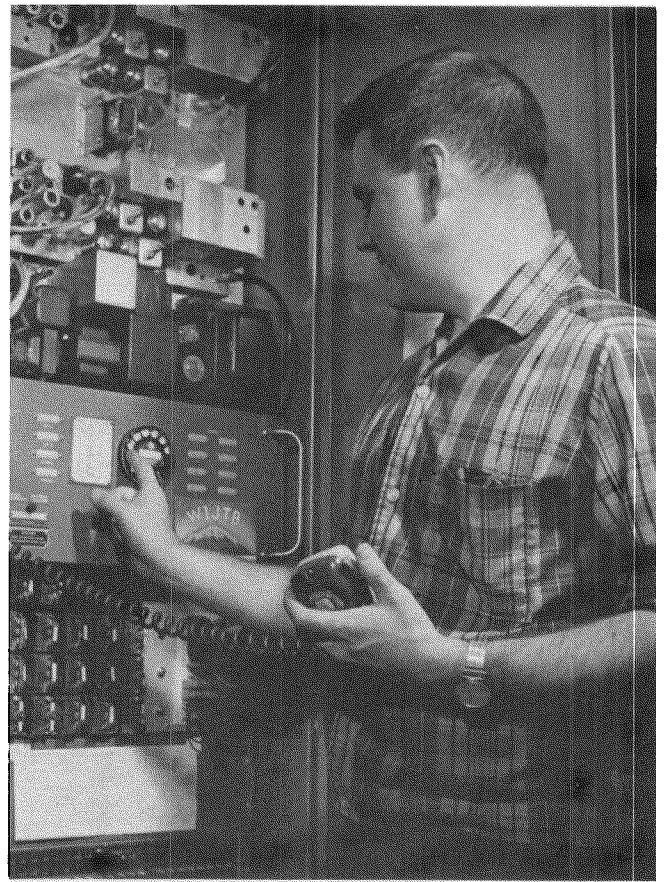
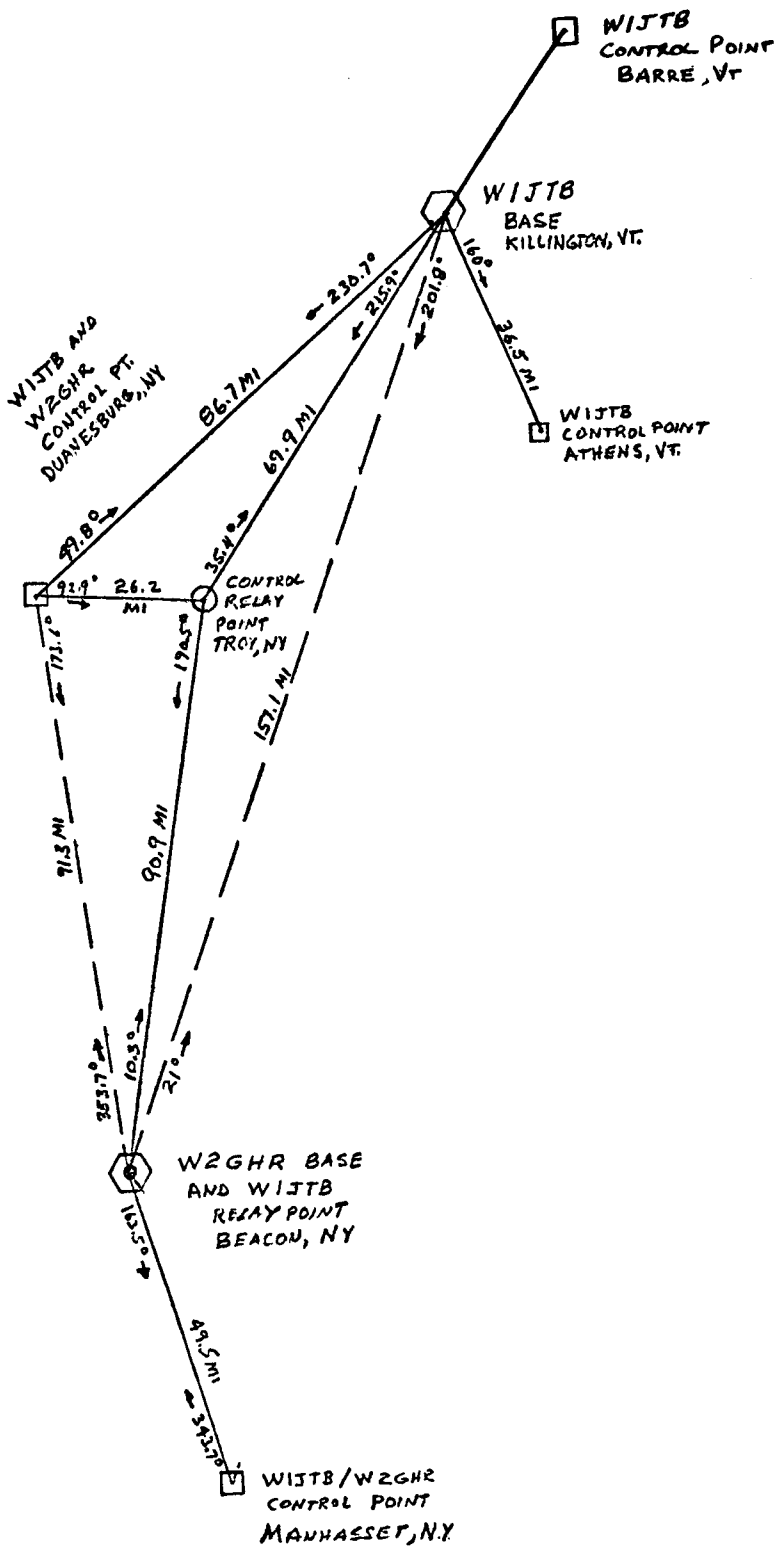
NOTE: ANTENNAS AT THIS SITE DO NOT EXCEED HEIGHT LIMITS REQUIRING SUBMISSION OF FCC FORM 401A

* MAY BE MULTIPLE RECEIVERS FOR INDIVIDUAL CHANNEL MONITORING

ALL EQUIPMENT EXCEPT CONTROL ADDITIONS AND INDICATORS FOR W1JT8 ARE PART OF EXISTING W2GHR REMOTE CONTROL INSTALLATION

THIS STATION EQUIPMENT IS SHARED IN PART WITH EQUIPMENT OF WA2SLP (WIFE)

W1JT8-W2GHR REMOTE AT MANHASSET, N.Y.



Gordon Pugh, W2GHR at the W1JTB - Killington Base station

LEGEND

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----- RADIO MONITOR PATH ONLY 2 METER BAND

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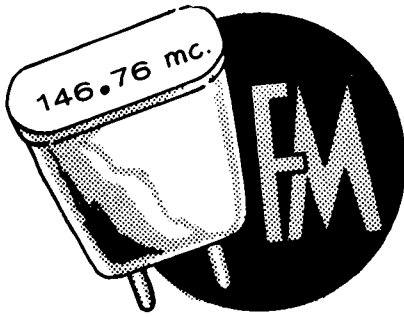
⬢ BASE TRANSMITTER AND CONTROL RELAY POINT - RADIO CONTROL

○ CONTROL RELAY POINT ONLY

□ CONTROL POINT

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BEARINGS ARE TRUE (GREAT
CIRCLE COURSES)



CHRONICLES OF SEVEN-SIX

By Ken Sessions

The Chronicles were not written to hurt anyone or impair their character. As per the request of K6KIX, we apologize & we are sorry that he took offense.

EDITOR

PROLOGUE

Last Month:

Although the rigid control of the Organization created a great deal of ill feeling among the FM'ers on 146.76 mc, the frequency was not without its good times. The wrath of the amateurs was tempered by a general spirit of good-natured devilment, and it became a fad to lambast other operators through the airing of carefully worded "bulletins." The bulletins, themselves, had their effect, too. Meanwhile, activity at an FCC monitoring station was barely perceptible to the organized seven-sixers...

III. BIRTH OF THE NEWS

The bulletin I had produced in retaliation to K6CHR's incessant maligning phrases was actually the forerunner of "Newsbeat", a nightly FM newscast on 146.76 mc. When the seven-six Governing Body decided that a news service was absolutely necessary for channel unity, I was saddled with the responsibility of producing the newscast. Thus, empowered with a smidgeon of authority, I appointed reporters in each of the major metropolitan areas. The reporters were to call me via landline daily and turn in their stories. WB6IGZ, my best friend, was the West Los Angeles reporter. He was unemployed and could thus devote a great deal of his time to channel monitoring. K6CHR was an anonymous correspondent for the San Fernando Valley area. (This was an ideal choice because of his heavy socializing, nosy character, and warped sense of humor.) Santa Barbara and Oxnard were represented by K6TAZ and WA6COT, respectively, the only stations in those areas with signals consistently strong enough to be heard in the Inland Empire.

It was my job to embellish, amplify, and otherwise twist real-life facts around so as to provide a nightly 15 minute transmission loud enough to be heard and interesting enough to be listened to. But it was rumored that FCC agents would be listening, too. So I very carefully studied Articles 97.91(b) and 97.89 of FCC Rules and Regulations, and decided that the news bulletins were as legal as the ARRL's nightly baldersdash and adamsite less dull!

I soon discovered that newsworthy events and important "one-way" messages were not altogether commonplace commodities. So, in order to fill up the allotted time slot, I resorted to an occasional assassination of character. Interestingly enough, these personal character assaults became the most celebrated and lauded portions of the news. (Which doesn't say much for the moral fiber of seven-sixers, in general, I'll confess.) The following is a typical Newsbeat broadcast:

Much of the success of the Organization was attributable to the seemingly unjammable signal of the news broadcast- not an easy status to attain on a frequency where but one station may be heard at a time. Actually, the king-size signals of the newscast were obtained through cooperation of several key stations. The newscasts originated in Ontario, but were transmitted on two frequencies. The main frequency, of course, was 146.76 mc. The secondary frequency was in the 220 mc band. WA6PCN, in the San Fernando Valley, received the secondary-frequency signals on 220 mc, and retransmitted them on 146.76 mc, greatly extending the coverage. Thus, a listener on seven - six could hear extremely powerful signals throughout the southland. (On F M, the stronger signal "captures" the weaker, so that heterodynes are virtually nonexistent.) A mobile seven-sixer on the Ontario side of a hill would hear the direct newscast. As he crossed over the hill, he'd hear the indirect transmission as the PCN transmission began to capture. The change-over would produce an almost imperceptible variation in signal level and overall quality.

This "simulcasting" system became known as the Newsmitter. Its operation was so successful that it was put into service as a single-frequency repeater. Stations operating on 146.76 mc were surprised to find they could be simultaneously repeated from 146.76 mc to 146.76 mc without feedback. I don't think anyone ever did figure out just how it was done. A mobile in, say Burbank, would transmit on seven-six. WA6PCN could receive it, and send the signals over 220 mc to Ontario, where they would be received and fed into a high power 146.76 mc transmitter.

The only tell-tale sign, outside of an unusually strong signal for a mobile, was the triple squelch tail at the end of each transmission (one tail for each receiver in the chain).

But the Newsmitter's basic purpose was dissemination of the evening seven-six news bulletins. And in this service, its career was faithful but short-lived. While the news programs continued, a group of F C C monitors stirred restlessly, ready to challenge its legality. Of course, we went blithely on about the business of maintaining our Organization, unaware of this awareness.

NEXT MONTH: THIS IS SEVEN-SIX

THE 76 NEWSBEAT BROADCAST

It's ten o'clock and time for the news! Stand by for Newsbeat - the Official Voice of Seven-Six. Tonight, you'll hear up-to-the minute reports on the major happenings on the channel for the past 24 hours. You'll hear shocking exposes by Walter Krimptite, penetrating interviews by Clete Clobbers, and news from the front by war correspondent Ernie Byle.

Newsbeat is rerecorded and distributed through the facilities of the Pacific Coast Network WA6(PCN), who welcomes independent AM open repeater stations WA6TDD and K6MYK to the distinguished list of outlets carrying the ten o'clock newscast. These two AM stations are gathering places for amateurs who long for the prestige of FM-type operation, but who must settle for second best because because of lack of funds, refusal of clearance to operate on seven-six, or a deficit of moxy. On behalf of seven-six, Newsbeat is happy for the opportunity to bring some excitement into their otherwise dreary world.

We'll have the news in a moment, but first this word...

Ever know a ham whom you'd like to see eliminated? Ever have a fiendish desire to jam out stations running more power than you? If so, listen closely; this announcement is meant for YOU! The California Ham Removers (CHR for short) is a unique and interesting service group devoted to the removal of operators from the 146.76 mc operating slot. After payment of your modest subscription fee, all you need to do is pick up your phone and dial ZM-76244. A secret agent will receive your call on his mobile telephone, then take your order. Select any seven-sixer you'd like to banish. Within hours, an impressive organization goes to work, and in a day or two, your worries will be over. Don't wait! Join the club today and you'll receive free with your membership a 45 rpm record of the only music authorized for transmission on FM amateur radio, the seven-six anthem: Waltzing Matilda.

We take you now to the Ontario newsroom, and seven-six news ace, Kandid Ken.

Good Evening, amateurs, pseudohams, bandscanners, and jammers. This is Kandid Ken with the latest news.

Los Angeles - The K6MYK open AM repeater crowd was so responsive to the news that plans are currently under way to repeat seven-six into MYK for several hours each evening. This will enable the less fortunate AM types to sit back and learn the real advantages of single-channel FM operation, while sparing them the expense of purchasing FM receivers. The MYK repeater output during this time will be received and retransmitted on WA6TDD, the only other AM open repeater in the Southern California area. All of seven-six feels that no amateur should be denied the great privilege of exposure to this fine medium of communications.

Riverside - WA6TLX is building a superrig which he says will be ready to jam out San Fernando and Los Angeles seven-sixers later in the year. TLX refers to himself as "Staunch Lone Defender of the Inland Empire," and says he is at war with seven-sixers nearer the coast. Competent Riverside news sources say fifth columnists are at work to assure that this rig never emits a signal on the Preferred Frequency. In addition, the wife of WA6TLX has announced an upcoming cut in his defense budget.

Here's an interesting item: For those among us whose chief enjoyment in this great hobby is malicious interference, WA6OVQ provides a list of recommended stations to be jammed. These include GKK and OVF for transmitting during Newsbeat, Riverside's TLX for routine rabble-raising, and all stations not officially authorized by the Frequency Coordination Bureau. (A directory of FCB-authorized stations is now being prepared under supervision of the FCB staff.)

San Fernando - The Valley may receive another permanent seven-sixer if upper echelon rumors prove valid. The secret Newsbeat grapevine reports that John (WA6ZFL) is negotiating with Jammer Joe (WA6VHC) to purchase his Newhall home. VHC will, unfortunately, remain in the California area.

Professional draft dodger Ken (K6TOX) has received greetings from Lyndon Johnson. Interested observers IGZ and OYY are watching his response carefully so they can follow suit if his method for evading Uncle Sam proves successful.

WA6LKK, habitual cruiser of Van Nuys Blvd., was arrested last night when police learned he was picking up pretty girls under the pretext of running a taxi service.

Today's literary award goes to WN6LID for the following bit of modern American literata, encapsulated into the limerick format by his younger brother, WN6DUD:

A few of the guys from the Valley,
While attending a malpractice rally,
Tried to record
The clobbers they scored
But the band was so jammed they lost tally.

For seven-six Newsbeat, this is Kandid Ken.... Goodnight.

ROLL YOUR OWN 2 METER

FM HANDIE TALKIE

By Dan Harger W8BCI

Every ham wants a hand-held transceiver for various reasons. On 146.94 MHz. its increased value is evident from emergency operation to transmitter hunts. The older Motorola transceivers have battery drain problems although work very well. Having no speaker is definitely a draw-back, when it comes to the place where monitoring for long periods is needed. Those of us who work the state water-skiing tournaments at Lansing, Mich. appreciate what it is like to hold an earpiece and monitor for two days at a time! What we need is a solid-state transceiver with a microphone and speaker including squelch, $\frac{1}{2}$ a microvolt sensitivity for 20 db and at least a $\frac{1}{2}$ watt output. This, I have attained quite successfully.

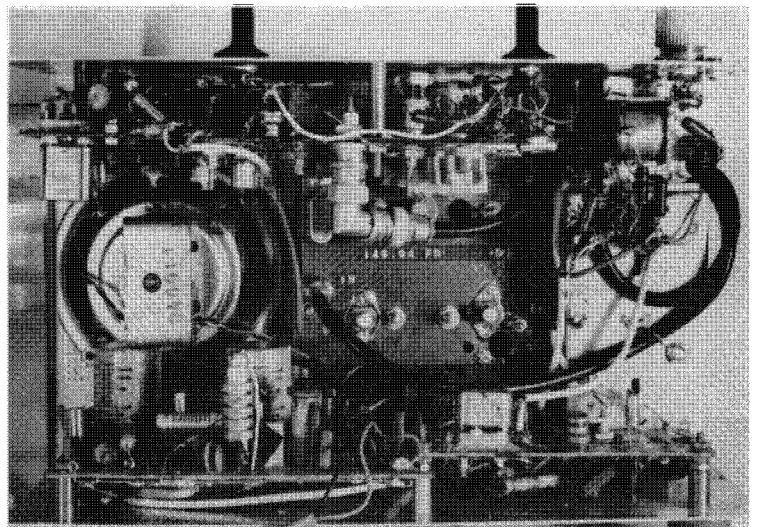
In the June issue of 1962 QST, is an article entitled, "A Transistor Transceiver for 6 Meters" a very excellent article, which describes a complete solid-state F M transceiver for six Meters. The author is Halford Greenlee, W8AXF. I have used most of his circuitry in my transceiver except for the front-end in the receiver which I obtained from "RCA HAM TIPS, Winter 1965-6". The final in the transmitter I copied out of one of Motorola's transmitters. I changed the IF in the receiver to 8 MHz, (high IF) to coincide with the 41V in case I needed to swap sections if one needed trail alone. The last IF is 455 KC as with most F M two-way, today. The receiver draws 15 ma. under closed squelch conditions, which rises to 20 ma. unsquelched and draws about 45 ma. under peak conditions of the class B receiver audio at 10v. The batteries are seven size "C" cells and life is in excess of 6 months. It approaches shelf-life very closely. The transmitter's battery drain total is under 100 ma. at 10 volts and is conservative for this battery complement. Audio power is about 200 milliwatts and RF power output is 250 milliwatts at 9 volts, so the transmitter output is greater at the battery voltage of 10.5 volts.

Since the battery capability on transmit is greater than 100 mls, I have obtained another transistor from "Poly-Paks" that is good for 2 watts which I will add-on to increase the power output to at least 1 watt as I can easily stand another 100 mls from 7 size "C" cells.

The transceiver is constructed in a grey hammer-tone case 10" x 6" x 3 $\frac{1}{2}$ " Bud GU-2110-A, price was \$2.60 net about 2 years ago.

THE TRANSISTORIZED RECEIVER

The transistors used in the front-end are the RCA silicon 40235, 40236, and 40237, RF, Mixer and Oscillator transistors consecutively. They are good to 1200 mc, each capable of 150 milliwatts of power and sell for less than 76¢ each. They can be obtained from the suppliers or contact your RCA transistor Rep. R.M. Mendelson W2OKO, is the author of the converter described in the "HAM TIPS" from which I obtained the front-end. His converter, however, is wired for



W8BICD PHOTO

positive hot and mine had to be negative hot, so I merely inverted his entire circuitry. When this was done, the RF stage became highly unstable so I went to grounded base configuration in the RF stage using another RF stage from Feb. '66 issue of QST.

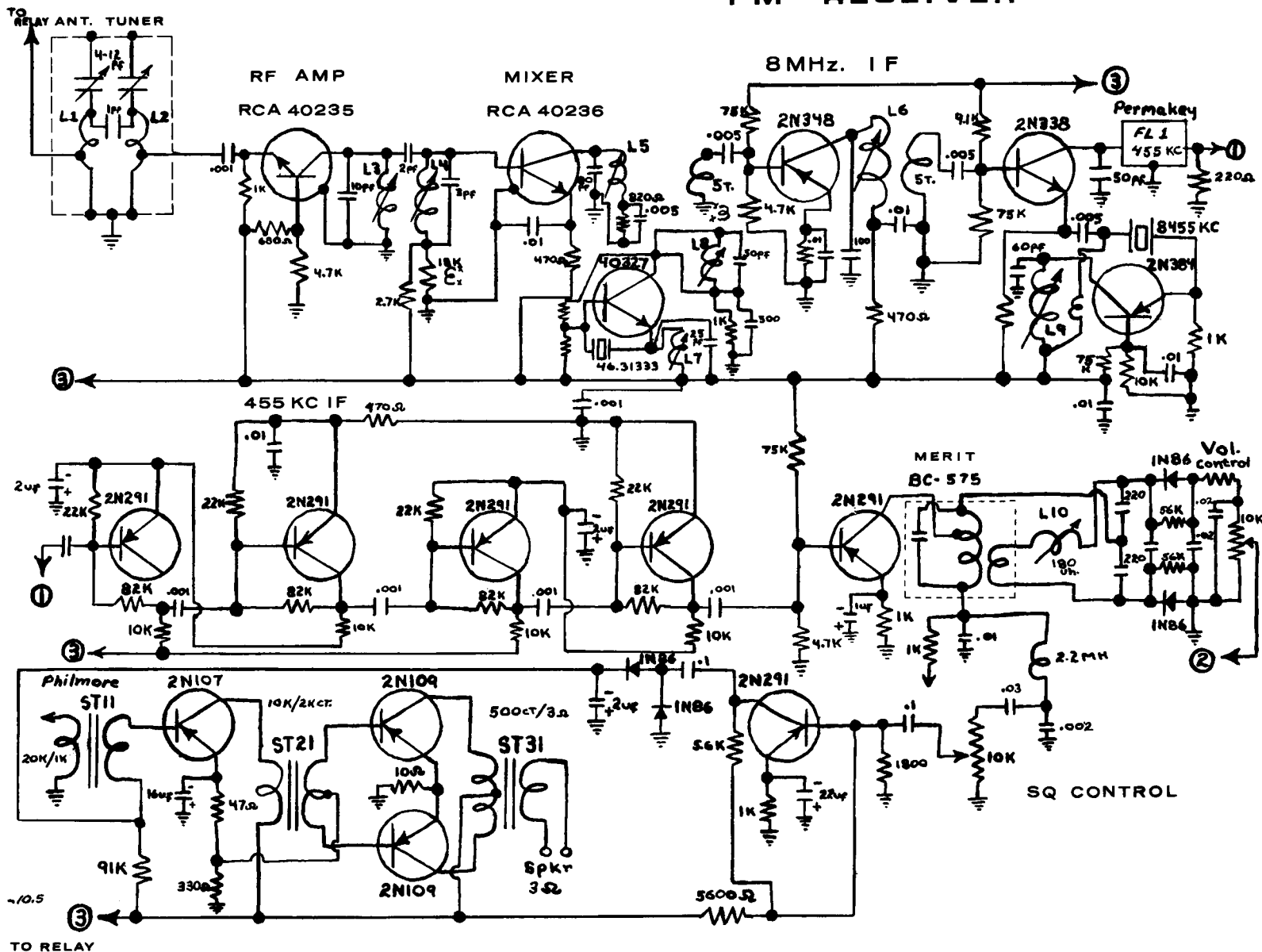
Please notice the antenna tuner in the receiver diagram. Without it various broadcast, (FM, AM or TV) would trigger the squelch when you walked around outside with the transceiver. I notice that other service transmitters no longer bother the squelch as it was prone not to be selective enough without a tuner. An FET would work fine here, but this has not been a problem and the cost of some FETs were greater at the time of construction.

The crystal is for a channel freq. of 146.940 MHz. Crystals can be ordered for fifth-overtone 46.31333 MHz., injection is at 138.94 MHz., and makes the grid-dipper move very nicely; I am using link injection from the 138.940 MHz. coil to the mixer input.

It is advisable to construct the entire transceiver either on a metal base or copper-clad board, not on perf-board as several of the stages of both the transmitter and receiver have quite high gain and need a metal ground to serve as a by-passing and shielding agent. Practically any transistor that is good for about 5 times the frequency which is to be used, can be used in the receiver. I happened to have a bunch of transistors that were roughly equivalent to 2N384's which I used for the 8 mc. IF, the 455KC I F and as an input transistor to the disc. transformer. Reading Greenlee's article would provide useful facts!

There is one modification in Greenlee's disc. transformer which I used that provided better disc. action. I found an unbalance in each side of center, when no primary tap is used on the 455 KC transformer. Since most of these miniature IF transformers come with this tap why not use it? What drew my attention to this fact was, that the slug when tuned on the transformer seemed to produce no effect on the balance of the action, however, when the tap is used, correctly matching the collector of the transistor, the coil has regained its "Q" and a balanced discriminator action results, with greater symmetry.

FM RECEIVER



PARTS LIST FOR DIAGRAM

- L1 - L2 6 T. no.18, tap 1 1/2 T., 1 1/4" Dia.
- L3 - L4 4 T. no.22, on white slug form 1/4"
- L5 - L6 - L9 30T. no.22enam. 3/16" Dia. red slug
- L7 15T. no.22 3/16" Dia. red slug
- L8 4T. no.22 3/16" Dia. white slug

Sub-chassis layout for the whole transceiver along with the transmitter schematic will follow in the Jan. '68 issue.

The squelch action is quite good considering its simplicity. It cuts off the audio section of the receiver completely, cutting the drain to a bare minimum.

Some have wondered why I didn't go to "IC's" for the IF, etc. The reason is that to date I have not been able to find one that suited this job as perfectly as the circuit I have now with such low current drain! All four of the 455 KC IF transistors at 10 volts only draw 1 mil total current, and their limiting action is excellent. It can be done with IC's, of course, but I will accept nothing less than an exact copy. I use the same argument for the audio stages and the converter.

The sensitivity of the receiver is a 1/2 microvolt for 20 db quieting and could be improved with some fiddling as these transistors are capable of better. Since these transistors are silicon, and good for 150 milliwatts I have had no burn-out trouble even though the receiver antenna has been two or three feet from my 41V car transmitter antenna during transmit, which has a 6146 in the final for about 20 watts total output. I

did not touch the antennas to provoke the matter! On the other hand, I, inadvertently transmitted at the same time with the car rig and promptly burned out the 2N1141 \$5.00 germanium final in the transmitter! It would be advisable to use silicon in the final of the transmitter if possible. Motorola fuses the final of their transmitters when using germanium transistors.

Next Month.....
THE SOLID-STATE TRANSMITTER

TWO METERS-A CROSS-COUNTRY FM NETWORK?

by

Don Milbury W6YAN

An FM'er in Utica, New York complains that 146.94 is getting too congested. His contact, a mobile in San Diego, sympathizes somewhat, but his transmissions are partially obliterated by a guy in New Mexico, who can't afford the time it takes to build up a dummy load. Implausible? Perhaps a little bit -- but it's possible, and without satellites, using today's radio technology.

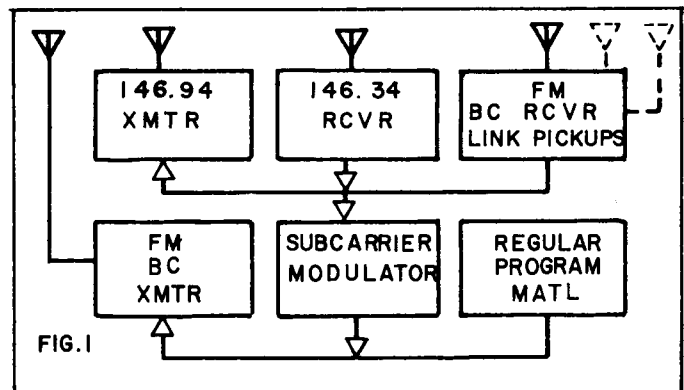
Our imaginary operators are communicating on 146.34 and 146.94, standard repeater frequencies. Yet their transmissions can be heard from coast to coast. How?

Well, if you're thinking "link," you're on the right track. But no amateur or group, regardless of how well organized, could afford to build and maintain the links required for saturating coverage of the U. S.

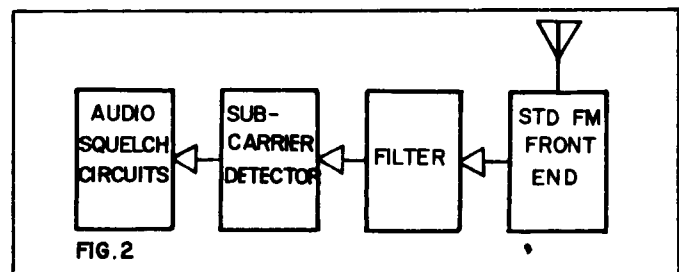
As unbelievable as it may seem, the links are already constructed. Some adapting circuitry is required at each link base, of course, but the capability does now exist. Unfortunately, however, the service is illegal. But perhaps, with a little pressure in the right places, the restraints will be lifted, and continental two-meter coverage will be a reality.

The secret is the use of subcarriers on standard broadcast FM stations. There are more than 1800 FM broadcast stations in the continental United States which could be used as communications base stations without interfering with their own existing operations. The FCC can issue permits to these stations which will allow them to transmit intelligence on their subcarriers. (Each station commands a broad chunk of spectrum, only a small portion of which is needed for high fidelity transmissions.)

In practice, the FM station's carrier would be modulated by the standard program material in addition to a special high-frequency subcarrier which would, itself, be modulated by the information supplied from the open amateur channel, such as 146.34 MHz. A standard broadcast receiver at another commercial FM station would accept the subcarrier signals and feed them -- along with local 146.34 MHz traffic -- into the next FM broadcast transmitter in the nationwide chain. The return circuit would be accomplished in the same manner, but using other well selected FM broadcast sites.



The diagram of figure 1 shows the setup at each link base station. The 146.94 MHz transmitter is actually not a requirement since FM operators could use a BC receiver equipped with an FM demultiplexer as the signal source. A prime advantage with this system would be the ease with which duplex operation could be achieved. Figure 2 shows the method by which the amateur signals could be extracted from the host carrier.



FM BROADCAST, continued

It is indeed an unfortunate thing that, as the FCC rules are now interpreted, standard broadcast FM stations can be used for nothing other than broadcasting. Regardless of the number of amateurs using the system or listening to the outputs, the mode is not considered by the FCC as a broadcast service. Communication links are, by definition, directed two-way networks.

The use of subcarriers for transmitting intelligence is actually a rather new technique, perfected in the fifties when FM stations were vying for better methods of transmitting stereo signals. The marriage of military technology with commercial research and marketing knowhow resulted in the development of multichannel transmission from a common carrier. But the FCC has so far refused to recognize standard broadcast FM as a common carrier, despite its capability.

If and when broadcast FM is granted the authority to serve as a common carrier, many services will benefit. Each of the participating FM stations could carry several parasitic carriers, so there would be room for extended-range commercial two-way radio, large-scale paging networks, and many other related services.

Mr. Leo G. Sands, in an article on subsidiary carrier utilization*, put it succinctly when he said "...We Americans are wasteful of our natural resources . . .(and) . . . should take steps to utilize what we have more efficiently. Using an SCA (for Subsidiary Carrier Authorization) channel for communications would be a significant step."

As amateurs, we would have little cause to disagree.

Amateur FM Directory

by Neil McKie WA6KLA

A problem that faces the FM'er when he prepares to take a vacation trip across the country is determining the two-meter channels to set up in his mobile unit. Most FM'ers know they'll be able to operate in metropolitan areas throughout the United States, but only a handful -- if that many -- know which frequencies are in use and where.

An FM directory would help. With a directory, the traveling FM'er could check the frequencies in use over the route he'll take, and set up his mobile for those channels before leaving home.

A directory of the type required could be published on a single page of FM Bulletin, but preparing it will be no easy task. It will take the cooperation of all FM'ers. Operating frequencies must be initially listed, and all changes or modifications to them logged immediately. This is the only means by which the directory can be kept up-to-date so that new repeaters can be planned based on its information.

As a start, let us know what the standard frequencies are in cities you are familiar with. Tell us where the repeaters are, the frequency of their inputs and outputs, and the requirements for their use.

Use the format shown below and mail your information to FM Directory, care of Southern California FM Association, Box 385, West Covina, California 91790.

City and State _____
Repeater: _____
 Output Input
Main Opr. Channels: _____

*Leo G. Sands, "Using FM - Broadcast SCA Channels as Base Stations," Communications News, October 1967.

TELEPHONE OPERATION BY REMOTE CONTROL

by

Ken W. Sessions, Jr. K6MVH
4861 Ramona Place
Ontario, California

Traffic on the freeway came to a sudden and violent standstill. When the screeching brakes were stilled and the traffic began to flow again, there was yet one vehicle unmoving. A twisted motorcycle, one wheel still spinning, was imbedded in the chainlink fence adjoining the turnpike. The patrolman lay some twenty feet distant -- not quite unconscious, shivering from shock, weeping with pain.

Don Milbury didn't stop. What could he contribute by joining the oglers? He watched the crowd begin to form around the downed officer and drove right on past. But the service he rendered that day saved the officer's life.

Don Milbury is an amateur (W6YAN) who operates a repeater that has been interconnected with a standard telephone system. Before he had traveled a quarter-mile from the scene, Don made sure that an ambulance had been dispatched. While many motorists were tying up traffic with their curious gawking, he was busy making calls. After giving the particulars to the ambulance service, he called the state highway patrol. Then, for good measure, he notified the local city police.

A few miles further down the road, Don accepted a call in his car. The city police appreciated his early report, and were happy to relate that the officer would live. It will take a lot of ugly towers and television-interference complaints to water down this city's opinion of amateur radio.

The personal advantages of telephone accessibility from a mobile unit are obvious. If you use the control facilities of a UHF repeater, you too should seriously consider including a telephone as part of your remotely controlled system. Should you chance upon a serious traffic accident, you will have the capability of dialing the police department directly. Your on-the-spot eyewitness reports will prove invaluable to the local radio and television stations. In civil emergencies, you will be able to participate by contributing a vital element to the communications network -- a telephone that will function even when the phone lines are down at the site of a disaster.

A great many amateurs seem to think it is illegal to interconnect a telephone with a repeater for automatic patching. As my own remote control license will attest, this is simply not true. The legality of a remotely operated telephone system depends on its ability to meet the requirements of FCC Rules and Regulations. The principal requirement is that incoming calls must not be capable of keying the transmitter when no licensed operator is monitoring from the control point.

Connecting a telephone into an existing control system is relatively simple. With a stepper and a few relays and timers, you can even build up a complete digital control system as well as an automatic phone patch. The circuit shown in figure 1 is a complete control system that includes a ten-digit function-selection network. It may be used with almost any standard decoder device. (At the transmitting end, the operator uses an audio oscillator to generate the tone signal and a standard telephone dial to pulse the proper digital sequence.)

The conventional telephone uses but two wires to accomplish what may amount to a multitude of different functions. There is typically a low-voltage dc level across the lines to drive the carbon microphone element; when the telephone rings, however, a higher voltage ac signal is superimposed on the lines to energize the bell.

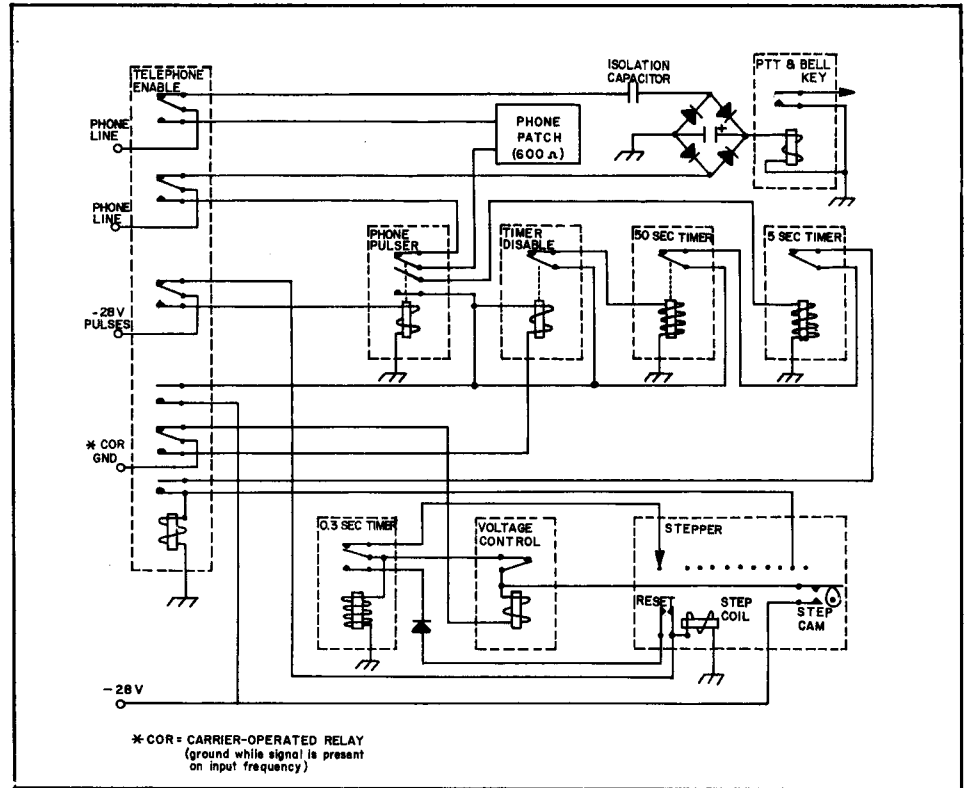


FIGURE 1. TELEPHONE CONTROL CIRCUIT AND INTERCONNECTION DATA

The control circuit of figure 1 takes advantage of these characteristics so that the line can be continuously monitored for incoming landline calls without disrupting the normal control functions of the remote radio installation. While the control portion of the system (lower three enclosed squares on the diagram) is in normal use, the phone lines are sensed for the presence of an ac voltage (indicating that the phone is ringing). The lines are fed through a set of normally closed contacts on the telephone enable relay to a bridge circuit. The dc component of the line is isolated by placing a capacitor in series with one of the conductors. A sensitive plate relay on the output of the bridge pulls in when the telephone rings and keys the push-to-talk of the remote transmitter for the duration of the ring. The momentary closure of the relay can also be used to trigger an oscillator or other signaling device so that when the transmitter is keyed by the phone a ring signal is generated also.

The ringer may be a simple relaxation oscillator such as the one shown in the circuit of figure 2, which can be constructed in a few minutes with a couple of capacitors, a resistor, and a neon lamp. The device shown generates a varying-pitch tone that is easily identifiable at the receiving end.

When the remote operator wants to place a call or respond to a phone ring, he dials a preselected number to energize the telephone enable relay (the digit 9 in the case shown). Here's what happens in the control portion of the system when a 9 is dialed:

The 28V decoder pulses (one for each digital increment, or a total of 9) are fed to the stepper coil through a set of normally closed contacts on the telephone enable relay. With each 28V pulse, the stepper moves one position. The step cam contacts of the stepper close when the stepper is first energized, and do not open again until after reset has taken place.

It should be noted that some stepper switches do not have these step cam contacts. Their function can be simulated, however, if the stepper has an extra deck with its own wiper arm. The function is achieved by bussing all the contacts of the extra deck together and running a lead from this bus to the voltage control relay. The wiper arm, forming the other contact of the makeshift switch, is connected to the 28V source.

When the stepper moves from its "home" position a 28V potential is applied to the voltage control relay whose contacts are pulled in as long as the dialing operation is taking place. (This is accomplished because the ground side of the relay coil is supplied from the carrier-operated relay.) After the 9 is dialed and the control-frequency carrier disappears, the voltage control relay drops out, applying voltage to the 0.3-second timer, which feeds the 28V signal to the stepper wiper through its own normally closed contacts. At the end of the 0.3-second period, the timer pulls in, removing voltage from the wiper and applying it to the stepper coil reset contacts. When the stepper resets, the step cam again opens and control voltage is removed from the system.

The selection sequence described above completes but one function: It causes a 0.3-second 28V signal to appear on the ninth contact of the stepper. The short signal causes the telephone enable relay to pull in and lock itself in the energized condition. A constant voltage from the 28V bus is applied to one of the normally open contacts of the telephone enable relay. Thus, when the relay pulls in momentarily the bus voltage can be transferred to the relay coil to hold it in. In this case, the voltage is passed through the normally closed contacts of two timers in the telephone circuit, both of which are used to remove coil voltage (and thereby accomplish telephone hangup) under certain conditions.

REMOTE TELEPHONE (Continued)

With closure of the telephone enable relay, the phone lines are disconnected from the rectifier circuit and fed directly into the phone patch for audiomixing and transfer. The decoder is coupled to the phone pulser relay so that additional dialing will pulse the phone line rather than the stepper. The push-to-talk of the transmitter is keyed continuously. A ground signal from the carrier-operated relay is supplied to the timer disable relay as long as the remote receiver is receiving a signal.

After a telephone conversation has been completed, hangup may be achieved in either of two ways: The operator may drop his carrier, causing the timer disable relay to close and supply coil voltage to the 50-second timer. At the end of its period, the timer opens to remove coil voltage from the telephone enable relay and return the control system to its normal state. As a quicker alternative, the operator need but transmit a continuous tone. This causes a continuous 28V signal to appear on the coil of the phone pulser relay, holding it in so that

a steady voltage is applied to the coil of the 5-second timer. When the timer pulls in, coil voltage is removed from the telephone enable relay. The phone is ready to accept other calls, and the stepper may then be used to select other functions.

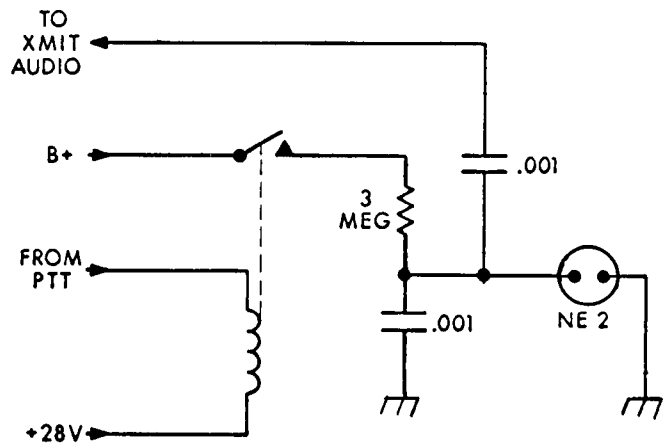


Figure 2
Telephone Ringback Oscillator Circuit

frequency coordination in california

by Jack Bankson WA6JXG

Standardization of FM frequencies and coordination of activity for FM control applications is proving to be an extremely valuable service in Southern California. The Southern California FM Association, which now boasts more than 70 members, has issued a resolution calling for the adoption of a restrictive number of FM channels in the 2-meter band. The channels are numbered from 1 through 31 and appear at multiples of 60 kHz throughout the upper portion of the band. (Channel 1 is 146.04 MHz.) This standardization, if adopted by other states and FM groups, will make it a little easier for an FM'er to keep active on cross-country trips.

Southern California FM'ers also believe this resolution could go a long way toward pacifying AM'ers, whose chief fear is that FM will "take over" the band. It is unlikely that an AM'er will balk at FM activity once it has become publicized that the FM channels are predictable and avoidable (by the AM'er), and that FM activity will never spread cancerously over the band as sideband did. The list shown here represents the SCFMA's choice of channels.

Since the California area is blessed with so many remotes and repeaters, a coordination effort was also required in the 450 MHz range. Neil McKie (WA6KLA) handles this difficult, arduous, and often thankless task. He maintains complete records of

Channel	Frequency	Channel	Frequency
1	146.04	17	147.00
2	146.10	18	147.06
3	146.16	19	147.12
4	146.22	20	147.18
5	146.28	21	147.24
6	146.34	22	147.30
7	146.40	23	147.36
8	146.46	24	147.42
9	146.52	25	147.48
10	146.58	26	147.54
11	146.64	27	147.60
12	146.70	28	147.66
13	146.76	29	147.72
14	146.82	30	147.78
15	146.88	31	147.84
16	146.94		

remotes and repeaters, and keeps an accurate list of their control and talkback frequencies. When a new repeater or remote system is planned, Neil studies his list (which is not publicized for obvious reasons), and assigns a new set of frequencies for control. He tries to maintain a 50 kHz spacing in the UHF spectrum, but must occasionally make tradeoffs because of locale, proximity to other users, concentration of UHF activity, etc.



Our 2 FM Group held a Pot Luck Dinner on Sunday, Nov. 12, at the QTH of W8CQB, Brother Jack Bauer in Springfield Township. It was enjoyed by a small but mighty group of 34 people. The Gen. County FM Operator of the Year was awarded a plaque for services rendered. It was presented to Gloria Sturm, K8WKE.

We regret to inform our readers of the very serious condition of our fellow Ham K8PKU, Ken LeBar. Our prayers are with his XYL, Ann and family.

Since our last report we have added three more stations to our list-Our new members being: John Engle- W8NKR Bill Quigley- WA8KMQ, & Theron Stewart-WA8RII.

RESOLUTION

The Southern California FM Association hereby resolves to condone, sanction, or otherwise support FM operation on only the following listed frequencies of the two-meter band.

Channel	Frequency	Channel	Frequency
1	146.04	17	147.00
2	146.10	18	147.06
3	146.16	19	147.12
4	146.22	20	147.18
5	146.28	21	147.24
6	146.34	22	147.30
7	146.40	23	147.36
8	146.46	24	147.42
9	146.52	25	147.48
10	146.58	26	147.54
11	146.64	27	147.60
12	146.70	28	147.66
13	146.76	29	147.72
14	146.82	30	147.78
15	146.88	31	147.84
16	146.94		

Channel 16 is the national calling frequency as well as the adopted frequency for in-band repeater output. The accepted repeater input is channel 6. Most active of the listed channels are: 6, 13, 14, 16.

**P L E A S E
 S U P P O R T O U R
 A D V E R T I S E R S**

FAST RESPONSE ON TPL

By Ken Decker, WA6OSB

I wish to thank Don Scott, WA5KUI of Alamagordo, N.M. for the response to my question about 4 frequency operation with the TPL, which appeared in the August issue of FMB. Here is another advantage of a service which can be performed by publications like the FM BULLETIN.

An excellent article boosting the image of Amateur F M appeared in the May, 1967 issue of C.E.M. (Communications Equipment Marketing), a magazine for the two-way mobile radio service and sales industry. It was written by Pat Devlin, WA5BPS, who is the President of the Tulsa Repeater Organization, Inc. It pointed out the various public services, repeater operations, plus other information common to Amateur FM operation.

New F M stations heard in San Diego area are : John Horgan, WB6SML and "Doc" WB6TYM.

Unfortunately, I was unable to attend the FM Picnic held Aug. 27 by the Southern California FM Association, a newly re-organized group. Among the activities were the repeater "Kapture" contest and the mobile field strength contest. I understand some pretty wild gain antennas were seen on some vehicles. Did they raise the legal height limit for vehicles to cover 13'-6" Fellas???

SOUTH FLORIDA FM ASSOCIATION
 Miami, Fla.

President Norman H. Ginsberg W4YFD
 Vice President Aubrey B. Hutchison Jr. K4ANV
 Treasurer Barnett D. Freeman K4EBG
 Secretary Theodore S. Holdahl K4ANW

The license for the repeater has been applied for but no word, as yet. The frequency is 146.34 input and .76 out. The repeater is located at the Engineering Bldg. of the University of Miami. Checks and tests have been made under the call K4HYE. Using a gain antenna for receive and a ground plane for transmit, we were able to work Ft. Pierce (100 miles north) from mobile to base. The repeater will be open and usable to anyone with a 146.34 MHz. crystal. The G E Progress line will be owned & operated by the South Florida F M Association. 73's- Don Hayman WA4JBI



**H E L P U S G R O W
 S H O W T H E
 F M B U L L E T I N A R O U N D**

By Tom Burford K7TDQ

SOUTHERN NEVADA FM ASSOCIATION

Just about two years ago FM activity really got started in this desert community. It all started when Don Brickey W7AKE put together a repeater for use by himself and his wife Millie W7CDH.

Some of the other hams in the valley heard the strange modulation signals on the air on their AM and SSB receivers and started to investigate. This was the start of it all.

The group started to grow and at the end of the first year there were about 15 active on the band. At that time the repeater operated 146.94 input to 147.50 Mhz output. Don used to have a two way shop in Illinois a few years ago and when he sold out he had what seemed like a couple of truck loads of old Motorola high band FM gear available. He also had a bunch of crystals for the rigs.

Then all of a sudden in the fall of 1966 things started to grow and equipment became scarce. The Las Vegas Radio Amateur Club had in the spring of 1966 signed an unique "contract" with the City of North Las Vegas who furnished a meeting place for the club in return for the club supplying as emergency communications capability for the Civil Defense Agency of this community. At the time the group did not know how much this was to benefit the members, but learned a few months later that the city had acquired twenty RCA-CMC20 series of FM units for the use of the club members for so long as they remained members of the club and attended drills and club meetings.

This meant that several of the members of the club that had not been on FM before could now join us.

At the present time there are about 55 individual calls on two meter FM in the Las Vegas Valley area including Boulder City, Henderson, Las Vegas and North Las Vegas.

Our group has helped in numerous Boy Scout activities and local emergencies that have arisen during the past two years.

Don Brickey, W7AKE & Frank Beising, WA7EZV have been working during the past year in completely rebuilding the repeater station and are now awaiting the remote station license to go "mountain top" with the machine. The location that has been selected for this machine is on Red Mountain just outside of Boulder City, Nevada. For those of you who are pilots this is at the same site of the Boulder VOR. This is a very good site as it is approx. 2000 ft. above the valley floor and will cover almost all of Lake Mead south to Searchlight, Nevada, Northwest to Indian Springs and possibly to Kingman, Arizona.

The control is via tone pulse system on 440 Mhz using G.E. Pre prog equipment. When this machine goes mountain top it will have two inputs and two outputs on two meters. They will be on a priority basis. 146.34 Mhz input will come out on 146.94 Mhz, and 146.94 input will come out on 147.50 Mhz. It is hoped that this machine will be on the mountain top and fully operational by the time of S.A.R.O.C. in January of 1968.

Things started to warm up right away Friday evening, with the registrations closing at 9 pm and everyone meeting at the hotel lounge for cocktails. It appeared to be a preview of the coming events, since they had to close the place around us at two am.

Early Saturday morning, things were well underway, except for a few heavy heads! Even the volume on the check-in stations were set at a whisper. Everyone wanted to man the FM station, hoping to escape any contacts and the ear piercing static.

The Swap and Shop went off nicely and throughout the day, tickets were being sold for the banquet to be held that night at the hotel. Could it top Friday nights catharsis? Everyone wanted to find out!

The evening cocktail hour started at 6pm, back at the scene of the lastnight's caper. The crowd of course was bigger, better and loader. The service hardly could keep up with the galloping pace, so double rounds were the usual.

Promptly at 8pm the dinner bell was sounded and everyone filed in to the Banquet Room, clutching their remaining cocktails. The sprites were already high enough, and now with the excellent banquet supper, everyone was truly serene.

The tables were quickly cleared in preparation for the evenings speakers. First to be introduced to the podium by the Master of Ceremonies, John Alexander (W8GZF) was Ralph Thetreau W8FX, the Section Communications Manager of the ARRL for Michigan. The audience of ardent V H F's, poised patiently, however the format was altered to Idle Yak, Yak, on VHF. After the air cleared from some of Tate's remarks degrading V H Fers I found myself being readied for a chopping block with an audience of irate fellow amateurs. I was introduced and lead to the podium.

Following that speech was hard enough, but just prior, I was informed that my topic "Sex and the VHFer" was out! To some people this would not be distressfull, but to me it was almost a total disaster... other than ham radio I didn't know anything else. Anyway, I conjured up a few words and turned it over to the next lamp of wisdom.

All was followed by dancing to a live (their pulse verified they were alive) band and more socializing. Everyone had a ball and surly will return next year!

WANTED BACK-(stolen)...One (1) General Electric Voice Commander II on freq. 146.34 and 146.94 from Tulsa, OK area. With rechargeable battery, belonged to WA5BPS. If the thief would like the battery charger, please contact the original owner. The unit may be easily identified by the crystal installation method on the back of the frequency switch with a small padder.
WANTED.... Schematic & info on Motorola equipment Model-K7288C, Rec.- PA7265B, Xmitter.- PA7291C, Power Supply- PA7299A Contact Jack Martindale, W0LSG, 709 1st Ave., NW, Waukon, Iowa 52172

"SPOOK PATROL"

Toledo, Ohio
Jim Grubs, W8GRT

6 Meter FM mobiles provided the eyes & ears for the Ottawa Hills Police in operation "Spook Patrol". Protecting the small Trick or Treaters and troublesome pranksters on Halloween night were: Jim Grubs, W8GRT/8 at the police station using John Murray's rig. Others were Frank Nicoli, K8UZT/M, Willard Shears, W8HYE/M, Jerry Coleman, W8HYW/M, Doug Mansor, WA8UWV, and Steward Hinze, K8DFD.

One of the cars did get egged and, also, they spotted and turned in an alarm for a incendiary leaf fire. It resulted, however, in the lowest rate of vandalism in years. As a result, long range plans will put F M in the Ottawa Hills Police Station.

At the conclusion both officers and FM'ers shared cider and doughnuts plus some good rag-chewing.

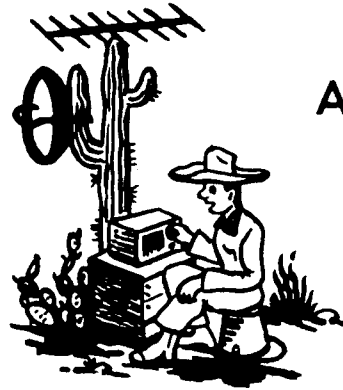
PETER PAN SHOES

ARE FOR EVERYONE



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GROSSE POINTE, MICH.

BILL CHIARAMONTE -- KBYCQ



ARIZONA

REPEATER

ASSOCIATION

P. O. BOX 675

SCOTTSDALE, AZ

At long last the organization and incorporation of the FM bunch in Central Arizona has been completed. Through the efforts of Barry Goldwater K7UGA and others, we will share a site on South Mountain near Phoenix. We will occupy a bomb shelter on top of the mountain (1300') with the local CBS affiliate KOOL (precious little room with TV, FM, & AM broadcast equipment occupying center stage). Through the gracious cooperation of Ray Stofer, K7JNK and Mike Seidelle K7STA, who are lending us their .34- .94 in-band repeater until our equipment is operational. So the area will be covered by W7AJU again.

Our membership campaign is being coupled with a subscription drive for the FMB.

If you fellows would be interested in a article on varactors, since the world-famous "batwing" varactors are manufactured locally, then drop me a line.

Peter Marshall K7AWI

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ANN ARBOR, MICHIGAN

Dear Sirs:

Three months ago, I saw your Bulletin for the first time. I was so impressed with it that I asked Ken Sessions (the one who showed it to me) to add my name to his list for subscriptions. Since then, I have found myself looking forward to receiving my copy in the mail each month. I enjoy getting reports from other parts of the country about F.M. and its progress, even though I'm not directly affected.

About one month ago, I was asked to write a column for your paper representing the Los Angeles/So. California area. This request came from several local amateurs and from the Board of Directors of the SCFMA (Southern California FM Assoc.). Due to a very busy schedule, I have not been able to find time enough to sit down and do it, but I do intend to.

Today, I heard that there was some controversy over the publishing of the Chronicles of Seven-Six. From what I heard, I felt that possibly you would want to hear the "public reaction". Here's mine:

I have read the Chronicles and heard them on the air and feel that I know what Ken was trying to do. When I saw them published in the Bulletin, I felt that they would make interesting reading and would be enjoyed by all. It seems obvious to me that any choice remarks made in the Chronicles about anyone are made in jest, and are not to be considered as character assassinations. I certainly hope that others do not take offense over such a trivial thing as one paragraph in a Bulletin.

It may be of interest to you that I am currently preparing a book on Repeaters (in-band and cross-band) and Remote Systems. It will include all important details involved in the construction, control, and operation of Repeaters. Remote control systems (dial, Touch-Tone, wire, etc.) will also be covered. I expect to fill up about 70 pages with information. At the present time, I have 26 pages.

I really like your publication: keep-up the good work.

Sincerely,



Bill Lyon, WA6VIF/WB6ZKW

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