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**NO. 1**

**VOL. 2**

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9/68

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FM BULLETIN

2005 HOLLYWOOD AVENUE

GROSSE POINTE, MICHIGAN 48236

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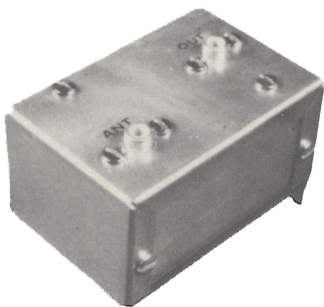
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## EDITORIAL

A DECEMBER EDITION OF BUSINESS WEEK CARRIED AN ARTICLE THAT TOLD OF A DEMAND BY AMERICAN BUSINESSES FOR MORE SPECTRUM FOR MOBILE COMMUNICATIONS. THE AUTHOR SAID THAT SEVERAL PROPOSITIONS WERE BEING CONSIDERED IN ORDER TO BRING ABOUT ADDITIONAL OPERATING SPACE FOR COMMERCIAL SERVICE. ONE OF THESE IDEAS INVOLVED THE SPLITTING OF CHANNELS TO A MAXIMUM SEPARATION OF 25 KHZ. ANOTHER CALLED FOR COMMERCIAL RADIO TO TAKE OVER TELEVISION-STATION SPECTRUM IN AREAS WHERE THERE WOULD BE NO INTERFERENCE. THOSE OF US WHO KNOW A LITTLE ABOUT RADIO KNOW THAT NEITHER OF THESE APPROACHES IS REALISTIC. AND WE'RE BEGINNING TO RUN SCARED! CONSIDER HOW EASY IT WOULD BE FOR SOMEONE TO SUGGEST EXPANSION INTO THE AMATEUR BAND. WE'RE PARTICULARLY VULNERABLE NEAR 450 MHZ, BECAUSE THE LEAGUE DOESN'T EVEN KNOW WE'RE THERE! OFFICIAL ARRL THINKING SEEMS TO BE THAT THERE IS SOME ACTIVITY -- MOONBOUNCE, DX, EXPERIMENTS -- DOWN AROUND 420 MHZ. AND IF THE ARRL WERE ASKED BY AN FCC COMMITTEE TO RECOMMEND AN EXPENDABLE PORTION OF THE AMATEUR BAND, THE ANSWER WOULD SURELY AFFECT THOSE OF US WHO OPERATE CLOSE TO 450 MHZ. IT'S UP TO ALL OF US TO LET THE ARRL KNOW WHAT WE'RE DOING AND WHERE WE'RE DOING IT. WRITE, PHONE, CABLE (BUT DON'T HAMGRAM) THE ARRL. LET THEM KNOW THERE IS CIVILIZATION ABOVE 432. DO IT NOW!!!

## = chronicles controversy =

...an open letter to FMB readers from the author of "Chronicles of an Amateur FM Channel."

An irate seven-sixer was offended by the material published in the series entitled "Chronicles of an Amateur FM Channel." As a result, the angry operator made numerous telephone calls to both the author and the FMB editor. Finally, the FM'er instructed his lawyer to elicit an apology for what the attorney said his client referred to as "libelous" material.

In the interest of good will and to avoid the costly and time-consuming prospect of possible judiciary litigation, the apology was published last month. The apology was tendered with sincerity; it speaks for me as well as for Editor Mike Van Den Branden. Mike subsequently asked me to contact others whose names were to appear in the Chronicles and prevail upon them to sign a standard release. But the task proved so Brobdingnagian that it was soon abandoned in hopelessness.

As an alternative, I thought it might be wise to do a little editorial air-clearing so that people will know exactly what the "Chronicles" represents.

The series is a fairly accurate sequential account of the activities on 146.76 MHz. The "character assassinations," such as the one to which the good FM'er took offense, are not really a part of the

Chronicles, but part of an illegal newscast that was once a nightly feature on seven-six. In order to better acquaint the reader with the FCC's justification for lowering the boom on the newscasts, it is of course necessary to show the content of typical broadcasts. The newscasts were rarely "unbiased truths" -- they were written as humorous, satirical reports BASED ON reality.

As for the text of the Chronicles, it is the truth as seen through MY eyes. (There really were Master Control Stations, Frequency Coordination Bureaus, power wars, saboteurs, mysterious jammers, etc.)

FCC representatives referred to the seven-six news broadcasts as "speculative gossip" -- and they were right. The Chronicles in no way denies this. Nor does the Chronicles necessarily sanction the newscasts. The Chronicles merely serves as a means for showing what the newscasts were. This can only be achieved by reprinting some of these news transmissions verb atim.

I'm sure Mike would drop the series if it were a source of general ill feeling, and I would concur with such action. Why not let us know what YOUR opinion is? Right now, while you're thinking about it, why not look over the text of the Chronicles, then drop us a line telling us what YOU think.

*Ken Sessions K6MVH*

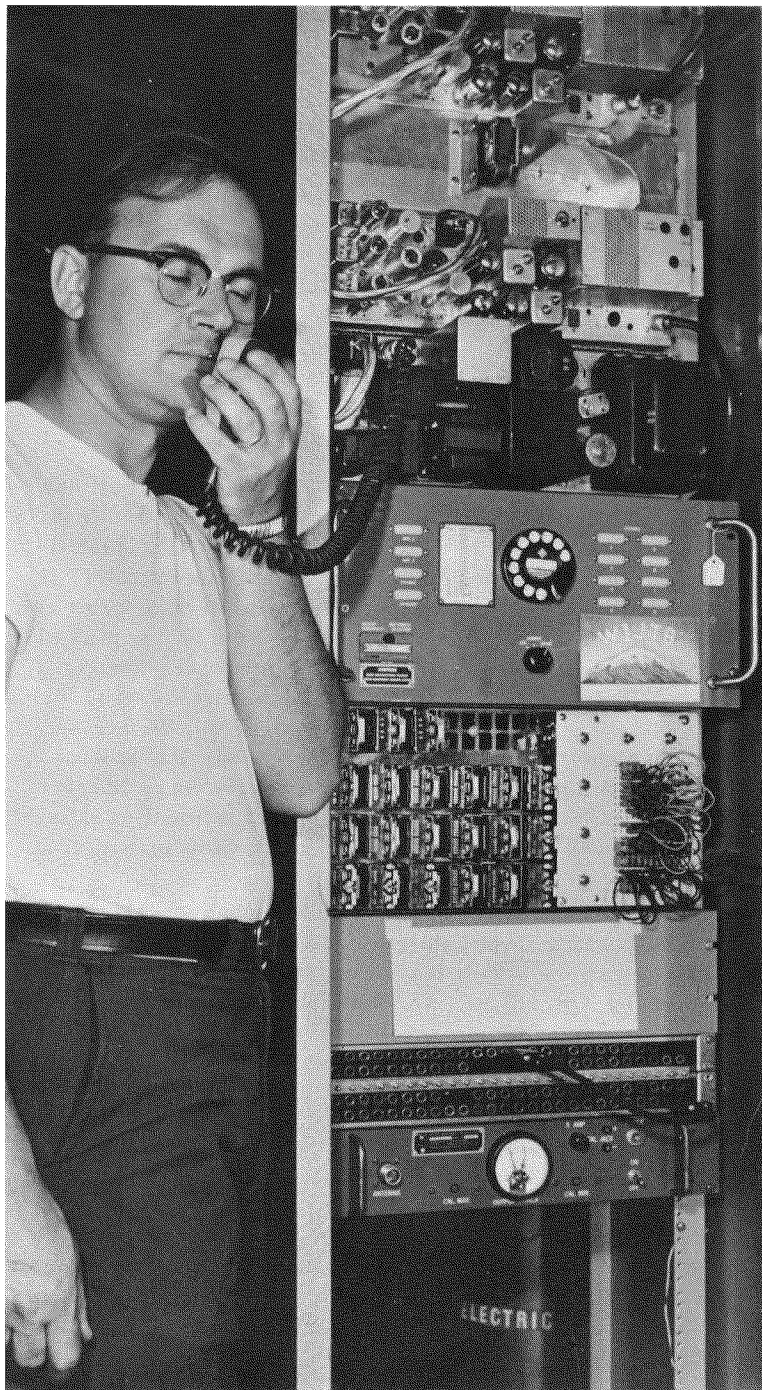


# W1JTB/ W2GHR

KILLINGTON, VERMONT

MANHASSET, NEW YORK

By Gordon Pugh, W2GHR



It's Out! After three-quarters of a year the FCC finally acted on the "most complex individual amateur application ever received." It all began shortly after the XYL received her modified WB2NRV license last January authorizing a "control relay point" between the control point and the remote station. Applications were submitted for renewal and modification of W1JTB and W2GHR relocating the main transmitter site of W1JTB from Mt. Washington, New Hampshire, to Killington Mountain in Vermont. The relocation became necessary because of the difficulty of maintaining a station on Mt. Washington without easy access to the site.

Since the licensee is a (winter) ski-nut, the most logical spot for the relocated station was the top of a ski area - and the favorite area just happened to be Killington, the second highest mountain in the state of Vermont. Taking the second highest was not objectionable since the highest was all ready occupied by the WKOO repeater. Details of how permission to install the station was obtained, are quite involved and will not be covered in this article. Needless to say, permission - and considerable support were received and the application filed.

During the rest of the ski-season, which lasts into May at Killington, plans were drawn and equipment constructed for assembly into the working station on the summit (4242 ft.). Thanks to the efforts of K1BKK the station was ready for testing by Memorial Day. A preliminary coverage survey was made and it was better than expected. Station on Cape Cod, 180 miles southeast, could work Montreal, 150 miles north, and Utica, New York, 150 miles west of the summit. The new station operating as a repeater fills the "gap" between WKOO to the north and WB2NNZ to the south-west. Killington is designed to be compatible with these and other repeaters operating on 146.94 with input on 146.34.

Several ideas that are relatively new to Eastern repeaters have been incorporated in this station. From experience and a traffic study of WKOO, it was decided to provide two input frequencies spaced 60 KHz apart. The 146.34 input is retained for mobile or portable units; 146.28 is a new input channel for base station and mobile use. Both input channels are available simultaneously permitting a mobile or portable station to break in during QSO's between fixed stations. The repeater is also programmed to permit selection of the output channel so that long-winded contacts need not occupy the "main channel." The alternate output channel is 146.88 MHz.

Maximum separation of 60 kHz between alternate channels was necessary because both receivers and the two transmitter frequencies are duplexed to a common Stationmaster antenna. The Sinclair Duplexer is tuned to 146.31 and 146.91, permitting operation at the required frequencies with 2 dB insertion loss and 120 dB isolation. The transmitter delivers 24 watts to the antenna feed line following the 2 dB loss in the duplexer. Receiver sensitivity is about 0.4 microvolts (with a 3.8 dB improvement from the antenna-duplexer combination). Additional sensitivity does not appear to be necessary or desirable with with an antenna over 3000 ft above average terrain.

LEFT: Warren Severance, K1BKK at the Killington, Vt. Base Station of W1JTB/W1ABI.



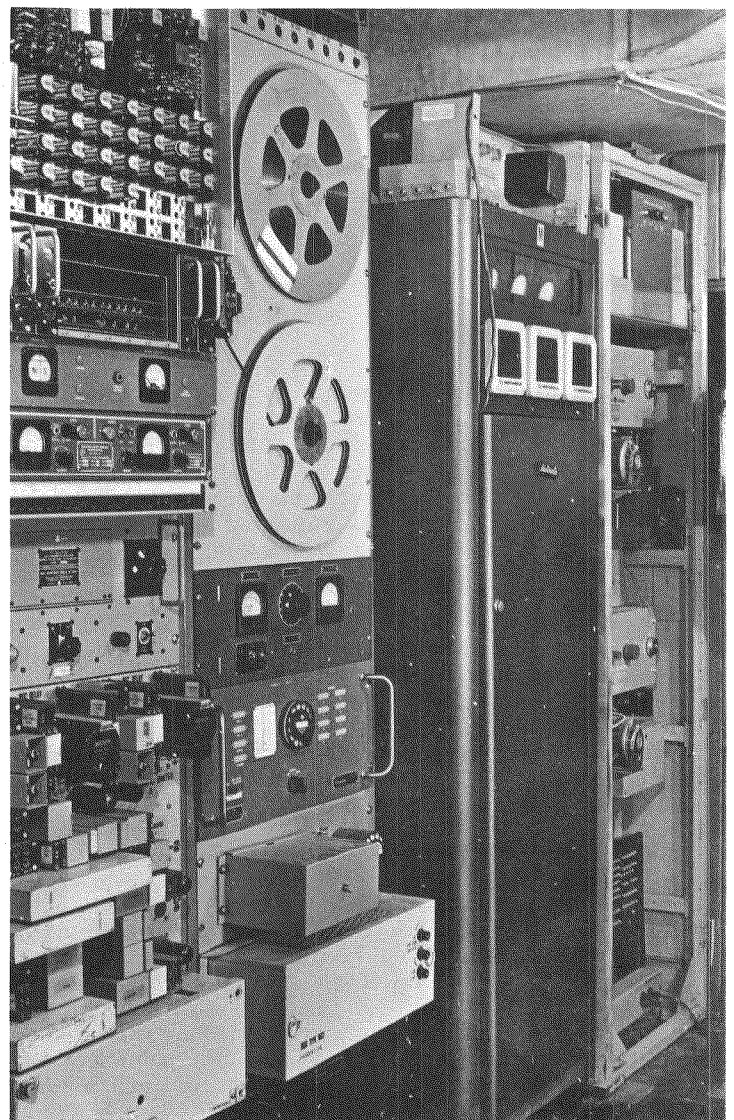
TOP LEFT: Doreen Pugh, WA2SLP at the Main FM Console, in Manhasset, N.Y.  
 TOP RIGHT: Remote Control in the Breakfast Rm.  
 BELOW: Relay racks at Manhasset control point for WIJTB, W2GHR, WA2SLP and WB2NRV.

Inverted operation is also programmed into the repeater. Receivers on 146.88 and 146.94 with tone-coded squelch circuits will key the repeater on 146.28 or 146.34 into the omni-directional Stationmaster or into a corner reflector on 146.40 for extended operation through adjacent repeaters. The tone frequency determines the output frequency and antenna selected. This inverted operation was used for a demonstration during the ARRL Convention at Montreal last summer when a repeater-to-repeater circuit was demonstrated between New Jersey and Montreal.

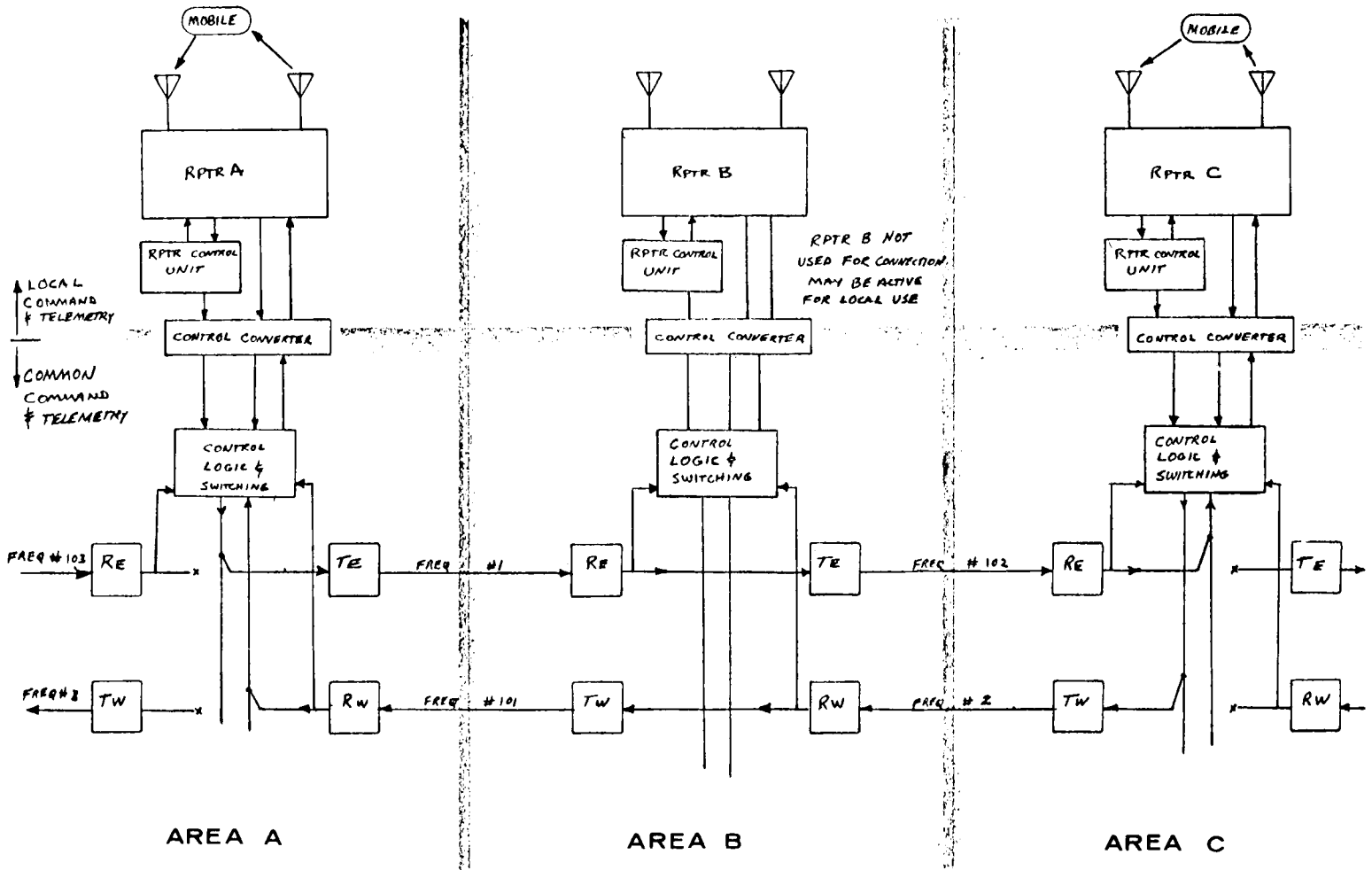
The station at Killington is also equipped to operate as a remotely controlled base station on all the above frequencies and on 146.70 receive and transmit for teletype (AFSK-FM). In addition to the two meter operation, a telemetry transmitter on 449.2 (and one other unspecified frequency) relay all information carried on the two meter transmitters plus selected receiver outputs to the control points - and anyone else within range of the station. The 449.2 MHz transmitter has a 100 watt omni-directional effective radiated power thanks to a Stationmaster antenna. While the polarization of all antennas on Killington is vertical, reception of the station in shadow areas may be better with horizontal antennas because of a shift in polarization caused by intervening mountains.

Five control and two control-relay points are authorized for WIJTB at Killington. This is probably what caused the long delay in issuing the license. Three of the control points are within easy reach of the station, as is the northern control-relay point. The other control locations are beyond normal direct reception of the main transmitter even when the channel is clear. The control point at Manhasset, Long Island, is 225 miles from Killington and requires a three-hop control and telemetry system. The second or southern control-relay point is at the W2GHR base station located on Mt. Beacon in the Hudson Valley.

For protection, a triple diversity system is used between Manhasset and Mt. Beacon, New York. This permits use of both W2GHR and WIJTB at the same time. North of Beacon the control system operates with two-channel diversity on 449 MHz and the 220-225 MHz band. Telemetry is returned on bands alternating with the control channels. "Foreign" signal protection on both control and telemetry channels is achieved with tone-coded squelch circuits.



# POINT - TO - POINT RELAY BETWEEN REPEATERS



NOTE: Freq 1, 2, 3 etc in Band A (220-225 or 445-450)  
 Freq 101, 102, 103 etc in Band B (420-425 MHz.)

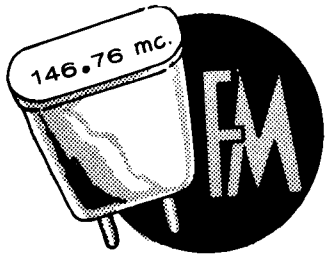
Actual control is achieved with out-of-band (note above the max. audio freq. used) tone signalling for repeater program selection. Time-division multiplexing of one tone channel is used for all control functions at W2GHR, Mt. Beacon. Alarm and telemetry from Mt. Beacon is returned on another TDM tone channel to the three W2GHR control points.

Both W1JTB and W2GHR are designed to be shared with at least one other licensee. At Mt. Beacon, the Poughkeepsie Radio Club shares part of the equipment under the call W2CVT and operates a 146.34 to 146.94 repeater serving the mid-Hudson Valley area of Eastern New York. W2CVT has four control points near Poughkeepsie, New York, and one remote receiver site in the Millbrook area. Control of W2CVT is by independent in-band tone signals.

The station at Killington, Vermont, is shared with the Northeast F-M Repeater Association, which has filed for a club station under call W1ABI. The club station will have 15 control points and three control-relay points, including some of the points authorized for W1JTB. About 90% of the W1JTB equipment will be shared with the club station including the control and telemetry system. For this reason the control and programming of the repeater has been simplified to reduce equipment cost at the many control points.

Automatic identification of each station is accomplished with a code wheel and tone generator. Main transmitters and some telemetry transmitters are identified with keyed 'P-L' or tone squelch frequencies at 30 second intervals. These tones are also used at the control points to identify the station for automatic log-keeping. Identification of shared equipment is selected by the tone-coded squelch signal received on the control circuit during activation of the station equipment. Complete recordings of all transmissions are made at the main control points for each station. In addition, an Esterline-Angus ten channel event recorder keeps track of the various operations through the telemetry equipment. Voice recording is made on Emerson M313 solid state tape recorders at 15/16 and 15/32 IPS. These machines have worked well for several years and are inexpensive. The four speed drive will run at 15/16 without modification and can be changed to 15/32 in less than a minute. The motor is keyed by tone signal or squelch relay as required while the electronics remains on continuously. Quality at 15/32 is just 'acceptable.'

Where do we go from here? The control telemetry system established for W1JTB/W1ABI is similar to that required for additional interconnection between repeaters, basically a "four-wire full-duplex" relay. The possibilities will be discussed in a future article.



# CHRONICLES OF SEVEN-SIX

By- Ken Sessions K6MVH

## PROLOGUE

Last Month:

The news was born out of a need to hold the 146.76 MHz. FM Organization together. And that it did! Seven - sixers were issued authorization cards and were told how much power they could use. And they ate it up. The Organization blossomed beautifully. Meanwhile, certain individuals winced at the activities. They paced nervously, wondering how long it would all go on. They were FCC monitors at the Santa Ana, California, monitoring station, and they felt it increasingly more difficult to overlook the infectious infractions.

## IV. THIS IS SEVEN-SIX

With the Organization in full swing, the frequency of 146.76 MHz. began to really shape up. Newcomers to the channel were challenged by other operators. And if the newcomer did not conform, he'd be willingly boycotted by the regulars. Occasionally, a new operator would be recalcitrant. It seemed difficult for some hams to swallow the idea of an amateur government organization which regulates such functions as operating frequency, power, etc.

In a typical case, a Los Angeles Novice happened to latch onto some FM gear, and found his way, quite by accident, to 146.76 MHz. He was of course chastised by all FM'ers who were within his range. Did he have authority to transmit? Was he exceeding his maximum power limit? What was his officially designated title? Seven-sixers told him in no uncertain terms that if he wanted to operate on the Preferred Frequency, he'd have to first obtain an official authorization card from the FCB. The Los Angeles Master Control Station (WA6KLA) issued a verbal permit that allowed the Novice to operate for 48 hours on a trail basis, but he was directed to make a formal application during this period.

Well, you can imagine how this might go over with any ham-- Novice or General-- whose only master had formerly been the FCC. The Novice didn't comply. He proceeded to jam the channel with his carrier each time he heard a signal. But in a few days he stopped. What fun is there in operating on a frequency where no one will talk to you?

So, the Novice yielded. He sat down and wrote a long letter to the Frequency Coordination Bureau, seven-six's self-styled allocation committee. He asked for issuance of an authorization card and requested official sanction to operate on the Preferred Frequency.

As FCB secretary, it was my duty to answer his letter:

Dear Sir:

Your application for FM operation on 146.76 mc was carefully considered by all members of the FCB's Authorization Committee, but permission, for the time being, is denied on the following grounds:

- Your probationary verbal permit, issued by Neil McKie(WA6KLA), was misused for purposes other than meaningful communications. Affidavits are on file from WA6HAH and K6VGH that you transmitted on channel during an emergency (VGH wanted a signal report) and thereby hampered expedient verbal exchange. When told of your jamming, you did not show authorized Technicians and Generals the respect normally due them by Novices.
- You did, willfully and maliciously, even after repeated warnings, transmit a signal that interfered with and jammed a Master Control Station who was idly conversing on channel. It is a standard policy that Novices will, immediately and without question, surrender the channel to any superior station desiring to communicate on the frequency. It is a serious offense for a probationary station— particularly a Novice—to jam out any authorized seven-sixer; but it is a capital crime to interfere with any Master Control Station.

You are advised that any further transmissions made by you are illegal on 146.76 mc, and such transmissions will result in banishment from the frequency permanently. On the other hand, if you honor the decision of the Committee, it is your prerogative to apply again after 30 days, at which time your recent conduct will be judiciously weighed.

I can promise that every consideration will be accorded you at the next application, and your past malpractice will be forgotten in view of the fact that (a) this is your first offense, and (b) you are a new operator, and thus are not fully aware of the ramifications of unsanctioned practices.

Sincerely,

Vern Thompson, W6ZJU  
Chief, FCB  
by Ken Sessions K6MVH

About 30 days later, the Novice reapplied. This time he was issued an official seven-six authorization card. He turned out to be a real swinging seven-sixer, too. When a new operator strays onto the channel, his challenging voice is heard loudest and longest.

A most interesting characteristic about these seven-six FM'ers is the manner in which they shun any association with standard ham lingo or operating customs. An operator who calls CQ is laughed right off the channel. And words or phrases sounding like cliches are immediately, religiously, and unceremoniously obliterated from the air by all who hear. It is with reluctance that I admit seven-six has a definite citizen-band ring to it. Ten-codes



are in. Q-codes are not. Sometimes a newcomer lets a Q signal slip out. A dead channel spontaneously comes to life with interesting banter:

"What'd he say?"

"He said QRT, I think."

"What's a cue-ar-tee?"

"I dunno. It's French, I imagine. He sounds pretty educated."

To a degree, the seven-sixer's philosophy is understandable. The Q-codes don't really lend themselves ideally to single-channel operation. Everyone knows everyone else intimately, so there's no need for a QTH. The query "10-20?" means "where are you now?" And there are ten-codes for every conceivable oft-repeated phrase.

"CQ" is an unwarranted, unwanted, and nonessential word in the seven-six vocabulary- for obvious reasons. Any transmission on channel is heard by all within range with receivers turned on. When a signal is heard seven-sixers will either respond to chat or ignore the signal; a CQ wouldn't change the situation one whit. Then, too, a CQ would tend to tie up the channel for however long it takes to get it out. So a ten-code is substituted. The phrase "10-8" after an initial appearance on channel means, "I am in service and subject to call by whomever feels like chatting awhile."

Right or wrong, seven-sixers feel the ten-code system is adequate and that Q-codes are not adaptable.

The ill feeling about standard "ham-isms" came gradually, but I can't say it's too regrettable. It's refreshing to hear something besides: Well, Old Man, it's about time to pull the Big Switch and Hit The Old Snore Shelf- we'll catch you a little Further On Down The Log Sheet- Seventy-Three's, etc, etc, ad infinitum."

At any rate, the trend is to avoid cliches at any cost! Strike out for originality! Up with nuances! Down with meaningless, insincere, patronizing traditionalism!

Seven-six is sort of a magic land. It's a refreshing and colorful oasis where amateur tradition is lost. This is not to say that tradition is bad; it's just worn with the too-familiar paragraphs repeated too often by too many. According to ardent FM'ers, the routine AM transmission, as a general rule, reeks with pseudosincerity, memorized dissertations, and a contagious and seemingly incurable disease called "electroencephalitis," or Electronics on the Brain.

Stations infected with electroencephalitis, say seven-sixers, are easy to spot. Each subject or topic that happens to arise during a conversation on the air is warped, angled, twisted, or otherwise shifted to a related or unrelated technical subject or topic.

Here's a typical subject initiated during a conventional transmission:

"...I heard Joe on 145.25 the other night. He's been off the air for almost a year."

And the station infected with electroencephalitis will respond in any of the following ways:

"Joe's had rig troubles; his final tank circuit was emitting harmonics which seemed to be caused by parasites. He wound a 100-ohm resistor with some 18 wire and...."

Or:

"I heard Joe, too. At the time, I was installing a splatter choke on this old bucket of bolts. I just got a couple of diodes,....."

There are apparently an unlimited number of side trails off the road of intelligent conversation; and seven-six is comprised of operators who just get tired of being led down them.

You hear shop-talk on seven-six, too- but it's the exception rather than the rule. Technical talk just for the sake of impressing others with our knowledge is virtually unknown. On FM, you either know your stuff or you don't. If you do, you must answer questions, troubleshoot equipment, and make technical recommendations. A mistake is easy to spot and impossible to cover up. But if you don't know FM, there's no shame. Lots of people just like to operate. Their vocations may be teaching truck driving, legal counseling, or any one of a thousand trades.

Seven-six is made up of Good Guys and Bad Guys. As it happens, all my friends (and me, of course) are the Good Guys. Stations (other than myself) who run more than 50 watts to an antenna higher than 35 feet at an elevation above 500 feet make the bulk of the Bad Guys. The Good Guys are always at war with the Bad Guys; and the war is seasoned with a great deal of espionage, counter-espionage, and—sometimes—sabotage.

Changes in a seven-sixer's power or antenna are made in unheralded and subtle steps to avoid undue attention. Occasionally, a new station finds a location on a hilltop, and sets up a system whereby he can operate a transceiver on the hill by remote control. Such a move is veiled under a cloak of extreme secrecy. The only evidence is the eventual and inevitable crushing signal.

Reasons for the rigid security may not be obvious, but they are valid nonetheless. A remotely controlled transmitter is not only particularly vulnerable to unauthorized use, but it is temptingly susceptible to mischievous tampering.

A remote station is a conventional transmitting/receiving system where the transmitter is keyed via a radio signal on another frequency, and the receiver feeds all signals to a nearby transmitter, also on a separate frequency.

The Enemy (one of the Bad Guys) need only know the frequencies of these off-channel transmitters and receivers to assume occasional command of the remote.

So the remote operator goes to more complexity. He wires the control receiver so that it will only hear control signals meeting certain preestablished criteria. Perhaps the control signal must contain a tone signal of a certain high-tolerance audio freq; or perhaps it might be merely accompanied by a half-second beep of a specific audio tone. In any case, the coding information is sacred, and categorized as Supersecret

Cont. on page 19





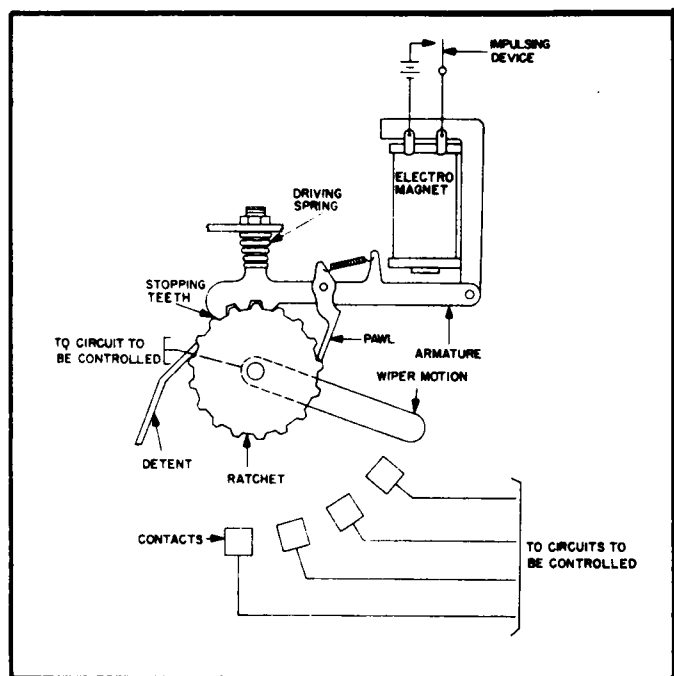


FIGURE 2

There are two types of driving mechanisms associated with rotary steppers: indirect (spring-driven) and direct.

- **Spring-Driven Stepper.** Operation of the stepping magnet moves the driving pawl out of the ratchet and drops it over the succeeding tooth, but does not move the wiper assembly; when the magnet is deenergized, the wiper is driven forward by a spring. The switching operation is not complete until the magnet circuit is opened.
- **Direct-Driven Stepper.** Operation of the stepping magnet moves the pawl into the ratchet and moves the wiper assembly; a detent holds the wipers in place when the stepping magnet is deenergized and the driving pawl is returned to normal by a spring. The switching operation is complete the moment the magnet operates.

Probably the most universally functional of the steppers is the Strowger (after inventor A. B. Strowger). In commercial telephone service, the Strowger type of switching device (figure 3) is the principal mechanism used in establishing automatic connections. This switch selects one out of 100 possible contacts. A contact bank consists of ten levels with ten contact points at each level. The wiper moves in two

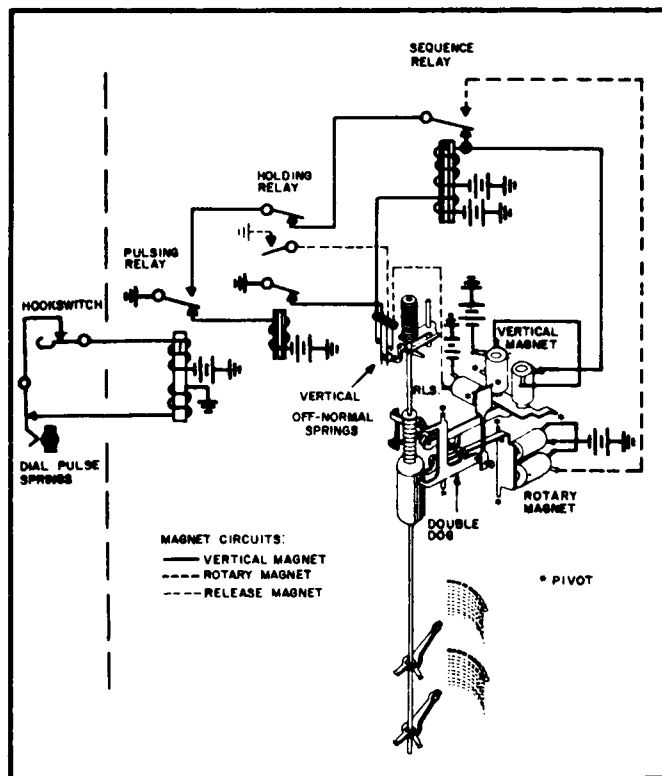


FIGURE 3

axes by being driven vertically on the first pulsing sequence, then horizontally on the next. The first digital sequence drives the wiper to the proper deck; the second selects the proper contact of that deck.

How does the Strowger know when to step up and when to step across? The partial schematic of figure 3 shows the typical use of fast and slow relays to channel dial pulses to the proper stepping magnet. In telephone use, when the caller lifts his handset, the hookswitch closes the line circuit and operates the pulsing relay. The pulsing relay operates the holding relay, which in turn operates the sequence relay. In amateur use, the hookswitch function is generally accomplished by the contacts of a carrier-operated relay.

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# COMMON CARRIER ...amateur style

Ken Sessions K6MVH

California FM'ers took another giant stride in the direction of "commercialism" when a Los Angeles repeater group announced the initiation of a "common carrier" service for amateurs. Fred Daniel (W6NOS), one of three partners in the new enterprise, said the new service would allow amateurs to participate in what he calls the "Repeater Movement" without the expenses that would normally accompany such a venture.

The informal common carrier "company" provides an elevated site, a full complement of repeater equipment (i.e. receivers, transmitters, remotes, decoding apparatus, etc.), antennas and interconnection links, and a service "contract" for a monthly fee of \$25. The fee remains the same, Daniel says, whether the repeater and/or remote is to be used by a single individual or by as many as ten.

Two one-megahertz bands have been reserved for the common carrier channels. The input channels, spaced at 50-kHz intervals, appear between 439.05 and 439.95 MHz. The matching output channels take up the spectrum between 434.05 and 434.95 MHz. There are 19 matching channel "sets"; these are designated by alphabetical listing from channel A through channel S.

The first common carrier assignee is a group of five FM'ers who operate a remote transceiver on 146.82 MHz and share a repeater on common carrier channel A (439.05 in and 434.05 out). Each person in the lessee group pays \$5 monthly for the mountaintop facility. Lee Coltin (K6VBT), spokesman for the first leasing group, feels that it is not only cheaper than installing his own repeater in a specially leased location, but it is substantially less expensive than operating a simplex system direct from his own home, considering the cost of service, electricity, equipment, etc. which would otherwise be mandatory.

"We're not out to make a profit," Daniel said when he announced his intention to convert his own system to a common carrier type facility. "It's just that the cost of operating a single repeater system is prohibitive." The common carrier approach, says Daniel, will help pay the expenses of his own remote facility and will also enable others to enjoy the benefits of remote operation without making it necessary for them to go to the expense of buying equipment, leasing a site, and building up the many control circuits.

When questioned about the legal aspects of his common carrier operation, Daniel commented that the term "common carrier" is misleading and is not really applicable. "What I'm doing," he said, "is merely leasing my own equipment and a corner of my building." According to Daniel, all users will be licensed amateurs who are authorized to operate remote radio equipment, and a key amateur in each group will be lawfully licensed for control of his system. This distinguishes the concept from the common carrier of the commercial band, where any citizen may use the channel without regard to licensing.

"A commercial common carrier user," says Daniel, "pays for the communication capability. The amateur lessee will be paying for the private though temporary ownership -- and exclusive use -- of a complete repeater system."

The three partners concede that the idea has never been tested on an amateur band (at least, not to their knowledge), but they feel that it is a "logical extension of the amateur repeater and remote facility trend."

No one has suggested a serious name for the newly formed partnership. Unfortunately, the hilltop equipment is 100% GE Progress Line. Otherwise, they'd probably consider something like "Hertz Rent-a-Kaar."



I WONDER WHAT'S EATING HER? SHE TOLD  
ME TO BRING A HAM HOME FOR DINNER!

# ROLL YOUR OWN 2 METER

## FM HANDIE TALKIE

By Dan Harger W8BCI

### PART TWO - THE SOLID STATE TRANSMITTER

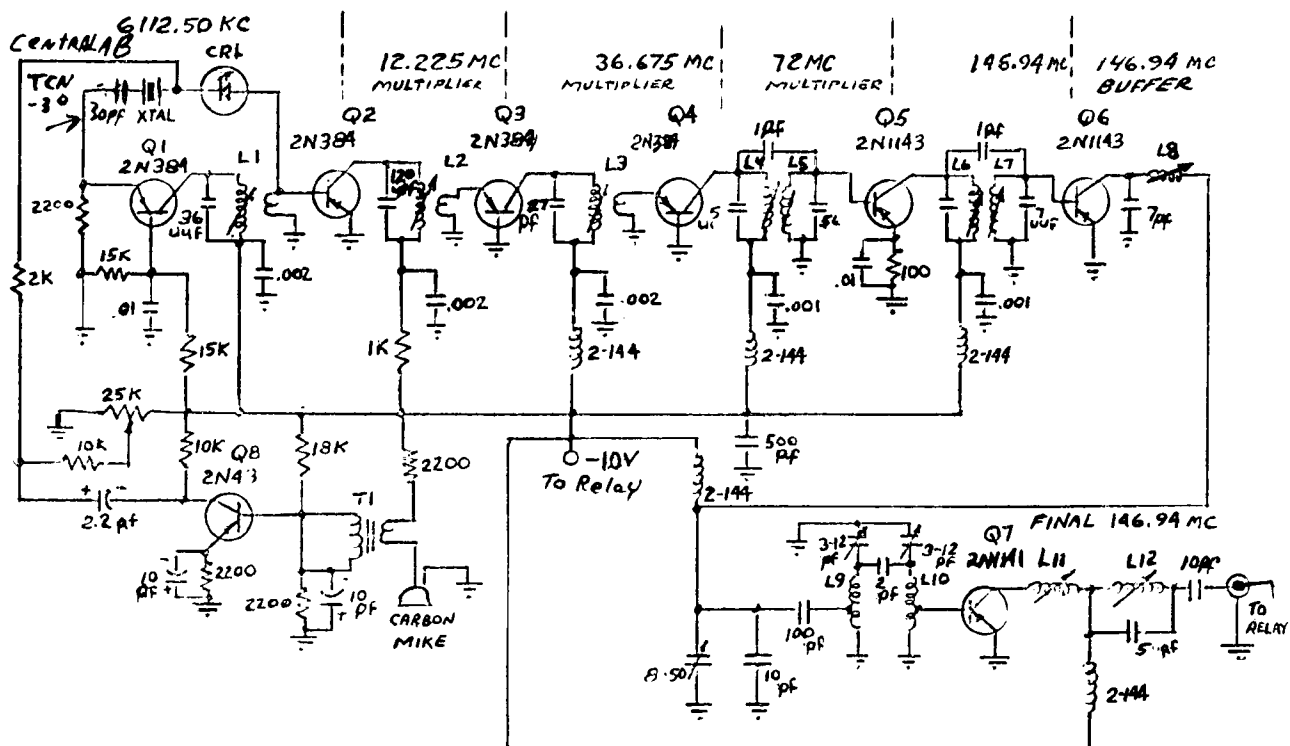
Thinking that the transmitter would be easier to construct and get working than the receiver proved to be untrue. The receiver was operative within a month but the transmitter took about a year to complete. The complete transceiver has been together around one and one-half years. The trouble was due to inexperience with transistors and improper transistors. The rule of thumb to, "use a transistor that is rated at least from 3 to 5 times the frequency at which you wish to make it operate" proved to be entirely true. I finally succumbed to price and obtained 2N1141's and 2N1143's and destroyed about \$25.00 worth before I discovered that the power supply I was using when placed on standby would blow transistors when the power to the shack was shut off! Other transistors that can be used, the RCA line: 40235, 40236, 40237 are good to 1200 MHz at 150 milliwatts, the RCA 40405 is the best bargain, can deliver 700 milliwatts as a straight-through amplifier to 400 MHz and costs net \$2.06. It is also good as a doubler. RCA has a 1 Watt Transistor, the 40280 for \$4.62 and a 40281 4 watts for \$14.69.

The lineup I am using at the present is 2N384's and 2N1141's complete. In constructing the transmitter one should start with the oscillator and work up the chain getting each stage going at a time until the final is reached.

The transmitter multiplies 24 times the same as the 41V and the same rock can be used if you have one available, the same is true about the 8455 rock in the receiver, the one out of a 41V will work but not so in the 46.31333 rock fifth overtone of the receiver, that must be ordered separately. The frequency of the transmitter crystal turns out to be too low at 146.94. This came as a blessing, because by in-

serting a temperature compensating capacitor, Centralab TCN-30 for 30 pf or whichever value you need to get it on frequency. Cold and hot weather were greatly washed out when this capacitor was used instead of a common silver mica. Most of the construction uses slug-tuned coils, which are very small, and require tedious pruning to get them to the desired frequency. Grid-dipping is a problem because of loading by the transistors. The best method is to grid-dip the coil about 10 MHz above the desired frequency with the transistor out and apply power with the transistor in and see if it will tune using the grid-dipper in absorption wave. It is almost impossible to build a rig like this without the grid-dipper. Each multiplier should be tuned individually after the transmitter is completed, it might be possible to be tuning at some other freq. if you are only watching the power output meter. The Bird Termaline milliwatt (250) milliwatt meter was quite indispensable, however the #49 pilot does work but will not tell you as much at lower power levels. Here you might possibly use the grid-dipper in absorption wave tuned to 146.94 as closely as possible to frequency.

The oscillator draws about 5 mils, the multipliers from 10-15 each, the doubler 15 mils, the driver about 20 mils and the final 35 mils or better. The total is about 100 mils at 10 volts.





I've given the amount of turns on the slug-tuned coils, the form size and the wire size, but each particular situation will have to be altered for your construction.

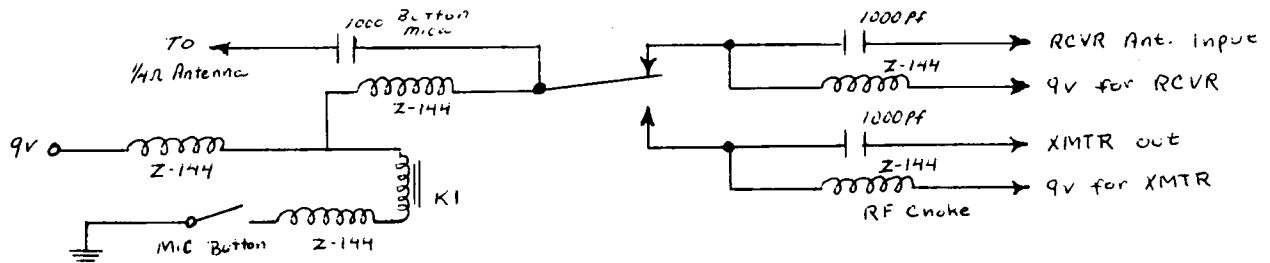
The change-over relay that was selected is the Potter & Brumfield #505 type RS5D which is SPDT with a coil DC resistance of 2500 ohms. It needs modification to make it function solidly at 9 volts, it was designed as a 12 volt relay. With this modification it will pull-in at 7 volts and drop-out at 6 volts. As it comes there is about 3/32" spacing between the armature and the pole piece (coil core) of the relay. The normally-closed contact is carefully bent down until there is about 1/32" spacing. The spring tension is provided by a small piece of strap on the relay that doubles as the contact; it runs along the length of the armature, up and over the armature hinge and down the back of the relay and is secured by a small screw. This screw is loosened and the spring slightly bent so there is a little less pressure on the normal-closed contact. When you bend NC contact down, you will also have to bend the NO contact down a little. When the relay has been modified, there should be plenty of contact pressure when the relay is un-energized and plenty of pressure on the NO contacts when the relay is energized. If you do not have enough pressure in the energized position, then you need less spring pressure. This

relay has only one set of contacts, SPDT with the frame of the relay attached to the center, or hinged contact. So the relay must be mounted above the frame of the chassis in the transceiver. I used the 1000 pf button-mica soldered directly to the frame of the relay on one side of the condenser and soldered the other side of the condenser directly to the center-conductor of the output connector. By using a small metal angle-bracket near the output connector as a place to solder coax grounds, the center of the receiver and transmitter coaxes can be soldered respectively to the NC and NO contacts through 1000 pf button micas. Other condensers should work ok if they are good condensators.

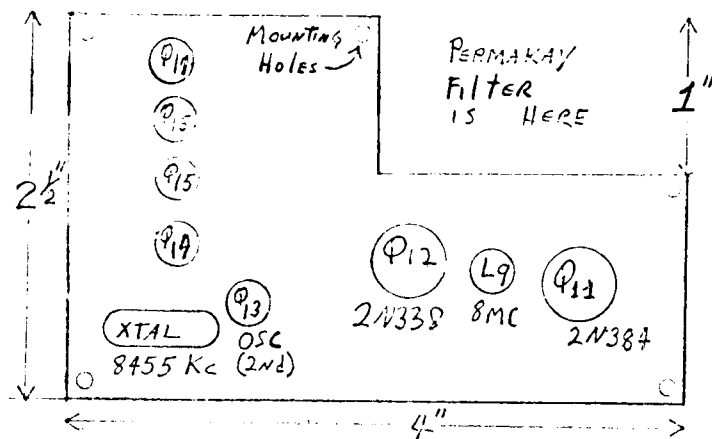
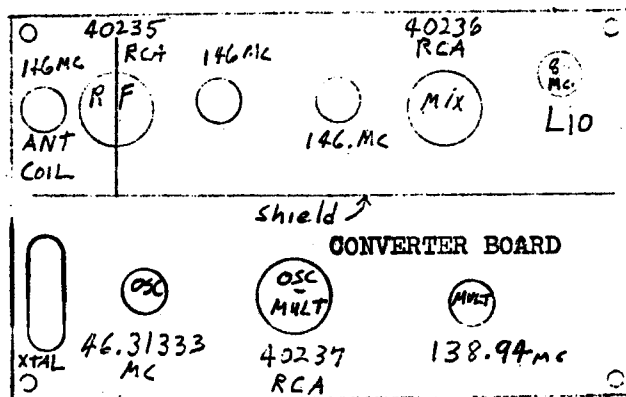
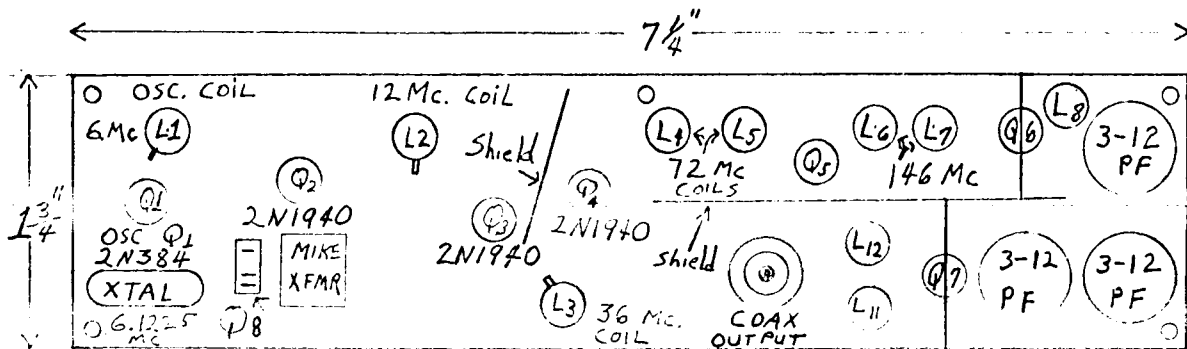
Since the relay does have only one set of contacts the contacts the condensators and the Z-144 chokes must be used to switch both the RF and the 10 volts for transmit and receive.

The transmitter has worked very well, the modulation is capable of at least 15 kc deviation. Using the vari-cap modulation I notice that the center of the carrier does shift a little during modulation but it is quite intelligible I think.

Next Month: an 'ADD-ON' final using two RCA - 40405's good for 1 1/2 watts output



Cont. on page 19



# ARE PHONE PATCHES LEGAL ??

A REPORT ON  
CURRENT  
FCC  
THINKING  
  
by  
  
Ken  
Sessions  
K6MVH

Probably every amateur who has connected a phone patch to his radio system has experienced the fleeting and cursory twinges of guilt that accompany each soldered connection. Or he feels the flash of anxiety each time he sees a telephone truck parked near the house.

Many self-respecting commercial producers of amateur radio gear include complete, packaged hybrid phone patches in their basic equipment lines. Following a logical line of reasoning, then, an amateur could easily make the assumption that phone patches are legal since they're sold by reputable firms. The truth is, none can say phone patches are unlawful, but they're not exactly legal, either. Not quite yet. Indications are that they will be, however -- and very soon!

Not too many amateur radio operators are familiar with the little-publicized prohibitory mandate called Tariff 132, an FCC edict which gives tele-

phone companies a broad range of freedom in rate-setting and rulemaking. Among other privileges, telephone companies have the right to establish price schedules (within certain limitations) and ban telephone "attachments" and "foreign equipment" that might tend to degrade telephone performance.

For the sake of the legal hair-splitters, it should be noted that there's nothing illegal about the phone patch, itself; it's the amateur's interconnection of it that causes the problems. If the phone company would make the connection or give a blessing to the installation before it is done, all would be well.

The manner in which the official government ruling is written and interpreted makes it an offense to attach anything to a telephone or telephone circuit. Thus, as the law now stands, a busy telephone user can't even legally connect a shoulder rest to the handset.

Just what constitutes an "attachment" has been the subject of many litigations in U.S. courts. It is surprising but true that a device may be considered an attachment even without a direct connection to the telephone or line.

A case in point is the Carterfone, manufactured by the Carter Electronics Corporation in Dallas, Texas. The Carterfone, a cradle arrangement onto which a standard telephone handset may be placed, couples the handset audio to a mobile radio setup. The device makes no electrical connection to the phone and requires no handset modifications. Yet, in 1965, the FCC advised Carter that the Carterfone device violated Tariff 132. An FCC examiner confirmed this finding later, and held that the device was indeed an "attachment" within the intent of the original ruling.<sup>1</sup>

An interesting outcropping from the Carter case was a recommendation by the examiner that the Carterfone be allowed in spite of the tariff. He said the tariff was an unwarranted restriction with a user's right to use his phone "in a way that is privately beneficial without being publicly detrimental."

The Carter case served to bring general reappraisal of the tariff regulations by the FCC and the Justice Department. The consensus was that the tariff's restrictions tended to place the telephone companies in monopolistic positions with respect to the supply and installation of peripheral telephone-dependent equipment.

The telephone companies have been plagued with their share of "monopolistic practices" problems anyway, and probably will not be able to prepare any overwhelming stumbling blocks to a new FCC ruling on attachments.

Two large telephone companies were recently under heavy fire from the Private Communications Association for unfair restraint of trade. The PCA went so far as to accuse the two giants of acting in contempt of court by "flagrantly violating" provisions of an antitrust injunction filed by the U.S. Government in the U.S. District Court of New Jersey (Civil Action 17-29, 24 January 1956).<sup>2</sup> The PCA complained that the telephone companies were not restricting their business to "common-carrier communications service" and were engaged in leasing of intercoms, alarms, public address equipment, and similar systems.

All these events weigh heavily in favor of the FCC reversing the "no attachments" mandate, because a more liberal ruling would invite open competition from manufacturers of terminal phone devices.

Ironically, the way things stand now, not even the phone companies can legally connect most types of

equipment, since this takes them out of the realm of "common-carrier communications services."

So how does this affect the amateur with his harmless little phone patch? Very profoundly! Already, restrictions on phone patches are relaxing. Phone companies acknowledge the fact that amateurs are attaching audio patching circuits, and they are beginning to realize that these devices pose no great threat to their overall operation.

One Southern California amateur, Donald Milbury (W6YAN), has been operating a fully automatic phone patch from his mobile station in conjunction with a radio repeater in the Los Angeles area for years under the cognizance of Pacific Telephone. He received "implied" permission, he says, when he was requested by Pacific to use a particular tone frequency for telephone control to avoid the possibility of interference with other telephone circuits.

My own remotely controlled station (K6MVH) was also given implied FCC sanction when it was licensed after a detailed description of an automatic phone patch was submitted with the official application.

It should be noted that automatic phone patches (standard phone patching devices operated by remote control) are compatible with only one mode of operation: FM. Levels for automatic patching must be set for approximately 1 dB (1 mW into a 600-ohm line), and maintained within 1.0 dB of this level, regardless of transmitting and receiving conditions. Telephone companies do get upset when audio is patched into a line at a high enough volume to intermodulate with adjacent wire-pair signals. Use of FM assures a relatively constant audio level at the receiver almost without regard to the strength of the received signal.

Today, the amateur who connects his phone patch runs the risk of a hand-slapping from his local telephone company. It's unlikely he'll get its blessing tomorrow. But if the recommendations of the FCC are followed, the amateur would have the right to connect a phone patch or any other similar device as long as it proved nondetrimental to the phone's principal function; and the phone companies would be saddled with the task of "showing cause" for denial of that right.

#### REFERENCES:

1. Electronic Design, "FCC Weighs Wider Use of Telephone Attachments," 8 Nov 1967
2. Communications News, "Hot Line," December 1967



# LAS VEGAS REPEATER ASSOC.

By- Gloria Sturm K8WKE

Flint, Mich.

The FM group here had a very successful project, with our Second Annual "Operation Food Basket". This project was adapted last year by the late Don Jones, WA8OBQ. It was such a tremendous success that we decided to make it an annual event in Don's memory. The basket is presented to a needy, well chosen family, to make them have a joyous Holiday Season. We are proud of the response to this program we had again this year.

We have added two more stations to our FM family here in Flint. They are W8TMO and WA8GNQ. Welcome fellows!

We found out through our Christmas mail, that our FM BULLETIN sure makes its rounds. My cousin KØYGX, in Aurora, Colo. Robert Huggins, had received a copy of it and was quite amazed to see my column. So we are very pleased and proud of our paper. "Hat's off Mike".

A mobile unit, WB2UXY- Vern Payne was traveling in the Flint area about 2 weeks ago. We had a small net on freq. to welcome him to the area. He was startled to find so much activity.

AUCTION... at our regular January meeting. The public is invited! We would like to see a lot of you out. This is an excellent opportunity to rid your shack- make a point to be there on January 16, 1967 at 7:30 pm. Jack Williams K8GOW, will be the auctioneer....all that's required is you and your billfold.

Genesee County Hams were saddened deeply at the loss of our beloved Ken LeBar K8PKU. Our deepest sympathy is out to his family....

### QSY

Though his, is now, a silent key  
Among the ham fraternity.  
The signal sent was QRT  
before he left the frequency.

Dear God, may we all know that he  
is sending on another key.  
All silent keys can read his hand  
And greet him to a higher band.

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5 Pads-250 shts.--\$4.50 Add'l order \$3

Order from FM BULLETIN

By Tom Burford K7TDQ

Due to the number of stations now on two meter FM and a desire of several of the operators to "improve the state of the art by tying together several of the bands" there is now another remote station on the

air in Las Vegas. This station is licensed to Tom Burford, K7TDQ as a remote station and is compatible with the Mt. Lukins machine in Los Angeles except that it does not require a "PL" input at the present time on the 440 MHz input channel. This machine is presently partially operational and as fast as it can be accomplished the other functions are being added. When fully operational this remote station will have inputs on 52,525, 146.94 and 440MHz. When the input is on any of the three channels the 440 MHz transmitter will always transmit. There is a 5 MHz separation on this band. The 6M and 2M channels are simplex operation. When the input is either 52.525 or 146.94 MHz then naturally that transmitter will not talk, but the other two will.

The 'mountain top' that has been selected for this machine will cover most of Southern Nevada and a wide area of the Southern California desert area.

At the present time this machine is located in the shack of Tom Burford, K7TDQ, in the Las Vegas Valley. Under the present operating conditions it is possible to work into the Los Angeles area from the 'TDQ' remote through either the W6FHF or WB6SLR remotes located on "Blue Ridge" which is just out of San Bernardino, Calif., a distance of about 175 miles via remotes. This path has been tried under all conditions and at all times of the day and has proven to be a reliable one. I have even had reports of Gene K6TVE hearing the station at his base station in Torrance direct but unless Gene gets some horsepower or some big beams I won't hear him.

The 146.94 station in use at TDQ is a Motorola 1/4 KW, but is usually run at 40 watts output into an A/S Isoplane at 50 ft. If the L. A. stations are giving us a problem then we 'flip the switch' and pump 300 watts into the antenna. The 440 MHz equipment is GE Pre-prog. modified per the DGX conversion that appeared in the FMB. The 146.94MHz equipment is Motorola with the receiver and exciter of the 30D variety slightly modified. At the present time the 52.525 MHz equipment is also of the 30D vintage. The max dev. acceptable by this station will be limited to 10 kHz and the transmitters will deviate a maximum of 10 kHz. This is done in order to make this station compatible with both narrow and wide band equipment.

It is hoped that this machine will be on the air fully functional by the time that S.A.R.O.C. comes around.





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## SAN DIEGO

Ken Decker- WA6OSB

A number of years ago, 7 to be exact, this writer became interested in the wonderful world of ham radio. VHF seemed to interest me and I soon was the proud owner of a "Goony Bird I". After several months of AM type yakking I found myself listening to the FM (funny modulation) signals emanating from the Los Angeles and San Diego county FMer's, W6KD and W6CDQ. Ray Jacobs, W6KD was using a homebrew transmitter and had regular scheds with Gus Hanson, W6CDQ up in Escondido on 145.0 MHz.

Upon moving to a better VHF location I discovered "Channelized" type operation in LA and even a repeater or two. One evening while tuning around I ventured across the FM signal of Nathan Pottorff, W6ERF in Lakeside. He was attempting to make contact on one of the now abandoned L. A., channels, 146.675 MHz usually inhibited by George Maynard-K6RTD, Lou Maynard-WA6MYF and Ray Neumann-K6PUW. I made contact with Nat and found we both shared a common interest in FM. Shortly thereafter I obtained the Gonset FM VFO and had many fine contacts channel hopping, or I should say sliding. Nat and I obtained my first real "base station" which, incidentally, I am still using, as his propagation path to L. A., has some very large 'lumps' in the way. We soon found out FM stood for the "finer medium."

Then it happened. We came upon a large quantity of mobile rigs at a reasonable price and San Diego became FM conscious. It was also learned that the city of National City had some rigs available for RACES use. We decided to organize on a common channel. I put in my two cents for 146.82 MHz, but to no avail. The state C.D. office authorized operation on 146.84 MHz. The city bought crystals for its RACES FM channel and the rest of the gang followed suit. 146.84 MHz is still the local San Diego channel although some times we are bothered by adjacent channel chatter from 146.82 in L. A. On June 2nd, 1963, the San Diego 2M FM Net was organized under the auspices of the San Diego VHF Club. It still meets every Sunday evening at 2000.

Our use of FM in San Diego has been as a local get together and general information channel as well as a public service channel. We report the ARRL Official Bulletins and local events on the previously mentioned net. Along the Public Service line, we have reported numerous traffic mishaps to the local authorities, provided communications for parades, handled communications for the Unlimited Hydroplane races held in Mission Bay, participated in an Eye Bank Drive and operated in Section Emergency test. In our last S.E.T. we had Fran Gifford K6RVR and Sherri Wasserman- WB6QIK, air mobile in Fran's plane with a GE 1 Watt walkie talkie, reporting on simulated earthquake damage.

One of our more industrious FMer's, Dennis Johnston, WB6DSL, is in the process of modifying his repeater. When completed it will have 146.34-146.84 or 146.34 - 146.94 MHz. capabilities, also a spot 450 MHz channel to 146.84 or .94 and vice versa, and 450 - 450 MHz. All inputs will be tone coded to prevent unintentional activating of transmitters. The possibility of working 52.525 MHz into the system exists also, however activity on that channel is low due to being in a semi-fringe area.

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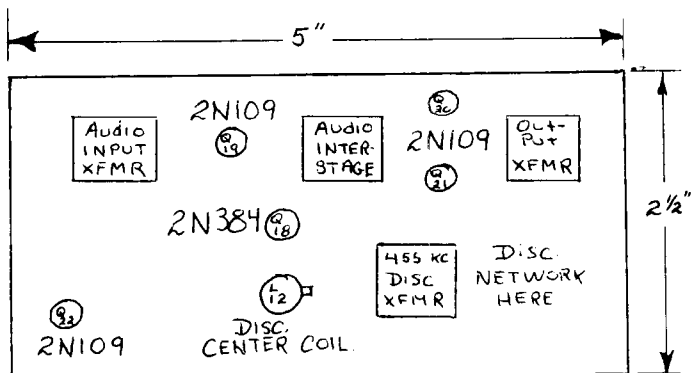
TO: FM BULLETIN  
2005 Hollywood  
Grosse Pointe, Mich. 48236

### PARTS LIST FOR W8BCI TRANSMITTER:

- L1- 3/16" 25T. #26 enam., W/5T Link of #26 red slug (osc. 6112.5 Kc.)
- L2- 3/16" 15T. #26 enam., W/2T Link of #26 red slug (1st Mult 12.225 mc)
- L3- 1/4" 10T. #20 enam., W/1T Link of #20 White slug (2nd Mult 36.675 mc)
- L4- 1/4" 7T. #18 enam., White slug (L4 & L5 3rd mult 72 mc)
- L5- 1/4" 7T. #18 enam., white slug (see above)
- L6- 1/4" 5T. #22 tinned-copper, white slug (input to buffer, 146.94)
- L7- 1/4" 5T. #22 tinned-copper, white slug (see above)
- L8- 1/4" 4T. #16 enam., white slug (output of buffer 146.94)
- L9- 1/4" I.D. air wound 5T. #16 tinned-copper, bare (L9 & L10 input final 146 mc)
- L10- 1/4" I.D. air wound 5T. #16 tinned-copper, bare (see above)
- L11- 1/4" 4T. #16 enam., white slug (Final output 146.94)
- L12- 1/4" 4T. 16 enam., white slug (Antenna coil 146.94 mc)

The red slugs above are coil forms with permeability-tuned slugs good to 30 mc. The white slugs above are coil forms good to 300 mc. use equivalent. The variable condensers used with L9 & L10, are ceramic, they are 3-12 uuf. The variable condenser used with L8 is ceramic and is 8-50 uuf.

T1- Transistor audio output, high-imp. winding to base of Q8.  
The vari-cap modulator is IR type 6.8 SC 20D from Fulton's.



## GRAB BAG

FOR SALE... FM RIGS: 2, 6 & 10 Meters....  
Send for complete listings to: Suffolk Radio Corp.  
17 Inwood Rd., Center moriches, NY, 11934

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William Tynan, W3KMV, 13620 Colefair Dr.,  
Silver Spring, Md. 20904

FOR SALE...2 MT. FM G.E. 50 watt Base Stn.  
on 146.94 with acces. \$75.00- WA8ARA- Marvin  
Hoekstra, 1146 Maryland, Grosse Pointe, Mich.

FOR SALE...A set of International Crystals for  
146.94. These are for Motorola T-43GGV or sim-  
ilar in F-609 holders. Trans 6122.5 kHz. type -  
DS-1, rec 26.988MHz type D-27. They are new.  
Russ Imburgia, W8SQY, 458 Justo Lane, Seven  
Hills, Ohio 44131

WANTED...Keyboard for Model 15 RTTY contact  
K8YCQ-Bill Chiaramonte, 12671 Filbert, Det., MI

WANTED...A fully transistorized two meter H/T  
similar to GE VC2 or VC3 or one of the small  
Motorola units. Write: Pat Devlin, WA5BPS at  
4817 E. 35th Court, Tulsa, OK. 74135

FOR SALE...450 MHz Dumont mobile- 12v. make  
offer to Ted Stahl, W8MO, 2134 Hawthorn Rd. in  
Grosse Pointe, Mich. 48236

FOR SALE...Motorola 5V on freq. 12v and ready  
to go. with acces. \$45.00 From K8IYZ-Glenn Pohl  
20245 Oakfield, Detroit, Mich. 48235

### CHRONICLES OF SEVEN-SIX cont.

No self-respecting amateur would infringe upon a fellow operator's secret remote-control frequency. Unfortunately, not all seven-sixers can be legitimately classified as self-respecting. There are those who try to keep abreast of all current remote facilities, secret control codes and signals, and private frequencies. Such individuals are equipped with direction-finding apparatus, multiband tunable receivers and transmitters, and extremely high fidelity tape recording and playback equipment.

When such a repeater-cheater homes in on a target, the only recourse for the victim is to either (a) change control codes, secret frequencies, or remote sites; or (b) arrive at a friendly and amicable settlement with the offending station. The former is usually the more practicable solution of the two.

So this is seven-six—treacherous, friendly, funny, wonderful seven-six. There were a couple of fellows down in Santa Ana who weren't quite as enchanted as they might have been, however; they were employed by the FCC, and they were just about ready to move.

NEXT MONTH: MR. SEVEN-SIX.

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